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PREFACE

Dear readers,

It is my pleasure to introduce you a collection of papers from the 12th annual international scientific conference The European Financial Systems 2015 organized annually by Department of Finance of the Faculty of Economics and Administration, Masaryk University in Brno, Czech Republic. This year's conference was focused especially on the current issues related to new regulation of financial markets, banks and insurance companies and their products and efficiency, different accounting and tax systems, corporate finance, public finance, financing of non-profit organizations and financial literacy.

Because the collection of papers presents the latest scientific knowledge in this area, I believe you will get a number of new insights usable both for your scientific, and educational or practical activities. I would also like to express my conviction that we meet each other in occasion of the 13th year of this conference held in 2016.

I wish you pleasant reading!

Petr Valouch

Chairman of the Program Committee

CONTENTS

Determining Boundaries of Using Gold as a Defensive Asset

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Abstract: *Gold plays special role on the financial market. It connected with its history and nowadays investors' attitude to the gold as a defensive asset. We have investigated conditions of being gold such asset with the help of the realized volatility theory and the CAPM model. Using statistical data from the Moscow Exchange, the IMF and other official sources we have found criteria of using gold as a defensive asset and analyzed key factors that influence gold price. We have made conclusions that gold has characteristics of defensive assets during the period under consideration; and the monetary indices of the USA economy influence gold price heavily.*

Keywords: gold, defensive asset

JEL codes: G11

1 Introduction

The role of gold in a modern world is changing. It connected with some world economic instability and use gold as a defensive asset by different kinds of investors and official monetary regulators as well. Gold can be used as a real asset and a financial one. Gold demand structure has differed from one that was ten years ago. In case of economic crises it would become one of the key instruments of saving money by all kinds of economic subjects.

In general, defensive assets are expected to provide return in any economic conditions. So, usually investors refer to defensive assets such ones as money in bank deposits, money in short-term money market securities, fixed interest investments, and others. Some researches refer to them such financial assets as reserve currencies and real assets as oil, gold, and real estate.

Does gold have characteristics of a defensive asset? There is a lot of evidence of using gold for hedging against risk by different kinds of investors. Factors that determine use gold in investors' portfolios connected with historical, political, and economical issues. From the economical point of view the key factor is return. To make an investor decision it is necessary to manage risk which is defined by volatility.

Usually volatility refers to the interpretation of unpredictable fluctuations in the values of a data series. As a rule, volatility could not be observed directly, and large variety of measurement methods is used. However a traditional concept of volatility does not totally reflect volatility of an asset and its Value-at-Risk. Recently, the approach of a realized volatility is getting more popular in investigation of finance issues. For the first time it was presented by Andersen and others (2003). This topic was developed by Andersen and Benzoni (2008). An important point in calculating the realized volatility is finding jumps which are characterized by abnormal fluctuations. The jump detection is used, for example, by Alexis (2014).

The role of defensive assets under uncertainty is observed by many economists (Apokin, 2013, Suetin, 2013). They prove advisability of investment in such assets as gold, oil, currencies, and real estate. There are strong links among return volatility of some assets (Gencer and Kilic, 2014).

Nowadays gold is getting more attractive for some kinds of investors and became an object of many research. World Gold Council provides investors with statistics and useful information about gold as an investment instrument. Numerous papers are devoted to the topical issues about investment process (Artigas et al, 2010, 2011, and 2015).

There are many investigations which use econometric analysis of factors that drive gold. R.Faff and al. (2010) defined conditional beta for gold for Australian and South African financial markets. Arayssi M. (2013) examined the relationship of gold price and S&P 500 and Dow indexes, various currencies and consumer price indexes. Fan W., Fang S. (2014) defined macroeconomics factors that influenced gold price.

In our investigation we have used the concept of realized volatility and the jumps detection to determine if gold is a defensive asset. For this purpose the CAPM model is used as well. Then we have observed some key factors influenced gold price and return with the help of correlation analysis.

2 Methodology and Data

Our investigation is devoted to the gold role on the financial markets. So, it is one of financial assets. To analyze gold as one of the assets in a portfolio we decided to consider a national financial market. So, the statistics were used from the Moscow Exchange. We examined the gold price and the RTS index for the period 1996 – 2014 of every day frequency. To observe factors that drive gold price we used the IMF statistics of money sector and some macroeconomics indices, Brent oil price and national equity indices. The statistics were used for such countries as the USA, the UK, Japan, China, and the Russian Federation. The total number of indicators was 33.

The first point of our analysis is connected with volatility assessment. To the purpose of our investigation we applied jumps detection to eliminate them before computing the realized volatility. We determined periods of time when jumps were observed and compared them with economic conditions in those periods. There are some approaches to price jump determining. In our research we implemented approach of Chan (2008). To register jumps we applied the threshold method after Truck et al. (2007) that detect jumps in case of exceeding the standard deviation three times in the month i.

Let's assume that P (t) – the spot price of gold at time t, is governed by the following price jump-diffusion process:

$$dP_t = \mu_t dt + \sigma_t dW_t + k_t dq_t \tag{1}$$

where μ_t is a drift term, σ_t is the local volatility and W_t is a standard Brownian motion, dq_t is a counting process with $dq_t=1$ that corresponding to a jump at the time t and zero otherwise, k_t is a parameter indicating the size of jump.

The continuous representation of the local volatility, so-called integrated variance (IV), is defined as:

$$IV = \int_{t-1}^{t} \sigma^2(s)ds \tag{2}$$

By the theory of quadratic variation in case of absence of jumps and as the time between two observations goes to zero, the realized volatility (RV) is an efficient estimator of integrated variance. For a period of T years of M, equally spaces intermonth returns (i=1…M), RV is expressed as:

$$RV_t = \sum_{i=1}^{M} r_{t,i}^2 \tag{3}$$

where $r_{t,i}$ is the return on gold, i.e. log-difference between two monthly price realizations i ($i=1,..12$) in year t.

To eliminate jumps we used approach implemented by Ullrich (2002).

In case of jumps are presented the realized volatility is calculated as:

$$\lim_{M \to \infty} RV = \int_{t-1}^{t} \sigma^2(s)ds + \sum_{i=1}^{N} k_{t,i}^2(s) \tag{4}$$

The meaning of the realized volatility for the period under consideration can be regarded as risk measurement. In case of standard deviation is not more than 1% we can make a conclusion that an asset has low risk and characteristics of a defensive asset.

The second point of our analysis is devoted to the gold beta computing. To determine an asset risk in a portfolio the CAPM model is used. In this model an expected return on an asset (R_i) depends on risk-free rate (R_{rf}), difference between expected return on market (R_m) and risk-free rate, and beta of the asset (β_i). If beta equal or close to zero, the asset has no relevant risk and its expected return equal risk-free rate.

The CAPM model is:

$$R_i = R_{rf} + \beta_i(R_m - R_{rf}) \tag{5}$$

where beta depends on correlation coefficient between market and asset ($\rho_{i,m}$), standard deviation of an asset (σ_i), and standard deviation of a market (σ_m):

$$\beta_i = \frac{\rho_{i,m}\sigma_i}{\sigma_m} \tag{6}$$

We assume that a defensive asset is an asset with beta equal or close to zero.

Finally, correlation analysis was applied in order to indicate the key factors that influence gold price and its return.

3 Results and Discussion

Firstly, we have analyzed standard deviation of gold during 1996–2014 (Figure 1). According to our calculation, standard volatility level was no more than 1% up to 2005. After 2005 the volatility is characterized by higher level than before, the highest value is observed in 2008.

Figure 1 Gold volatility 1996–2014
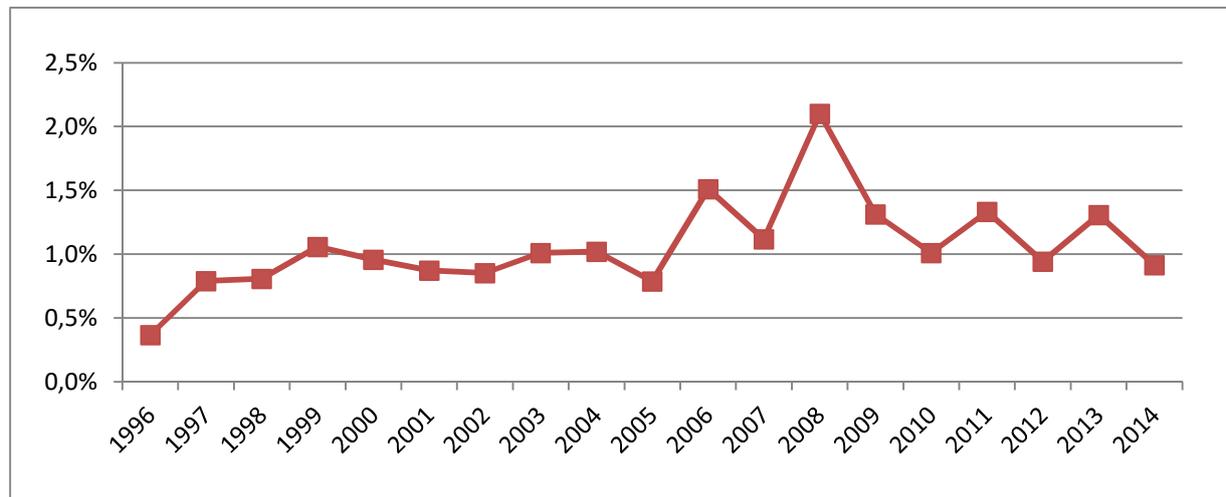
Source: Authors

Figure 2 shows daily average return rate of gold for the whole period under consideration. Positive daily average return is observed in the most of the time. It increases drastically after 2001. 2013 is the year of sharp decline of this indicator.

Figure 2 Gold daily average return 1996–2014
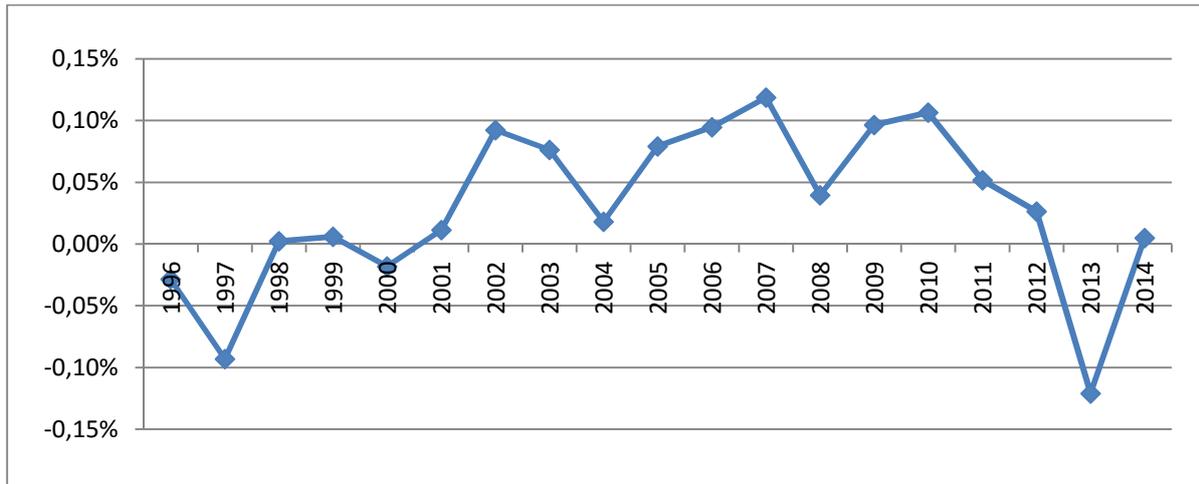
Source: Authors

To detect jumps we have used methods described earlier in our paper. So, based on jumps of the gold return calculated we can conclude that after 2006 the number of jumps and volatility of this asset increased. The highest intensity of the jumps was identified in 2008 (Figure 3). It is important that jumps of this year have "positive" effects what reflects higher level of return on gold than before. 2012 and 2013 are characterized by positive jumps as well.

Figure 3 Numbers and intensity of jumps
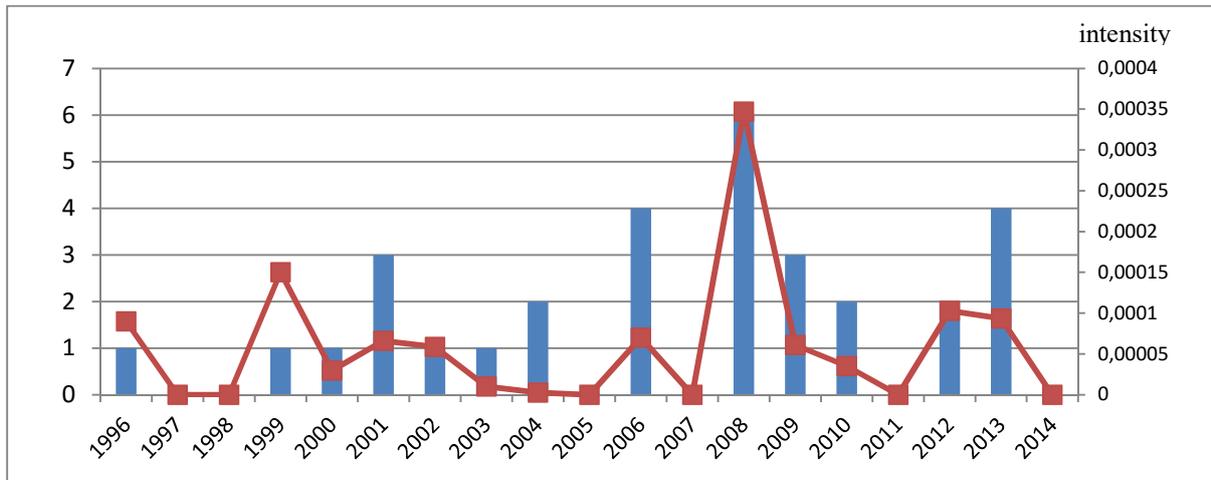
Source: Authors

Figure 4 shows the realized volatility for gold calculated after the jumps elimination. It lets us conclude that the realized volatility for gold is quite stable as its standard deviation is 0.82% (less than 1%). So, using the realized volatility as an instrument of risk estimation shows that gold has characteristics of a defensive asset.

Figure 4 Realized volatility for gold 1996–2014
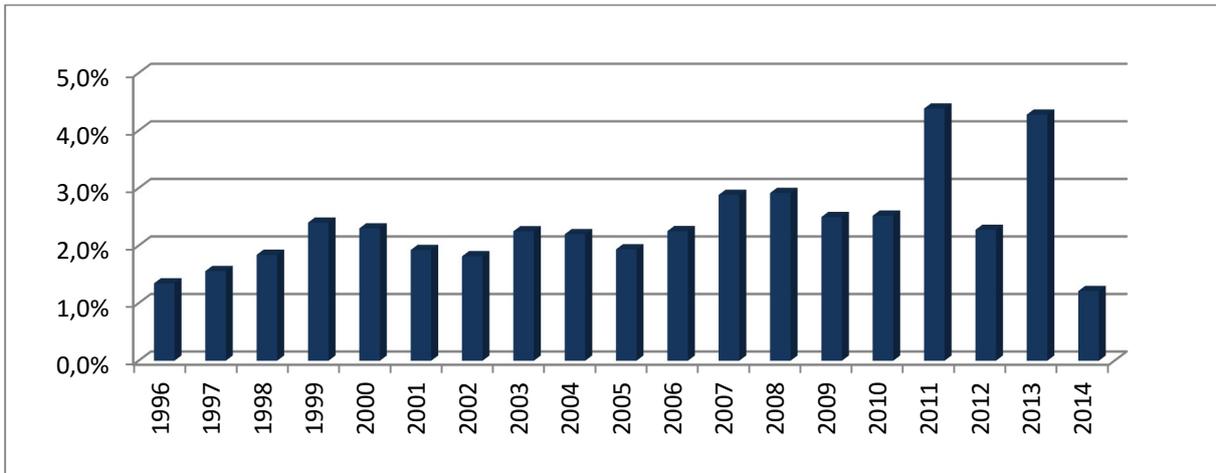
Source: Authors

Secondly, to prove the results that have got by the first method of the risk estimation we have used the CAPM model to assess beta for gold for 1996–2014. As Figure 5 shows, usually the beta is close to zero. Relatively high fluctuations are observed in 2007–2008 and 2011.

Figure 5 Beta for gold 1996–2014
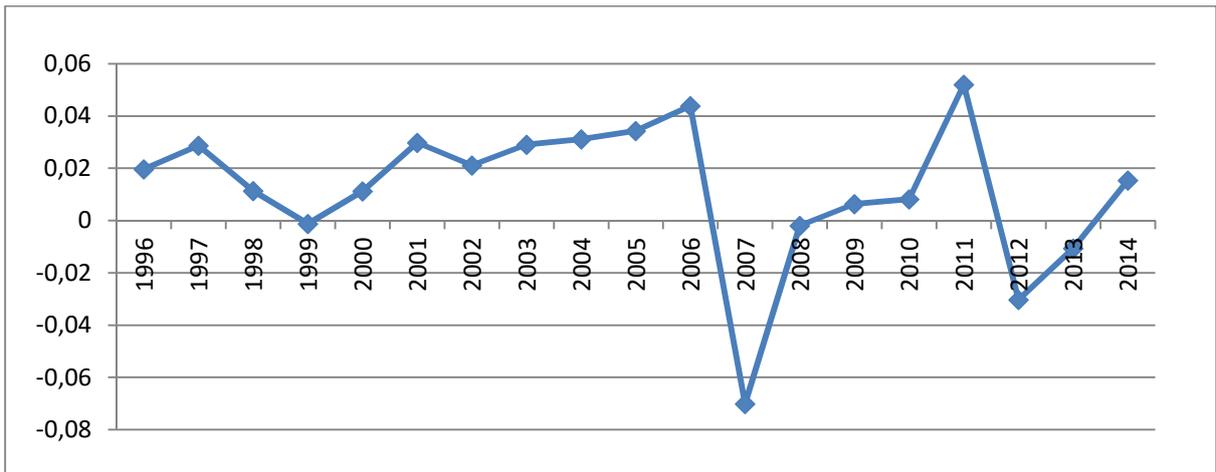
Source: Authors

The gold beta value is evidence of being gold a defensive asset in a portfolio. It has risk that is almost equal to the market risk because the beta has very low level. In the time of economic instability the gold beta has negative meaning that can be considered as reinforcement of its hedging functions.

Finally, we have analyzed some factors that drive gold. According to the World Gold Council papers (Artigas et al., 2010, 2011, 2015) there are key factors that influence gold price. They are as follows: currencies, inflation rates, interest rates, consumer spending and income growth, short term investment flows, etc. Using the IMF statistics and some other official data we applied correlation analysis to determine links between gold and the factors (Table 1).

The statistics include 33 indicators that contain monetary and macroeconomics indices, Brent oil price and national equity indices for five countries.

We have detected not correlated regressors. There is strong interdependence of interest rates in chosen countries that proves macroeconomic theory of approximately equal interest rates in economics of the same development level. GDP growth and equity

market indices depend on each other that explain links between these indicators as characteristic of high economic growth. So we have eliminated all correlated indicators and realized that the most important drivers influenced gold price are the monetary indicators for the USA economy.

Table 1 Correlation analysis for return on gold 1996 – 2014

	Confidence	P (t) value
US Dollar per SDR	**0.8317**	**0.000**
Ruble per SDR	-0.2668	0.526
Brent	0.1660	0.125
Official Gold Holdings, USA	-0.7452	0.499
Official Gold Holdings, Russian Federation	0.3552	0.419
Consumer Prices, USA	-0.6834	0.391
Consumer Prices, Japan	0.2725	0.981
Monetary Base, USA	**-0.9544**	**0.000**
Monetary Base, Russian Federation	-0.1432	0.068
Monetary Base to Broad Money, USA	0.0184	0.094
Interest Rates, USA	**-0.9717**	**0.000**
Interest Rates, China	-0.6450	0.297
GDP Growth, USA	0.0120	0.311

Source: Authors' calculations

4 Conclusions

To determine if gold can be regarded as a defensive asset, in our investigation two criteria were proposed. They are as follows: the realized volatility assessment and the gold beta as risk measure of an asset in a portfolio. They complement each other because they assume to analyze an asset as one of the financial instrument or an asset in an investment portfolio. We assume that an asset has a characteristic of a defensive one if standard deviation of realized volatility is less than 1%. It is necessary to take into consideration volatility jumps. In case of their positive effect the asset defensive characteristics become stronger. As for beta, the closer its meaning to zero is the more defensive an asset is.

Taken these criteria we cannot determine any boundaries of using gold as a defensive asset for the Russian financial market for the period under consideration (1996 – 2014). Gold has been used as a defensive asset during the whole period. Its defensive function was stronger during crisis 2008. The standard deviation of realized volatility did not exceed 1% and the gold beta fluctuated from 0.05 to -0.07.

This result can be regarded as peculiarity of the economy with emerging markets. In the 2000s the national stock market return was high, but in 2008 the equity indices fell down drastically. Negative gold beta does not mean investors' losses from the gold investments during the time before crises, but it is an indicator of some differences between the market return and the gold one.

We used correlation analysis to indicate the key drivers of gold price and its return. They are the American monetary indices such as the US dollar exchange rate, the US monetary base, and interest rates in the USA. Other countries' macroeconomics and monetary indices did not show any strong connection with the gold return. The reasons of it could be caused by historical and political issues.

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Evaluation of Investment Activity in the SR
through the Development of Gross Fixed Capital Formation

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Abstract: *Economic growth is a fundamental objective of economic policy of every developed market economy. Investments are the main source of it. That is why it is important to observe the development of investments, their structure and share on GDP. The aim of the article is to analyze the development of gross fixed capital formation (GFCF), to compare its level with EU - 28, as well as to present interdependence between GDP and GFCF. As statistical data reveal, the values of GFCF have increased from 2010, what indicates economic recovery. We confirmed strong dependence between GDP and GFCF by the performed correlation and regression analysis.*

Keywords: gross fixed capital formation, economic growth, gross domestic product

JEL codes: E 22

1 Introduction

Economic entities decide between current consumption and future consumption, i.e. savings in national economy of each country. Direction of the country will be largely influenced by the decisions on consumption and savings, which are related to investments. In the short term, a lack of investment opportunities can lead to a reduction in consumption and the overall reduction in investments. On the contrary, in the long term it is not possible to increase the amount of investments without the reduction of consumption and increase in savings rate in the previous period (Fulop et al., 2010; Rabatinová et al., 2014).

The accumulation of capital in the country is also one of the factors affecting the long-term economic growth. In order to create conditions for future growth of consumption and gross domestic product, saved resources must be invested in the country. The more you saved and invested, the growth will be higher, resulting in a higher capital formation.

Gross capital formation is the result of the interdependence between investments and savings in the economy. It is one of the components of gross domestic product (GDP) in the system of national accounts, and it consists of gross fixed capital formation and inventories.

This paper focuses on the issue of gross fixed capital formation. GFCF indicates the investment activities of the private and public sectors, whichare reflected in production.

It is possible to meet many definitions of this indicator. The article follows the definition of Statistical Office of the SR (SO SR), by which gross fixed capital formation is the acquisition of fixed capital assets, that means goods which are expected to be used in production for several years.

It is possible to acquire it in a form of a purchase of assets or the construction of these assets by producers for their own use. Share of GFCF in GDP is significant, because it is used for quantification of annual investment rate.

Our aim is to analyze the development of GFCF in the period 2006 – 2014 for the economy of SR total, according to sectors and economic activities. We chose the period with a view to elucidate the effects of the financial crisis from 2009. We compare the level of GFCF with EU – 28. Subsequently we present the interdependence between GDP and GFCF.

2 Methodology and Data

We used the statistical data by the elaboration of the proposed contribution from the portal of the Statistical Office of the Slovak Republic, as well as from the Eurostat database. To determine whether GFCF affects GDP, i.e. whether and how GDP changes by unit changes of GFCF in mil. EUR curr.pr., we used the method of correlation and regression analysis. The database used is shown in the table 1.

Table 1 Comparison of GFCF development with real GDP growth 2006–2014

Year	Real GDP growth (%)	Annual change of GFCF measured in constant prices 2005 (%)
2006	8.3	n.a.
2007	10.5	9.1
2008	5.8	0.9
2009	-4.9	-19.7
2010	4.4	6.5
2011	3.0	14.2
2012	1.8	-3.7
2013	0.9	-4.3
2014	2.4	5.7

Source: Own elaboration according to SO SR
Note: 2014 – Qualified forecast

3 Theoretical Background of the Solved Issue

Numerous research studies have shown that capital formation plays a crucial role in the models of economic growth (Beddies, 1999; Gbura and T.Hadjimichael, 1996; Gbura, 1997). This view called capital fundamentalism by Youopoulos and Nugent (1976) has been reflected in the macroeconomic performances of many countries.

New growth theories stress the importance of investments, human and physical capital in the long-run economic growth. The policies, which affect the level of growth and the investment efficiency determine the long-run economic growth.

Namely, the gross capital formation affects the economic growth either increasing the physical capital stock in domestic economy directly, Plossner (1992) or promoting the technology indirectly, Levine and Renelt (1992).

Many empirical studies carried out recently emphasized in diversified role of private and public investments in growth process. The public investments on infrastructure, in extent in which are proved to be complementary to the private investments, can increase the marginal product of the private capital, augmenting the growth rate of a domestic economy.

Khan and Kumar (1997) supported that the effects of private and public investments on economic growth differ significantly, with private investment to be more productive than public one. Knight, Loyaza and Villanueva (1993) and Nelson and Singh (1994) confirmed that public investments on infrastructure had an important positive effect on economic growth over the period 1980-1990. Easterly and Rebelo (1993) evaluated that public investments on transportation and communications are positively correlated to economic growth, while there were negative effects of public investments of state-owned businesses on economic growth.

However, it is clear that even mildly robust growth rates can be sustained over long periods only when countries are able to maintain capital formation at a sizeable proportion of GDP.

As Vidova (2004) shows in her study, high economic growth that Slovak economy received in the years 1995 – 1996 began soon to encounter obstacles and substantial

investments were required to maintain the momentum. Their soaring altogether with the combination of other factors caused the overheating of the economy in 1996. Investment rate was at the level of 40% for the economy of Slovakia during the period of the transformation process. Such a high level of investment rate that Slovak economy reached, is unusual in international comparison.

As the author also notes, to ensure the high rate of investment to bring only positive results for economic development, it must be accompanied by a corresponding level of domestic savings and efficient mechanism for allocation of investments. High investment rate can seriously undermine the macroeconomic balance of the economy when this condition for the maintaining of internal equilibrium is broken.

4 Development of Real GDP in the SR and EU before and after the Crisis

Examining the development of the real GDP of EU – 28 countries in the period 2006 – 2013 we can conclude, that a serious recession in the EU in 2009 was a consequence of the financial and economic crisis (similarly in Japan and the USA). It was followed by a recovery in 2010. Real GDP decreased in the EU- 28 by 4.4 %. There was an increase in GDP in constant prices by 2.0 % after the recovery in 2010 and another increase by 1.6 % was recorded in 2011. GDP decreased by 0.4 % in 2012 and it was quite stable in 2013 (it increased by 0.1 %) – see Figure 1.

There were big differences in the growth of GDP in member states of the EU – during the time and among the single countries. Overall performance of the economies of the member states decreased due to financial and economic crisis. The average annual growth rate amounted to 1.1 % from 2003 till 2013 in the case of EU – 28. Slovakia and Lithuania recorded the highest rate according to this measure (both countries 4.2 % a year).

Regarding Slovakia, global economic crisis reached Slovakia in the first year of declining phase of the economic cycle. That means that there would be a slowdown in economic growth of the SR in 2008 even without the effect of the global economic crisis. However, the crisis affected this decline due to the high openness of the economy, significantly.

Figure 1 Real GDP Growth, 2006–2014 (% change compared with the previous year)
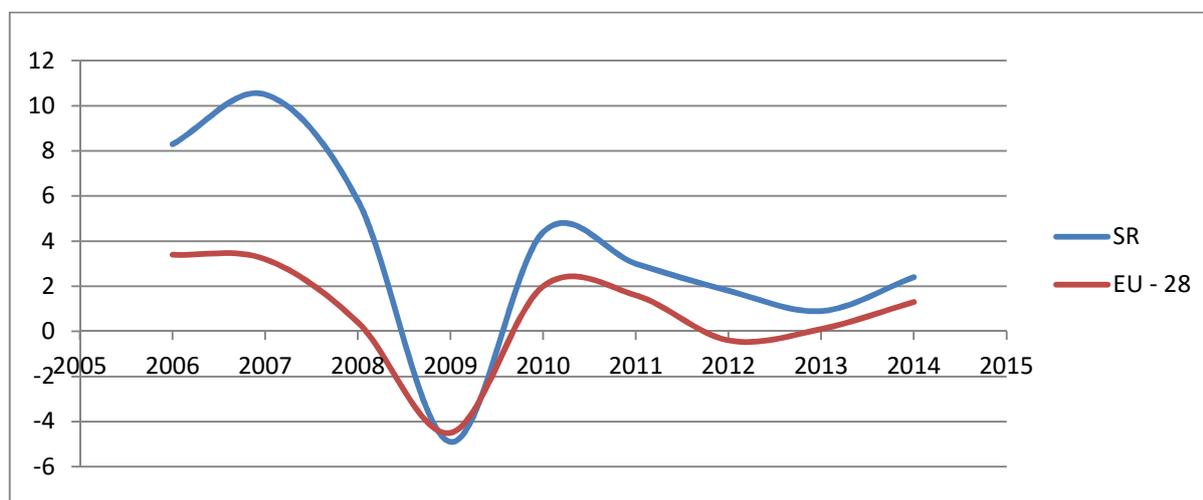
Source: Own elaboration according to Eurostat database
Note: 2014 – Qualified forecast

Domestic demand is the main engine of growth in terms of the structure of GDP (it is a common nomenclature for items household consumption and investments according to the SO of the SR).

5 Development of GFCF in the Period 2006–2013

As we mentioned in the theoretical background, the development of gross fixed capital formation should roughly correspond to the real growth of gross domestic product.

As shown in Table 1, in the period when Slovak economy overcomes its unequal status it is not like that.

In 2009, the creation of GFC actually fell by -19.7% while GDP fell by 4.9%. In 2010, GDP and GFCF recorded their growth of 4.4% respectively 6.5%. In 2011. this growth was 3.0% (GDP), resp.14,2% (GFCF). In 2012 GDP reached real growth of 1.8%, while FCF decreased by 3.7%. Similarly, in 2013 a GDP growth was 0.9% and a decrease in gross fixed capital formation by 4.3%.

Regarding the development of GFCF itself, by analysis according to sectors we monitor the highest formation of fixed capital in the sector of non financial corporations in the observed period (Figure 2). Participation of foreign capital is the reason of the highest formation of fixed capital in this sector.

The effect of the crisis was obvious for the sectors of financial and non financial corporations, sector of households was touched less and it was almost without a change for sector of public administration.

If we take into account the last year (2014), we can state that non financial corporations had a dominant position among the sectors because they invested 62.1 % of the total capital expenditures. Households accounted for a share of 20.5%, public administration for 15.6 % and financial corporations for 1.5%. The rest 0.2 % was accounted for investments of non – profit institutions serving households.

Fact, that almost all sectors evidenced growth in investment activity in 2014, sounds positively. Volume of investments increased by 3% in current prices (curr.pr.) in financial corporations, by 3.7% in non financial corporations, by 20.4 % in public administration and by 0.2% in households. The volume of investments remained at the same year on year level in non profit institutions serving households.

Figure 2 Gross fixed capital formation by sectors in mill. EUR at current prices
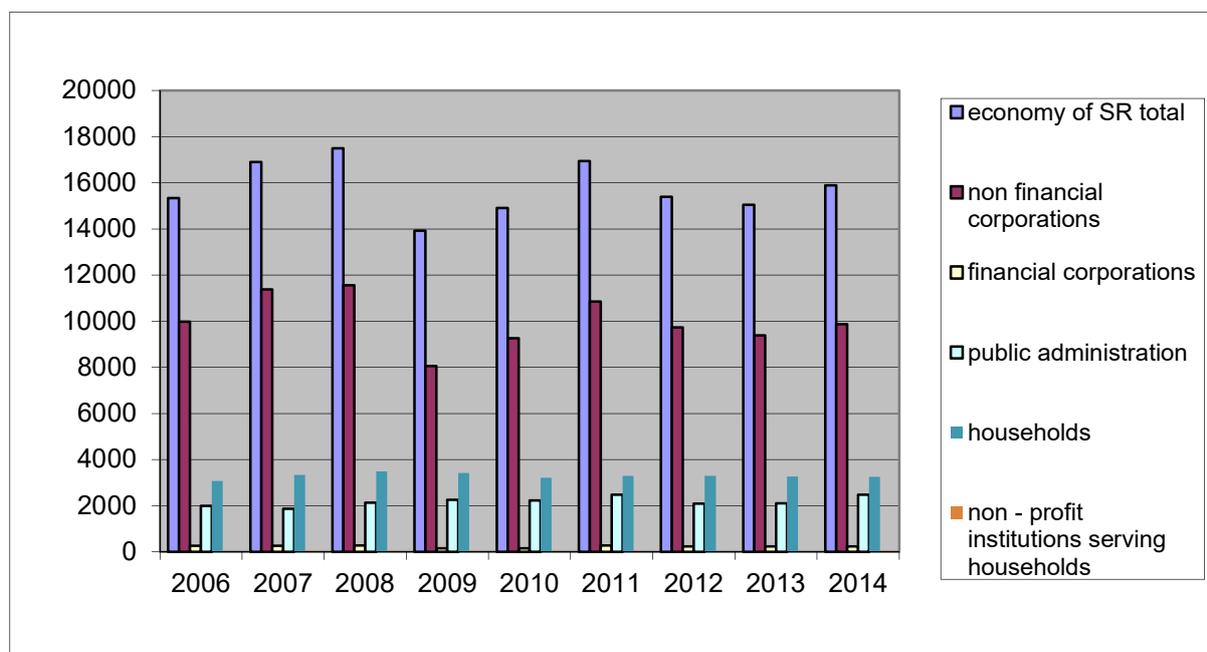
Source: Own elaboration according to SO SR
Note: ESA 2010 methodology, by quaterly national accounts

Main branches (according to economic activities) participated in GFCF in curr.pr. in 2013 and 2014 like this:

Table 2 Gross fixed capital formation by branches of NACE Rev. 2 in Mill. EUR at current prices, indices

Branch of activity	2013		2014	
	mil. EUR curr.pr.	Indices at curr.pr. sppy = 100)	mil. EUR curr.pr.	Indices at curr.pr. sppy = 100)
Economy in total:	15 045.39	97.7	15 893.11	105.6
A Agriculture, forestry and fishing	345.01	91.0	353.17	102.4
B Mining and quarrying	50.97	34.3	37.24	73.0
C Manufacturing	3 366.52	87.2	3 711.83	110.3
D Electricity, gas, steam and air – condition supply	1 183.17	67.9	1 283.84	108.5
E Water supply, sewerage, waste manag. and remediation	182.15	54.5	224.27	123.1
F Construction	296.65	108.7	313.92	105.8
G Wholesale and retail trade	746.41	85.1	781.67	104.7
H Transportation and storage	2 597.94	235.2	2 630.75	101.3
I Accomodation and food service activities	43.07	59.0	110.63	256.9
J Information and communication	557.46	85.0	582.58	104.5
K Financial and insurance activities	237.37	100.3	264.61	111.5
L Real estate activities	2 377.97	89.1	2 444.5	102.8
M Professional, scientific and technical activities	183.01	135.8	210.26	114.9
N Administrative and support service activities	580.87	108.5	587.07	101.1
O Public administration and defence; compulsory social security	1 642.07	103.4	1 686.86	102.7
P Education	262.62	97.3	262.82	100.1
Q Health and social work activities	243.56	73.1	252.05	103.5
R Arts, entertainment and recreation	126.44	82.7	131.73	104.2
S Other service activities	22.14	92.4	23.33	105.4

Source: Own elaboration according to SO SR

As shown in table 2, most funds for acquisition of GFCF were invested in manufacturing (23.3%). Share of investments in trasportation and storage was also significant (16.6%), as well as in real estate activities (15.4%).

Regarding the level of investment rate (in curr. pr.), it was declining from 2006 till 2009, namely from 26.5 % to 20.7% in 2009. In 2014, this item was at the value of 21.1 % in curr.pr; i.e. it has not reached the level before the crisis.

Table 3 Development of the investment rate in the SR

	reality								
	2006	2007	2008	2009	2010	2011	2012	2013	2014
Investment rate (curr.pr. in %)	26.5	26.2	24.8	20.7	21.0	23.1	21.5	20.4	21.1
Indices (sppy = 100)	99.9	98.8	94.7	83.6	101.4	109.8	93,3	94.8	103.4

Source: Own elaboration according to SO SR

There were large differences in the overall intensity of investment among EU Member States, what may partly reflect different stages of economic development, as well as the rate of growth in recent years. Share of GFCF in GDP was at the level of 17.3% in 2013 in EU – 28 (18.3 % in 2012) and 17.7% in eurozone (EU- 18). The vast majority of investments was for private sector. Investments of corporations and households created 16.0% of GDP in EU – 28 in 2012 compared with 2.3% in case of public sector investments.

5 Impact of GFCF on GDP

We investigate if there is an interdependence between GDP and GFCF in this part of paper. According to economic theory, we expect a positive impact of GFCF on GDP. It can be assumed that GFCF growth leads to GDP growth and vice versa.

Figure 3 depicts the development of GDP according to changes in GFCF.

Figure 3 Dependence of GDP by GFCF
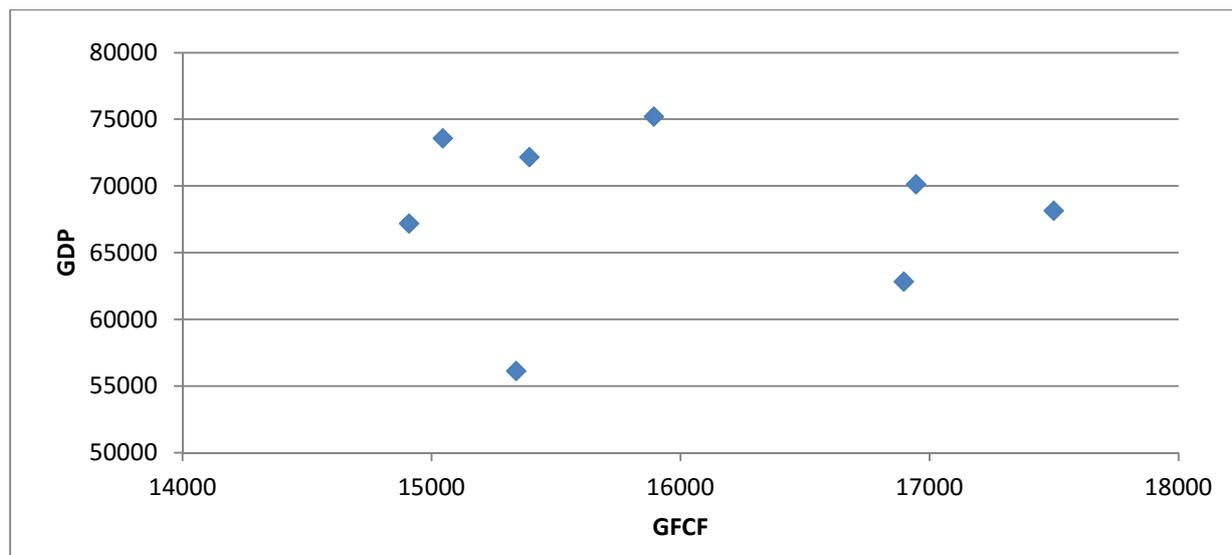
Source: Own elaboration

We realized correlation and regression analysis in MS Excel. When we compared all calculated models by the criteria (such as R Square, Significance F and p – values) we took an exponential function to be the most appropriate. Output summary from Excel is presented as Figure 4.

We found out that there is an interdependence between GDP and GFCF, while value Multiple R confirms high degree of tightness between these variables. Value R Square says that the chosen exponential function explains the variability of GDP to about 99 % level, other part presents unexplained variability. Overall F – test indicates, that model as a whole is statistically significant. Value of test statistics F significantly exceeds on the 5% significance level critical value ($9.86 \times 10^{-9} < 0{,}05$). However, statistical significance is not confirmed at this level for coefficient of variable GFCF (0.099>0.05).Therefore, the

assumption that GDPr=f(GFCFr),   i.e. GDP is only a function of GFCF, is very simplified. Anyway, a model confirmed logically expected impact of GFCF on GDP.

Figure 4 Summary Output

Regression Statistics	
Multiple R	0.998927
R Square	0.997856
Adjusted R Square	0.997141
Standard Error	321.8219
Observations	9

ANOVA

	df	SS	MS	F	Significance F
Regression	2	2.89E+08	1.45E+08	1395.9956	9.86086E-09
Residual	6	621415.8	103569.3		
Total	8	2.9E+08			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95,0%
Intercept	-66055	13783.37	-47.923	5.534E-09	-694279.349	-626826	-694279
THFK	-0.0371	0.099	-0.374	0.722	-0.280	0.206	-0.280
logY	150929.2	2872.018	52.552	3.186E-09	143901.637	157956.8	143901.6

Source: Own calculations in MS Excel

6 Conclusions

The paper presents an insight into investment activity in Slovakia through the development of GFCF indicator. Crisis has had an impact on its previously positive development. Though there was a regrowth in 2010 and 2011, next two years are connected with its decrease. There was an increase in investment activity in all sectors in 2014. Regarding the single sectors, nonfinancial corporations have had a dominant position in the observed period. Rate of investment had a negative development before the financial crisis, and its level is still not at the level before the crisis. Another observation is that the development of GFCF in the SR does not correspond to real GDP growth. This is in contrast with the theoretical knowledge as well as empirical studies, according to which even mildly robust growth rates can be sustained over long periods only when countries are able to maintain capital formation at a sizeable proportion of GDP. To identify significant relationships and connections of growth processes assumes to understand especially the nature of bondage between economic growth and investments. The applied model cannot be regarded as a complete one, ie, it cannot be argued that GDP is only a function of GFCF. Anyway, it is an appropriate device drawing a relationship with explaining variable, i.e. with GDP.

Acknowledgments

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Profitability versus Debt in Hospital Industry

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Abstract: *The paper examines the relationship between profitability of hospitals and their debt ratios. The main objective is to investigate, whether hospitals use debt as a source of funding, in the absence of sufficient profits from operating activities. Using statistical methods, we have proved a negative relationship between the profitability measured on many levels (ROA, EBIT margin, EBITDA margin) and hospitals' total debt ratio. On the other hand, we have found a positive relationship between the debt and profitability, taking into account only short-term and long-term loans and credit. That might suggest, that hospitals characterized by poor financial condition, try to finance their operating activities with payment obligations. Research sample includes financial data from over 333 hospitals in Poland, the Czech Republic, Slovakia and Hungary (the data comes from Amadeus and Emis databases). Research sample covers hospitals, having, at least an admission room and two hospital wards, with total assets and operating turnover above 1 mln EUR.*

Keywords: hospital, profitability, debt, financial management

JEL codes: I10, I11, L31, G30

1 Introduction

Hospitals are very specific units, that operate on the heavily regulated market. In most countries, there are two types of hospitals – profit and non-profit ones. As far as the purpose of the profit entities is to maximise profit, the question arises, what objectives non-profit hospitals pursue? Deneffe and Masson (2002) showed, that, in fact, those hospitals do not look for maximized profits. Regardless of the aims, profitability is still an essential assessment indicator, because it is a useful measure of management efficiency (Gavurová, 2012), (Michalski, 2015). A characteristic feature of the hospital industry is, that most of the revenue comes from public funds or from insurance companies. Most hospitals operate as non-profit institutions. These two characteristics affect the capital structure (Wedig et al., 1988), (Gavurová et al., 2013), (Michalski, 2014).

Generally, hospitals should finance their growth with debt or revenue from provided services. In fact, however, the sources are different in the case of public and private hospitals. In the absence of access to additional resources from the owners, hospitals must reach an external one – usually this is a debt (Gentry, 2002), (Michalski, 2009). Public hospitals generally acquire funds for investment from public bodies (government or local authorities). Hence, there are no incentives to accumulate profits, since possibilities

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of its utilizations are very limited (except of investments). On the other hand, the profitability of most public hospitals, in analysed countries, is low or very low, hand in hand with low financial liquidity (Prędkiewicz, Prędkiewicz and Węgrzyn, 2014), (Bem et al., 2014a), (Bem et al., 2014b), (Bem, Ucieklak-Jeż and Prędkiewicz, 2014), (Prędkiewicz et al., 2014), (Gavurová, Šoltés and Balloni, 2014), (Šoltés, and Gavurová 2014a), (Michalski, 2008b), (Raisova et al., 2014), (Szczygiel et al., 2015), (Hajdikova, Komarkova and Pirozek, 2014), (Bem and Michalski, 2014). This may suggest the need to finance operational activity with debts, which may significantly reduce profitability.

The size of a hospital positively or negatively affects the decisions regarding a new debt. Large hospitals have better access to the financial market and higher profitability ratios increase their chance to get a credit. Decisions concerning the level of debt are also affected by availability of public grants, which, usually, reduce the demand for external funds. Public hospitals are often supported by public donors, because their financial position is too weak to be attractive to potential creditors (Gentry, 2002), (Michalski, 2008a). On the other hand, McCue and Nayar (2009), did not confirm that non-profit hospitals (generally public) have higher levels of debt financing.

Ehreth (1994) stated, that both, the debt indicators (long term debt-to-net fixed assets), and profitability indicators (total margin), represent different aspects of the hospitals' efficiency. Literature provides limited and mixed evidence regarding the relationship between hospitals' profitability and debts. The level of financial leverage grows along with the demand for external funds – and so a high free cash flow, which is, among other things, the effect of high profitability, decreases the level of the financial leverage (Chung, Seung Na and Smith, 2013). Wedig (et al., 1988) showed, that hospitals which are generally remunerated on the basis of costs, have higher levels of financial leverage, due to lower profits. Valvona and Sloan (1988) proved, that private hospitals use the financial leverage to a greater extent than public hospitals, and are generally levered more than other industries.

Harrison and Sexton (2004) showed, that public hospitals, which are often involved in missions of providing significant scope of benefits to local communities, are more vulnerable to bankruptcy. It is also associated with their larger size and increased clinical complexity. Some research proved, that hospitals, which are more exposed to bankruptcy are less prone to take the debt on. Collapsing hospitals usually limit the debt, in order to be more attractive to potential investors (Landry and Landry, 2009). This would suggest the existence of a negative relationship between profitability and debt level.

Langland-Orban (et al., 1996) showed that hospitals with higher profitability have lower debt ratios. In the other study, Vogel et al., (1993) confirmed the link between the level of debt and the extraordinary profitability. Price et al. (2005) basing on the Financial Strength Index, claimed that hospitals characterised by high profitability and liquidity and low debt have exceptionally good financial condition. On the other hand, part of the research did not confirm, the relationship between their debt and profitability (Ngorsuraches and Sornlertlumvanich, 2006), (Šoltés, and Gavurová 2014b), (Michalski, 2010).

The aim of this research is to analyse the relationship between the profitability and the debt burden in hospital industry. Basing on literature's review and authors' previous research in the area of financial management (Bem, Ucieklak-Jeż & Prędkiewicz, 2014), (Bem et al., 2014a), (Bem et al., 2014b), (Bem & Michalski, 2014) we have formulated the following research hypotheses:

H1 hypothesis: *hospitals, which are characterized by lower profitability indicators have a higher level of debt;*

H2 hypothesis: *the level of debt is mostly affected by the level of operating margin.*

The H1 hypothesis refers to the assumption, that hospitals in a difficult financial situation, in particular with a negative profitability, reduce the level of debt. We have assumed that in the case of hospitals in the analysed countries, such a situation does not

occur, because the hospital care sector is dominated by the public ownership. A public owner usually tends to hold hospital's activity, and if it's necessary, supports them financially.

The H2 hypothesis assumes that the negative correlation is the strongest in the case of operating margin. Walker (1993) proved, that the operating margin is the only financial indicator, that separates the profitable and unprofitable hospitals. The operating margin better than ROA illustrate the ability to generate cash flow necessarily to sustain current activities. Because hospitals in the analysed countries generally finance investment activities with grants from public bodies (government, local government), they may be related with operating activities.

Research sample includes 333 Hospitals from the V4 Group (the Czech Republic, Hungary, Poland, Slovakia). The financial data came from the Amadeus database. The analysis has been conducted for the 2013 data. We've applied statistical methods (ANOVA, T-Student), using the Statistica 10 package.

2 Methodology and Data

In order to prove the hypotheses, we have created a database, consisting of financial data from 333 hospitals. The hospitals were collected by hand, to ensure the homogeneity of the sample. Financial data for the year 2013 have been obtained from Amadeus Database.

We've initially investigated 416 medical entities from the Czech Republic, Hungary, Poland and Slovakia. Some of the observations have been removed due to lack of all the required data. Entities, for which providing hospital services is not a primary activity, have also been excluded. We have decided to investigate only hospitals meeting the criterion of having an admission room, and at least 2 hospital wards, in order to exclude hospitals providing mainly "one day" surgical procedures, due to its special financial character. We also removed small entities with total assets and operating turnover below 1 million EUR.

The research sample includes: 94 Czech hospitals (36,7% of hospitals in the Czech Republic), 10 Hungarian hospitals (5,8% of hospitals in Hungary), 212 Polish hospitals (21,9% of hospitals in Poland), and 17 Slovak hospitals (12,1% of hospitals in Slovakia). The selected hospitals are both private and public, and operate in different legal forms. The sample includes also teaching hospitals. We have qualified to this study both public hospitals (owned by the government or local authorities or with a public majority shareholding) and private hospitals, regardless of the legal form of the activity. We removed outliners by removing top and bottom 5% values in each indicator.

In order to measure the level of profitability, we've decide to use several indicators:

- *ROA(b) (return on assets before taxes)*, described by formula: profit before taxes/total assets;
- *EBIT (operating margin)*, described by formula: (Revenue – Cost of Goods Sold – Operating Expenses)/Operating Turnover;
- *EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization margin)*, described by formula: [Revenue – Expenses (excluding: Interest, Taxes, Depreciation, Amortization)]/Operating Turnover.

The level of debt has been measured using the classic debt indicators:

- *Debt Ratio (DR)*, described by formula: total debt/total assets;
- *Loan Debt Ratio,* described by formula: ([(long-term + short-term loans and credit) / total assets].

In order to verify the hypotheses, we have analysed the linear relationship using the Pearson correlation coefficient. The Pearson correlation coefficient indicates both the direction and strength of relationship. Due to the strength that can sometimes be questionable, its significance has been tested using the test of the significance of correlation coefficients, assuming that the hypotheses are constructed as follows:

H0: the correlation coefficient is statistically insignificant,
H1: the correlation coefficient is statistically significant,
for which the testing statistic is:

$$t_e = \frac{r}{\sqrt{1-r^2}}\sqrt{n-2} \qquad (1)$$

that, assuming the validity of the H0 hypothesis, has T-Student's distribution with n-2 degrees of freedom.

The differences among means (average values) have been tested using ANOVA. The statistical significance of differences have been tested using the F-test. The analysis has been carried out using the Statistica 10 software.

3 Results and Discussion

The analysis of hospital's debt indicators has shown a slight variation in the level of the total debt to the total assets ratio. On average, hospitals in Slovakia and Hungary have higher debt, in relation to total asset - the situation of the hospitals of the Czech Republic and Poland seems to be much better in this respect. Taking into account only short-term and long-term loans and credit (excluding, for example, payment obligations) – LOAN_RATIO – we have been able to conclude, that hospitals in the Czech Republic and Slovakia, to a lesser extent, finance their activities with loans and credits. These sources of funding are mostly used by Polish and Hungarian hospitals (Table 1). In addition, we have found positive, statistically significant, relationship between the value of the debt indicators (DEBT_RATIO and LOAN_RATIO) (Table 3).

Table 1 Descriptive statistics for variables: DEBT_RATIO and LOAN_RATIO

	CZ	HU	PL	SK	total
DEBT_RATIO					
Min	9.1%	20.8%	10.6%	14.5%	9.1%
Max	102.4%	99.9%	98.8%	99.7%	102.4%
Mean	46.0%	66.6%	49.4%	57.9%	49.5%
St. deviation	27.59%	25.85%	22.02%	30.34%	24.93%
p-value	0.0613*				
LOAN_RATIO					
Min	0.0%	0.0%	0.0%	0.0%	0.0%
Max	47.9%	41.4%	47.2%	29.7%	47.9%
Mean	9.1%	14.7%	11.5%	4.9%	10.3%
St. deviation	10.46%	14.91%	12.83%	9.28%	12.03%
p-value	0.0852*				

* significance level α = 0.1, ** significance level α = 0.05 *** significance level α = 0.01

Source: Own study

Further statistical analysis has shown, that the differences in the level of debt indicators (DEBT_RATIO and LOAN_RATIO) - although rather small, are statistically significant (Table 1).

Table 2 Descriptive statistics for profitability indicators (ROA, mEBIT, mEBITDA)

	CZ	HU	PL	SK	total
			ROA (b)		
Min	-10.4%	-6.1%	-10.8%	-8.4%	-10.8%
Max	16.3%	7.7%	13.9%	10.4%	16.3%
Mean	1.2%	0.3%	1.4%	1.8%	1.3%
St. deviation	5.77%	4.82%	4.98%	4.67%	5.18%
p-value			0.9314		
			mEBIT		
Min	-11.3%	-5.1%	-12.1%	-5.2%	-12.1%
Max	15.3%	15.0%	16.3%	8.6%	16.3%
Mean	1.4%	1.0%	2.2%	2.3%	1.9%
St. deviation	6.77%	6.58	5.47%	6.77%	5.82%
p-value			0.7821		
			mEBITDA		
Min	-5.0%	-2.5%	-5.5%	-2.8%	-5.5%
Max	23.8%	17.6%	22.6%	20.2%	23.8%
Mean	6.5%	5.5%	7.7%	9.1%	7.3%
St. deviation	7.44%	6.58%	6.81%	6.31%	6.99%
p-value			0.4301		

* significance level α = 0.1, ** significance level α = 0.05 *** significance level α = 0.01

Source: Own study

Next, the value of profitability indicators – ROA(b); mEBIT; mEBITDA - have been analysed. In all the analysed countries, there are hospitals with negative profitability and the average level of profitability's indicators are very low (especially in the cases of ROA(b) and mEBIT). The values of mEBITDA have shown greater variations, among hospitals, in each country – the average and maximum values are much higher than for other profitability's indicators. Analysis using ANOVA has not demonstrated the existence of statistically significant differences among countries (Table 2). Between values of all the profitability's indicators (for the entire sample), a strong, statistically significant, positive relationship, have been observed (Table 3).

The principal stage of the study involved the analysis of a correlation coefficient between debt indicators of and profitability indicators. By examining the correlation we discovered certain negative relationship between the total debt (DEBT_RATIO) and the profitability of hospitals at each level (ROA(b), mEBIT, mEBITDA). The strength of this relationship is weak, and only in the case of ROA(b) – statistically significant. At the same time, at the level $\alpha = 0.01$, we have found a statistically significant, positive correlation between profitability and credits and loans' debt, described by the LOAN_RATIO (Table 3).

Table 3 Correlation coefficients for analysed variables

	DEBT RATIO	LOAN_RATIO	ROA(b)	mEBIT	mEBITDA
DEBT_RATIO	1	0.28***	-0.14*	-0.13	-0.10
LOAN_RATIO	0.28***	1	0.08	0.23***	0.25***
ROA(b)	-0.14*	0.08	1	0.83***	0.69***
mEBIT	-0.13	0.23***	0.83***	1	0.88***
mEBITDA	-0.1	0.25***	0.69***	0.88***	1

* significance level α = 0.1, ** significance level α = 0.05 *** significance level α = 0.01

Source: Own study

The results have been a little bit surprising, since we expected a clear correlation between indebtedness and profitability. In order to explain these uncertainties, we have

formulated ad hoc the H3 hypothesis, assuming that the debt may be the result of long-term loss of profitability.

To verify the new hypothesis, we have calculated the average ratio of profitability in the years 2011-2013. We have found, that the correlation between profitability and LOAN_RATIO is positive and statistically significant (p-value: 0,85% and 0,09%), while being statistically irrelevant for ROA(b).

In the case of the total debt ratio (DEBT_RATIO) we have demonstrated the existence of a negative, statistically significant, relationship. Thus we have shown that there is a clear correlation between the profit margins and the level of debt, which means the adoption of the H1 hypothesis.

These results have also allowed partial adoption of the hypothesis assuming the highest strength of relationship between the operating margin and debt (the H2 hypothesis) – results have shown that taking into account only the "loan and credit-debt" ratio (LOAN_RATIO), the strength of the relationship and EBITDA margin is the highest (0,25). On the other hand, in the case of the total debt ratio (DEBT_RATIO), the return on assets (ROA(b)) is more important (-0,27) (Table 4).

Table 4. Correlation coefficients for debt ratios (DEBT_RATIO, LOAN_RATIO) and profitability indicators for years 2011-2013 (Avg ROA(b); Avg mEBIT; Avg mEBITDA)

	Avg ROA(b)	Avg mEBIT	Avg mEBITDA
DEBT_RATIO	-0.27***	-0.18**	-0.18**
LOAN_RATIO	0.05	0.19**	0.25***

* significance level α = 0.1, ** significance level α = 0.05 *** significance level α = 0.01

Source: Own study

Our research has confirmed the existence of a clear, statistically significant, relationship between indicators of profitability and debt ratios. However, this relationship was revealed only, after the average values of profitability indicators for the period of 3 years had been examined. Identical results were obtained for longer periods of time (5-7 years) (not presented in this paper). The direction of this relationship is very important – in the case of the total debt ratio it is negative, in the case of the debt related to interest's payments - positive. We have also proved, that operating margins - especially mEBITDA is correlated with debt indicators. However, the strongest relationship has been reported for the return on assets and the total debt ratio.

Studies have confirmed the results of A. Landy and R. Landry (2009), who stated that hospitals in bad financial condition might limit the debt, however, the mechanism of this phenomenon have not been fully explored. We believe, that this is the result of difficulties in obtaining an external funding in any form, even a trade credit. Results have partly confirmed the observations of Langland-Orban et al., (1996) and Price et al., (2005), but only concerning the total debt.

4 Conclusions

The conclusion is that hospitals characterised by low profitability are more heavily indebted, than those having high profitability ratios. According to our observations, those entities probably try to finance its operational activity using trade creditors, due to potential problems associated with obtaining funding on the financial market. The increase of current liabilities, in the case of hospitals in poor condition, might be considered as a result of external sources of financing. It usually concerns accounts payables towards suppliers, employees and public institutions. Financial problems may translate into several problems in the economy – like, for example, the domino effect - and affect adversely enterprises which cooperate with hospitals (providers of medicines, medical materials, energy, water). In addition, in the case of bankruptcy or liquidation of the hospital, these companies have very little chance to be paid off.

Paradoxically, hospitals with better conditions have higher debt, defined as a sum of long-term and short-term loans and credit. It might suggests, that credits and loans are available only for hospitals, that are able to prove a good financial standing. The existence of such a relationship may suggest, that hospitals obtaining higher operational margins, can finance a broad-based investment activities from external resources including loans and credits. From a wider perspective it also enables the more efficient absorption of EU funds earmarked for the health care system.

From the point of view of financial management, the research has indicated a relevant relationship between profitability and debt. This is an important contribution to science, considering mixed evidence presented in the literature. It seems, that further studies should be carried out separately on two samples - covering public and private hospitals, whose debt decisions are influenced by different factors. The next issue is to determine the direction of the relationship between the debt and profitability. It is important whether the existing debt reduces profitability, or low profitability restricts the acquisition of external funding.

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Natural Disasters and their Impact on Long-term Growth

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Abstract: *Article deals by using empirical analysis with evaluation of the long-run relationship among the realization of natural disasters and with economic growth in selected countries. According to the research results Skidmore & Toya (2002) there is a correlation between higher frequency of natural disasters and higher rate of accumulation of human capital, which ultimately leads to the increase in total factor productivity and therefore economic growth, but mostly only in the long term. The effect of disasters by time we can divide into short and long term, this article will focus on the impact only of second group of this effects. The article aims to confirm or refute the claim that there is a correlation between the implementation of natural disasters and economic growth. According to the results of analyses dependencies between the implementation of natural disasters and economic growth in Czech Republic. Dealing with the consequences of natural disasters implementation is influenced by many different factors, one of which is its dependence on the use of the model covering the aftermath of disasters, which in its form varies by individual national legislations. In Europe, there are several basic models addressing the consequences of the implementation of catastrophic risks. Article will focus on some of them.*

Keywords: catastrophic risk, economic growth, natural disaster

JEL codes: D81, O11, O47, Q54

1 Introduction

To maintain financial health and development of each country is also important optimally configured model solution implementation risks of catastrophic range (Kubová & Mužáková, 2014). In the world there are many of models dealing with damage caused by the natural hazards realization. Each of these models ultimately affect the maintaining the financial health of the country Mužáková (2014) in which the risk of catastrophic impacts implemented. The main hypothesis of this paper is that is dependence between realizations catastrophic risks and long-term growth in the Czech Republic for the period 2006-2014.

The aim of this article is to identify and assess the relationship between two factors – catastrophic risk and long-term growth. To understand this issue is also important single definition of "disaster/catastrophe" – this issue will focus attention on the first part of the article. Most insurers based on the definition of disaster/catastrophe by Swiss reinsurance SwissRe that this definition specifies every year. Disaster/catastrophe, according to the causes can be divided into man-made disasters and natural catastrophes. In the article, attention will be paid only the impacts of natural hazards. Second part of this paper consists of verifying and testing the strength of mutual relationships between realization of catastrophic risks and long-term growth. The paper will show the results for selected sample of countries, analyse it, and confirm or reject the hypothesis about the significant linkages of realization of catastrophic risks and long-term growth.

2 Methodology and Data

In the following part will be characterized data for analysis and research methods. For data analysis is important not only to the definition of catastrophic risks (natural or man-made), but also which data are calculated within the framework of catastrophic risks.

In the research were particular used scientific methods: induction, deduction, comparative analysis and synthesis of partial knowledge, SwissRe and other important resources. Due to the nature of the article was used secondary data taken from SwissRe, Czech Insurance Association and Czech Statistical Office (2015).

Definition and Categorize of Catastrophic Risks

Natural catastrophes/disasters is caused by natural forces, the definition by SwissRe is (SwissRe 2014): "The term 'natural catastrophe' refers to an event caused by natural forces. Such an event generally results in a large number of individual losses involving many insurance policies. The scale of the losses resulting from a catastrophe depends not only on the severity of the natural forces concerned, but also on man-made factors, such as building design or the efficiency of disaster control in the afflicted region. In this sigma study, natural catastrophes are subdivided into the following categories: floods, storms, earthquakes, droughts/forest fires/heat waves, cold waves/frost, hail, tsunamis, and other natural catastrophes."

According to the Koukal & Pošmourný (2005), most natural disasters are caused by four main causes, such as rapid mass movements (landslides, avalanches), releasing the energy of the earth (earthquakes, volcanic activity), increased water levels (floods, tsunamis) and balancing the temperature differences in the atmosphere (cyclones, hurricanes). In addition, the rise and fall of the disaster extra-terrestrial body, the cause of which is therefore in the cosmos.

Categorize disasters summarized in his article Lahnstein (2005). At first divided the risks into four basic categories: natural hazards; technological risks, including the risks of infrastructure (transport by road, rail or air); social and political risks; purely financial risks. Then also divided the damage into four categories, as follows: the damage to the environment; damage to health; damage to property; purely economic losses. Also distinguished and length of scenarios: short period (industrial accidents, terrorism, etc.); long term (soil and water pollution, climate change, etc.).

There are combinations and fluid transitions: accidents, events arising in the short term, can result in long-term damage, almost unlimited in the case of nuclear accidents, for example. A large number of individual accidents – such as leaks in industrial plants – can be seen as the result of one continued risk operation. The causes of an industrial fire may be specific to that industry, but they may also be sabotage or terrorism.

The analysis will include natural disasters, regardless of the categorization of damage that caused and regardless of the length scenarios.

SwissRe determines each year the lower limit beyond which it is a disaster. SwissRe (2014) changes in the amount caused by the fact that each year these criteria adapted to inflation. Below (see in Table 1) is shown the development these criteria over the past five years. Criteria include amount of: insured loss in mil USD (total damage, marine accidents, aviation accidents, other events) and number of damaged people (death or disappearance, injured, homeless).

Table 1 Development of criterion of disaster by SwissRe

Insured loss in mil USD	Year				
	2010	**2011**	**2012**	**2013**	**2014**
Total damage	86.5	89.2	91.1	96.0	97.6
Marine accidents	17.4	18.0	18.3	19.3	19.6
Aviation	34.8	35.9	36.7	38.6	39.3
Other events	43.3	44.6	45.5	48.0	48.8
Number of damaged people	Year				
	2010	**2011**	**2012**	**2013**	**2014**
Death or disappearance	20	20	20	20	20
Injured	50	50	50	50	50
Homeless	2000	2000	2000	2000	2000

Source: Own elaboration from (SwissRe, 2011–2014)

Natural Disasters in Czech Republic

Among the risks that the Czech Republic is one of the most endangered risks: floods and flooding, heavy snow and windstorm and hailstorms.

Basic analysis of the number of claims and amount of damages in natural hazard insurance for the last nine years for members of the Czech Insurance Association (CIA) in the Czech Republic in Table 2.

The above data for the last nine years shows that the greatest damage occurred in 2010, the largest share of these damages should damage from flooding. The most significant natural disaster in the Czech Republic and the associated burden of claims is:

- 1997 − floods in Moravia (paid CZK 9.7 billion);
- 2002 − floods in Bohemia (paid CZK 33 billion);
- 2006 − heavy snow (shame CZK 2.5 billion), 100-year water (paid CZK 1.1 billion);
- 2007 − orcan Kyrill (paid CZK 2.25 billion);
- 2008 − windstorm Emma (total damage CZK 1.24 billion);
- 2009 − floods in the Opava, Olomouc and South Bohemia (the amount of damage CZK. 1.8 billion);
- 2010 − snow calamity Daisy (the amount of damage CZK 1.1 billion), floods in Moravia and Northern Bohemia (the amount of damage CZK 3.7 billion), hail in Prague (the amount of damage CZK 2.6 billion).
- 2013 − floods (paid CZK 7.4 billion); orcan Xaver (payout of CZK 8.6 billion).

If we look at the criteria of the disaster SwissRe (see Table 1), and these levels compare with the data mentioned above - the list of natural disasters in the Czech Republic, it is obvious that all events meet the criteria disasters. For simplicity, we analysis based on the data in Table 2.

Methods

To choose an appropriate model for the regression analysis must be performed elementary statistical analysis of analyzed two variables: amount of damages and GDP at purchaser prices.

For elementary statistical analysis was used the following five indicators (Hindls, et al, 2000).

the first difference (absolute gain, $_1\Delta_t$), the second difference

$$_2\Delta_t = {_1}\Delta_t - {_1}\Delta_{t-1} \tag{1}$$

the growth coefficient

$$k_t = \frac{y_t}{y_{t-1}} \tag{2}$$

the growth rate

$$\delta_{y_t} = T_{y_t} - 100 \tag{3}$$

the increase rate

$$T_{y_t} = k_t \cdot 100 \tag{4}$$

For regression analysis will be used software STATGRAPHICS Centurion XVI. According to the results of an elementary statistical analysis will be chosen a suitable model for regression analysis. The results of correlation models will be evaluated based on their individual indices:

- p-value (of parameters and model) of significance, according to which the robustness of a particular model is evaluated at the 5% significance level;
- R-squared (adjusted for d.f.),
- F-ratio of model.

<div align="center">Table 2 Natural Disasters in Czech Republic</div>

Indicator	2006		2007		2008	
	Number of claims (pc)	The amount of damage (in thousands CZK)	Number of claims (pc)	The amount of damage (in thousands CZK)	Number of claims (pc)	The amount of damage (in thousands CZK)
Damages caused by weight of snow	68 690	2 564 492	1 677	20 603	866	12 201
Damages caused by floods	31 262	1 340 848	12 121	386 892	17 948	168 523
Damage caused by gales and hail storms	17 990	685 606	108 024	3 134 566	89 526	2 755 318
Sum	117 942	4 590 946	121 822	3 542 061	108 340	2 936 042
Other damages	1 733	10 857	33 740	33 589	0	0
Sum of CIA	**119 675**	**4 601 803**	**155 562**	**3 575 650**	**108 340**	**2 936 042**

Indicator	2009		2010		2011	
	Number of claims (pc)	The amount of damage (in thousands CZK)	Number of claims (pc)	The amount of damage (in thousands CZK)	Number of claims (pc)	The amount of damage (in thousands CZK)
Damages caused by weight of snow	17 183	309 790	55 417	1 212 759	12 145	271 774
Damages caused by floods	25 010	1 508 902	38 367	3 994 437	10 405	336 827
Damage caused by gales and hail storms	35 375	1 936 736	52 097	2 706 853	22 826	1 045 302
Sum	77 568	3 755 428	145 881	7 914 049	45 376	1 653 903
Other damages	834	53 697	1 037	15 489	0	0
Sum of CIA	**78 402**	**3 809 125**	**146 918**	**7 929 538**	**45 376**	**1 653 903**

Indicator	2012		2013		2014 [1]	
	Number of claims (pc)	The amount of damage (in thousands CZK)	Number of claims (pc)	The amount of damage (in thousands CZK)	Number of claims (pc)	The amount of damage (in thousands CZK)
Damages caused by weight of snow	8 250	148 399	7 744	124 402	270	4 165
Damages caused by floods	9 938	353 794	47 041	7 457 780	9 859	873 696
Damage caused by gales and hail storms	33 828	1 740 007	37 400	1 733 727	17 815	817 212
Sum	52 016	2 242 200	92 185	9 315 909	27 944	1 695 073
Other damages	0	0	0	0	0	0
Sum of CIA	**52 016**	**2 242 200**	**92 185**	**9 315 909**	**27 944**	**1 695 073**

1) Data from Czech Insurance Asscociation (CIA), condition only for the period 1-9/2014.

<div align="center">Source: Own elaboration from (CIA, 2007–2014)</div>

3 Results and Discussion

The results of elementary statistical analysis of development of amount of damages are given below, the basic characteristics of the data illustrated in Table 3 and in Figure 1.

Table 3 Elementary Characteristic Development of Amount of Damages in Czech Republic

Year (*t*)	Development of amount of damages, thousands of CZK (*y_t*)	$_1\Delta_t$	$_2\Delta_t$	k_t	T_{yt}	δ_{yt}
2006	4 601 803	×	×	×	×	×
2007	3 575 650	-1 026 153	×	0.78	77.70	-22.30
2008	2 936 042	-639 608	386 545	0.82	82.11	-17.89
2009	3 809 125	873 083	1 512 691	1.30	129.74	29.74
2010	7 929 538	4 120 413	3 247 330	2.08	208.17	108.17
2011	1 653 903	-6 275 635	-10 396 048	0.21	20.86	-79.14
2012	2 242 200	588 297	6 863 932	1.36	135.57	35.57
2013	9 315 909	7 073 709	6 485 412	4.15	415.48	315.48
2014	1 695 073	-7 620 836	-14 694 545	0.18	18.20	-81.80

Source: Own elaboration

Figure 1 Development of Amount of Damages (in thousands CZK)
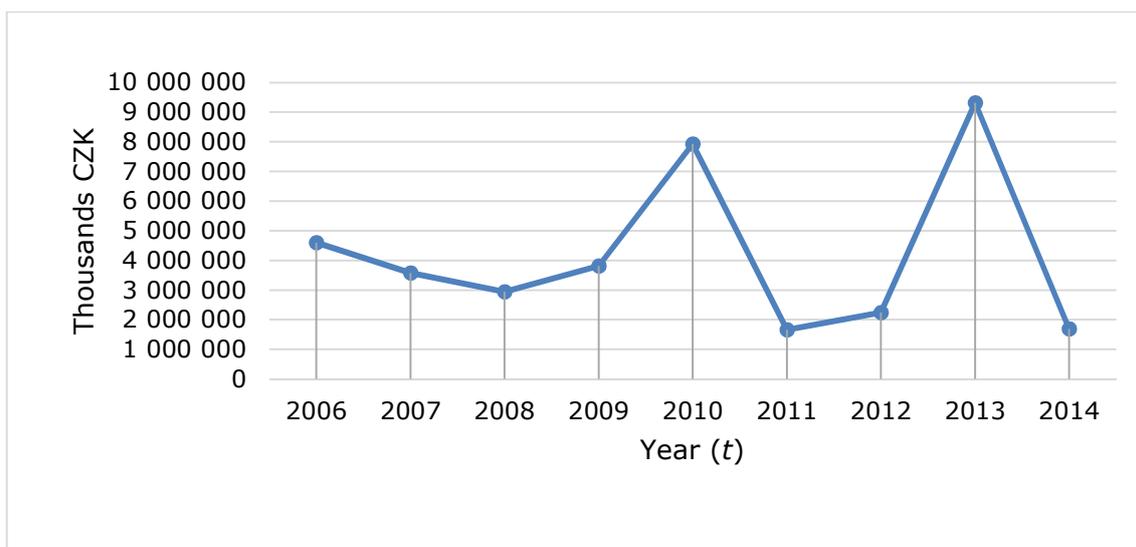
Source: Own elaboration from Table 3

According to the results given in Figure 1 it is clear that the development of the reference indicators volatile. Not predict whether it would be possible to say that this is a cyclical trend, since the time series is short.

For regression analysis will be used sum of amount of damage. Data for long-term growth was taken from the Czech Statistical Office. The results of elementary statistical analysis are shown in Table 4 and Figure 2.

Table 4 Elementary Characteristic Development of GDP at Purchaser Prices in Czech Republic

Year (*t*)	GDP at purchaser prices, billions of CZK (y_t)	$_1\Delta_t$	$_2\Delta_t$	k_t	T_{yt}	δ_{yt}
2006	3 507 131	×	×	×	×	×
2007	3 831 819	324 688	×	1.09	109.26	9.26
2008	4 015 346	183 527	-141 161	1.05	104.79	4.79
2009	3 921 827	-93 519	-277 046	0.98	97.67	-2.33
2010	3 953 651	31 824	125 343	1.01	100.81	0.81
2011	4 022 410	68 759	36 935	1.02	101.74	1.74
2012	4 047 675	25 265	-43 494	1.01	100.63	0.63
2013	4 086 260	38 585	13 320	1.01	100.95	0.95
2014	4 266 141	179 881	141 296	1.04	104.40	4.40

Source: Own elaboration

Figure 2 shown development of GDP at purchaser prices during the reporting period. This figure shows that in the first three years monitored indicator showed an upward trend, then in 2009 followed by a decline in the coming years and grow again.

The results of an elementary statistical analysis of the analysed indicators – amount of damages and GDP at purchaser prices – can be say hypothesis that the indicators examined are independent. However, this hypothesis is necessary to confirm or refute it using regression analysis, the results of which are shown below.

For regression analysis was used software STATGRAPHICS Centurion. According to the character of examined variables (see results above) was chosen polynomial regression, where the dependent variable was GDP at Purchaser prices and the independent variable of amount of damages. Polynomial regression results illustrate Tables 5 and 6 and in Figure 3.

Polynomial Regression is characterized (5):

$$\hat{y}_t = \beta_0 + \beta_1 t + \beta_2 t^2 \tag{5}$$

Figure 2 Development of GDP at Purchaser Prices (in thousands CZK)
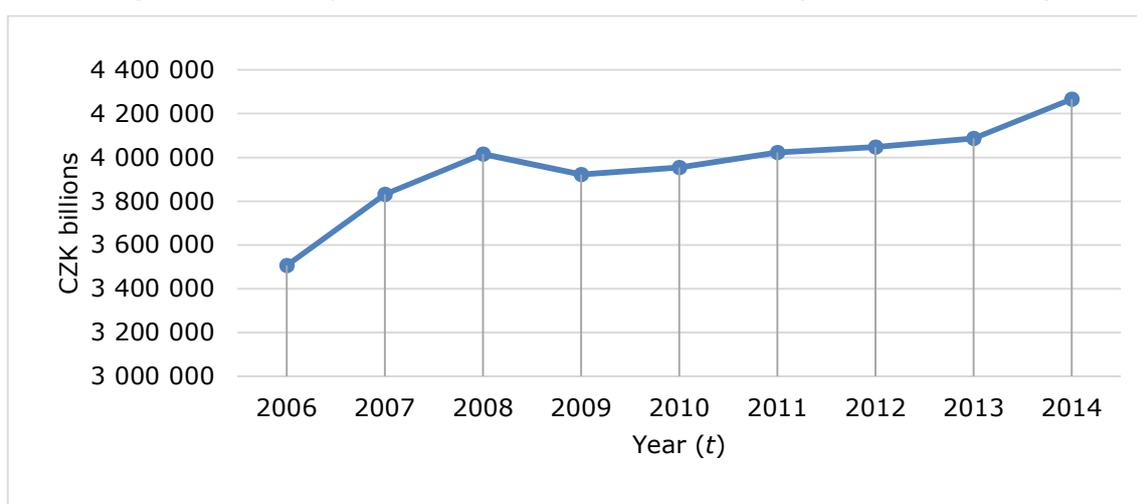
Source: Own elaboration from Table 4

Table 5 Polynomial Regression – analysis of variance of parameters

Parameter	Estimate	Standard Error	T Statistic	P-Value
CONSTANT	4.65809E6	212893	21.88	0.0000
Col_2	-0.34194	0.099829	-3.42525	0.0141
Col_2^2	3.05479E-8	9.05232E-9	3.37459	**0.0150**

Source: Own elaboration

Table 6 Polynomial Regression – analysis of variance of model

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	2.29802E11	2	1.14901E11	5.87	**0.0387**
Residual	1.17508E11	6	1.95847E10		
Total (Corr.)	3.4731E11	8			

Source: Own elaboration

Other results of polynomial regression analysis are:

- R-squared = 66.1663 percent;
- R-squared (adjusted for d.f.) = **54.8884** percent;
- standard Error of Est. = 139945;
- mean absolute error = 92334.7;
- Durbin-Watson statistic = 1.4121 (P=0.1364);
- lag 1 residual autocorrelation = 0.0373825.

According to the above results, it is clear that among the examined variables there is little dependence. These results are also influenced by the fact that, thanks to the absence of data was analysed nine year time series.

Further analysis options depending realization catastrophic risks and their impact on our longterm growth is the use of methods published Skidmore and Toya (2002). To explore the dependence of these variables is not possible, due to lack of data necessary for analysis according to this method, to perform. It is interesting that these authors demonstrated correlation between the implementation of disaster risks and long-term growth, which is different from the above results, when this dependence between examined indicators for the examined period in the Czech Republic could not be proved.

Figure 3 Development of GDP at Purchaser Prices (in thousands CZK)
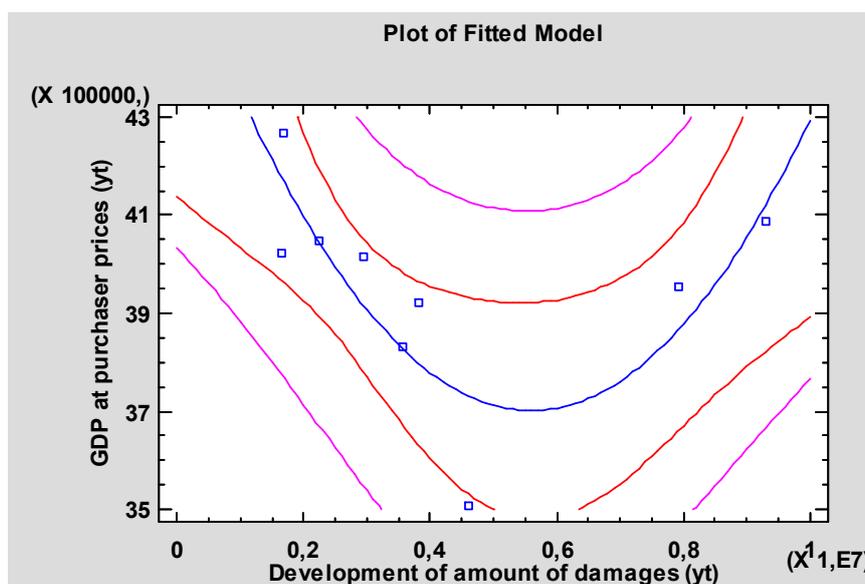
Source: Own elaboration

4 Conclusions

The aim of the paper was to confirm or disprove the hypothesis about the dependence of catastrophic risk and long-term growth. It is possible to conclude form the results achieved in the paper that between realization of catastrophic risk and long-term growth in years 2006-2014 in the Czech Republic there is very little dependence so insignificant that it can be stated that between the limits of these indicators over the period in the Czech Republic is no dependency. The topic is so timely and important, that we need to deal with further on, not only with regard to the recommendations issued by the European Commission – Green Paper on Insurance against natural and man-made disasters, published in 2013. Further research should focus on the impact realization of disasters on economic growth of countries using analysis of selected indicators (not only macroeconomic).

Acknowledgments

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Global Economy, Monetary Policies and their Impact on Financial Markets

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Abstract: *The Global Economic and Financial Crisis led central banks in advanced economies to adopt a variety of standard and non-standard measures to ease monetary conditions. In the US, the UK, and Japan the centerpiece of these non-standard measures has been large-scale purchases of financial assets, also known as quantitative easing (QE). Purchases of financial assets financed by central bank money increase liquidity and push up asset prices, as those who have sold assets to the central bank rebalance their portfolios into riskier assets. This, then, stimulates expenditure by increasing wealth and lowering borrowing costs for households and companies. The sharply appreciation process of US dollar against euro and other currencies, has an implication on asset allocation, GDP growth, international business flow and profit distribution. The paper deals with the analyses and influence of applied monetary policies to global economy development, asset prices and reallocation trends, the currency movements and predictions. The aim of the paper is to point out to different aspects of applied monetary policies with description of positive and negative trends on economies, investors and asset prices.*

Keywords: monetary policy, quantitative easing, market volatility, currency movements, asset reallocation, institutional investors

JEL codes: G11, G15, F30

1 Introduction

More than six years after the onset of the financial and economic crisis, a return to the pre-crisis growth path remains elusive for a majority of countries. In most advanced economies, potential growth has been revised down and, in some cases, there are growing concerns that persistently weak demand is pulling potential growth down further, resulting in a protracted period of stagnation. Risks of persisted stagnation concern mainly the euro area and Japan, but many of the underlying challenges such as slowing productivity, high long-term unemployment and falling labour force participation are common to other advanced economies. In major emerging market economies, growth has become far less impressive in the last two years, owing to a varying extent to infrastructure bottlenecks, financial sector vulnerabilities and resource misallocation (Mann, Catherine L., 2015). The slowdown has been particularly sharp in countries most exposed to commodity price developments.

International financial markets have been under the spell of monetary policy, showing a keen sensitivity to the impact of monetary policies, actual or expected. The source of that trend originates from the conventional and unconventional monetary policies adopted by the major advanced economies since 2008. Policy rates have remained at very low levels for an unprecedentedly long time; long-term interest rates have fallen to historical lows; credit spreads have been compressed across asset classes, including emerging market economies' (EMEs') debt securities and high-yield corporate bonds.

This has led to a dramatic increase in global liquidity and, in the context of uncertain growth prospects for advanced economies, to large capital inflows to EMEs. The composition of these flows has seen a decline in bank lending and an increase in portfolio flows, which tend to be more volatile. Large capital inflows may feed credit and asset price bubbles across majority of economies. Moreover, by causing the exchange rate to appreciate, inflows may create external imbalances. Contrasting the impact of such

inflows may be costly and not necessarily effective. However, these trends can be quickly reversed if markets become convinced that a change in the monetary policy stance of major countries is imminent.

2 Methodology and Data

In a first part we look deeper at the global economy outlook and analyzing the major trend in monetary policies, currency and financial markets. We used primarily the data and studies published by OECD, Bank for International Settlement and Eurostat.

Global asset allocation decisions were the subject to several economist and research papers. Feroli, Kashyap, Schoeneholz, Shin (2014) find out, that in recent years, the wealth intermediated by asset managers has risen considerably. Strong fluctuations in international portfolio flows over the same period have raised concerns about potential contagion and amplification effects due to the behaviour of fund investors and asset managers in response to shocks (Jotikasthira, Lundblad, and Ramadorai, 2012; Raddatz Schmukler, Williams 2012). Such movements in international portfolio flows have often been attributed to the policy actions by major central banks during the recent financial crisis. More specially, U.S. monetary policy has been argued to have contributed to swings in international portfolio flows and to act as a global push factor (Fratzscher, Lo Duca, and Straub, 2013) for capital flows. Another line of argument is that the low interest rate environment (post-crisis) has contributed to a search for yield indexed income markets (Stein, 2013).

Further we analyzed the QE policy effect on asset allocation and portfolio distribution in US and England, as we assume, that the similar effect could be observed in Eurozone after ECB announced QE program. From methodological point of view, we used the approach advocated by Pesaran and Smith (2012), searching the factors that influence portfolio allocations by using the regression model, explaining net investment by insurance companies and pension funds into different asset classes in terms of government bond issuance, and the amount of QE purchases. In the model were used annual data on life insurers provided by SynThesys for 1985-2012 and pension funds (using annual data provided in anonymised form by the Pension Protection Fund for 2005-2010). The main advantage of using the micro-data is that it enables to examine how heterogeneous the responses to QE are across different types of institutions.

The last part of this paper analyzes the ECB monetary policy effect on the economy, euro depreciation trend and future prediction of the Eurozone economy.

3 Results and Discussion

The rapid decline in oil prices, quick adjustments in exchange rates (with the US dollar appreciating and weakening of most other currencies, notably the euro), and the new quantitative easing program of the ECB are just a few examples of the economic factors at play. In addition, there is increased geopolitical uncertainty related to the Russia-Ukraine and Middle East conflicts, as well as increased concern about the economic and political future of the Euro Area and European Union.

The global economic outlook for 2015 will reflects a combination of upsides and downsides. Downward revision are primarily due to a major GDP decline in Russia (from +0.8 to −3.5 percent) and moderate declines in the Euro Area (1.6 to 1.4 %), Japan and Brazil. Upward revisions include the United States, Mexico and India. As a result, the overall global real GDP growth average in 2015 is projected to be slightly below the forecasted 3.69 %. For illustration, the table 1 describe the real GDP forecast in major world economies.

Table 1 Real GDP forecast, Total annual growth rate (%), 2009–2016

	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
World	-0.64	5.29	4.6	3.9	3.11	3.26	3.69	3.95
OECD - Total	-3.44	3.1	1.92	1.32	1.40	1.81	2.31	2.56
Euro area (15 countries)	-4.45	1.97	1.64	-0.67	-0.44	0.83	1.6	1.67
Italy	-5.48	1.71	0.59	-2.27	-1.93	-0.37	0.22	1.4
France	-2.87	1.89	2.9	0.37	0.38	0.37	0.76	1.45
Germany	-5.58	3.93	3.66	0.58	0.21	1.47	1.8	1.83
Greece	-4.36	-5.34	-8.87	-6.62	-3.98	0.85	2.25	3.34
Hungary	-6.55	0.79	1.81	-1.48	1.53	3.34	2.12	1.73
Slovak Republic	-5.29	4.83	2.70	1.60	1.42	2.64	2.83	3.44
Poland	2.63	3.70	4.76	1.76	1.67	3.34	2.99	3.51
Czech Republic	-4.70	2.14	1.97	-0.73	-0.71	2.36	2.35	2.74
China	9.21	10.45	9.30	7.65	7.67	7.26	7.14	6.90
India	5.24	11.8	7.78	4.91	4.71	5.40	6.39	6.57
Brazil	-0.31	7.55	2.74	1.3	2.49	0.32	1.50	1.96
Russia	-7.82	4.50	4.26	3.44	1.32	0.32	0.03	1.64
South Africa	-1.53	3.14	3.60	2.47	1.89	1.27	2.10	2.91
Japan	-5.53	4.65	-0.45	1.48	1.54	0.35	0.84	1.3
Korea	0.71	6.50	3.68	2.29	2.97	3.46	3.76	4.10
United Kingdom	-4.31	1.91	1.65	0.66	1.73	3.30	2.68	2.53
United States	-2.78	2.53	1.60	2.32	2.22	2.17	3.70	3.10

Source: OECD Data, 2015.

The development of the public finances goes in line with the consolidation programmes in many European countries. At the end of the third quarter of 2014, the government debt to GDP ratio in the euro area (EA18) stood at 92.1 %, compared with 92.7 % at the end of the second quarter of 2014. In the EU28, the ratio decreased from 87.0 % to 86.6 %. This decrease in the EU28 government debt to GDP ratio comes after fifteen consecutive quarters of increase. The government debt management participates on lower interest rates, on the other hand economy as a whole is missing public investments and this part is visible on the detail structure of GDP by each single country.

Generally, the global economy was affected by following trends:

- Nominal interest rates are extraordinarily low, and in many case now negative.
- Rapid moves in exchange rates and asset prices, lower oil prices.
- Financial markets may be mispricing risk. There is evidence that markets are repeating behaviour that led to the financial crises in 2007.
- With subdued inflation, many central banks have eased monetary policy.
- Still lagging real investment and employment.

The weakening of the common European currency in recent months opened the question, what are the implications for European firms and workers. Key areas where they may experience significant fluctuations in the exchange rate are particularly price development (more expensive imports) and foreign trade (exports less expensive). The price development on import side is strongly influenced by commodity prices, those are nowadays especially by row materials at a favourable levels, looking on that from production prospective. In further analyses we will concentrate on the possible effects of the weakening euro on the export performance of the euro area member countries.

Trade of goods and services belongs to one of the few areas in which the euro area economy as a whole was so far successful during the crisis years. In 2013, the euro area countries recorded outside EMU a trade surplus of EUR 340 billion. Current considerable weakening of the euro should act as further stimulus for the trade surplus increase,

whereas lower prices in foreign currency usually mean increase in competitiveness of exports. Regarding the intensity of foreign trade, a number of euro area countries belong to highly open economies; it means countries with a high share of exports on GDP. However, the biggest Eurozone economies, reports a relatively low proportion of non-euro area share on total exports, resp. on GDP (see Figure 1).

Figure 1 Selected export performance indicators of the euro area in 2014
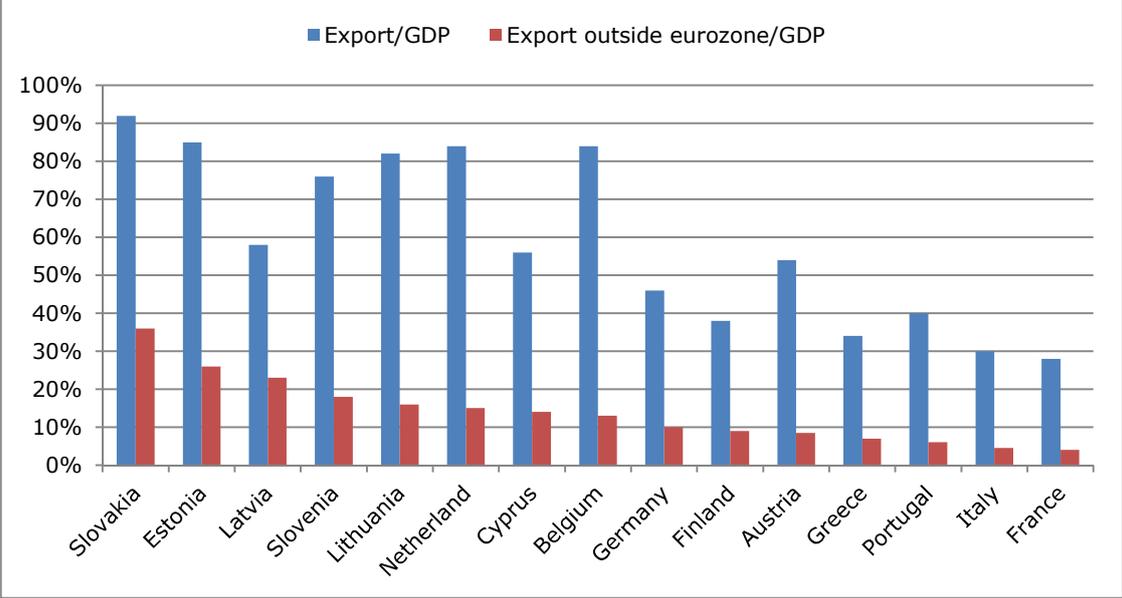
Source: Eurostat, 2015.

With respect to the above mentioned fact, the current sharp weakening of the euro will not have a significant impact on the overall economic performance of the euro are economies. If the current low rate of the euro will last throughout 2015, according to the ECB estimated elasticity, it could boost the euro area GDP by around 0.5 %. It is not insignificant, but structural problems in the euro area would not be definitely resolved. Moreover, the problem countries have the lowest proportions of non-euro area exports to its GDP, what implicates, that the growth potential resulting from the weakening of the euro will be especially in these countries weakest.

Top managers of companies nowadays did not concentrate on a real management of their companies, but are primarily interested in the evolution of the price of its shares on the stock exchanges. Stock exchange prices are overprized due to the influence of central bank quantitative easing policies and low interest rates. Net profits of companies forming S&P 500 reached the value of USD 945 billion for the period of the year (ending 3Q 2014). Concurrently, for the same period of time, USD 895 billion accounted the value of redemptions and paid dividends. Since the bottom of the recession in 2009 to the end of the third quarter of 2014, the cumulative value of dividends and redemption consisted the sum of USD 4 trillion, what represents 85 % of profits of 500 largest companies in US. New transmission channel of monetary policy in an era of enormous money printing runs through corporate management. Given the significant ups and downs that we had the opportunity recently observed, we can assume, that the new transmission channel is strong and pro-cyclical, which means that does not alleviate the economic cycle, but rather drastically increase its oscillation.

Since the financial crisis there was a significant reallocation of assets in equities, while the amplitude of the equity growth rate was much higher than the growth rate of earnings. Immediately after the peak of the S&P 500 (around 1570 points in October 2007), the level of redemptions and dividend payments gradually began to fall, to a minimum during the crisis of 2008 and 2009. When the market reached the bottom in the second half of 2009, the sum of money invested in equities amounted only USD 85 billion, which represents only a third from the market peak times.

History is likely to repeat. In the third quarter of 2009, when the economy started to recover gradually, distributed companies from the S&P 500 only 63 % of net profits in dividends or redemptions. Five years later, in the third quarter of 2014 after a record rise in stock markets, companies from the S&P 500 divided the sum of USD 234 billion out of USD 244 billion in net profits (see figure 2). Managements of companies are in a so strong bull euphoria that split up to 96 % of profits to dividends and redemptions.

Figure 2 Quarterly Shareholder Distributions from Buybacks and Dividends 2005-2014
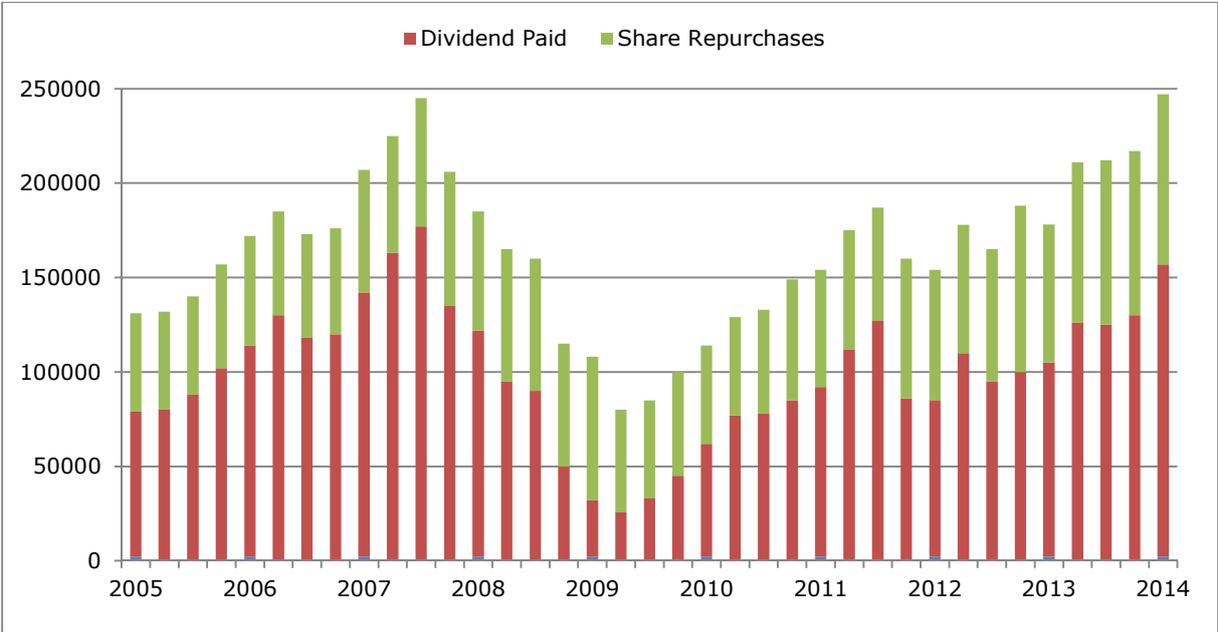
Source: FactSet Research System, 2014.

We have to admit, that managers of large companies from the US are dominantly interested in the appreciation of its shares and bonus incentive schemes. Once this trend by managers wears off, the stock market bubble deflate. Automated trading systems causes a stop-loss orders in the market like in 2000 and 2008.

FED tries after each shock to stabilize markets through cheap financing and carry trades for equity speculators and massive liquidity injections into the Wall Street. However, irrational rising share prices does not only display the spiral redemptions and dividend payments, but also the counter-cyclical behaviour. As soon as managers will gain confident about favourable economy and stock market development, succumb mentality "times have changed", and infects the entire equity market participants and the whole economy. Managers start to hire more employees', increase production with the expectation that the real economy will continue to follow the growth of the stock market. Finally, managers will bump to a hard reality, as the expected boom will not occur. Conversely, firms will have an excess of unnecessary employees, huge stocks of goods, and will be sensitive and under the pressure of market shocks.

Further aspect, which we analyse, is the influence of applied monetary policy to change in an asset allocations. According to latest study (Kroencke, Schmeling, Schrimpf, 2015), global asset reallocations of U.S. fund investors, as a response to U.S. monetary policy, recorded switches between U.S. bonds and equities and reallocations from U.S. to international assets. These two factors accounting for more than 90 % of the overall variation. Reallocations of both retail and institutional investors show return-chasing behaviour in the week prior to and the week of FOMC meetings. This result holds irrespective of whether the FOMC meeting effectively leads to an easing or tightening of monetary conditions. Institutional investors reallocate from basically all other asset classes to U.S. equities and tend to reallocate toward riskier, high-yield fixed income segments, consistent with a search for yield. Via this channel, U.S. monetary policy affects allocations not just in U.S. assets but also internationally. At the same time, a

yield curve flattening and a compression in term premia are associated with a shift out of equities and into U.S. bonds (Stein, 2013). All these effects tend to be more pronounced for institutional fund investors as opposed to retail investors. Reallocations are positively related to lagged returns, especially those captured by the diversification factor, consistent with a channel where fund investors chase equity and bond returns internationally.

Overall, the monetary easing induces U.S. fund investors to actively raise allocations to international assets, consistent with the view that investors search for higher returns abroad within fixed income markets. Understanding these broad portfolio shifts is relevant given the recent large swings in capital flows and asset prices and an increasing trend towards bond market financing (intermediated via asset managers) at the expense of traditional cross-border bank lending (Fratzscher, Lo Duca, Straub, 2013). Moreover, this aspect can inform policy discussions about the effects of monetary policy on investor behaviour, international capital flows, and asset prices.

Similar effect could be observed in England. The Bank of England began its programme of asset purchases financed through the creation of central bank reserves in March 2009. During the first wave of purchases from March 2009 to January 2010, the Bank purchased a cumulative total of GBP 200 billion of medium- to long-term UK government bonds (gilts). In a subsequent wave of purchases that began in November 2011, it bought a further GBP 175 billion of gilts, an overall amount equivalent to nearly 25 % of annual GDP. About a fifth of the Bank of England's QE gilt purchases appeared to have come from institutional investors (Joyce, Zhuoshi, Tonks, 2014). According to the BIS study, every GBP 1 of gilts purchased as part of the QE programme, lead investment companies and pension funds to reduction of their net inflows into gilts by about GBP 0.12 (Kroencke, Schmeling, Schrimpf, 2015). Regarding the portfolio rebalancing, every GBP 1 of QE leads to investment companies and pension funds long run flows into corporate bonds by 30 pence. The switch into corporate bonds was remarkably similar across different types of insurance companies and pension funds, but in the case of insurers, the switch away from gilts was more pronounced for schemes that showed less risk aversion.

Overall, the Bank of England's QE policy resulted in some portfolio rebalancing behaviour by institutional investors, who appear to have reduced their gilt holdings and reinvested some of the proceeds into riskier corporate bonds relative to the counterfactual. But it appears that portfolio rebalancing was limited to corporate bonds, with most of the evidence suggesting that institutional investors moved out of equities during the period of QE purchases. Institutional investors, meaning insurers and pension funds, were therefore only marginally contributed to increase of equity prices during QE programme.

In an emerging market economies could be also observed an asset allocation trend as a reaction to transmission of shocks on international markets (Jotikasthira, Lundbla, Ramadorai, 2012). Investors tend to change the flow of assets originated in developed countries and invested into emerging markets. This forced trades or fire sales affect emerging market equity prices, increased capital short-term inflows and outflows, currency movements and international portfolio diversification.

Except of monetary policies and external shocks, asset allocations and capital flows across countries are strongly influenced by the well-known benchmark indexes and mutual funds from around the world investing in equities and bonds. Investments and mutual funds explicitly declare a benchmark to compare their performance. Given that benchmarks are based on market capitalization, they instantaneously absorb any return shock to the countries in the index (Raddatz, Schmukler, Williams, 2014). Benchmark weights also receive frequent, exogenous revisions by the companies that construct them. These benchmark changes affect the mutual fund portfolios, their reallocations, and their sensitivity to injections or redemptions. The effects of benchmarks on mutual fund allocations are significant even after controlling for industry effects, country-time effects, macroeconomic fundamentals, potential reverse causality, and other important micro and macro factors that drive country portfolios.

4 Conclusions

All crises in the past lead to changes of monetary policies. As crises are likely to spread across markets, financial intermediaries play a significant role in an international portfolio diversification and asset reallocation. Prediction of most major banks estimate, that the ECB quantitative easing policy by buying bond in the monthly amount of EUR 60 billion will cause depreciation of the euro. In addition, the market expects the Fed will raise rates in the second half of this year. In relation to the phase of the business cycle and monetary policy in both regions, within one year we can expect the euro – dollar parity. Quantitative easing in the euro area caused a reduction in bond yields and the cost of debt service managed by sovereign states. Excess reserves and low-interest bonds lead to reallocation of resources into riskier assets. Investors will prefer longer maturities that still offer a positive return, what will flatten the trend line of yield curve. In terms of risky assets, stocks and real estate will dominate. We could predict the cash outflow from currency market, what will further weaken the euro currency.

The fundamental problem of the euro area remains divergence of prices and wages. In each euro area countries, the euro has different purchasing power. Relative prices are higher in high-income mainly Nordic countries, than in low-income periphery countries. For comparison, in the US there are not so big price differences among single states. For example, Germany reported in 2014 the current account surplus of 7.5 % of GDP, while Greece, despite harsh austerity measures achieved deficit. Other macroeconomic indicators, such as net investment position (amount of assets less foreign liabilities of the country), or unit labor costs, shows the same results. The internal imbalance has on the economy as a whole, the detrimental effect. In the majority of peripheral Eurozone countries must prices and wages, relative to Germany, fell by around 10-30 %. The convergence process should be ideally symmetrical, it means surplus and deficit countries should meet somewhere in the middle. Due to low inflation, which the ECB aims to raise above the 2 % level, this process is not happening.

A possible solution offers price regulations, if for example Greece will keep zero inflation rates, while Germany 4 %, what will equalize prices and wages after five consecutive years. Structural policy changes are blocked within the monetary union. Therefore, there is no other alternative than to implement money transfers from rich countries taxpayers towards weaker ones. If such transfers would not be realized, local pressures and social unrest become stronger, extreme radicalization parties would overtake political power and finally the situation would become unbearable. Moreover, as mentioned by Vavrova, K. (2013), the tax optimization would then be even more the issue in a global functioning societies.

ECB unconventional monetary policy pushed interest rate down trying to stimulate economy growth via loan channel. Negative deposit interest rates should motivate bank in their lending business, and increase consumption by households and firms. Based on ECB, Annualised moving 3-months loan development in a private segment in Eurozone reached in February 2015 an amount of EUR 659 billion. Since end of 2011, this indicator except of one month amounted negative numbers (meaning loan decreases). Taking into account the euro depreciation and cheaper export, this could be a positive signal in euro economy development and prediction for a stronger economy growth.

The non-standard measures applied by major central banks should reverse in a maximum of one-two year's duration into a normal interest rate conditions. This will normalise demand upon loans, asset prices, commodity prices, and lower currency volatilities, encourage appropriate investments and significantly lower the potential market bubbles and new financial shocks and crises. The artificially created safety funds, those will socialise the debt among all contributed countries (like ESFM fund in a Eurozone) will never help an over debt economies to be healthier and will just postpone the further taken hard solutions. The policy makers should come back to standard measures, and investors, including banks, should write off their bad investment decisions taken in the past on the back of their equity owners.

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The Effect of a New Lease Reporting in Transport Companies

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Abstract: Current differences between the accounting treatments for a financial and an operating lease force users of the financial statements to capitalize individually the operating lease. The Re – exposure draft of the new standard Lease should eliminate the problems of the current reporting principles. As a result of the application of the new standard, it is expected that more leases will be activated on the balance sheet on the lessees' side. It is probable that the most significant impact will be observable in the case of companies where operating leases are major sources of financing (e.g. transport companies, airlines). The paper deals with the potential impact of the new methodology for lease reporting in one the most affected industries. The aim is not only the calculation of the financial impact and its comparison with the current standards but also the definition of the economic consequences for lessees. In the frame of methodology the selected financial ratios which are supposed to be influenced by the new treatments are used for research. Based on results the incidental lessees' economic consequences will be defined.

Keywords: lease, lessee, capitalization, Re-exposure draft

JEL classification: M41

1 Introduction

The lease is a globally important external source of finance for companies regardless of their size and industry. Lease can be seen as an alternative to the purchase, for which is not necessary so high initial cash outflow. According to World Leasing Yearbook (2013) the volume of newly closed lease contracts was more than $ 800 billion. It is absolutely clear that reliable lease reporting is necessary. Unfortunately, the present lease accounting standards (IAS 17 and Topic 840) are characterized by a number of ambiguous adjustments which do not provide necessary comparability and reliability of financial statements. The main problem of the current standards is different accounting models for financial and operating leases which force users of the financial statements to adjust financial statements of lessee.

Roughly speaking, the financial lease is recognized in the lessee's balance sheet and operating lease is not. The current lease principle allows lessee of the long-term operating lease to use the property which is not recognized in the financial statements and thus it cannot be identified by the users of the financial statements. Conversely, the lessor retains the object of the lease in their financial statements and continues in depreciation. It is called the off-balance sheet accounting which does not provide comparable information for effective decision making process. (Fahnestock, 1998)

The Financial Accounting Standards Board ("FASB") and the International Accounting Standards Board ("IASB") have been jointly working on a replacement for the current lease accounting standards. According to Bosco (2010), the impetus to this effort was the ENRON accounting scandal in 2001. Even though, ENRON's bankruptcy was not caused by leases but it was caused by other off-balance sheet transactions, this demise showed that it is necessary to protect the investors from "incorrectly" accounted transactions. Leases, specifically operating leases, were cited as a major class of off balance sheet obligations. The formal objective of the common project is to "ensure that investors and other users of financial statements are provided useful, transparent, and complete information about leasing transactions in financial statements" (FASB 2007). The

informal objective of the project is "fundamental revision of the leasing guidance" (FASB 2007).

Based on the results of a large number of studies (e.g. Lubov (2002), Feldman (2002), Franz et. al. (2009)), it can be concluded that companies prefer operating lease to financial one. The lessees prefer operating lease because it allows them to create a "better" financial picture of the company to the investors due to the absence of the lease liability in their balance sheet and also that all risks associated with the lease are taken by the lessor. (Lubov, 2002) The lessors also consider the operating leases more attractive because they remain the ownership of the leased asset and they can continue in providing a tax deductible expense in the form of depreciation. Feldman (2002) concludes that the operating leases are generally preferred in sectors where there are the leased assets of high financial value. Examples of these sectors are airlines industry and transportation companies. The preference of the operating lease is also confirmed by McCarthy, Cotten, Schneider (2014) who concluded that only the financial sector is sector where financial lease is preferred. Construction industry, retail and services are the sectors where percentage of the firms with operating lease is more than 89%.

The paper deals with a quantification of the financial impact of the proposed lease treatment in transportation companies (NACE code H 49-53) with the current accounting principles. The selected financial ratios which are supposed to be most influenced by the new treatment are used for testing. According to results, the economic consequences for lessees are defined.

Problems of the current lease treatment and their solution

The classification of a lease agreement as a financial or operating lease has a significant impact on the financial statements of both the lessor and the lessee. Under the IAS 17, İn the case of a financial lease the lessee generally records the leased asset at lower of its present value or present value of minimum lease payments and the lease liability at the same value. On the face of income statement, the lessee shows the depreciation of the leased asset and reports the interest expense connected with the lease liability. At the inception of the financial lease, the lessor derecognises carrying amount of the asset and recognises the lease receivable on the face of its income statement. In operating leases, the lessor retains the leased asset on the balance sheet, but is obliged to recognize it as a leased asset. The revenues from the lease are charged as income over the term and the lessor continues in the depreciation. In this case, the lessee is not obliged to recognise the lease liability or the lease asset on its balance sheet. Instead, it is required only to acknowledge a rent expense. According to IAS 17.56, all companies must disclose their future minimum operating lease payments for the following years, for the year two to five and the years after the fifth.

According to Fahnestock (1998), different approaches to reporting of finance and operating leases do not provide important comparability of financial statements. The financial statements must be subjectively adjusted by their users who individually capitalize operating leases. The capitalization means that the company's financial situation is shown as if the long-term operating lease were reported as a financial one. The consequences of the adjustment models could be seen not only on balance sheet, but also on income statement, cash flow statement and in recalculated financial indicators. There have been developed many capitalization models since past century. Each of the adjustment models has its own characteristics which strongly influences the effects of the capitalization and the "new"financial picture of the company. Therefore, it is quite obvious that the use of individual capitalisation models brings different results, which makes the comparison of companies' financial statements nearly impossible. Even though the rating agencies should publish independent, quality and comparable rating, each of them uses their own modified capitalization models. As an example it is possible mention that Standard & Poor's capitalizes operating leases using present value method, Moody's uses factor method developing present value method and Fitch applies hybrid method – mixture of two previous methods. (Berman, LaSalle, 2007)Other modifications

of the capitalization models are used by the authors of national studies dealing with the effects of the capitalization of operating leases. The results of these studies are not clear. Similar results in case of the impact on financial indicators can be found in studies - e.g. Imhoff, Lipe and Wright (1991) and Hsieh and Duke (2006). Different results based on studies of De Villiers and Middelberg (2013), Durocher (2008), Fulbier, Pferdehirt and Silva (2008) were determined. Different results are caused not only by selection of the capitalization model, but also by a selection of researched countries, sectors (e.g. Bennet and Bradbury (2003), Goodacre (2003), Imhoff, Lipe and Wright (1997)) and the size of the sample (e.g. PwC and Rotterdam School of Management (2010) and Tai (2013)). The frequent inability to compare the results of the studies is also due to the different examined indicators.

Imhoff, Lipe and Wright (1991) are authors of the basic capitalization models. Nearly each of the capitalization models came from theirs. The authors, themselves, have modified entrance parameters (the timing and amount of lease payments, the rate used to discount these future lease payments, the past and future depreciation related to the leased asset, and the tax rate faced by the company) of their capitalization model three times so far. Another example is a model by Fahnestock and King (2001), based on previous models, but they added a few specifics such as the value of the leased asset is exactly equal to the present value of the future lease payments. So, it is clear that the application of the capitalization models bring different results, so the change of the current lease principles is absolutely necessary. The most important thing is to settle unified accounting principles for financial and long-term operating leases that the users of the financial statements will not have to individually capitalise operating lease.

The first result of a joint convergence project of the FASB and IASB was an Exposure Draft Leases (ED/2010/9) in August 2010 with 4 months comment period that changed and simplified accounting for leases. The Exposure Draft generated a huge response from the management of the companies, accounting experts and stakeholders in the form of Comment Letters (over 780). In the Exposure draft there were not only some problematic general principles but the specific proposed methods of reporting. Although the Boards initially focused on lessee's side, it turned out that it was also necessary to find an adequate way of the lessor's reporting which would be consistent with the lessee's principles. In June 2013 the revised Exposure Draft (ED / 2013/6) was issued. The most significant change in the new proposal is the "dual recognition" approach to recognition, measurement and reporting of costs and cash flows arising from lease treatments. However, there is consensus that the readers of financial statements would have better information if operating leases greater than 12 months were capitalized as an asset and a liability on balance sheet.

Dual approach distinguishes lease type A and type B. The classification dependents on whether the lessee consumes the significant portion of the leased asset or not. If so, this is the lease of type A, in the other case it is the lease of type B. For equipment, trucks, aircraft and similar assets which are the examples of the lease Type A, interest expense and amortization (i.e., depreciation) will be recognized on the income statement. Under lease Type B (lease of property) a single "lease cost" will be recognized that will combine the interest expense and amortization expense. (FASB 2013c) Under the new approach regardless of the type of the lease, a lessee records a right-of-use asset and a lease liability both initially measured at the present value of the future lease payments. Subsequently, the lease liability will be reported at amortized cost using the interest method to determine the amount of interest expense and the carrying value of the lease liability. The right-of-use asset is amortized on a systematic basis beginning with the start of the lease. The period of amortization is the term of the lease or the life of the asset, whichever is shorter. Under the lease type B, lessors continue in recognition of the underlying asset in their balance sheet and recognize rental income over the lease term on a straight-line basis. (Baker, 2013)

The biggest expected impacts of the proposed lease accounting standard will be seen in key financial ratios. The changes will be mainly caused by the increase of the newly

recorded long-term debt and asset at lessee. Beattie et al. (1998) provided evidence that unrecorded long-term debt, due to operating leases, equals 39% of recorded long-term debt. In addition, unrecorded assets equal 6% of recorded asset. It is supposed that the most affected ratio will be the debt and activity ratios. The proposal would have an effect on both current and total liabilities for companies currently reporting leases Type A as operating leases. According to Srnová, Bohušová, Blašková (2014), the total of lessee´s financial position statement will increase due to presentation of the right-of-use as long term asset and the lease liability. The increase of long term assets will result in decrease of ratios connected to assets. The structure of the cost will be changed in the lessee´s income statement due to amortization of the right-of-use instead of rent cost in the current approach. Similar conclusions were reached in the study of Svoboda, Bohušová (2013). Grossman and Grossman (2010) made a study, where 91 companies of the Fortune 500 list for 2009 were tested. Without discounting, 60 of the companies would have increased their current liabilities by less than 5%, but 21 would have increased them by at least 10%. With discounting, 70 of the companies would have effects of less than 5% for current liabilities, but 13 would have increases of at least 10%; for total liabilities, the effect was less than 5% for 50 companies but at least 10% for 29 companies. These increases could have important implications for financial analysis. Imhoff, Lipe and Wright (1991) indicated that constructive capitalization significantly caused decrease of the Return of assets (ROA) and increase of the debt ratios measured as debt/equity. In the case of the companies with high percentage of the operating leases, ROA decreased by 34% and in the case companies with low percentage of the operating leases, it was 10%. The increase in debt/equity ratio by 191% was calculated at companies with high percentage of the operating leases while at companies with low percentage of the operating leases it was 47%. Fülbier, Lirio, Pferdehirt (2008) added another influenced ratios - profitability ratio (EBIT, EBITDA).

2 Methodology and Data

The paper is concerned with the situation of comparing lessee's financial results, especially the volume of assets (noncurrent and total), liabilities (long-term, short-term, total), expenses (financial and operating) and the amount of profit, in the case of lease is recorded according to IAS 17 or Topic 840 and under constructive capitalization. It is expected that the biggest impact will be at the industries with high long-term operating lease percentage. Moussaly and Wang (2014) identified industries with significant share of the operating lease - Manufacturing; Finance, insurance, and real estate; Mining; Construction and Transportation.

Transportation was chosen as a representative industry with the high share of the operating lease. The financial statements of three international parcel delivery companies (DHL, UPS and FedEx) are used for the research. DHL, UPS and FedEx belong to the biggest players at the market. Another reason why these companies were chosen is that UPS is an example of the company with low percentage of the long – term operating lease, DHL represents the companies with medium percentage and FedEx significantly uses long – term operating leases. These companies prepare financial statements in accordance with IFRS and US GAAP obligatory. The companies' notes to financial statements contain all reporting requirements for operating leases. According to current standards, all companies must disclose their future minimum operating lease payments (MLP) for the following years, for the year two to five and the years after the fifth. The paper works with accounting data from the financial year-end closing dates in 2014. Information on operating leases is utilized for off-balance sheet operating lease capitalization for the purpose of financial statements comparison and analysis of key financial ratios. A fixed discount rate 5 %is determined.

The used capitalization model is derived from the approaches defined by Bohušová (2015) based on simplified model by Imhoff, Lipe and Wright. The value of capitalized operating leases is added to book value of assets and to long-term debt. Firstly, it is necessary to determine lease liabilities and the actual value of leased asset. Although, the value of leased asset should be disclosed under current accounting standards, the

value is usually not recorded and the actual value of leased asset must be estimated. As the value of leased assets (LA) is equal to the lease liability at the lease inception, the estimation of the leased asset comes from calculation of the lease liability. The lease liability calculation in this research is based on present value (using the 5% effective interest rate) of minimum lease payment (PVMLP). Finally, implicit lease interest expense must be removed from operating income and it will be newly disclosed as financial cost. The calculation is based on value of the operating lease payment multiplied by the determined interest rate (5%). The remaining lease interest expense is considered as depreciation of leased assets.

The quantification of the impact of operating lease capitalization is expressed as the percentage changes in several items which were most affected by the capitalization. Three key financial ratios (Return on assets, total indebtedness and debt-to-equity ratio) are used to demonstrate effects of the capitalization.

$$ROA = \frac{Operating\ profit}{Total\ assets} \tag{1}$$

$$Total\ Debt\ to\ Total\ Assets = \frac{Total\ liabilities}{Total\ assets} \tag{2}$$

$$Debt\ to\ Equity\ Ratio = \frac{Total\ liabilities}{Shareholdre\ '\ Equity} \tag{3}$$

3 Results and Discussion

The Table 1 describes financial impacts of the constructive capitalization of the operating lease on selected items of the companies' balance sheet. As it was supposed, newly recorded leased asset and related lease abilities will surely cause increase in Log-term Assets, Short and Long-term Liabilities and consequently it will lead to the growth of Total Balance Sheet. Under current lease treatment, the operating lease is not reflected in company's balance sheet and users of the financial statement could think that the company has lower liabilities and fewer financial obligations than it really does.

The increase in assets due to capitalization of operating leases is corresponding to the increase in liabilities. The calculated effects are accordance with the results of many previous studies (e.g. Bennett, Bradbury (2003), Opperman (2013)). Outcomes in Table 1 confirms that amount of change strongly dependents on how much the company uses operating lease. In case of UPS the change is the smallest, whereas FedEx could wait biggest changes in its financial position. Bennett and Bradbury (2003) found out 23% average increase in total liabilities. Similar result was determined in this research at company DHL which is the example of the company with the medium percentage of the long – term operating leases.

Table 1 The impact of Operating lease Capitalization on Balance Sheet

Item	UPS	DHL	FedEx
Long-term Assets Change +/-	6%	29%	64%
Long -term Liabilities Change +/-	8%	43%	225%
Short-term Liabilities Change +/-	4%	12%	37%
Total Balance sheet Change +/-	3%	18%	38%

Source: Authors' calculation based on Annual Reports

Nowadays, the operating lease instalment is only recorded as expense on the company's income statement annually. Under constructive capitalizationit is necessary to divide the expenses into two parts – depreciation of the long-term assets and interest costs. The effects of the division will be seen in increase of operating income ad financial costs. Rise of operating income is caused by reduction of operating expense. Newly recorded

interests cost will lead to the increase of the financial costs. Similar to Table 1, size of change is influenced by the percentage of operating lease in company.

Table 2 The impact of Operating lease Capitalization on Income Statement

Item	UPS	DHL	FedEx
Operating income change +/-	1.1%	11.2%	19.2%
Financial costs change +/-	15.9%	77.0%	393.8%

Source: Authors' calculation based on Annual Reports

In the paper three financial ratios were examined. ROA is the first one. In all examined companies, ROA decreased but it was not as significant as Imhoff, Lipe and Wright (1991) indicated. Reduction in ROA comes from the higher increase in total assets than increase in operating profit. Secondly, the research focused on change in total indebtedness. The capitalization of operating lease leads to the slight increase of indebtedness in all examples. The last examined ratio was D/E ratio. The increase in this ratio could be observed at all three examples. As compared with previous calculations, the change in D/E ratio is the biggest one. According to Imhoff, Lipe, Wright (1991) increase in D/E ratio by 191% it was calculated at companies with high percentage of the operating leases while at companies with low percentage of the operating leases it was 47%.

Table 3 The impact of Operating lease Capitalization on Financial Ratios

Item	UPS	DHL	FedEx
ROA (operating lease)	0.1401	0.0802	0.0995
ROA (capitalization)	0.1342	0.0603	0.0582
Change +/-	-0.0058	-0.0199	-0.0412
Indebtedness (operating lease)	0.5216	0.7353	0.3038
Indebtedness (capitalization)	0.5363	0.7550	0.4959
Change +/-	0.0146	0.0197	0.1921
D/E (operating lease)	8.6422	2.8361	0.6577
D/E (capitalization)	9.1656	3.2591	1.4827
Change +/-	0.5234	0.4230	0.8249

Source: Authors' calculation based on Annual Reports

4 Conclusions

The current lease accounting principles (IAS 17 and Topic 840 Leases ASC) are characterized by a number of problems. The biggest one is the existence of the different attitude towards disclosing financial and operating leases. To make financial statements comparable and comprehensive, individual capitalisation models are used. Each of the capitalization models has its own characteristics that bring different results. IASB and FASB have been working on convergence project whose main aim is establishment of new accounting principles under which financial and operating leases will be reported in a similar manner.

The paper focuses on economic consequences of capitalization of operating leases on lessee's financial situation. The biggest impact is expected on companies where operating leases are major sources of funding. Transportation was chosen as a representative industry. Results confirmed a relation between percentage of operating lease in company and amount of change. The higher share, the bigger impact on selected items of financial statements and consequently on selected financial ratios. Effect of capitalization could be seen in rise of liabilities (long-term, short – term, total), noncurrent assets and financial costs. The capitalization of operating lease leads to increase of indebtedness and D/E

ratio and decrease of return on assets. It is clear that current accounting principles allow companies to improve its financial position. So, it is necessary to find unique and effective solution eliminating present problem.

Acknowledgment

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Fees or Taxes - The Hamlet Question for the Czech Municipality

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Abstract: *This paper is focused on the analysis of the basic patterns of the municipal revenue in the Czech Republic, especially the trade-off between the tax and fee financing. Data reveals that the Czech municipalities often introduced local coefficient of 2 which doubled the basic property tax revenue. This is the mean value applied for more than one half of the surveyed units. Local fee is often introduced at the level of 500 CZK per capita. It seems that the municipality rather prefers such values, which are used by the vast majority of municipalities. We can hypothesize it is due to a competitive effect, when citizens move from one municipality to another to reach lower taxes or fees, ceteris paribus. Moreover, it seems there is not a trade-off between the tax and fee financing. It also seems that both larger and more industrialised municipalities prefer lower level of fees. It is in accordance with the hypothesis that the revenue needs of the larger municipalities are sufficiently financed by the taxes or by other sources.*

Keywords: tax, fee, local coefficient, fee for the municipal waste, vote, industry

Jel: H71, H73

1 Introduction

Fees for municipal waste ("fees") together with tax for buildings and land tax ("property tax") represent a significant source of income for municipalities which amount is under the control of municipality.

The purpose of this paper is to examine the basic factors of decision whether to use taxes or fees for financing of municipal services. The basic premise was that there is a trade-off between taxes and fees in the Czech municipalities. In our analysis, we control the set of factors as the industry level in the municipality, the size of the municipality, the number of inhabitants and the electoral preferences. We have also analysed a set of 160 municipalities from the South Bohemian region. We have analysed tax revenues, non-tax revenues ("fees"), the size of municipality and the number of inhabitant.

Financing Municipal Services – Theoretical Background

The trade-off between "tax on" and "fee for" was addressed for example by Stiglitz (2003), Jackson and Brown (2003), Kurtis, Janeba (2011), Semerad andSobotková (2012), Lambe and Farber (2012) or recently Houdek and Koblovský (2015). Semerad and Sobotkova (2012) focused on the impact of higher education on economic performance. The result of this investigation was that it is better to finance education from taxes, rather than through fees. Lambe and Farber (2012) studied how we can be taxes and fees used to deal with the greenhouse effect and to reduce its overall impact on the environment. They focus on the difference between "tax" and "fee" effects. Similar areas, applied to China, were analysed in MAZuo (2002), which examined how public support of industry and agriculture by fees and tax credits influenced their economic performance. The study concluded that it is better to support these sectors through taxes than through fees.

For excellent summary of this phenomenon see Kurtis and Janeba (2011). They state that both taxes and fees funding has advantages and disadvantages. Fees correspond to the principle of benefit and equivalence. The taxpayers pay for what they actually (genuinely) want. We can eliminate "free riders" and this principle is quite fair and supports desirable behaviour. Taxes, on the contrary, guarantee a certain degree of solidarity and represent the advance guaranteed income for the local administration.

In this paper, we focus on the municipal level, the basic hypothesis is that the municipality will introduce higher "taxes on" (additional charge to property tax) rather than "fees for". There are 3 factors supporting this hypothesis.

1. Fees are more "visible" and thus less tolerated by payers. Moreover, taxes are generally set up on the state level rather than municipality level. Thus, the higher level of taxes is less harmful to voters' preferences of municipality officers. To sum up, municipality officers would prefer taxes.
2. Smaller municipalities will prefer increasing of both fees and taxes. They do not have access to other kinds of public support.
3. Larger municipalities will prefer to decrease both fees (and partly taxes too). They do have access to other supplementary kinds of public support. These other sources are "more friendly for citizens" because they (citizens) "do not bear the burden" directly.

On the contrary, the reason for fees (and not for uniform taxes) can be the occurrence of negative externalities. So-called Pigouvian taxes (fees) can reduce their impact (Sandmo 2006). "In the case of negative externalities, Pigouvian taxes are one way to correct this market failure, where the optimal tax leads agents to internalize the true cost of their actions. … We show that a uniform tax performs very poorly in eliminating a deadweight loss…" (Knittel, Sandler (2013).

In our contribution, we decided to examine the factors of decision whether to use taxes or fees. The basic premise was that there is a tradeoff between taxes and fees in Czech municipalities. In our analysis, we control the set of factors as the industry level in municipality, the area of the municipality, the number of inhabitants and the electoral preferences. These are the factors that could play their role in the decision. The municipality, which is located in the industrial zone, will prefer to use taxes because of a higher tax yield from industrial enterprises. Generally, the taxation of industrial objects and areas is substantially higher.

Financing Municipal Services - Legislative Perspective

In this chapter, we briefly discuss the potential ways of municipality budget inflow in the Czech Republic. The first part is devoted to the "property tax", which is significantly affected by the local coefficient. The second is focused on "fees for" municipal waste.

The following table shows the share of income taxes from real estate to total revenues of municipalities throughout the central (analysed) region.

Property tax is the "property tax" according to the Law No. 338/1992 Collections amended.

Municipalities can generally introduce 1) the so-called correction coefficient, 2) the so-called coefficient of 1.5 or/and 3) the so-called local coefficient. The correction coefficient is determined by the number of inhabitants of the municipality, other coefficients are fully under the control of municipality. The tax is multiplied by these coefficients, therefore, they significantly influence the final tax revenue.

The most important is the local coefficient which takes the value 2, 3, 4, or 5 and is fully under the control of municipality. They can be used to multiply tax duty on all types of real estate, with the exception of arable land, vineyards, gardens, plantations and permanent grassland.

The second kind of municipality revenue focused on in our study is municipal fee for waste. Municipalities introduce fee for municipal waste according to Act No. 185/2001

Coll., on waste and amending certain other acts, as amended, according to law No 280/2009 Coll., the tax code, as amended.

There is the fixed fee for the "container" and "periodicity of collection" under section §10b of the Act on local fees. The payers of these fees are individuals specified as follows:

- individual having a permanent residence in the municipality,
- foreign individual having temporary stay for a period longer than 90 days,
- individual having been granted international protection in accordance with the law governing asylum or temporary protection in accordance with the law governing foreigners' temporary protection,
- having in their ownership a building intended for individual recreation, flat or family house.

2 Methodology and Data

The correlation analysis method was chosen as an appropriate method to measure mutual statistical relations. The correlation analysis examines the mutual dependency of one variable to another one. Variables are correlated to each other if both variables occur together. The correlation coefficient has values from <-1 to 1>. In the case of it being zero, it means that the variables are not correlated. The Pearson correlation coefficient was used for the calculation. We also test the significance (Gujarati 1995) of the correlation coefficient using following formula:

$$t = r\sqrt{\frac{n-2}{1-r^2}},$$ (1)

where "r" is Pearson correlation coefficient and t value follows the t - distribution with (n – 2) degree of freedom.

As the explanatory variables, we choose set of factors including the industry level in municipality, the size (area) of the municipality, the number of inhabitants and the electoral preferences. There is a list of variables (and basic statistics) below that were used in our analysis.

Table 1 Input data for analysed subset of municipalities

Variables	Definition	Source
Local coefficient (later indicated as "tax")	Coefficient used to adjust property tax. The measure of preference of tax financing.	the Ministry of Finance
Local fee (later indicated as "fee")	Local fee for municipal waste according to Act No. 185/2001 Coll.	municipality web pages
Number of inhabitants	Number of inhabitants according to the latest census	municipality web pages
Industry	Industry area (km^2).	municipality web pages
Area	Area of municipality (km2).	municipality web pages
Voter preferences	Voter preferences according to the election results (0 is left, 1 is right party)	municipality web pages

Source: Own research

All municipalities implemented the local coefficient. Coefficient 2 (which means the tax was doubled in comparison with its basic level) was used by 78% of the analysed cities, coefficient 3 (5) was used by 15% (5%) respectively, and only 2% of municipalities have

used the coefficient 4. The link between the size of the municipality and the local coefficient values is generally ambiguous.

If we focus on "fee" financing, the total of 50% of the municipalities applied the value of the fee at the level of CZK 500, 30% in the amount of CZK 500 and the remaining 20% of municipalities apply a higher rate of fee.

To sum up, in most cases the amount of the "fee" is set up at the level of CZK 500 and the value of the coefficient on the local level 2. From the above mentioned, it could be concluded that the municipality rather prefers such values, which uses the vast majority of municipalities. We can hypothesize it is due to a competitive effect, when citizens move from one municipality to another to maximize their personal utility (lower taxes or fees, ceteris paribus; the so-called Tiebout effect).

We also use in our analysis the set of 160 municipalities. We have analysed multiple regression.

3 Results and Discussion

The results of correlating analysis for all dependent and independent variables are summarized in appendix.

At the beginning, we focus on the trade-off between "tax" and "fee" financing. We measured the correlation between the amount of the "fee" and the value of the local coefficient ("tax"). In this case, the correlation coefficient of plus 0.11 came out slightly positive. One could infer from this that the municipalities, which have a higher value for the local coefficient, at the same time introduce even higher fees for municipal waste. But it is necessary to take into account the fact that this is a very low positive value and it is not statistically significant on the standard levels. It seems there is not a trade-off between tax and fee financing and the choice between tax and fee financing seems to be independent.

Let us focus on the factors influencing the degree of the tax financing. The background information is expressed in the following table.

Table 2 Pearson correlation coefficients for the tax financing

Variables	Correlation coefficient
Tax and number of inhabitants	0,11
Tax and area	0,02
Tax and industry	0,89*

Source: Own research

We measured the dependency between the value of the local coefficient and the number of inhabitants. In this case, the correlation value of plus 0.11 came out, slightly positive, thus a higher coefficient was used by a larger municipalities, once again with a very low statistical significance.

In the case of measuring the correlation between an established amount of local coefficient (tax) and area of municipality, correlation coefficient was 0.0, thus these data does not reveal any relationships. Again, it is in accordance with our knowledge of structure of the Czech municipality budget. The Czech budgetary allocation law does not take into account the municipality area directly. On the other side, the level of industrialisation is the inherent part of the Czech budgetary regulation, thus we can suppose the high level of correlation. The Czech municipalities receive resources not only by raising taxes from its residents, but also from any businesses that are located in their vicinity. The correlation coefficient is large and positive and statistically significant, it reaches almost 0.9.

Let us focus on the factors influencing the degree of "fee" financing. The correlation coefficients between "fee" and other explanatory variables were all negative, see table

below. It seems that the higher rate of the "fee" is introduced in the smaller municipalities. It is in accordance with our preliminary hypothesis that smaller municipalities will prefer increasing both the fees and taxes. Only large municipalities are able to reach other supplementary kinds of public support, which are "friendlier for citizens", thus also preferred by municipality representatives.

It also seems that both larger and more industrialised municipalities prefer lower level of fee. It is in accordance with our preliminary hypothesis that their financial needs are sufficiently covered by taxes or by other sources.

The analysis also revealed some interesting correlations between explanatory variables. When assessing the industry of municipalities and voter preferences (0 is for left, 1 is for right party), the correlation is slightly positive, 0.11. It seems the greater industry-focused municipality leans more to the right-wing parties. We also measured the dependency between the number of inhabitants and the vote preferences. There was a slight positive correlation, 0.2. It seems the larger municipalities prefer right parties.

There is also much to do in the case of the future analysis. Our sample was rather small, it should be enlarged and some our implications could not be generalized yet. We also believe the multiple regression would be a better tool for future attempt in uncovering some other factors of tax/fee financing.

We have also analysed 160 municipalities of Czech bohemian region. We have analysed relation between these variables:

- area**,**
- population (popul)**,**
- industry**,**
- tax revenue (tax)**,**
- no-tax revenue (fee)**,**
- other no-tax revenue (fee1)**,**
- tax/all**.**

Area represents the area of municipality. Population represents the number of inhabitant. Tax revenue represents revenue from taxes, no-tax revenue represents revenue from fees. No-tax revenues included other no-tax revenues, which include fees for municipal waste.

According to the multiple-regression there is no significant relation between variables. There is only relation between area of municipality and the tax revenue. Bigger municipalities have higher tax revenues than smaller. Tax/all represents divided of tax revenue on summary of tax and no-tax revenue. Fee1/all represents revenue from fee for municipal waste and similar fees divided all revenues (tax and no-tax). Fee/all represents revenue from fee divided summary of fee and tax revenue.

Table 4 Model OLS using observations 1-160
Dependent variable: TAX/all

	coefficient	std. error	t-ratio	p-value
const	0,867958	0,0224222	38,7097	<0,0001***
industry	−3,09316e-05	0,000131958	−0,2344	0,8150
popul	−4,79872e-06	−4,79872e-06	−0,7865	0,4328
tax	1,24613e-09	5,14391e-010	2,4225	0,0166**
fee	−2,86841e-09	8,63883e-010	−3,3204	0,0011***
fee1	−1,58149e-08	8,6792e-09	−1,8222	0,0704*
Industry/popul	0,066041	0,683713	0,0966	0,9232

Mean dependent var	0,867958	S.D. dependent var	0,097946
Sum squared resid	−3,09316e-05	S.E. of regression	0,090531
R-squared	−4,79872e-06	Adjusted R-squared	0,145676
F(6, 153)	1,24613e-09	P-value(F)	0,028873
Log-likelihood	−2,86841e-09	Akaike criterion	−307,7576
Schwarz criterion	−1,58149e-08	Hannan-Quinn	−299,0166

Source: Own research (gretl)

According to the research (teble 1) there is a relation between tax revenue divided all revenues and tax and fee. The higher tax revenue related with the higher fee revenue. Table two show relation between other fee revenue divided all revenue and other variables.

Table 5 Model OLS using observations 1-160
Dependent variable: fee1/all

	coefficient	std. error	t-ratio	p-value
const	0,0145723	0,0203027	0,7178	0,4740
industry	−3,78459e-05	3,63498e-05	−1,0412	0,2994
popul	4,25898e-06	1,88678e-06	2,2573	0,0254**
tax	−3,26233e-010	1,50978e-010	−2,1608	0,0323**
fee	1,36111e-010	1,17801e-010	1,1554	0,2497
Industry/popul	0,380181	0,710404	0,5352	0,5933

Mean dependent var	0,024288	S.D. dependent var	0,049229
Sum squared resid	0,380218	S.E. of regression	0,049689
R-squared	0,013268	Adjusted R-squared	-0,018769
F(5, 154)	1,228329	P-value(F)	0,298456
Log-likelihood	256,3446	Akaike criterion	−500,6891
Schwarz criterion	−482,2381	Hannan-Quinn	−493,1968

Source: Own research (gretl)

According to the research there is a relation between other fees, population and tax revenue. The higher municipalities (in context of inhabitants) have higher tax and no-tax income. The same relation is in the case of fees and this variables (table 3).

Table 6 Model OLS using observations 1-160
Dependent variable: fee/all

	coefficient	std. error	t-ratio	p-value
const	0,132042	0,0224222	5,8889	<0,0001***
industry	3,09316e-05	0,000131958	0,2344	0,8150
popul	4,79872e-06	6,1014e-06	0,7865	0,4328
tax	−1,24613e-09	5,14391e-010	−2,4225	0,0166**
fee	2,86841e-09	8,63883e-010	3,3204	0,0011***
Industry/popul	−0,066041	0,683713	−0,0966	0,9232
fee1	1,58149e-08	8,6792e-09	1,8222	0,0704*

Mean dependent var	0,133932	S.D. dependent var	0,097946
Sum squared resid	1,253966	S.E. of regression	0,090531
R-squared	0,177915	Adjusted R-squared	0,145676
F(5, 154)	2,423296	P-value(F)	0,028873
Log-likelihood	160,8788	Akaike criterion	−307,7576
Schwarz criterion	−286,2314	Hannan-Quinn	−299,0166

Source: Own research (gretl)

4 Conclusion

The analysis of municipal revenue in the Czech Republic reveals that the local coefficient of 2 is often introduced, which doubled the basic property tax revenue. This is the mean value applied for more than one half of the surveyed units. Local fee is most often introduced at the level of 500 CZK per capita. From the above, it could be concluded that the municipality rather prefers such values, which uses the vast majority of municipalities. We can hypothesize it is due to a competitive effect, when citizens move from one municipality to another to reach lower taxes or fees, ceteris paribus.

Moreover, it seems there is not a trade-off between the tax and/or fee financing and the choice seems to be independent.

On the other side, the analysis revealed that the level of industrialization is a relevant factor of the financing of the municipality. The Czech municipalities receive resources not only by raising taxes from its residents, but also from any businesses that are located in their vicinity. The correlation coefficient is large and positive and statistically significant.

It also seems that both larger and more industrialised municipalities prefer lower level of fees. It is in accordance with the hypothesis that the revenue needs of larger municipalities are sufficiently financed by the taxes or by other sources.

The analysis also revealed some interesting relations between chosen explanatory variables. It seems that both larger and industry-oriented municipalities vote for the right-wing parties.

According to the research of 160 municipalities there is also a relation between population, tax and fees. Bigger municipalities (in context of number of inhabitant) have more revenues (tax and fees).

Acknowledgments

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Economic and Demographic Determinants of Life Insurance Industry Development

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Abstract: Life insurance industry represents an important part of economy in all developed countries. In European area, the majority of life insurance business is concentrated in the West European countries, where life insurance has a long tradition in the population. Central and Eastern European (CEE) countries are significantly behind in this area, what is documented by the level of their life insurance density and penetration. However, during the last few decades, we have observed extensive growth in these markets. In addition, CEE countries also overcome dynamic changes in economy and demography, during this period. The main aim of the paper is to uncover whether these trends affected the development of life insurance industry in CEE and to identify the most relevant economic and demographic factors. For the analysis, we chose data from the block of four Central European counties: the Czech Republic, Hungary, Poland and the Slovak Republic. We decided to analyse these four CEE countries based on their common cultural, historical and economic similarities. Our panel regressions results suggest that both economic and demographic determinants significantly affect the life insurance industry development in these countries.

Keywords: life insurance industry, industry development, economic determinants, demographic determinants

JEL codes: G22

1 Introduction

Life insurance industry represents an important part of economy in all developed countries. In the European area, the majority of life insurance business is concentrated in the Western European countries, where life insurance has a long tradition between the populations. Central and Eastern European (CEE) countries are significantly behind in this area, what is documented besides other things by the level of their life insurance density and penetration.

However, during the last few decades, we have observed extensive growth in these markets. In addition, CEE countries also overcome dynamic changes in economy and demography, during this period. For example, life expectancy at birth increase from 71,2 years in 1990 to 76,2 years in 2012 in the Slovak Republic and from 71,6 years to 78,2 years for the same period in the Czech Republic (OECD, 2012). Also regarding the economic development GDP per capita more than doubled in Slovakia and more than tripled in the Czech Republic during the same period (OECD, 2012). Undoubtedly these changes have brought new challenges into life insurance business.

In the theoretical and empirical research dominate the results that economic and demographic determinants are fundamental in life insurance development (e.g. Beck and Webb, 2003). Therefore, the main aim and motivation of the paper is to uncover whether these trends affected the development of life insurance industry and to identify the most relevant economic and demographic factors that caused this development. For the analysis, we chose data from the block of four CEE: the Czech Republic, Hungary, Poland and the Slovak Republic. This group of countries is also known as the Visegrad Group or Visegrad Four. We decided to analyse these four CEE countries based on their common cultural, historical and economic similarities.

2 Methodology and Data

The analysis of the role of economic and demographic factors in the development of life insurance industry is based on the data from the block of four CEE counties: the Czech Republic, Hungary, Poland and the Slovak Republic. Data were collected for the period 1995 - 2010 from OECD and World Bank databases (OECD, 2012; World Bank, 2015). Descriptive statistics of dependent and independent variables are shown in Table 1.

Table 1 Descriptive statistics

Variable	N	Minimum	Maximum	Mean	Std. Dev.
Life insurance density	64	12.8	423.87	125.52	103.3513
GDP per capita	64	6 383.18	25 845.00	13 591.45	4 610.537
Annual inflation rate	64	0.02	24.45	0.86	3.0542
Population size	64	5.36	38.29	16.00	13.0592
Age dependency ratio	64	28.17	38.23	31.96	2.5381
Life expectancy at birth	64	69.79	77.08	73.82	1.6835

Source: Authors' own calculations

Data were analysed using the panel OLS regression model with country fixed effects, since the Hausman test confirm the presence of fixed effects of the country. The data in the model were transformed log-log transformation in terms of better interpretability as elasticities, and also in order to ensure normality.

Dependent variable in the model is represented by life insurance industry development, which is approximated by the life insurance density. In the theory, there are three types of the measure of insurance industry development: gross written premium, insurance density and insurance penetration (Beck and Webb, 2003; Browne and Kim, 1993; Outreville 1996; Chui and Kwok, 2008). Gross written premium is an absolute value and do not reflect subject characteristics e.g. country size. Other two indicators correct this feature where insurance penetration is a percentage of total premiums to GDP and the insurance density represents the average amount that a typical person spends on commercial insurance in the country. Based on the non-standard development of inflation during the analysed period in the countries, we decided to use insurance density as our dependent variable. Although this indicator has some limitations, in our view, this indicator better complies for the purpose of our research.

Independent variables represent economic and demographic factors: GDP per capita, annual inflation rate, population size, age dependency ratio and life expectancy. These determinants were selected on the basis of the results of previous studies.

3 Results and Discussion

Based on the theoretical and empirical research, economic and demographic determinants are fundamental in life insurance development (e.g. Beck and Webb, 2003). Our panel regressions results, reported in Table 2, suggest this assumption where both economic and demographic determinants significantly affect the life insurance industry development in these countries. R-squared of the model is 0,91.

From the group of economic determinants, in theory, income represents the crucial element in life insurance industry development (e.g. Zhang and Zhu, 2005; Feyen et al., 2011). Growth of the income of individuals, as well as, whole population increases the affordability of life insurance and effort to retain living standard for the individual and his/her dependents in case of undesirable event (Beenstock et al., 1986; Browne and Kim, 1993; Outreville, 1996; Ward and Zurbruegg, 2002; Beck and Webb, 2003). By contrast, inflation and its volatility have a substantial negative effect to life insurance industry development (Cargill and Troxel, 1979; Beck and Webb, 2002). This relation is a

result of the life insurance nature as a savings product with long term duration (Beck and Webb, 2002). Higher levels of inflation evoke lower expected return which decreases the demand for life insurance in the population. In our model, only GDP per capita represents statistically significant factor. Our results support the assumption that increasing GDP per capita increases the consumption of the life insurance. In contrary, inflation rate do not represent statistically significant factor in our analysis. This result could be due to the non-standard volatility in the levels of inflation during the analysed period.

Table 2 Regression results

	Coefficient	Std. Err.	t	P>|t|	95% Coef. Interval	
GDP per capita	5.0426	1.5258	3.30	0.002	1.9794	8.1059
CPI	0.0197	0.0338	0.58	0.563	-0.0481	0.0875
Population size	13.5044	6.4167	2.10	0.040	0.6223	26.3865
Age dependency ratio	-2.8435	0.7495	-3.79	0.000	-4.3483	-1.3388
Life expectancy at birth	43.7698	3.6773	11.90	0.000	36.3873	51.1524
_cons	-207.9604	24.9795	-8.33	0.000	-258.1089	-157.8120

Source: Authors' own calculations

However, not only the economic development of the country determines the life insurance demand. Life insurance covers financial consequences of undesirable events as premature death or survival and then beyond all doubt also demographic characteristics influence life insurance consumption. These assumptions are also supported by empirical research that identifies the key demographic determinants: size of the population, life expectancy at birth and age dependency ratio (e.g. Schlag, 2003; Lai, 2002; D'arcy and Xia, 2003). The size of the population in the country significantly determines the range of life insurance, namely, population growth increase demand for life insurance since it induce the growth of the market (Mantis and Farmer, 1968). According to Zhang and Zhu (2005), societies with higher life expectancy at birth have a lower demand for life insurance due to the changes in the probability of death. The exception is represented by the life insurance products with saving component where individuals demand increases especially in the area of pension security (Zhang and Zhu, 2005). Consumption of life insurance is connected with the existence of individual's dependents (Beck and Webb, 2003; Schlag, 2003; Beenstock et al., 1986; Browne and Kim, 1993), i.e. those who depend on his/her financial support (e.g. children, elderly, etc.). In general, researchers argue that a higher proportion of young people (younger than 15 years) to the working population lead to a decrease in demand for insurance due to higher saving rates (Zhang and Zhu, 2005). By contrast, in populations with a higher proportion of elderly people (older than 65 years) to working population may increase demand for life insurance with savings component, although it may reduce the demand for premature death risk coverage (Zhang and Zhu, 2005).

In our model, all included demographic variables are statically significant. According to our predictions, population size has a positive effect on life insurance industry development. Positive effect is also revealed by life expectancy at birth. This result indicates that the majority of life insurance products purchased in analysed countries have a saving component. Age dependency ratio affects the growth of the life insurance industry negatively which could indicate that the main aim of life insurance purchase in analysed countries is not driven by the dependents security.

4 Conclusions

The main aim of the paper is to uncover whether the economic and demographic trends affected the development of life insurance industry and to identify the most relevant economic and demographic factors that caused this development. For the analysis, we chose data from the block of four CEE counties based on their common cultural, historical

and economic similarities. We analysed following countries: the Czech Republic, Hungary, Poland and the Slovak Republic.

Our results suggest that both economic and demographic determinants significantly affect the life insurance industry development in analysed countries. From the group of economic determinants, we analyse GDP per capita and annual inflation rate measured by CPI. The only statically significant variable from this group is GDP per capita which influence is positive. By this outcome, we supported previous research that increase in economic performance also increases the consumption of life insurance. In contrary, inflation rate do not represent statistically significant factor that could be due to the non-standard volatility in the levels of inflation during the analysed period.

In the analysis of the role of demographic determinants, we choose three factors: population size, age dependency ratio and life expectancy at birth. All studied variables statically significantly affected life insurance industry development in the dataset. Population size has in line with predictions a positive effect as higher population in the country generate bigger potential for life insurance market. In contrary to theoretical assumptions, the life expectancy at birth has positive effect which reveals that the majority of life insurance products purchased in analysed countries have a saving component. Age dependency ratio affects the growth of the life insurance industry negatively which could indicate that the main aim of life insurance purchase in analysed countries is not driven by the dependents security.

Our outcomes point out that economic and demographic changes affect the life insurance industry in analysed CEE countries. However, the development especially in these areas is very dynamic and future perspectives and predictions are even stronger. These processes including the ageing population process or longevity could have a strong impact not only on public finance as it is usual presented (Péliova and Kováč, 2009) but also for the life insurance industry and private pension schemes. Life insurance companies therefore, have to carefully monitor this development and prepare proper strategies for sustainability of future growth and their financial health (Vávrová, 2014).

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Comparative Study: The Financial Literacy of Students of Economics and Finance versus Students of Law

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Abstract: *The objective of this article is to analyze results of the comparative study related to the financial literacy conducted among the students of the Faculty of Economic and Administration and the students of the Faculty of Law at Masaryk University. The empirical survey was focused on the examination of the financial literacy in terms of personal budgeting, numerical literacy, price literacy, payment methods, how to search for relevant information, breach of a contract and its consequences, indebtedness, right and obligation of consumers in the financial markets. The results of surveyed categories are compared between the students of economic and the students of law which implies interesting results and suggestions for further research.*

1 Introduction

The level of financial literacy in the Czech Republic as well as in the other countries in the world is insufficient (Ministry of Finance, 2010). This fact concerns not only the financial knowledge, but also attitudes and financial behavior. The numerous financial education projects and programs can be approached by people for advice as a quick solution, however, these projects still have a limited range in terms of the number in the target group (Roulet, 2009). Nonetheless, it is supposed that the advisors have the sufficient level of financial literacy and are able and willing to help. The research conducted in the Czech Republic and abroad demonstrates that the level of financial literacy increases with the obtained higher education (ČNB, 2010). Therefore, the university students have been chosen as a suitable group having potentially higher level of financial literacy and the ability to provide useful and effective advice. Universities are able to offer the opportunity to motivate their students to participate in delivering financial education to adult population. The university students received during their studies tools suitable for the application of basic financial principles and skill needed for adopting financial education. For this reason they were identified as convenient disseminators of financial education in the society (Atkinson, 2005). The university's ambience can develop and give possibilities to participate in volunteer activities which can be used as a tool for spreading financial education among population.

2 Methodology and Data

The research conducted by the University of Economics (Hradil, Křížek and Dvořák, 2012) showed that the university students possesses higher financial literacy than the adult population (Ministry of Finance, 2010), although with some deficits. The survey was based on the structure of the "Empirical verification of university students' literacy" project, where the Faculty of Economics and Administration participated in the structure of the questionnaire through the Institute for Financial Market and also modified it according experts on financial literacy (Lusardi, Mitchell and Vilsa, 2010) to establish the level of financial literacy at the faculty.

In our research we focused on two groups of university students in order to identify potential gap in knowledge between students of economics and law. The amount of respondents differs. The sample of law students is larger than the sample of economic students. Also, the numbers of respondents vary within the samples. The number of law

students ranged from 806 to 608, while the amount of students from economic faculty ranged from 393 to 329, in both cases with declining trend as they were answering more questions.

The survey was conducted through online-based questionnaire of 107 questions which principally had more options with one correct answer. In some cases the students were asked to fill the number or circle more than one correct answer. The data was collected in autumn 2014. The questionnaire was presented at the Faculty of Economics and Administration to the students of Basics Finance (taught generally in the 1st year of study). The other target group was students of National Economy and Financial Law (enrolled in the 2nd and 5th year of study) at the Faculty of Law (see Figure 1).

Figure 1 The respondents and their year of study at the university
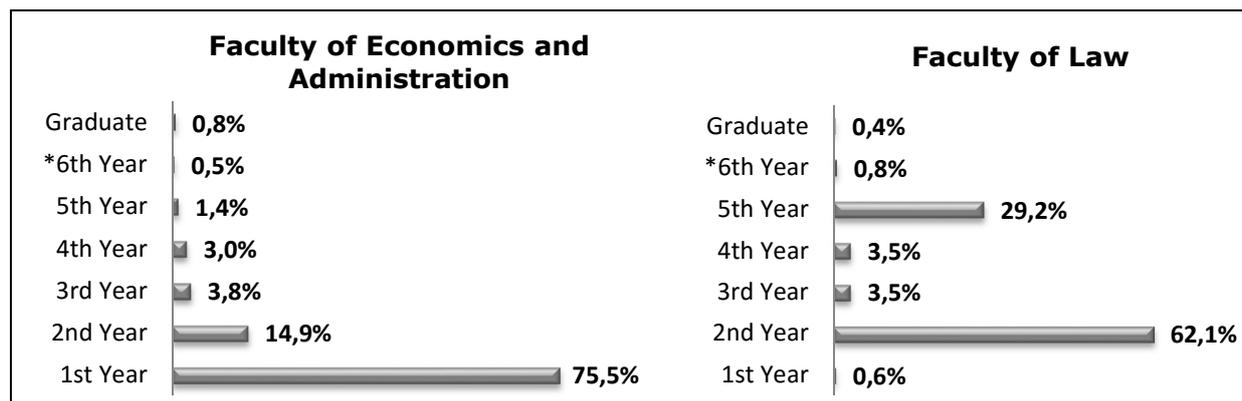
Source: Author's own work based on survey results

The structure of the questionnaire was organized into blocks that were focused on a particular area of knowledge. Firstly, self-assessment questions were asked. Secondly, basic financial concepts and numeracy were tested. This was followed by a block which included payment methods in domestic and foreign currencies, pricing, inflation and macroeconomic situation. The questions regarding the management of personal finance and household debts were tested also, followed by investments, interest rates, loans and credit products. Then, the students were asked about insurance and its basic concepts including insurance fraud. The law literacy was represented by questions concerning to whom contact in the case of financial difficulties, fraud or not understanding contract arrangements. The survey comprises socio-demographic data as well as their attitudes towards delivering financial education or their perception of current level of financial literacy in the Czech Republic. Furthermore, three questions of international comparison testing the knowledge of compound interest, the effect of inflation and the principle of diversification were added. Finally, the students were given the opportunity to express their interest in specific topics related to personal finance.

The collected data was processed in order to conduct analysis by descriptive statistics. The tested hypothesis was whether the students studying economic field score better than the students studying law, and in which topics their scores differ. The results can be seen in the next section.

3 Results and Discussion

First of all, we should pay attention to the profile of respondents. The first group of respondents was students of the Faculty of Economics and Administration (ESF), and the second group students from the Faculty of Law (PrF). As mentioned above, the numbers of respondents varied between and within samples. The gender ratio was relatively balanced in both groups (see Figure 2).

Figure 2 Gender ratio of respondents
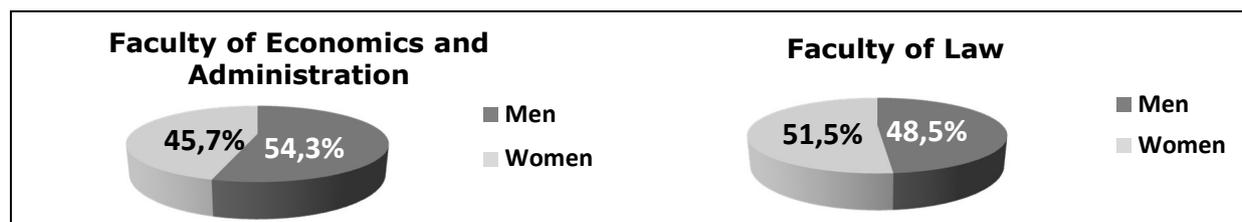
Source: Author's own work based on survey results

The dataset shows that almost 98% of the respondents were university students - our target group, therefore they should have been aware of the tested topics. Although the majority of students marked the questionnaire as difficult and moderately difficult (see Figure 3).

Figure 3 Difficulty of the questionnaire perceived by respondents
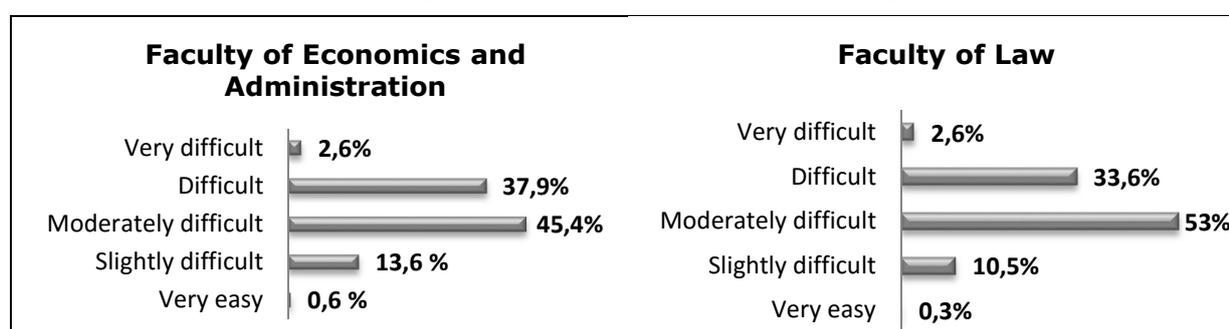
Source: Author's own work based on survey results

In general, the respondents perceived the questionnaire rather difficult than easy to complete it, despite the fact that majority of questions had only one correct answer. In some questions the students had to mark more than one correct answer which led to a decrease in a success rate of correct answers because they did not included all the correct options. Additionally, we asked students if any subject studied at the university helped them to answer to questions from the questionnaire. Around 29% of economic students and 37% law students said that the subjects they had studied at the university helped them to answer several questions, 38% economic students and 41% law students responded that the subjects helped them only with a few questions (see Figure 4).

Figure 4 Did subjects studied at university help to answer the questions?
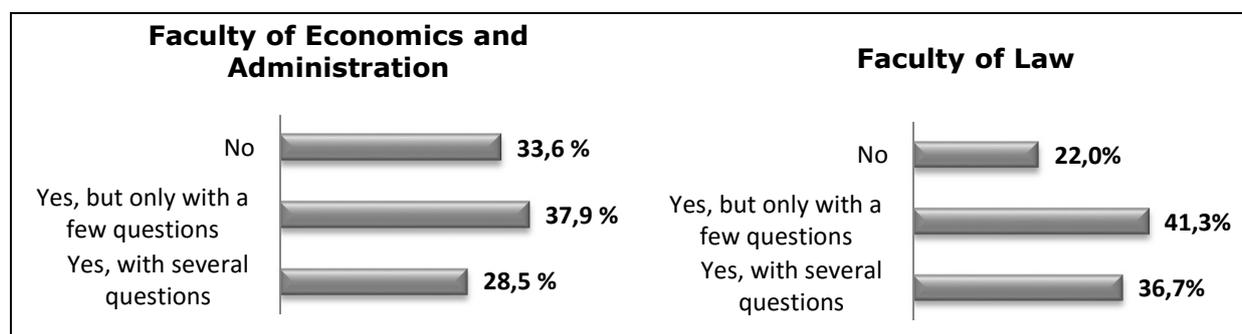
Source: Author's own work based on survey results

We examined also the attitudes and opinions of the students. Firstly, on the self-assessment question whether they understand personal finance, almost 52% of economic students and 45% law students responded positively (see Figure 5). Approximately 52% economic students have been asked for advice on the personal finance issues and over 60% of respondents think that they will be able to advise on the same topic. On the other hand, around 41% law students have been approached with a request of this type

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of advice, also half of them believe in being capable of help regarding a matter of personal finance.

Figure 5 Students' self-assessment of knowledge in personal finance

Do you think that you have a good knowledge in the field of personal finance?

Faculty of Economics and Administration

I don't know	4,3 %
Absolutely not	3,1 %
Rather not	41,0%
Probably yes	47,6%
Definitely yes	4,1 %

Faculty of Law

I don't know	3,8%
Absolutely not	6,0%
Rather not	45,5%
Probably yes	40,2%
Definitely yes	4,5%
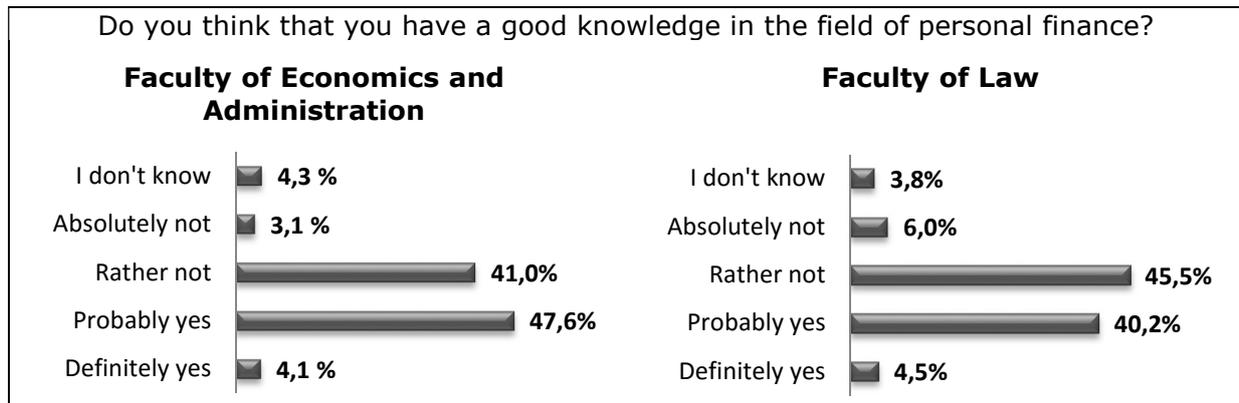
Source: Author's own work based on survey results

Students perceive the level of financial literacy in the Czech Republic as inadequate which is the case in 55% of economic students and 62% of law students. Both groups are significantly cynical hence only 1% of respondents in each sample agreed that the level of financial literacy is good (see Figure 6). The students are also pessimistic about the education of the Czech population in management of finance and proper use of financial products when 75% economic students and 86% law students considered this knowledge as insufficient. However, 43% of the respondents of economic field and 47% of law faculty believe that Czech citizens have adequate access to objective, independent and comprehensive information regarding financial topics.

Figure 6 Students' opinion on the level of financial literacy of population in the Czech Republic

What is the level of financial literacy in the Czech Republic?

Faculty of Economics and Administration

1% 44% 55%

■ Good
■ Average
■ Poor

Faculty of Law

1% 37% 62%

■ Good
■ Average
■ Poor
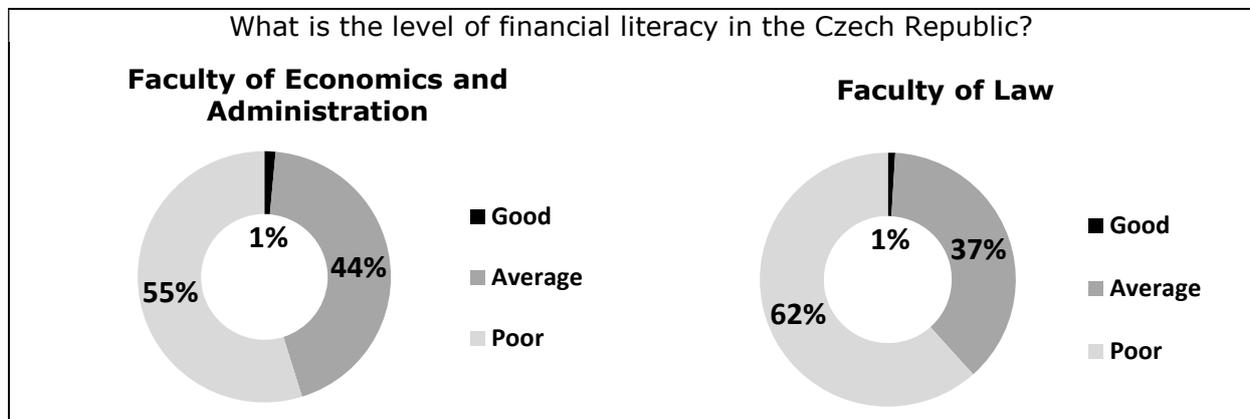
Source: Author's own work based on survey results

According to students, the financial education should be delivered by state institutions, including educational institution (see Figure 7). More than 90% of respondent in each group consider the implementation of an effective and sustainable system of financial education of the Czech population on national level as necessary. Whereas 55% of economic students find the level of financial literacy in the Czech Republic as poor, only 33% would be willing to voluntarily participate in delivering the financial education. In the case of law student, barely 20% expressed interest in the participation of the financial education.

Figure 7 Students' opinion on who should deliver financial education
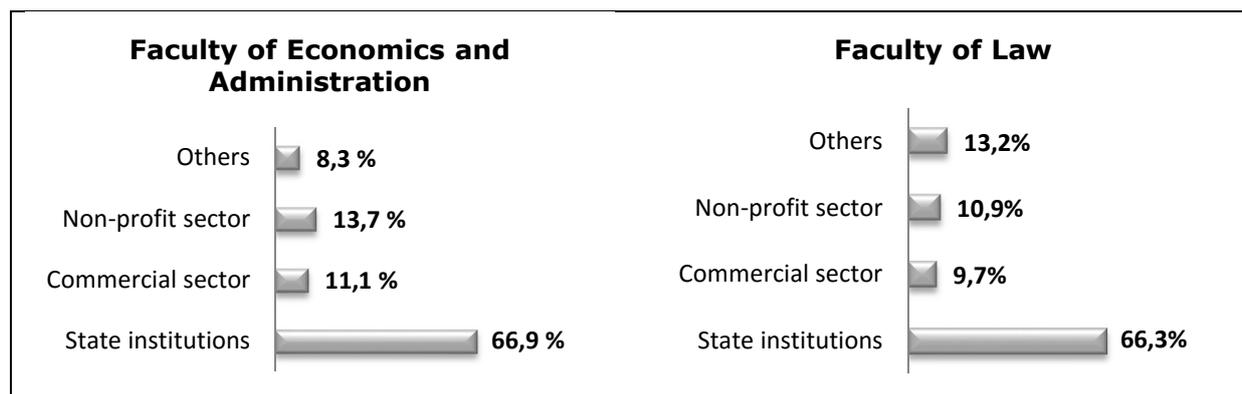
Source: Author's own work based on survey results

In terms of the results of questionnaire, the students of each faculty have proven that they have knowledge on basic financial concepts such as compound interest or the effect of inflation on their savings. On the other hand, both groups of students had difficulties with the concept of diversification used in investments. In Table 1 we can see the results of the questionnaire testing varied topics regarding finance, personal finance or law literacy.

Table 1 The scoring of Masaryk University's students tested in financial literacy topics

Topics	Faculty of Economics and Administration		Faculty of Law	
Numeracy	90,2	*	88,3	
Compound interest	91,2		90,5	
Inflation	91,1	*	88,4	
Diversification	66,5	***	57,2	
Price and financial literacy	22,7		24,5	*
Household finance management and debts	32,3		45,4	***
Investments	32,6	**	29,2	
Loans and interests	46,7	**	42,9	
Insurance	45,1		49,1	**
Law Literacy	39,5		46,6	***
Social system and benefits	22,5		25,4	*

Source: Author's own work based on survey results

The top overall score 91,2 was reached by students of economics in question testing compound interest, whereas the lowest score was 22,5 in topic social system and benefits. The law students obtained the highest successful rate also in compound interest and the lowest in price literacy, but still higher than the students of economics.

The scores demonstrated in the Table 1 is measured out of 100, which was the best possible score. In order to more transparently show the differences in results among the scores of the students of Faculty of Economics and Administration and the students of Faculty of Law, we set the scale indicating the size of this difference as following:

- Difference in scores larger than 5 % is marked by ***.
- Difference in scores between 3% - 4,99 % is marked by **.
- Difference in scores between 1% - 2,99% is marked by *.

The gap knowledge is demonstrated separately in the Figure 8 where the upper part shows higher scores of the law students and the lower part illustrates higher successful rate of the students of economics, measured by difference between the overall results of the students of each group on a particular topic.

Figure 8 Score difference among students of Faculty of Economics and Administration and Faculty of Law
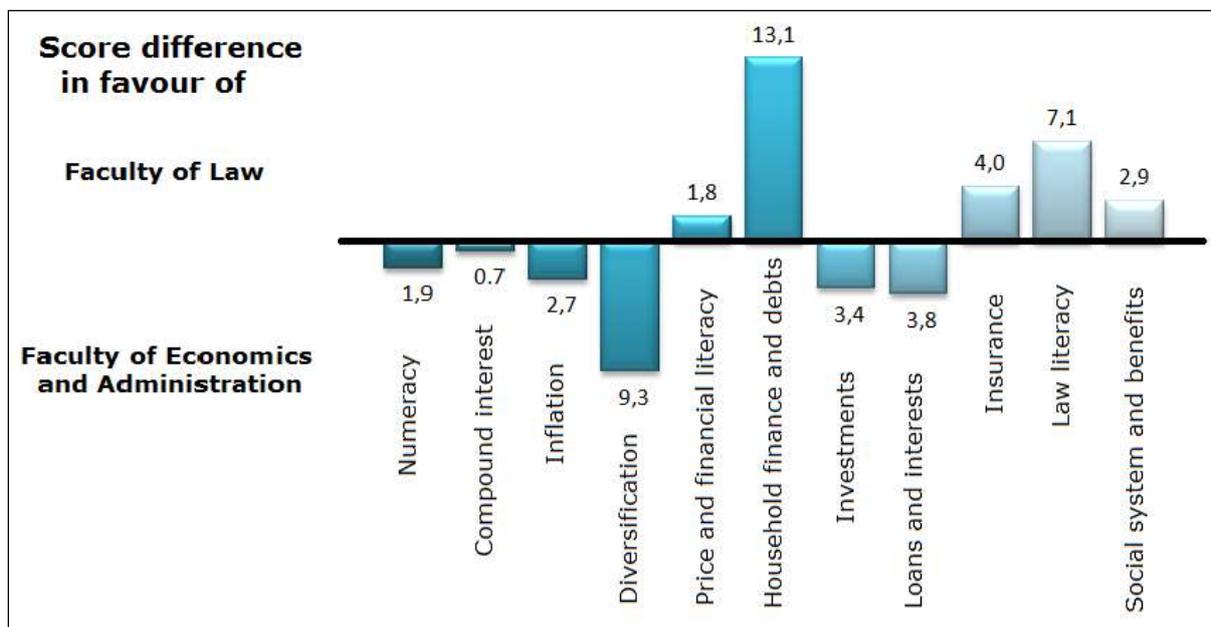
Source: Author's own work based on survey results

The significant gap knowledge of risk diversification when the difference was 9,3% in favour of students of economic field. In contrast, the knowledge of household finance management of debt was higher in case of law students by more than 13%. The law students marked also more correct answers in questions regarding law literacy where the difference was 7,1%. Other differences in knowledge could be seen in topics such as numeracy, inflation, investments and loans where the students of economics gained better score, while in price literacy, insurance, social system and benefits the law students scored higher.

4 Conclusions

In conclusion, the overall comparison of the students of Faculty of Economics and Administration and the Faculty of Law at Masaryk University shows that the knowledge of respondents are similar in some areas concerning mainly numerical questions and basics of finance. Nevertheless, we could have seen some significant differences in such topics as household finance management and debts, risk diversification or law literacy.

The questionnaire consisted of questions testing the students' knowledge of basic financial principles, payment methods, pricing, inflation, budgeting, taxation and welfare benefits, debts, investments, insurance, law literacy, actual economic situation and socio-demographic characteristics. The highest score the students obtained in the tasks testing numeracy, knowledge of compound interest and inflation.

The majority of students consider that the level of financial literacy of the population in the Czech Republic is generally low and that needs change. However, less than third of them are willing to voluntarily participate in delivering financial education. We should also be aware of the fact that almost half of the students is confident about their knowledge of financial issues despite their not so successful score rates. Furthermore, the students have been asked for advice on personal finance in more than half of cases, and they believe in being able to give advice on such matter. For this reason, the financial education of university students, even those who study finance and economics, should not be underestimated. The data showed that even the financial knowledge of university students should be improved.

Acknowledgments

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Management of Insurance Mediation for Small and Medium Enterprises

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Abstract: The aim is to characterise the risks of SMEs and recommending insurance mediation through experts, i.e. insurance intermediaries of commercial insurance companies. Furthermore this paper deals with insurance, insurance brokerage and selected risks of insurance risk by SMEs. Specifically on premium insurance products for SMEs their characteristics and evolution. This paper also presents current issues and trends in risk insurance intermediation for SMEs in Slovakia. As methodology of the papers standard methods of investigation, such as – analysis of existing documents and the relevant laws with evaluation of relevant documents will be used. The results of this paper will be utilized in author's scientific work and lecturing.

Keywords: insurance, premium, insuring, commercial insurance company, insurance mediation, insurance intermediary, risks, small and medium enterprises, insurance products

JEL codes: G 22

1 Introduction

The business of small and medium enterprises (SMEs) has a significant and irreplaceable role in all countries with market economy. Small and medium enterprises are a backbone of the European economy and, in the long term, also the key employer. Their greatest advantages include their flexibility, lower capital intensive nature, innovation possibilities and coverage of more and more differentiated market segments. They are considered to be the most effective, most progressive and thus most important part of economy. The paper will characterise insurance mediation for SMEs.

2 Methodology and Data

The paper will deal with insurance mediation for SMEs as well as their risks and insurability. The methods of description, analysis, synthesis, deduction and comparison will be applied. The conclusion will include the current problems and trends in the mediation of insurance of the risks of SMEs.

3 Results and Discussion

Economic activities carried out by small and medium enterprises also report a number of negative impacts. Small and medium enterprises are threatened by risks occurring during their business activities. Insurance is a significant form of risk financial coverage. Insurance is supposed to cover risks which would result in a significant damage made to enterprises and could even lead to their bankruptcy. The significance of insurance mediation for small and medium enterprises is therefore increasing nowadays.

Problematic areas mainly include complex legislation, low level of law enforceability, high tax wedge and administrative burden in business. On the other hand, enterprises are threatened by risks resulting from business activities (e.g. manufacturing, technical and technological, market, social, financial and other risks).

The range of risks business entities are exposed to has widened over the last decades. The number of risks related to different natural disasters, vandalism, fraudulent behaviour and other risks has increased. Solutions to damages caused by the given risks are offered by insurance and insuring in commercial insurance companies.

3.1 Insurance of the Risks of Enterprises

Managers of every enterprise need to have an overview of risks which could jeopardise the smooth operation of a company in future. Before identifying a risk, both the owner and employees of a company have to carry out an assessment of all company values (material, financial, intangible assets, workforce), which could be a subject to loss or damage. It needs to be carried out in order to find out what risk factors represent a potential threat for their company. A number of risks can be eliminated. They can be influenced and subsequently checked. Such risks are called influenceable risks. They predominantly concern insurable risks upon insurance mediation and insuring the risks of SMEs.

Different risk factors and risk levels are to be concerned upon specifying the amount of premium in practice. Insurance policies are divided into tariff groups according to different factors and risk levels upon calculating premium. Tariff group represents a group of insurance policies with an approximately equal risk. For instance, four risk factors can be considered upon motor vehicle insurance – age of driver, gender, type of car and residential address. The number of tariff groups them equals to the product of the number of factors and levels. Each tariff group has a different premium amount. The process of its calculation is thus simplified in practice. Other risks of SMEs include credit risk, liquidity risk, market risk, currency risk, interest rate risk, operational risk and other risks (Čejková et al., 2011.).

Risk management: Neither people nor business entities can insure all risks jeopardising their lives or business activities. Some risks can also be eliminated in a different way. It is important for them to know the risk management instruments and implement the risk management process. Risk management is a process of risk exploration, its influencing, preventing, damage reduction, and exploring the possibilities of financial coverage of consequences (Martinovičová and Čejková, 2013).

SMEs conclude insurances ordered by law (i.e. compulsory insurance) and voluntary insurance, which a company has decided for. It usually represents the insurance of property, motor vehicle insurance for enterprises and other types of insurance. It sometimes includes life assurance for employees as a form of their motivation.

3.2 Insurance Mediation and Insurance Intermediary

Insurance mediation and mediation activities are defined as:

- the submission of offers to conclude an insurance policy, submission of a draft insurance policy, carrying out other activities leading to the conclusion of an insurance policy,
- the conclusion of an insurance policy,
- cooperation upon insurance administration,
- cooperation upon insurance claims settlement and indemnity especially in relation to a claim, the exploration, assessment and processing of insurance risk analyses,
- the provision of professional counselling in the area of insurance (http://www.nbs.sk/_img/Documents/_PUBLIK_NBS_FSR/Biatec/Rok2012/8-2012/11_biatec12-8_gergelyova.pdf and Act of the National Council of the Slovak Republic 186/2009 Coll. on Financial Mediation and Financial Consultancy).

Insurance mediation is an activity within which insurance is agreed, i.e. it is an activity leading to the establishment of an insurance relationship, a business activity of an insurance company. In a broader sense, it is a whole set of working procedures related to insurance activities.

It includes marketing, promotion of insurance, its administration and settlement of insurance claims (Chovan and Čejková, 1995). Competitive environment on the insurance market creates conditions for citizens and enterprises to choose a quality environment based on their needs and possibilities, which is what insurance intermediaries help them with. Insurance agents typically clarify for clients the offer of insurance products of the insurance company they work for. Insurance brokers provide their clients with impartial and objective consultancy in the sphere of insurance products offered by several commercial insurance companies on the insurance market.

Insurance mediation is only carried out by an insurance intermediary, i.e. a person carrying out such activities for financial or non-financial remuneration on the grounds of a respective licence. Such an insurance intermediary is included in one of the following categories, based on meeting certain qualification requirements: exclusive insurance intermediary, subordinate insurance intermediary, insurance agent, insurance broker.

Insurance intermediary is a professional representative of an insurance company who is supposed to agree insurances for the benefit of one or several insurers. Insurance intermediary can be a dependent or independent insurance expert – a legal entity (a business entity or organisation) or a private entity. Dependent intermediary typically carries out mediating activities for one insurance company and essentially only offers insurance products of such an insurance company. The insurance company is responsible for their activities and also provides them with all means necessary to conclude insurance policies. Independent intermediary is not bound to a particular insurance company. Besides insurance, they also provide policyholders with other services like risk evaluation, consultancy, they form insurances themselves and offer them to insurance companies, they represent the insured against insurance companies, etc. Intermediaries carry out their activities for remuneration (commission), which is included in premium. Intermediaries can be agents (mandataries) of one or another party (policyholder or insurer). The term broker is most frequently used for intermediaries in Slovakia (Chovan and Čejková, 1995).

Insurance intermediaries operate as an interface between an insurer and a policyholder on the market (Ducháčková, 2009).

Exclusive insurance intermediary is a natural person carrying out insurance mediation on the grounds of a mediation agreement with one commercial insurance company.

Subordinate insurance intermediary is a natural person carrying out mediation on the grounds of an agreement with an insurance agent, insurance broker or insurance mediator from a different Member State.

Insurance agent is a natural person or legal entity carrying out insurance mediation on the grounds of an agreement with one or several insurance companies.

Insurance broker can either be a natural person or legal entity carrying out insurance mediation on the grounds of an agreement with a client. Insurance mediation can also be carried out on the grounds of a contract with one insurance company or several insurance companies. Mediation activities in the EU Member States are not regulated by law (http://maag.euba.sk/documents/sprostredkovaniepoistenia_000.pdf).

Mediation activities can also be carried out by a financial advisor, who is a trained person carrying out financial consultancy on the grounds of a written contract on financial advisory provision executed with a client. Mediation activities are carried out in the sector of insurance or assurance (Act of the National Council of the Slovak Republic 186/2009 Coll. on Financial Mediation and Financial Advisory).

Intermediaries carry out their activities on the grounds of a licence issued by e.g. the National Bank of Slovakia in case of the Slovak Republic following the demonstration of their abilities and knowledge necessary to carry out mediation activities. Every intermediary is allocated a licence number under which they carry out mediation activities on the insurance market.

Intermediaries are supposed to facilitate the orientation of businesses on the insurance market. They help them decide for a suitable type of insurance based on client risks, and they provide them sufficient information with regard to their insurance protection. Mediation activities are becoming more and more popular.

3.3 Insurance Products and Small and Medium Enterprises

It is important upon mediating the insurance of risks of SMEs to ensure complex insurance protection of all business activities from small traders up to big industrial corporations.

Insurance products for SMEs, which are offered by insurance intermediaries individually, are suitable to cover the risks of small and medium enterprises and independently employed natural persons. Advantages of such insurance products include their complexity and variability, enabling optimum insurance protection within a single insurance policy. Such complex insurance services provide insurance protection solutions for small businesses, traders as well as manufacturing and commercial companies. We are listing insurance products offered by Allianz – Slovenská poisťovňa a.s., a significant commercial insurance company in the Slovak Republic. Insurance intermediaries play a significant role for the company Allianz – Slovenská poisťovňa a.s. not only upon executing insurance policies, i.e. business. Mediation activities represent a long-term cooperation with clients, establishment of good relationships, professional advisory in the insurance area as well as help following insurance claims. The objective of the commercial insurance company is to have as broad network of insurance intermediaries as possible, who can meet client requirements, propose the best insurance products for the insurance needs of SMEs. Besides understanding the insurance market and good orientation on it quality intermediaries also have business abilities and other knowledge in other areas like psychology, empathy, etc. They have communication skills, which also demonstrate the professional approach. Increasing and regular supplementing of expert knowledge contributes to perceiving the mediation activities in commercial insurance companies as a recognised and respectable profession (Internal materials of the company Allianz - Slovenská poisťovňa, a. s., from the period of 2010 - 2013).

There are several types of insurances for SMEs; we are providing the characteristics of the most significant ones:

- Property insurance, i.e. insurance of buildings and tangible assets insured for the cases of the following risk occurrences: fire, lightning, aircraft explosion and crash, theft and burglary, water from water mains, gale including the risk of hale, earthquake, volcanic eruption, landslide, avalanche and the weight of snow, natural phenomena, robbery, vandalism, vehicle crash, smoke or shockwave, glass breaking and fall of objects.
- Business interruption insurance for the cases of operation interruption due to the suspension or interruption of business activities following an insurance claim in relation to the insured property. It also covers financial losses, as SMEs cannot carry out business activities and generate profit. The following are covered: lost profit, which is the profit a business would have generated if an insurance claim had not occurred in relation to life, health and material damage; fixed costs, which are necessary to exert also during the suspension of operation, e.g. energy, salaries, rent and other costs; costs exerted to shorten or prevent operation suspension in case of an insurance claim.
- Insurance of electronic devices, including hardware and technical risks insurance. The insurance covers the risks of SMEs in the cases of a damage or destruction caused due to operational reasons, human factor, insufficient experience and skills, manufacturing defects, or electricity. Damages occurred during machine operation, during a break in operation, during disassembly for the purpose of cleaning, maintenance or displacement within the place of insurance and subsequent assembly are covered. Damages to electronic equipment, e.g. damages to audio and video devices, telephone devices, data processing

equipment, office equipment and healthcare and surgical equipment, are also covered.

- Liability insurance also applies to belongings not owned, but placed in the plants of SMEs at a determined place or regular place, which are damaged or destructed; damage caused during day-to-day operation in rented premises or buildings, belongings of employees which they use at fulfilling their work tasks.
- Insurance of liability for environmental damage provides a full insurance coverage in terms of valid legislation on environmental liability at prevention and remedy related to environmental damages.
- Insurance of construction risks is suitable for builders, investors, owners, main contractor and subcontractors. All risks related to a work in progress and all works related to construction execution and used stocks of materials, construction machinery and other site equipment are insured.

4 Conclusions

The economic and other activities of small and medium enterprises carry certain risks. Insurance and insuring are a significant form of risk financial coverage. Insurance is focused on covering the risks whose occurrence would cause considerable damages to a business. The importance of insuring the risks of small and medium enterprises through the intermediaries of insurance for SMEs is therefore increasing nowadays.

SMEs execute different types of insurance however they execute voluntary insurance, e.g. insurance of liability for damage caused by the operation of an organisation, insurance of liability for damage caused by an employee and other types of liability insurance, in a smaller extent. Life assurance for the employees of SMEs is also executed in a small extent. The risks of different financial losses resulting from business activities, e.g. loss of profit insurance, professional indemnity insurance, insufficient income insurance, legal expenses insurance and others are not insured. On the grounds of the aforementioned, the paper characterised some other insurance products which are listed in the portfolios of commercial insurance companies.

The paper aimed at characterising the risks of SMEs and recommending insurance mediation through experts, i.e. insurance intermediaries of commercial insurance companies.

Insurance intermediaries nowadays fulfil the task of professional-level advisory on the insurance market. They offer and subsequently sell the products of commercial insurance companies and offer clients their professional services in the area of insurance protection of business entities, including SMEs, and execute insurance policies. They represent an important connecting link between a commercial insurance company and a client on the insurance market.

Our paper characterised insurance products and insurance mediation for small and medium enterprises, specifying particular insurance products for small and medium enterprises in the commercial insurance company Allianz – Slovenská poisťovňa, a.s.

We highlighted the current trends and problems in relation to insuring the risks of small and medium enterprises in the selected commercial insurance company. We also specified the basis of mediation activities and pointed to the importance of an intermediary in insurance relationships. We presented possible risks resulting from the business activities of SMEs and pointed to the importance of cooperation of an intermediary with a client, i.e. the managers of SMEs.

We consider it important to present the accessibility of services provided by risk insurance intermediaries for SMEs. The managers of SMEs can choose the most suitable commercial insurance company and transfer the risks of their business to it, thus ensuring effectiveness, profitability of their business and elimination of losses of their own financial resources.

Acknowledgments

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European Evidence on the Long-Run Superneutrality of Money

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Abstract: *This paper investigates the validity of the money superneutrality concept for the sample of 30 European economies. Using a structural vector autoregressive framework, we examine the long-run response of real output to a permanent inflation shock for each country. We find that for the majority of countries in our sample the long-run superneutrality concept is confirmed as the original increase/decrease in output growth fades in time. We also fail to proof the additional hypothesis that the exception to superneutrality validity is a group of countries with smaller in-sample inflation mean.*

Keywords: money superneutrality, SVAR

JEL codes: C32, E50

1 Introduction

The concept of long-run money superneutrality (LRMS) states that permanent changes in the growth rate of money supply have no appreciable effect on real variables, such as output, real interest rate and real exchange rate. In particular, inflation rate and growth rate of nominal variables change in the similar proportion as the growth rate of money stock. While there is general agreement that changes in the inflation arise solely from an equal change of money supply, there are many supporters to the view that fluctuations in the money supply growth rate maintain an appreciable effect on the real variables determinants – making money not superneutral in the long run. However, there is no agreement about the size and significance of short-term effects and even long-run superneutrality is open to debate. Given the non-unity of monetary theorists, it is important to study this relationship in detail using an empirical approach.

In this paper, we investigate the short- and long-run relationship between real GDP and inflation growth rate. We assume that inflation is a monetary phenomenon (as famously stated by Friedman), meaning that the permanent component of inflation is associated with permanent changes in the growth rate of money supply. Therefore, the effect of a permanent inflation change to real output growth can be positive, negative or zero. If negative, it would mean that a permanent increase of money supply growth rate leads to inflation growth which is known to have a distortive effects on real output. If positive, the inflation growth would lead to a rise of the real output. We expect the estimated long-run responses to be positive for low level inflation countries and negative for countries with high average inflation rates.

Earlier studies of money superneutrality use reduced-form regression analysis, which analysis is certainly incomplete as it has low power and no ability to identify permanent and temporary changes in money supply. As shown by Fisher and Seater (1993) within ARIMA framework, a meaningful superneutrality tests might only be constructed if variables are nonstationary (and thus subject to permanent schocks). Other work in this area is typically either focused on a time series analysis for a single country or uses panel or cross-section data to study a larger group of countries. However, there are still only few studies on international level. Bullard and Keating (1995) use structural VAR model to identify a relationship between inflation and real output on a large sample of 58 countries in a post-war time period. Their results suggest that in sixteen cases the

reaction of output to a permanent inflation shock was zero, in four cases positive and negative only for one country. Weber (1994) finds no superneutrality for G-7 postwar economies, similar to results of King and Watson (1992), who's focused on the postwar US economy using differenced output and twice differenced money in a bivariate VAR model framework. Levine and Renelt (1992) provide a great survey of literature focused on cross-section approach to superneutrality.

We add to the literature by investigating the validity of the money superneutrality concept for the sample of 30 European economies. We are not limited to EU member countries; however, they form a majority in our sample. We find that for eighteen countries the long-run superneutrality concept is confirmed, seven countries have experienced positive output response to a permanent inflation shock, while only two countries have experienced negative response. The remaining countries did not experience any permanent inflation shock.

2 Methodology and Data

Empirical testing of money superneutrality is not an easy task since we have to separate temporary and permanent effects of macroeconomic shocks. Here we partially build on methodology proposed by Blanchard and Quah (1988), a statistical model that is able to decompose output movements into permanent and transitory components (trend/cycle decomposition). The basic assumption is that there are two types of disturbances affecting output. The first (temporary) has no long-run effect on output and the second (permanent) has. These two disturbances have to be uncorrelated at all leads and lags.

Let Y and π denote the GDP and inflation. Let ε^{π} be the permanent inflation shock which is attributed to permanent changes in money supply growth rate. Temporary shock to inflation ε^{y} is permitted to have a permanent effect on output (it could only temporary raise the inflation but permanently lower the output). If we set X to be the vector $(Y, \pi)'$ and e be the vector of disturbances $(\varepsilon^{\pi}, \varepsilon^{y})'$ than X follows a stationary process given by:

$$X(t) = A(0)e(t) + A(1)e(t-1) + \ldots = \sum_{k=0}^{\infty} A(j)e(t-j), \tag{1}$$

where the sequence of A matrices has its upper left entry $a_{11}(j), j = 1, 2, \ldots,$ sums to zero. So if the temporary effect of e on X is given by $A(0)$, subsequent effects are given by $A(j), j \geq 1$ and X is $I(0)$ process, than neither disturbance has a long-run effect on used variables. Our bivariate time series model takes a following form:

$$\Delta \pi_t = \theta_{11}(L)\varepsilon_t^{\pi} + \theta_{12}(L)\varepsilon_t^{y}, \tag{2}$$

$$\Delta y_t = \theta_{21}(L)\varepsilon_t^{\pi} + \theta_{22}(L)\varepsilon_t^{y}, \tag{3}$$

where $\Delta \pi$ is the change in the rate of inflation, Δy is the growth rate of GDP, ε^{π} and ε^{y} are the two disturbances explained above. Each lag operator has the following general form:

$$\theta_{ij}(L) = \sum_{k=0}^{\infty} \theta_{ijk} L^k, \tag{4}$$

for $i = 1, 2$ and $j = 1, 2,$ with each θ_{ijk} as a scalar parameter. The model is defined by two restrictions. First:

$$\theta_{12}(1) = \sum_{k=0}^{\infty} \theta_{12k} = 0, \tag{5}$$

ε^{y} shock is not allowed to have permanent effect on inflation, so the remaining transitory inflation shock will primarily results from nonmonetary disturbances. Second restriction is that the disturbances are uncorrelated.

Considering $\Delta x_t = [\Delta\pi, \Delta y]^T$ and $\varepsilon = [\varepsilon^\pi, \varepsilon^y]^T$, we than rewrite (2) and (3) into:

$$\Delta x_t = \theta(L)\varepsilon_t, \text{ where } \theta(L) = \begin{bmatrix} \theta_{11}(L) & \theta_{12}(L) \\ \theta_{21}(L) & \theta_{22}(L) \end{bmatrix}, \tag{6}$$

In order to obtain the VAR representation, we must rewrite (6) as:

$$\Delta x_t = \theta(L)\Delta x_{t-1} + e_t, \tag{7}$$

where $\theta(L) = A^{-1}B(L)$ assuming that A is invertible, B is a polynomial in the lag operator and $e_t = A^{-1}\varepsilon_t$. Setting $E(\varepsilon_t\varepsilon_t^{'}) = \sum_\varepsilon$ and $E(e_t e_t^{'}) = \sum_e$ we achieve:

$$\sum_e = A^{-1}\sum_\varepsilon A^{-1}, \tag{8}$$

For the detailed discussion on identification of A^{-1} through long-run restrictions see Blanchard and Quah (1988).

We proceed as follows: first, we use the Choleski decomposition of (8) to identify the parameters in A^{-1} matrix. We then use the VAR coefficients and $\theta(L) = A^{-1}B(L)$ to identify structural disturbances and finally we insert obtained parameters into (7). The long-run response of output to a permanent one percent increase in inflation is then obtained through a simple representation from the matrix of long-run multipliers (see Fisher and Seater, 1993 for detailed derivation):

$$d = \lim_{k\to\infty} \frac{\partial y_{t+k}}{\partial \varepsilon_t^\pi} / \frac{\partial \pi_{t+k}}{\partial \varepsilon_t^\pi} = a_{21}/a_{11}, \tag{9}$$

From (9) we can observe several cases:

- $d \approx 0$ - a case of superneutrality,
- $d > 0$ - positive output response to inflation shock and
- $d < 0$ - negative output response to inflation shock.

We use annual real gross domestic product and gross domestic product deflator for 30 European countries from the World Bank's World Development Indicators. We initially chose European sample of countries and then removed those not offering a long continuous set of observation on the both time series. Since we are interested in long-run relationship analysis, we set the criterion on at least twenty years.

3 Results and Discussion

The model specified in section 2 assumes that $\Delta x_t = [\Delta\pi, \Delta y]^T$ follows a $I(1)$ process. We start with adjusted Dickey-Fuller tests to check the stationarity of our time series. To apply VAR modelling, we require permanent shocks to the inflation rate and output. In other words, if the GDP deflator time series are found to be stationary, we cannot expect them to contain any permanent changes. See Table 1 for unit root test results. Note that nonstationarity is the ADF tell null hypothesis.

As seen from Table 1, there is no strong evidence against nonstationarity of either deflator or the output in most cases. However, results for Belarus and Bulgaria show a strong evidence for their inflation time series to be stationary and are therefore removed from our analysis. Appropriate lags are determined by Schwarz information criterion. Last column contains the information whether it was necessary to detrend a variable before entering VAR. Following Bullard and Keating (1995), we run a simple regression with constant, linear time trend and a lag chosen by sequential testing (maximum lag of four). If the t-statistics was significant for corresponding trend with particular lag, the variable was detrended.

Table 1 Unit root tests results and sample characteristics

Country	Sample	N	ADF $\Delta\pi$	ADF Δy	Lag	Detrended
Albania	1981-2013	32	-3.217158	-1.903055	0,0	Δy
Austria	1961-2013	52	-2.711388	-0.938999	0,0	Δy
Azerbaijan	1991-2013	22	-3.101537	-2.415028	0,1	
Belarus	1991-2013	22	-9.286194	No permanent shock to inflation		
Belgium	1961-2013	52	-3.055885	-2.061589	1,0	Δy
Bulgaria	1981-2013	32	-5.022123	No permanent shock to inflation		
Cyprus	1976-2013	37	-1.633321	-1.742528	0,0	Δy
Czech Republic	1989-2013	24	-1.241964	-2.233436	0,0	Δy
Denmark	1961-2013	52	-0.919719	-1.468276	3,0	Δy
Finland	1961-2013	52	-1.941980	-2.164394	3,1	Δy
France	1961-2013	52	-0.665786	-1.384967	1,0	Δy
Germany	1971-2013	42	-1.967419	-1.201229	0,0	
Greece	1961-2013	52	-1.104164	-0.689668	0,0	Δy
Hungary	1992-2013	21	-1.220922	-0.154734	0,0	Δy
Iceland	1961-2013	52	-0.269696	-1.318227	0,1	Δy
Ireland	1971-2013	42	-1.376719	-1.015965	1,0	Δy
Italy	1961-2013	52	-1.841974	-2.005682	1,1	$\Delta\pi$, Δy
Latvia	1966-2013	47	-2.487507	-1.557718	0,0	
Lithuania	1991-2013	22	-1.768670	-1.865441	0,1	$\Delta\pi$
Malta	1971-2013	42	-2.446991	-0.641038	0,0	
Netherlands	1961-2013	52	-0.731018	-1.142075	0,0	Δy
Norway	1961-2013	52	-3.553506	-2.035590	0,0	
Poland	1991-2013	22	-1.765644	-1.814554	1,0	
Portugal	1961-2013	52	-2.502416	-1.307552	0,0	Δy
Romania	1982-2013	31	-1.348325	-1.765026	0,0	Δy
Spain	1961-2013	52	-0.909518	-1.039027	0,0	
Sweden	1961-2013	52	-0.763431	-1.467316	1,0	Δy
Switzerland	1981-2013	32	-1.258970	-2.136021	0,0	
Turkey	1961-2013	52	-1.425644	-1.351642	0,0	Δy
United Kingdom	1961-2013	52	-1.449151	-2.297070	1,0	Δy

Source: World Development Indicators, own computation

We start with the discussion of the long-run response of output to permanent one percentage point increase in inflation. Results are reported in Figure 1 and Table 2. Figure 1 shows the estimated long-run relationship between output and inflation together with 90% confidence bounds. We sort the sample so that countries are in increasing order of in-sample inflation mean. Judging from the graphical representation, we can derive that of 27 countries seven economies (Austria, Germany, Ireland, Netherlands, Poland, Sweden and Turkey) has experienced inflation shock with a positive permanent increase in the level of output. However, Poland has less than 25 consecutive years of observations, so we should refer to this result with great caution. Azerbaijan and Italy has experienced negative permanent shock to output. Again it should be noted that

Azerbaijan time series length is only 22 years. For the rest of countries, the results are not conclusive since their confidence bounds include zero.

Table 2 SVAR analysis results with 90% confidence interval reported

Country	d21/d11	low	high	inflation mean	Long-Run Relationship
Switzerland	-0.166	-0.4	0.07	1.82	-
Germany	0.321	0.111	0.531	2.62	positive
Malta	0.009	-0.17	0.184	3.2	-
Austria	0.65	0.546	0.754	3.35	positive
Netherlands	0.622	0.489	0.755	3.61	positive
Belgium	0.478	-0.137	1.092	3.67	-
France	0.296	-0.098	0.69	4.41	-
Sweden	0.138	0.017	0.259	4.95	positive
Denmark	-0.06	-0.17	0.047	5.01	-
Cyprus	-0.203	-0.69	0.312	5.04	-
Norway	0.028	-0.05	0.106	5.32	-
Finland	0.167	-0.29	0.624	5.38	-
United Kingdom	0.267	-0.062	0.597	5.74	-
Czech Republic	0.734	-0.036	1.504	6.11	-
Ireland	0.43	0.277	0.583	6.27	positive
Italy	-0.297	-0.36	-0.23	6.91	negative
Spain	0.108	-0.39	0.61	7.26	-
Portugal	0.318	-0.137	0.773	8.47	-
Greece	0.256	-0.79	1.304	9.43	-
Poland	0.335	0.216	0.454	12.21	positive
Albania	0.49	-0.35	1.334	16.53	-
Iceland	0.517	-0.06	1.095	17.36	-
Latvia	1.46	-0.07	2.993	28.1	-
Turkey	1.375	0.565	2.184	35.11	positive
Romania	1.762	-0.03	3.557	41.75	-
Lithuania	-0.345	-0.72	0.03	72.54	-
Azerbaijan	-1.698	-2.87	-0.52	173.6	negative

Source: Own computation

Figure 1 Long-run response of the output growth to a permanent inflation shock
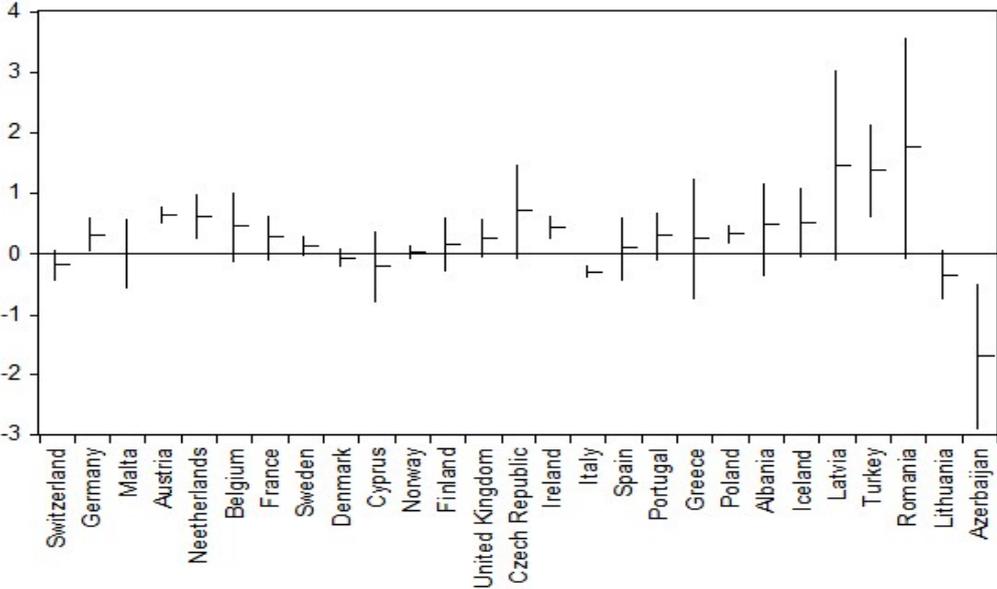
Source: Own computation

Note: Horizontal lines represents point estimates, vertical lines are 90% confidence bounds

Next, we turn our attention to impulse response functions (IRFs) of chosen countries. Figure 2 presents IRFs for six countries: Germany, Ireland, Finland, Iceland, Italy and Denmark.

For Germany and Ireland, unit inflation shock increases real output which permanently remains higher following the shock. This would suggest the non-superneutrality of money for these two cases. There also exist some theoretical and empirical support for the view, studied by some cross-country regressions, that a permanent decrease in inflation will increase the long-run real output (see Barro, 1995 or Motley, 1998), however we did not find any evidence supporting this theory. Also we failed to conclusively proof the hypothesis that positive long-run relationship between studied variables will exist for the initially low level inflation countries as Ireland, Poland and Turkey violate this assumption.

Figure 2 Impulse response functions for Germany and Ireland
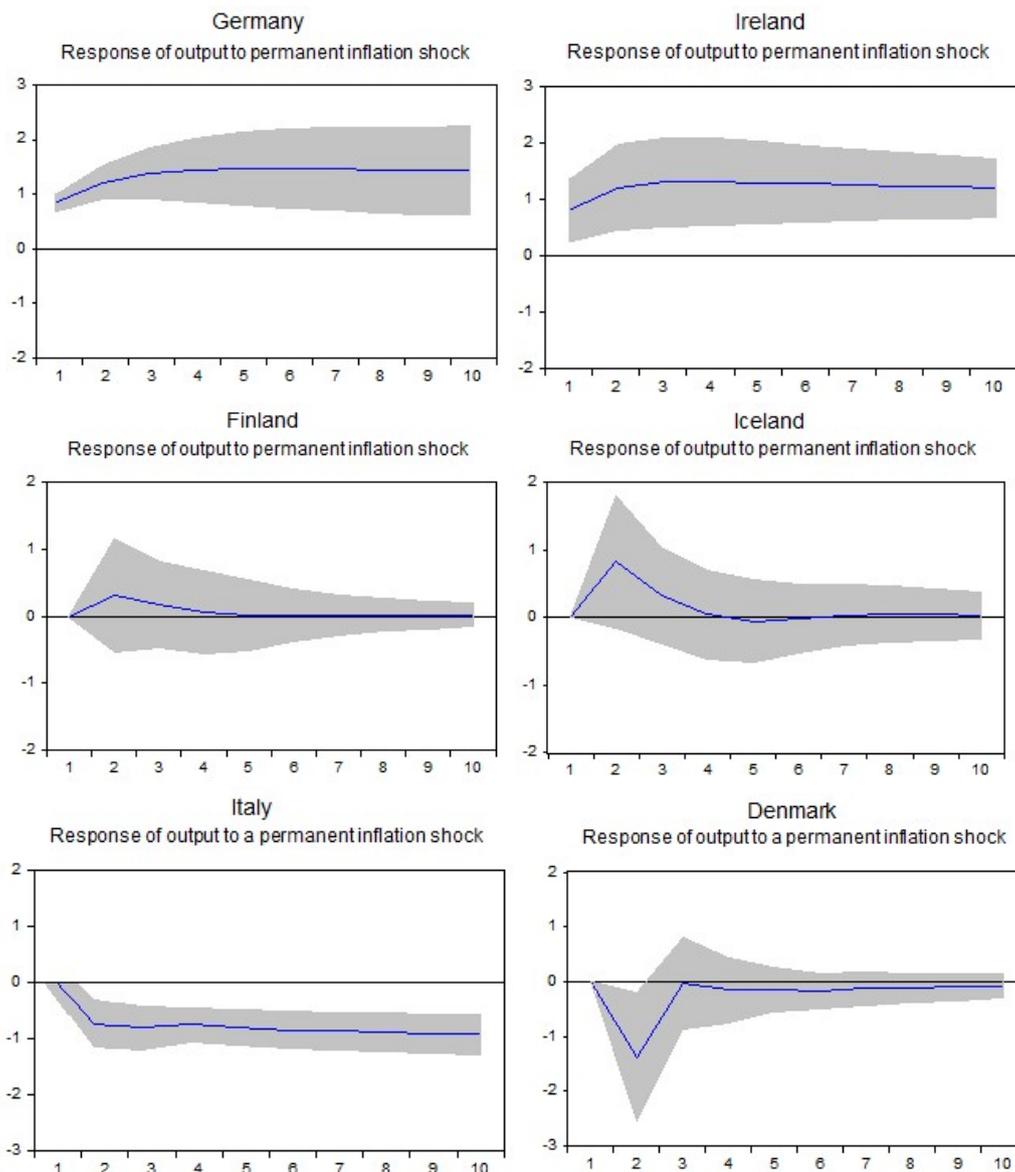
Source: Own computation

As already seen from Figure 1 most countries do not display such positive and statistically significant response to a permanent inflation shock. For example, for Finland and Iceland the initial increase in output is fading out after some time which could be

viewed as an empirical support to the money illusion theory. This situation is observed by the majority in our sample while only number of periods for the shock to disappear differs.

We are now left with the last group of countries to describe. Of twenty seven countries in our sample only four have experienced a negative long run response of output to an inflation shock: Azerbaijan, Denmark, Italy and Switzerland. As mentioned above, Azerbaijan has shorter time series so the results should be treated with caution. Denmark and Switzerland have experienced negative shock to output but this was only temporary as can be seen in Figure 2. Italy, on the other hand, has experienced, according to our SVAR model results, a significant long lasting negative inflation shock to output. The shape of impulse response function corresponds with this claim.

The IRFs obtained for the three groups of countries are applicable to the rest of the countries fitting the same condition. For most of observations in our sample we found empirical evidence supporting money superneutrality concept in a long run. The special cases should be submitted to a more detail explanation in future research.

4 Conclusions

In this paper, we consider long-run money superneutrality concept in modern times for thirty European economies in the classic empirical framework. The estimates are generated through structural VAR model using identifying restrictions motivated by methodology proposed by Blanchard and Quah (1989) and Fisher and Seater (1993). The model allows the permanent effects of inflation shock on the output growth to be zero, positive or negative.

In our analysis, only seven experienced permanent positive shock to output, while two countries experienced negative shock. For the rest of the analyzed countries, the results are not conclusive and their confidence bounds include zero, therefore we can conclude superneutrality. There exists some empirical support for the reversed Mundell-Tobin effect that a permanent decrease in inflation will increase the long-run real output, however we did not find any evidence supporting this theory. Also we failed to conclusively proof the hypothesis that positive long-run relationship between studied variables will exist for the initially low level inflation countries as Ireland, Poland and Turkey violate this assumption. Our results also contradict the study of Rapach (1998) who rejects superneutrality for all 14 industrialized countries in his sample.

While focusing on endogenous growth theories, there is a general prediction that a permanently higher inflation rate will influence the output growth rate. However, we find no empirical evidence supporting this view, meaning that inflation and output growth might be unrelated in a long run.

Acknowledgments

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Management Trends in Slovakia's Tax Revenue Administration and its Process Model for Slovakia's Economic Performance

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Abstract: Within the frame of the research on this matter, we came out form the existing functional organizational structures and tax administration systems not only in Slovakia but also in Hungary, Poland, Czech Republic and Slovenia, where as the fundamental prerequisite of investigation was increasing efficiency of the system globally. On the basis of trend analysis we assume that upcoming reform of Tax and Customs administration will significantly contribute to the increasing efficiency of the system and in the end to the positive perception of taxes as a socially unpopular obligations.

Keywords: taxes, tax reform, tax administration, efficiency, process management

JEL codes: H2

1 Introduction

The management of the Tax Administration in Slovakia is governed by principles introduced after 1989. Despite the effort of recent years to decrease the number of employees, the system of administration of taxes in Slovakia can be considered as inefficient in terms of increasing competitiveness of the state. At present, the general tendency is to complain about the rigid, unfriendly bureaucratic apparatus, which brings about unwillingness of the citizens to comply with tax obligations and more and more strict regulations of the state. The final consequences of such conditions lead in to the mentioned decrease of competitiveness of the state and decrease of its credibility in the eyes of its citizens.

2 Trends in the Management of the Tax Administration in the Slovak Republic

The starting point of the up-coming trends in the Tax Administration of the Slovak Republic is the Programme Declaration of the Government1 from 4 November 2002 which in its Section „Economic Policy" determines following objectives in the area of the administration of taxes: simplify tax legislation, amend parts of tax laws which allow for ambiguous interpretation, simplify the system of penalties in the tax area, decrease direct taxes, shift the tax burden from the direct taxes on to the indirect taxes, review and revaluate the application of property tax rates, unify income tax rates, analyse possibilities of introducing a single tax (rate), strengthen own tax incomes of municipalities, determine own tax incomes of higher territorial units, ensure strict, direct, just and efficient tax collection and decrease tax rates, reduce tax evasion, create new system of horizontal financial settlement.

The Slovak Republic, not only thanks to the last tax reform from 2004, introducing single tax rate, has joined the progressive states of the European Union and has significantly strengthened its attractiveness and competitiveness.

1http://www-8.vlada.gov.sk/index.php?ID=918 – Programme Declaration of the Government 2002

From the point of view of levels of managing taxes within the Slovak Republic, the current situation can be defined as official two-level management system; however, by transposing some of the competencies of the Tax Directorate of the Slovak Republic on to the Branch Offices of the Tax Directorate of the Slovak Republic (hereinafter "BO TD"), it actually is a three-level management system, based on the need of efficient management of 102 local tax offices which cannot be assured form one centre. Such organization of the Tax Administration is not optimal from several reasons, which follow:

- the performance of main business processes is scattered throughout the whole territory, when each local tax office (whether small, middle-sized or large) carries out all processes related to the administration, audit and enforcement of taxes, disabling thus the optimisation of the performance of these processes as well as costs for their performance from the point of view of the tax administration as a whole[2],
- the system of the distribution of local tax offices is not flexible enough because it does not enable to adjust the allocation of the main organizational units to the needs of the taxpayers,
- BO TD have become an administrative level of management within the current system of management, and for quite some time the need to concentrate the performance of certain processes (such as book-keeping, salaries) is becoming obvious as these are unnecessarily split between TD SR and BO TD and thus increase the administration and communication intensity (e.g. demand excessive administration and communication),
- in performing the work tasks of the employees of BO TD, some problems occur which are typical for those organizations who apply nother levels and types of management apart from the linear management (such as project, technical, methodological etc.).

Based on the above mentioned, the outline of the planned reform takes into regard the principle of justice, neutrality, simplicity and un-ambiguity, efficiency and elimination of double taxation. Analyses of the Institute of Financial Policy from years 2001 – 2004 show the reasons and obvious need for a reform:

- complicated tax legislation – intelligibility,
- too many exceptions, exemptions and allowances leading to social ineffectiveness because the production and consumption is not governed by the demand and offer but by the tax advantages,
- variability of setting tax base enabling optimisation on the side of the taxpayer is increasing administrative costs and decreasing the efficiency of control.

From the point of view of management and organization of the Tax Administration, further reasons can be:

- complexity of organizational structure – ambiguity and duplicity of the functions and competences on the central and regional level,
- costly administrative apparatus of the Tax Administration,
- non-transparent project management, decreased possibility of controlling processes,
- unwillingness of taxpayers to pay taxes.

The intention of the Government of the SR declared in the mentioned Programme Declaration of the Government of the SR is to carry out a reform of the Tax Administration in such a way which will make it more effective, with the aim of providing methodological assistance to the compliant taxpayers and detecting those taxpayers who are avoiding taxes. The objective is to create conditions for efficient co-ordination of the public authorities, to guarantee the access of the citizens to the internet and secure the interconnection of information systems of the public authorities. Another priority of the

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[2]Rašner, J., Rajnoha, R.: Nástroje riadenia efektívnosti podnikových procesov (Instruments for Managing Effectiveness of Business Processes), Zvolen: Technical University in Zvolen, 2007.

Ministry of Finance of the SR is the reform of the Customs Administration aiming at unification of the processes of collecting taxes, fees, customs and contributions. The reform should thus proceed in two phases, the first stage shall be the merger of the Tax and the Customs Administrations, the second stage will unify the collection of taxes, fees, customs and insurance contributions.

3 Tax Reform and its Expectations – Selected Results of the Survey

- time schedule of the carried out survey: 01/11/13 - 31/10/14
- geographical structure: Prešov and surroundings, Košice and surroundings, Banská Bystrica – township, Bratislava – township
- age structure of respondents: 18 – 60 years
- employed as: clerks, businessmen, students, some did not disclose their occupation
- representative sample: 1 500
- number of collected and completed questionnaires: 2873

Graphical representation of the age composition of the respondents on the Figure 1.

Table 1 Quantitative analysis by age of the respondents

Age category	Table of frequency: Age			
	frequency	cumulatively (frequency)	rel. frequency	cumulatively (rel. frequency)
26 - 35	369	369	24,60000	24,6000
36 - 45	359	728	23,93333	48,5333
46 - 60	388	1116	25,86667	74,4000
18 - 25	384	1500	25,60000	100,0000
Ch-D	0	1500	0,00000	100,0000

Source: Own processing based on processed questionnaires

Figure 1 Distribution of respondents in terms of their aeg
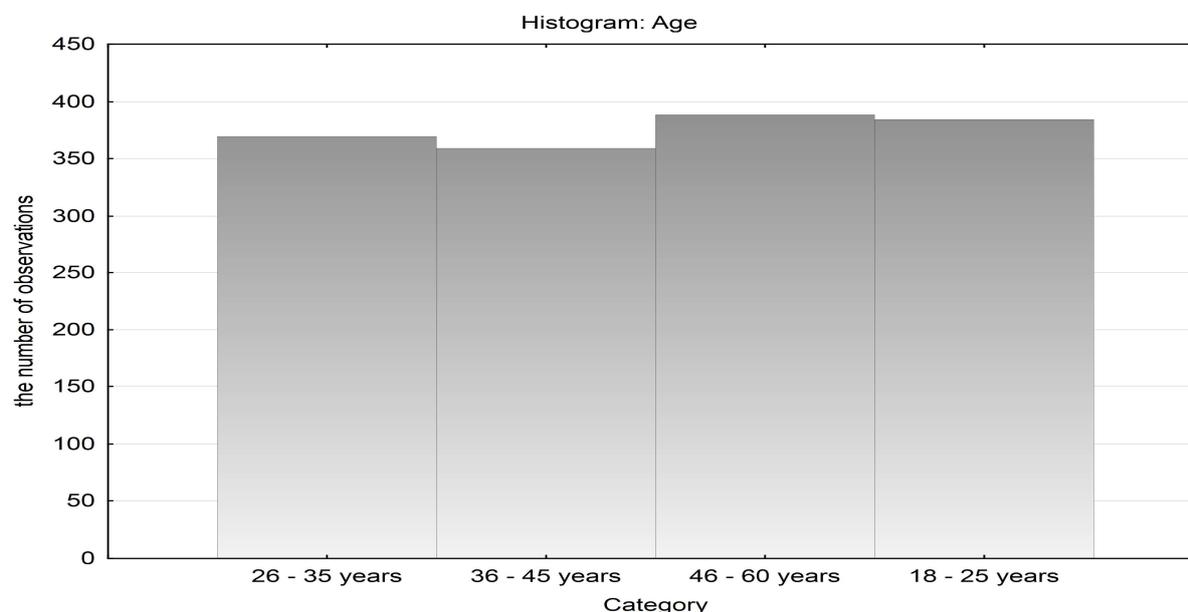
Source: Own research based on the processed questionnaires

Based on KMO test results, we can state that the reached value 0,895 points out the suitability of using factor analysis by processing the research data. The statistics of Bartlett's Test of Sphericity acquires the value of 91,564 by the number of degrees of freedom 66. The corresponding p-value is 0,001, so the hypothesis that the realization of selection correlation matrix with 12 considered variables is a unit matrix is rejected on

the asymptotic level of significance 0,05. The assumptions of the application of factor analysis have been thus fulfilled and its usage for the data analysis is justified.

Table 2 KMO test, Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,895
Bartlett's Test ofSphericity	Approx. Chi-Square	91,564
	Df	66
	Sig.	0,001

Source: Own processing based on processed questionnaires

For the assessment of the number of common explanatory factors, which are in the background, the matrix of eigenvalues has been realized, whereby the method of principal components has been selected as an extract method. According to Kaiser's criterion, the eigenvalue has to be more than 1. As it follows from Table 10, there are 6 common factors in the background of research data matrix with 12 variables. These six common factors explain cumulatively 54,21 % of the total dispersion.

Table 3 The table of eigenvalues

Values	Extraction: Main components			
	eigenvalues	% total (spread)	cumulatively (eigenvalues)	cumulatively (%)
1	1,185683	9,880695	1,185683	9,88070
2	1,129148	9,409563	2,314831	19,29026
3	1,073402	8,945018	3,388233	28,23528
4	1,054944	8,791202	4,443177	37,02648
5	1,035592	8,629930	5,478769	45,65641
6	1,026562	8,554679	6,505330	54,21109

Source: Own processing based on processed questionnaires

For the objectification of the number of common factors, we will use the Sutin's graph of eigenvalues (graph 2), the sixth factor in sequence can be called the break-even (critical) point (regarding the slight change in the point 7). Thus to explain the variability of respondents' replies, six common factors can be used.

Figure 2 Graph eigenvalues
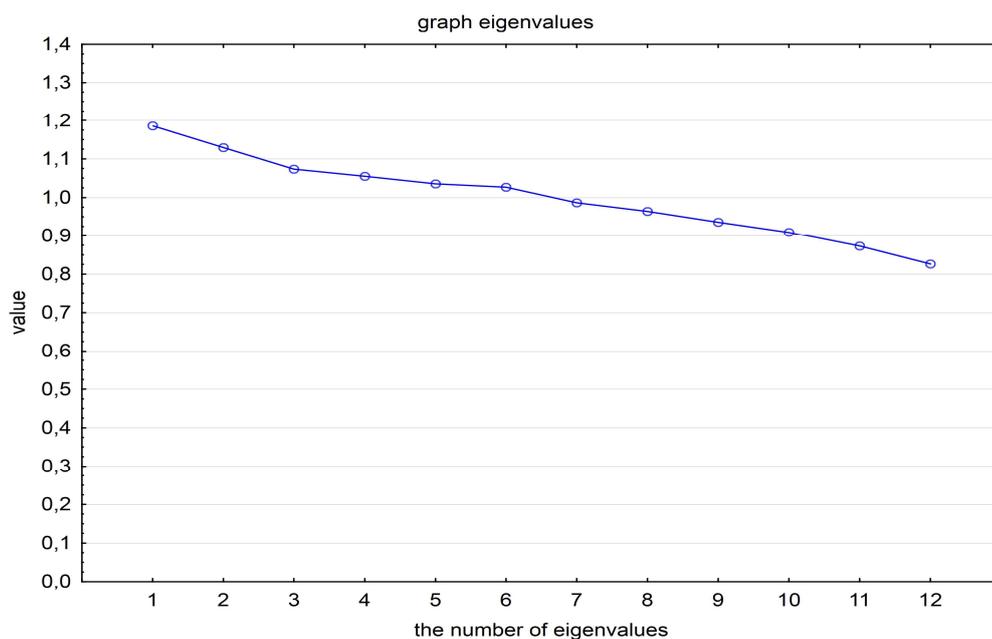
Source: Own processing based

4 Qualitative Survey

Table 4 Table factorial loads

criteria	Factor of load questionnaire Extraction: Main components (marked loads are > 0,600000)					
	Factor (1)	**Factor (2)**	**Factor (3)**	**Factor (4)**	**Factor (5)**	**Factor (6)**
1.willingness	0,247480	0,407177	-0,204138	0,247481	-0,119360	0,033054
2. competency	-0,055020	**0,681540**	0,006961	-0,072000	0,265825	-0,143970
3. collection of taxes	0,208022	0,193628	0,113738	**0,679960**	0,040969	0,043309
4. collection of customs	0,132591	0,065282	-0,075041	-0,362360	0,549920	-0,087184
5. collection of contributions	**0,681574**	-0,003556	-0,035835	-0,123172	-0,073222	-0,030383
6. administrative burden	0,059084	-0,045698	-0,032242	-0,025110	0,030893	**0,857102**
7. time saved	-0,019193	0,122648	**0,774129**	0,022727	-0,152556	-0,235661
8. accessibility	**0,631722**	-0,009950	0,037099	0,165632	0,066763	0,065606
9. electronisation	-0,246514	0,479615	0,041579	-0,040427	-0,365937	0,364061
10. transaction costs	0,164648	0,278856	0,194761	-0,570120	-0,033999	0,152900
11. mailing costs	-0,015977	0,224791	**-0,620793**	0,032046	-0,174028	-0,250511
12. workforce costs	-0,152111	0,061086	0,068049	0,266025	**0,711466**	0,122212
Interpretation of variance	1,103872	1,051341	1,092940	1,102301	1,094582	1,060295
quite	0,091989	0,087612	0,091078	0,091858	0,091215	0,088358

Source: Own processing based

From the total number of submitted completed questionnaires, I have selected 1500 to constitute the representative sample so that the homogeneity remains maintained. The results from Picture 2 show an overall discontent with the tax and customs system in the SR; the most critical being the costs for the workforce dealing with the taxes and customs, as well as time needed to process this agenda.

Taking into account the expected benefits of the tax reform as provided in the document "Outline of the Reform of the Tax and Customs Administrations with the View of Unifying the Collection of Taxes, Fees, Customs and Insurance Contributions", elaborated by the Strategy Section at the Ministry of Finance of the SR, the planned reform should bring about improvement in the perception of all set criteria, and with the highest probability the current discontent will with the gradual introduction (of the reform) change for better.

5 Conclusion

Slovakia through the above mentioned process of tax reform approaches an effective tax system which will lead to the increase of effectiveness and competitiveness of our state amongst the EU member states. The impacts of the suggested changes can be divided into two main categories. The first category comprises the benefits of the reform of the Tax and Customs Administration in terms of saving the costs and time, growth of value added, efficiency of work etc. The second category is represented by the expenditures used for individual objectives of the reform of the Tax and Customs Administrations. Both of these categories can further be divided into the impact on taxpayer, that is the client / user, and impacts on the public administration. From the financial point of view, the highest importance have the impacts with permanent or repeated effect.

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Capital Structure and Credit Risk in the Czech Republic

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Abstract: *The paper deals with the risk management being a very important concept for any business as most financial decisions revolve around the corporate cost of holding risk. This issue is particularly important to banks since risk constitutes their core business processes. This paper examines how credit risk affects a bank's capital structure, profitability and lending decisions. Banks hold private information about their borrowers that makes sales of loan difficult due to adverse selection.*

Keywords: risk management, capital structure, banks, lending

JEL codes: G21, G32

1 Introduction

Risk is a degree of uncertainty of net future returns. It is specified as a fall in a firm's value because of the changes in the dynamic business environment. Credit risk is the "risk arising from the uncertainty of an obligor's ability to meet its contractual obligations" (Monetary Authority of Singapore, 2006). Banks hold capital as a buffer against insolvency, and they hold liquid assets – cash and securities – to guard against unexpected withdrawals by depositors or drawdown by borrowers (Berger et al., 1999).

Risk management at banks has come under increasing scrutiny. Banks and bank consultants have attempted to sell sophisticated credit risk management systems that can account for borrower risk (e.g. rating), and, perhaps more important, the risk-reducing benefits of diversification across borrowers in a large portfolio. Financial market frictions such as moral hazard and adverse selection problems require banks to invest in private information that makes bank loans illiquid. Quality of risk management increases the profitability of banks, ensure business continuity.

Risk management is the key area in banking, as the risks are an integral part of the financial transactions and the quality of risk management has a significant impact on the profitability of banks. In the financial markets, and thus in banking, the rate of return is directly proportional to the amount of a taken risk. The revenues or creation of the profit is one of the fundamental objectives of the business. The owners of the banks expect a proper valorisation of their investments.

Bank management requires sophisticated and highly skilled management. The goal of effective management of the bank is to manage internal conflict between business approach, maximizing of the profit and the need for prudent behaviour and minimizing of the risk. Given these conflicting tendencies that are accountable for business results and risk management they are divided and assigned to different departments of the bank. Good risk management is the kind of "business card" of the bank's management.

Risk management is an essential from a microeconomic point of view on the one hand - quality risk management increases the profitability of banks and ensures business continuity. On the other hand from a macroeconomic perspective, quality of risk management in banks and financial institutions increases the stability of the banking sector and thereby it promotes economic growth.

State of the banking sector is crucial for the condition of the whole financial market and by extension the entire economy. Negative developments in the banking sector have an impact on the stability of the financial system and unstable financial system threatens the economic growth. Because of the current level of interconnection of the economies, there is a risk of spreading the negative developments into other different countries.

Therefore risks in banking are so important and they became the subject of international regulation system.

The main platform for the regulatory rules creation is the Basel Committee on Banking Supervision (BCBS), which operates at the Bank for International Settlements (BIS). The Committee shall provide standards and recommendations for banking supervision. One of the fundamental rules is represented by International Standards on Capital adequacy.

Risk management is undergoing intensive development, e.g. in the nineties of the 20th century there were not used tools such as VaR (Value at Risk), credit risk modelling or RAROC (Risk Adjusted Return on Capital).

Current development in banking sector emphasizes the quality of comprehensive risk management. The most recent expression of access to bank risk management represents the Basel III regulatory rules expressed in the document Basel III: A global regulatory framework for more resilient banks and banking systems.

2 Credit Risk Management

Credit risk management is part of a comprehensive management and control system of the Bank. Credit risk can be considered a major risk because it is associated with any active business. Banks typically process management strategy, which includes the principles of risk management processes including risk identification, monitoring and risk measurement system of limits and restrictions. The objective of risk management is to maintain the efficiency of business operations and business continuity.

Credit risk is the risk of loss given default partner (the debtor) that fails to meet its obligations under the terms of the contract, thereby causing holders of claims (creditors) loss. These obligations arise from lending activities, trade and investment activities of payment and securities settlement when dealing on own account and foreign. There may be cases where the counterparty fails to honour its undertaking and has not paid or partially due principal and interest, or have to repay on time. Credit risk is the part of the majority of balance sheet assets and off-balance sheet transactions series (bankers' acceptances or bank guarantee).

Credit risk includes the risk of default, the guarantor or counterparty risk from derivatives. This risk is present in all sectors of the financial market, but the most important is in the banks, especially from lending activities and off-balance sheet activities, including for example warranties. Credit risk also arises inputting into derivative transactions, securities lending, repurchase transactions and negotiating. Derivative transactions the banks carried out an analysis of the creditworthiness of counterparties and monitor its changes.

In the process of lending bank must carefully consider all risk factors as potential losses (loss of the principal outstanding - foreign sources, loss of foregone interest income) may be higher than the potential gain (only interest income). The negative development loan cases has an impact not only in financial results, but also on the liquidity of banks and the large volumes then also affect the credibility of the bank and its market position.

Credit risk can be divided into four categories (Cebenoyan, 2004):

1. Direct credit risk: the risk of loss of a partner's failure in full or partial value, ie., loans, bonds, notes. Within this category are the so-called earmarks. sovereign risk - this is the risk of failure of a foreign government agencies or government-supported
2. Credit equivalent exposure: risk of losses from defaults partner off-balance sheet items ie., provided with loan commitments, guarantees, letters of credit provided, derivatives, etc.
3. Settlement risk: risk of losses from failures in the process of settlement of transactions (supplies), especially in a situation where the value of the partner was supplied, but the value of a partner is not yet available

4. Large credit exposure risk: risk of losses from exposures to a particular partner country, economic sector, instrument, etc.

Credit risk management is an everyday essential function of the bank activity. To ensure business continuity, banks must act prudently and create so-called economic capital to cover unexpected losses. Creating sufficient capital to cover risks also requires a controller, especially today on the platform of the outputs of the Basel Committee on Banking Supervision.

Management of credit risk involves four basic elements:

- Identification of credit risk (where and how risk arises)
- Credit risk measurement (quantification of emerging risks)
- The credit risk (risk reduction by way of limits, prevention)
- Monitoring of credit risk (comparing actual size of the exposure the size required, resp. max. allowed).

In managing credit risk is paying attention to all its planes, ie. control the level of individual credit transactions, the loan portfolio and the level of the banking portfolio.

According to CNB Decree, the term risk management means (www.cnb.cz):

- Establishing procedures for identifying, evaluating or measuring, monitoring, reporting and possible risk reduction,
- Determine the limits of the system used in risk management, including procedures and information flows in excesses
- Defining the principles of control mechanisms and risk management activities, including monitoring compliance with established procedures and limits for risk management and verification of outputs of the evaluation or measurement of risk.

Management of credit risk begins to clients' requests for active trade (trade active trade on the asset side of bank balance sheets, ie. Bank is a creditor, a client is in the position of the debtor) and continued evaluation stage. If the application is approved and agreed terms of trade, the transaction is affected. Subsequently carried out regular monitoring of repayment and fulfilment of agreed conditions. If both parties fulfil their obligations, the risk management process ends with the settlement of the principal, interest and accessories of the borrower and returns the collateral. If the borrower fails to meet its obligations, the process of risk management through regular monitoring and evaluation of the situation of the client, or the application of the collateral, or can get into the recovery phase (Inderst, 2008). Recovery phase ends at best the settlement of the amount due or sale of assets, depreciation in the worst case situation of active trade.

3 Credit Risk and Lending

The exposure to credit risk occurs when negotiating active business, which is one of the main sources of income for banks; see Figure 1, which shows the total balance of the Czech banking sector since 1993 to 2014.

Figure 1 Total Balance Sheet in Czech banking sector since 1993 to 2014
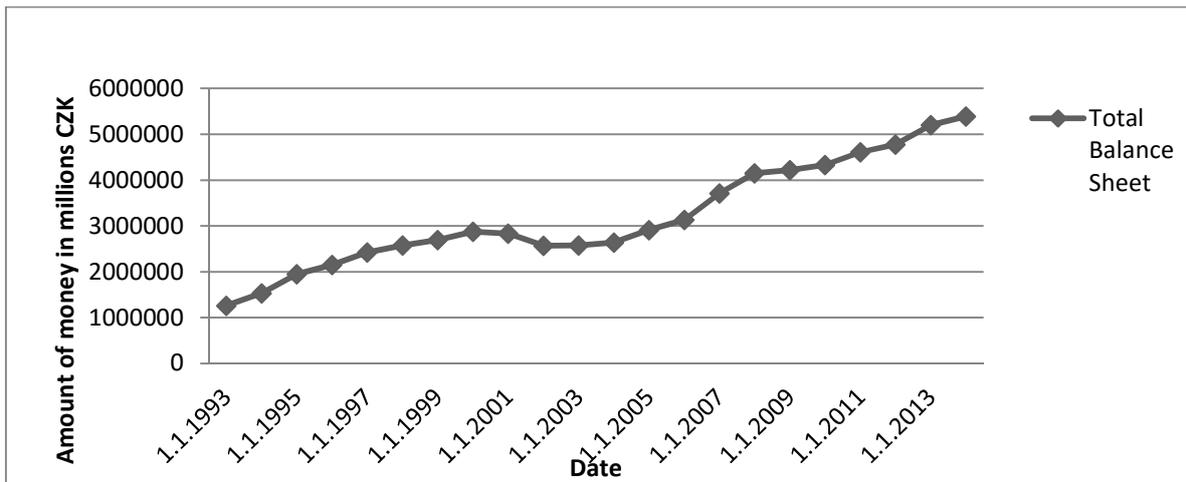
Source: Data from www.cnb.cz

It is clear that total balance sheet has had growing tendency during these years.

Following figures show the development of the Czech banking sector. Figure 2 shows that sheet total of the Czech banking sector amounted at the end of 2014 was 5388814,4 millions CZK. As it is visible in the Figure 3 the volume of deposits of residents constitutes the most significant item of liabilities of the banking sector 3435304,5 millions CZK at the end of 2014. Dominant item active sides of the balance are loans granted to residents (credits). Their volume reached 3735017,6 millions CZK at the end of 2014.

Figure 2 Deposits from Client in Czech banking sector since 1993 to 2014
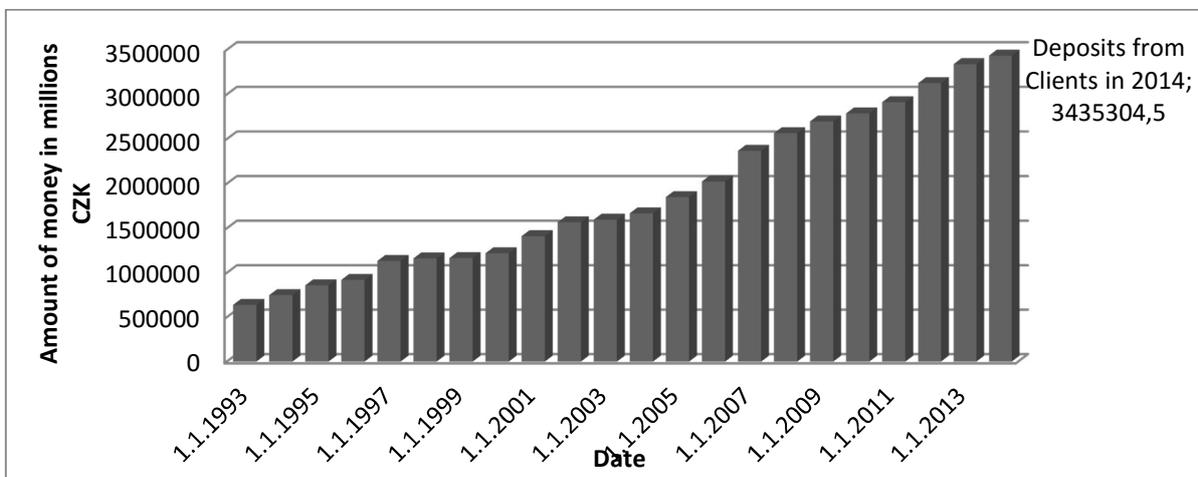
Source: Data from www.cnb.cz

In official resources it was not possible to find data for Czech banking sector since 1993 to 2001, so Figure 3 shows just Credits to clients in Czech banking sector since 2002 to 2014. This fact can make the tables not so comparable but it is clear that during years 2002 and 2014 the figures for client's ´deposits and clients´ credits are quite similar – they are closely connected.

Figure 3 Credits to Clients in Czech banking sector since 2002 to 2014
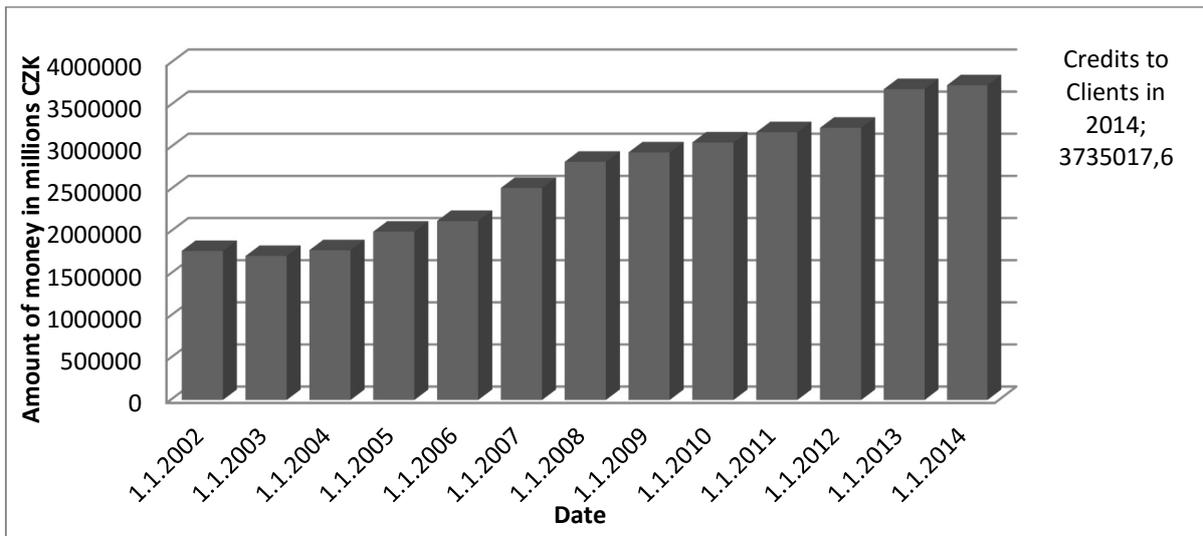
Figure 4 expresses the development of the profit from current period in Czech banking sector since 1993 to 2014. At the beginning of this period were just small profits and some loss because of the need of economic transformation. Since 2002 there is a clear almost constant growing tendency.

Figure 4 Profit from Current Period in Czech banking sector since 1993 to 2014
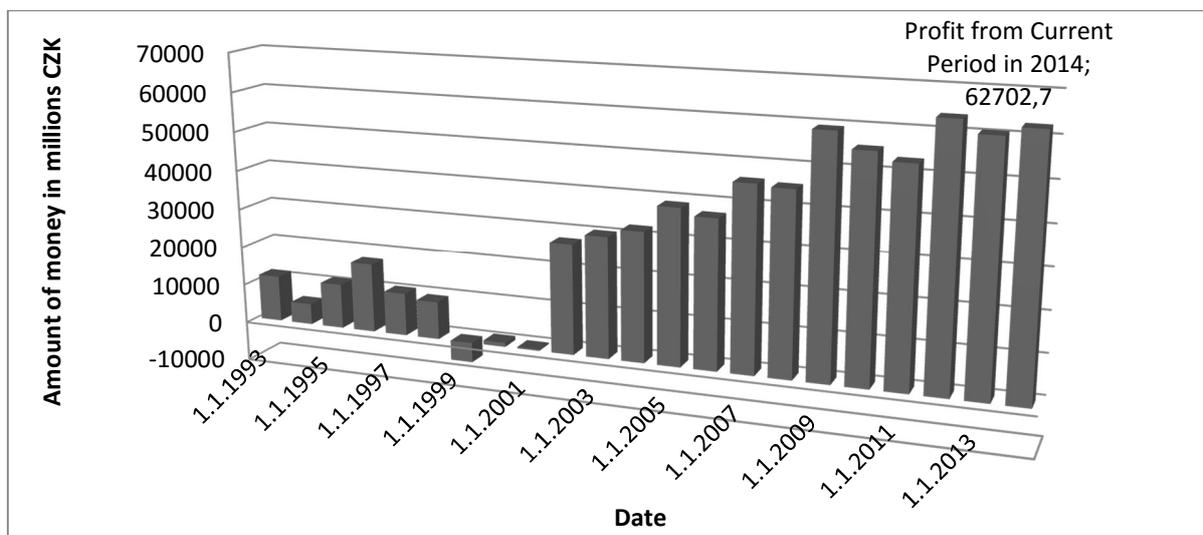
4 Research Methods

The study examines how bank credit risk affects capital structure, profits and risk. The used sample contains time series from all banks supervised by the country's Central Bank (Czech National Bank). The study uses financial data of the banks collected from Czech National Bank. The proposed period was from 1993 to 2014. The statistical method of analysis that has been used is cross-sectional regression analyses with credit risk exposure as the dependent variable. The explanatory variables include capital (CAP), liquidity (LQT), and profitability (PRE).

Time series data involves figures from 31.12.XXXX of every year from 1993 to 2014. The general form of the time series model can be specified more compactly as:

$$Y_{it} = a + \beta X_{it} + \ddot{e}_{it} \ldots \tag{1}$$

where the subscript i represents the cross-sectional dimension and t denotes the time-series dimension. The left-hand variable Y_{it}, represents the dependent variable in the model, which is the firm's debt ratios. X_{it} contains the set of independent variables in the estimation model, a is taken to be constant overtime t and specific to the individual cross-sectional unit i. If a is taken to be the same across units, Ordinary Least Squares (OLS) provides a consistent and efficient estimate of a and β.

5 Empirical Results

As we can see in the following tables the most important for the capital, profitability and liquidity of the banks are deposits from the clients. From these three variables is the most dependent on the clients´ deposits the Capital in Table 1. Sufficient capital reduces credit risk very much. When a bank has enough capital it is able to fulfil the needed liabilities.

Table 1

Capital	coeficient	deviation	t-statistic	p-statistic	
Deposit/Credit	1.39692	0.049814	28.04	7.72E-11	***
Deposit/Credit by CNB	−0.0321271	0.169715	−0.1893	0.8536	
Deposit/Credit by other banks	0.370807	0.296478	1.251	0.2395	

Source: Data from www.cnb.cz

In Table 2 we can see the dependency of Profitability on clients´ deposits – it is not so strong, because profitability is influenced also by other elements like investment strategies very much.

Table 2

Profitability	coeficient	deviation	t-statistic	p-statistic
Deposit/Credit	0.0149454	0.00418062	3.575	0.006***
Deposit/Credit by CNB	−0.0115041	0.00951175	−1.209	0.2573
Deposit/Credit by other banks	0.0218274	0.0187538	1.164	0.2744

Source: Data from www.cnb.cz

Liquidity is closely connected to Capital and it is depended on clients´ deposits too as can be seen in the Table 3. Banks are at risk of some unpredictable behaviour like run on the bank (when a lot of clients withdraw their money at the same time) a clients´ deposits and liquidity can drop.

Table 3

Liquidity	coeficient	deviation	t-statistic	p-statistic
Deposit/Credit	0.922255	0.076652	12.03	3.0E-04***
Deposit/Credit by CNB	−0.69773	0.203977	−3.421	0.0268**
Deposit/Credit by other banks	−0.03524	0.348708	−0.1010	0.9244

Source: Data from www.cnb.cz

6 Conclusions

Credit risk management is different in the case of large credit exposures and, in the case of small credit exposures (e.g. consumer loans). For large credit exposures is a strong emphasis on evaluation and ongoing monitoring of the individual client. External or internal credit ratings for small credit exposures are more applied portfolio approach is used rather pointing, which is usually the output of statistical models.

It is clear that total balance sheet has had growing tendency during these years. Volume of deposits of residents constitutes the most significant item of liabilities of the banking.

Dominant item active sides of the balance are loans granted to residents (credits). Some of the figures at the beginning of watched period (1993-2014) were influenced by underwent economic transformation.

From used time series model it is clear that the most important for the capital, profitability and liquidity of the banks are deposits from the clients. Those three variables influence a credit risk and have to be seen in this consequence. Czech National Bank manages the risk and as we have seen on the data (and it is its philosophy too) it is more or less successful in stabilising the financial market.

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Performance of Actively Managed Funds in Various Stages of Business Cycle

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Abstract: *Discussion between advocates of active and passive investments has been going on for at least three decades. Broadly speaking, evidence in favor of passive investments against active investment strategies has grown very strong during that period bringing active investments almost on the edge of obscure methods. The aim of this paper is to contribute to mentioned discussion by submitting an analysis of performance of actively managed funds in various stages of business cycle with given benchmarks within particular time periods and on particular markets. The analysis shall enlighten relation between outperformance or underperformance of actively managed funds in comparison with selected indices which can be treated as index products in the post-financial crisis realm.*

Keywords: active investments, passive investments, investment strategies, investment funds, financial markets

JEL codes: G11, G14

1 Introduction

Active investment strategies has been an only option for individual investors for many decades and has been dominating investors' thinking ever since. Passive investment products, which brought a possibility of passive investment strategies to retail investors became offered as late as in the 1970s since when passive investing was gaining ground among public. Such products include index certificates, index funds or ETF. The clash between active and passive investing is one of the greatest dilemmas within investment theory and practice. We shall start with defining actively and passively managed investments: actively managed investments are characterized by an effort to outperform market yield and reach an excessive return. On the contrary, passively managed investments restrict themselves to achieve market yield. Active investing carries a chance for investor to reach an excessive return in exchange for the risk of non-reaching even market yield. Passive investing can never lead by definition to lower than market yield.

Since the 1970s index products hand in hand with passive investment strategy enjoyed worldwide expansion exposing extraordinary difficult task lying before each active investor - to achieve an excessive return repeatedly and not by chance - which most of active investors do not. There exist vast amount of studies showing underperformance of active strategies. Reasons for that are analysed in many books and papers, so we do not need to analyse them here. However, it deserves several remarks. Whatever choice we make about an investment portfolio it will always generate transactional costs. Second, if we are to make informed decisions about portfolio, it will consume at least our time, if not money.

This paper shall contribute to discussion between proponents of active or passive investing in the realm of Czech financial market and its retail segment. The aim of this paper is providing an analysis of performance or outperformance of widely used mutual funds representing active strategies in comparison with selected indices which are underlying assets of passive investment products in various stages of business cycle represented by bull or bear market.

2 Literature Review

There is plenty of available studies on active or passive investment strategies and performance and costs of actively or passively managed financial products and their comparison - notably studying foreign funds and products that are not easily available to domestic non-professional investors - along with analyses of mixed strategies, developing models of portfolio management etc. Let us mention "Active Share and Mutual Fund Performance" by Antti Petajisto (2013) or "Active Versus Passive Index Management: A Performance Comparison of the S&P and the Russell Indexes" by S. Gowri Shankar (2007) as a few examples of many. The situation is much different in the Czech Republic. There is still lack of Czech literature on this issue. We can give an example of "Advanced investment strategies in environment of financial markets" of Jan Budík (2012). There is no recent study known to the author that would provide an analysis of performance of domestically offered equity funds. Despite this fact we are able to formulate an hypothesis that actively managed equity funds offered in the Czech Republic outperform benchmark during economic growth but do not match benchmark in times of financial crisis and economic downturn.

3 Methodology and Data

Collective investment still occupies a minor position in the allocation of households' savings in the Czech Republic. Investments to mutual funds accounted for 8,8 % in 2013 while life insurance accounted for 10,9 % the same year which makes about 510 billion CZK altogether (MFČR 2014). However, unit-linked insurance occupies only a part of life insurance. Data of CAP (2013) show, that premium paid on unit-linked insurance exceeded 22 billion CZK only in 2013. Most recent data of AKAT (2015) shows that the amount of money invested both in domestic and foreign mutual funds offered in the Czech Republic exceeded 360 billion CZK in March 2015 reaching its all-time high. The share of domestic and foreign funds in total has been virtually identical for a couple of years. Most of the sum is allocated to non-equity assets, though. Particularly to bond and mixed funds, making 117 billion CZK (65 %) both. Mixed funds usually invest large amount of their equity in stocks, yet it is difficult to quantify the exact sum held in this type of assets. Equity funds hold almost 67 billion CZK (18,5 %) in assets. There are some marginal types of funds which invest for the most part to stocks or equity funds too. These are funds of funds and real estate funds holding nearly 21 billion CZK (6 %) in assets. For the purpose of our paper we have chosen fourteen equity funds under certain criteria, which performance will be analysed and compared with three indices in five time periods. Chosen time periods are shown below:

- 1st October 2004 till 1st October 2007
- 1st October 2007 till 1st March 2009
- 1st October 2004 till 1st March 2009
- 1st March 2009 till 1st May 2015
- 1st October 2004 till 1st May 2015

Determination of such time periods deserves some explanation. The first three year era was characterised by rapid growth of shareholders' value to all-time high. We begin on October 1, 2004 in order to have a complete data of performance for all selected funds. This era peaked in Autumn 2007. In the following time span there was a gradual downfall of markets culminating in the financial crisis of 2008. The bottom was reached during February and March 2009, so we took March 1, 2009 as the next and last turning point from when we have been experiencing markets' recovery up to now.

Funds that have been chosen had to comply with several requirements. First, they had to prove sufficiently long track record to be comparable within the whole time span. Second, they had to invest in an appropriate and unambiguously defined portfolio of assets. Third, where possible, we picked funds managed by the most significant investment companies, banks or insurance companies which are offering them to retail domestic customers. Most of them are open-end mutual funds and many of them also (few of them

exclusively) serve as an investment option within unit-linked insurance. The first five of funds contains:

- AXA zahraniční fond
- ČSOB akciový mix
- ISČS Global Stocks FF
- NN Global Equity (EUR)
- Pioneer akciový fond

These funds invest in global equities or equity funds with no territorial or sectorial restrictions. They focus especially on developed countries and equities contained in the world's most used equity indices, such as S&P 500, EuroStoxx 50, FTSE 100 or MSCI World. The MSCI World Index, which some of these funds are explicitly trying to outperform, proved to be a suitable benchmark for the comparison. The second five of funds contains:

- NN European Equity (EUR)
- Pioneer Funds Euroland Equity
- Raiffeisen Europa Aktien (R)
- KBC Equity Fund Europe
- Allianz Akciový fond Evropa

These funds invest in European equities without sectorial or monetary boundaries. They focus especially on large international companies from Western Europe contained in the Europe's most used equity indices, such as EuroStoxx, FTSE 100, DAX or MSCI Europe. Concerning the fact that funds' assets are not limited to equities quoted in EUR, MSCI Europe has been chosen as the most appropriate benchmark for the performance of these funds. The last four of funds contains:

- ISČS Sporotrend
- ING International Český akciový fond
- NN Fond českých akcií
- Akciový fond Generali

These funds invest in equities which are quoted on Central European stock markets, namely on the Prague Stock Exchange. It has proven very difficult to find funds with sufficiently long history that meet this criterion. Therefore we have chosen only four of them. This group of funds has been purposefully chosen to be compared with the PX index as a benchmark. All funds we are dealing with are actively managed by fund managers and explicitly struggle to exceed market yield.

4 Results and Discussion

The comparison of performance of all funds with respective benchmarks resulted in an outcome which can be best depicted in tables and graphically:

Table 1 Outperformance of funds compared with MSCI World Index in %

	AXA zahraniční fond	ČSOB akciový mix	ISČS Global Stocks FF	NN Global Equity (EUR)	Pioneer akciový fond
1.10.2004 - 1.10.2007	-29.80	-8.29	-30.11	0.42	-15.43
1.10.2007 - 1.3.2009	13.67	-7.93	9.41	2.23	1.81
1.10.2004 - 1.3.2009	4.24	-15.22	-3.12	3.66	-4.15
1.3.2009 - 1.5.2015	-27.74	2.69	-2.72	33.70	-28.65
1.10.2004 - 1.5.2015	-8.34	-31.27	-6.74	22.57	-28.44

Data sources: Bloomberg, AXA, ČSOB, ISČS, NN, Pioneer

Figure 1 Performance of funds compared with MSCI World Index in %

Legend:
- MSCI World
- AXA zahraniční fond
- ČSOB akciový mix
- ISČS Global Stocks FF
- NN Global Equity (EUR)
- Pioneer akciový fond
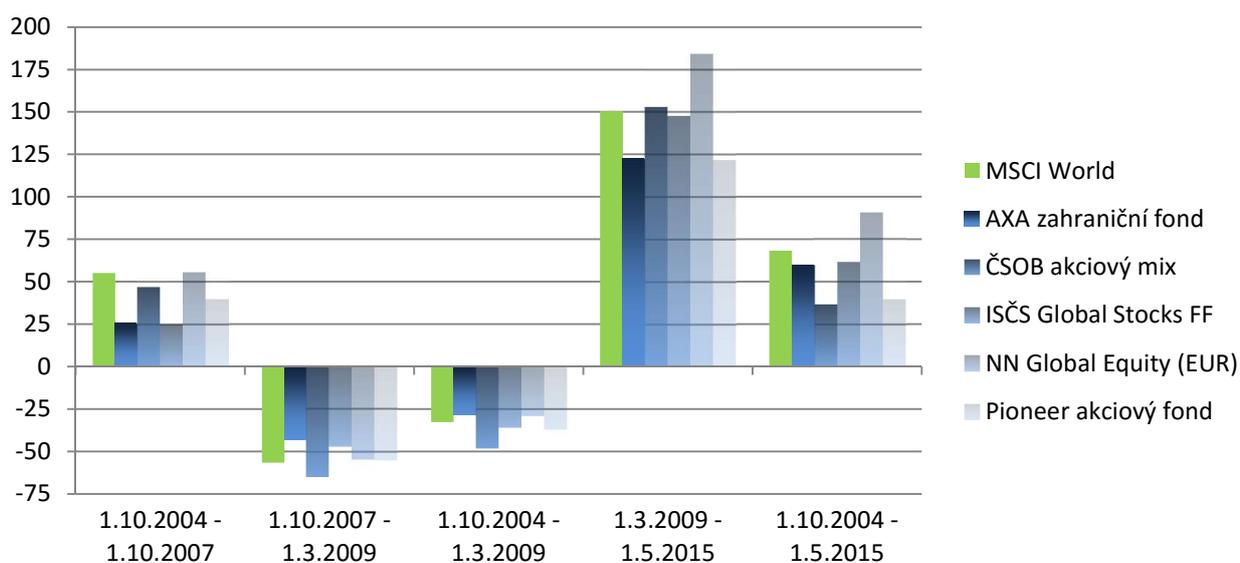
Source: Own depiction

Table 2 Outperformance of funds compared with MSCI Europe Index in %

	NN European Equity (EUR)	Pioneer Funds Euroland Equity	Raiffeisen Europa Aktien	KBC Equity Fund Europe	Allianz Akciový fond Evropa
1.10.2004 - 1.10.2007	0.46	13.05	5.58	2.51	-13.32
1.10.2007 - 1.3.2009	2.41	2.96	-1.85	-3.71	3.30
1.10.2004 - 1.3.2009	3.94	10.60	-0.56	-4.78	-1.07
1.3.2009 - 1.5.2015	50.12	40.84	10.55	16.58	-48.47
1.10.2004 - 1.5.2015	34.27	56.44	5.68	6.89	-34.40

Data sources: Bloomberg, NN, Pioneer, Raiffeisen, ČSOB, Allianz

Figure 2 Performance of funds compared with MSCI Europe Index in %

Legend:
- MSCI Europe
- NN European Equity (EUR)
- Pioneer Funds Euroland Equity
- Raiffeisen Europa Aktien
- KBC Equity Fund Europe
- Allianz Akciový fond Evropa
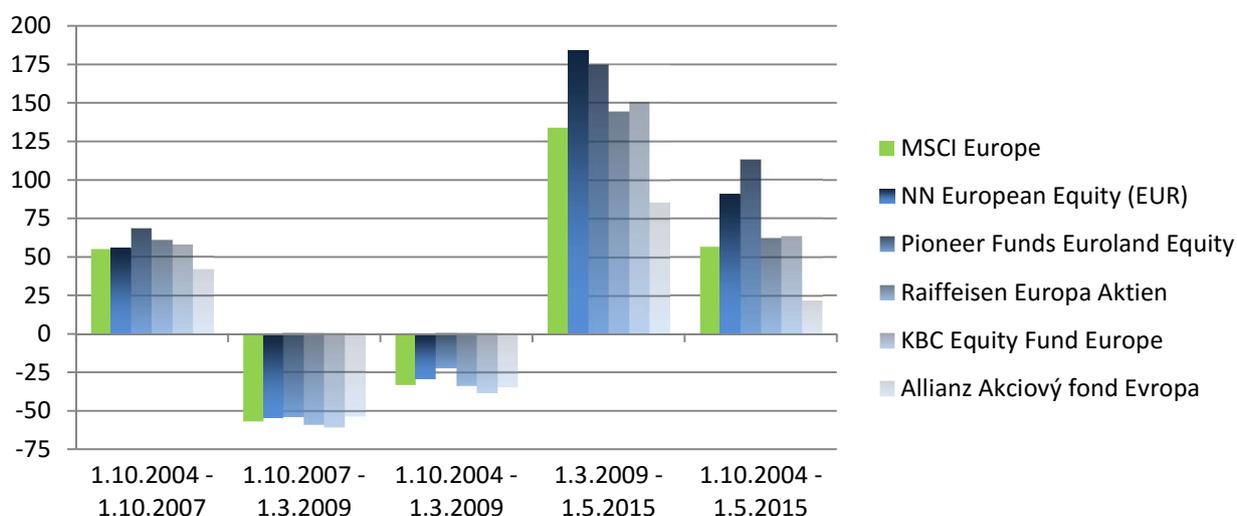
Source: Own depiction

Table 3 Outperformance of funds compared with PX Index in %

	ISČS Sporotrend	ING International Český akciový fond	NN Fond českých akcií	Akciový fond Generali
1.10.2004 - 1.10.2007	-17.27	-5.01	-33.92	-65.42
1.10.2007 - 1.3.2009	-4.05	2.83	2.97	29.86
1.10.2004 - 1.3.2009	-12.60	4.80	-5.16	22.53
1.3.2009 - 1.5.2015	14.00	51.53	30.88	-27.87
1.10.2004 - 1.5.2015	-11.72	46.10	12.61	9.45

Data sources: Patria, ISČS, ING, NN, Generali

Figure 3 Performance of funds compared with PX Index in %
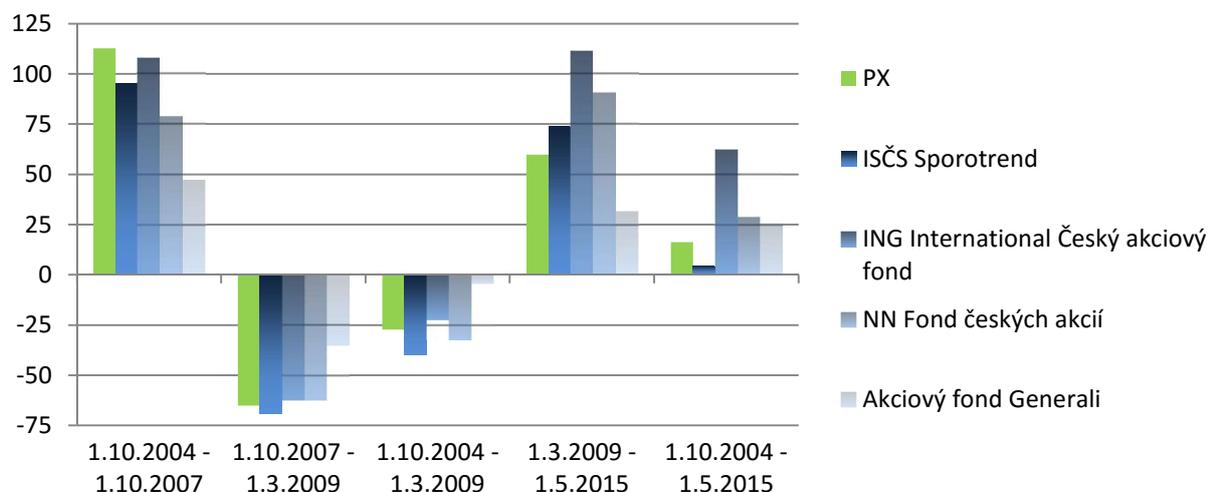
Source: Own depiction

Performance of funds compared with MSCI World did not confirm given hypothesis. From 2004 till 2007 all funds except NN Global Equity (EUR), that reached the benchmark, underperformed in comparison with MSCI World. The slump period from 2007 till 2009 saw a better performance of funds. AXA zahraniční fond and ISČS Global Stocks FF experienced lesser losses than benchmark while NN Global Equity (EUR) and Pioneer akciový fond performed roughly the same as MSCI World. ČSOB akciový mix dropped deeper than the index. This fund showed relatively worse performance than benchmark between 2004 and 2009 unlike the others that achieved roughly the same rate of return (RoR) as did the index. From 2009 till 2015 only NN Global Equity (EUR) has made a huge recovery which significantly surpassed the RoR of MSCI World. ČSOB akciový mix and ISČS Global Stocks FF remained more or less equal to benchmark with AXA zahraniční fond and Pioneer akciový fond performed notably worse. NN Global Equity (EUR) within the whole time span was the only fund that outperformed benchmark. The remaining funds did not achieve its performance.

Performance of funds compared with MSCI Europe brought somewhat different results that contradicts our hypothesis slightly less. All funds with an exception of Allianz Akciový fond Evropa outperformed benchmark in the first period, albeit closely. Their losses during financial meltdown were approximately the same as those of MSCI Europe. As a result, NN European Equity (EUR) and Pioneer Funds Euroland Equity managed to outperform benchmark over the 5-year period from 2004 till 2009. The rest of the funds underperformed, yet slightly, though. The recovery since 2009 have seen quite different scheme. Except Allianz Akciový fond Evropa all funds performed better than index, some of them massively. This development led to the result that NN European Equity (EUR) and Pioneer Funds Euroland Equity substantially outperformed benchmark over the whole

11 years, Raiffeisen Europa Aktien and KBC Equity Fund Europe achieved slightly better RoR while Allianz Akciový fond Evropa remained far from market yield.

Performance of funds compared with PX shown quite different results than both previous comparisons, confirming our hypothesis only marginally. Neither of funds achieved the performance of the index from 2004 till 2007. Akciový fond Generali underperformed quite extremely but it can be explained with the portfolio structure of the fund. It is not pure equity fund as its name indicates, because it can invest only 80 % to stocks, up to 20 % to bonds or to money market instruments. Between 2007 and 2009 all funds except Akciový fond Generali lost very similarly. Only this fund was able to significantly outperform PX from 2004 to 2009. Post-crisis period have seen similar development to that of funds compared to MSCI Europe. With an exception of Akciový fond Generali all funds more or less obviously outperformed benchmark. This can be partly explained by poor performance of PX over the last couple of years. Funds in this comparison invest also to equities quoted on other CEE markets than PSE which generally recovered much better from the financial crisis. Within overall time span ING International Český akciový fond outperformed PX by mile, much more than NN Fond českých akcií and Akciový fond Generali. ISČS Sporotrend was the only fund that underperformed.

The results obtained are holding valuable information for retail investors. Based on pure past performance, it seems reasonable to invest in global stocks index than trying to outperform it through investing in globally focused equity funds. This conclusion does not apply to investing in European or CEE stocks since respective funds has been outperforming their benchmarks in this second period of boom. However, to assess these investment options more relevantly, it is also needed to analyse the risk of chosen funds in comparison with indices, which is going to be a further direction of this research.

5 Conclusions

The hypothesis set at the beginning of our study proved to be wrong. In the boom period from 2004 till 2007 selected indices outperform most funds in this comparison. Only MSCI Europe was outperformed by most funds. Our thought, that equity funds exceed yield of an appropriate index was not confirmed. Our second thought, that funds underperform in time of bear market was not confirmed as well. From 2007 till 2009 funds achieved similar or even slightly better return to indices in each of the three comparisons we have carried out. In this study we observed an interesting disharmony in results concerning growth periods from 2004 till 2007 and from 2009 till 2015. While indices outperformed most funds in the former period, they were outperformed by most funds in the latter period. Partial explanation of this phenomenon lies in the performance of the PX index. It experienced an era of an outrageous growth in the former period and a persistent stagnation in the latter period - unlike MSCI World and MSCI Europe indices - which contributes to deepening the observed phenomenon. However, we can clearly observe it at both MSCI World and MSCI Europe comparisons. It could be caused by numerous factors which deserve further analysis.

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Optimal Strategies for Tax Policy and Social Policy Tools Mix

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Abstract: In the paper the problems of optimal taxation and tax policy are considered. We use the game theory approach for the mathematical formulation of the problems discussed in the tax theory. In the paper, we developed own simple matrix game using the dilemma between taxes and transfers, and ideas for optimal tax-transfers policy. Combination of taxes and transfers are the example of problem with conflict of interests: State is interested to get more revenues from taxes and provide less social transfers and tax payers wish to pay taxes as few as possible, but they are interested in more social benefits. Our model presents contribution to the analysis of optimal strategies in tax policy and social transfers mix for sustainability of public finance system.

Keywords: optimal taxation, tax policy, game theory, tax, transfer

JEL codes: H31, C79

1 Introduction

Mankiw (2009) noted, that the standard theory of optimal taxation posits that a tax system should be chosen to maximize a social welfare function subject to a set of constraints. Primary focus of modern optimal tax research has been the schedule of marginal tax rates on labor income. Another approach to define optimal tax system is to find a commonly acceptable outcome as a compromise for interests of economic subjects that are different. For this problem we can use a game theoretical approach.

Nowadays the different mathematical models and methods are developed for game theory, they are varied from simple matrix games to cooperative and evolutionary games (Frey and Holler, 1998, Seldon and Tsigaris, 2012. An interesting experimental approach for practical applications as well theoretical issues is emerging in the field of game theory (Palfrey and Rosenthal, 1988, Seldon and Tsigaris, 2012, Panayiotis 2014). Thanks to the models based on the game theory we can analyze tax harmonization or competition between different subjects such as countries, economic sectors, agents, firms, etc. Beckman (2005) used game theory and matrix game for two countries to explain the tax competition. The centrepiece of tax competition models is to demonstrate an inter-jurisdictional mobility of the tax base, which generates an externality to tax policy. For the situation where the social planner's goal is to choose the tax system that maximizes the representative consumer's welfare, knowing that the consumer will respond to whatever incentives the tax system provides J. Slemrod (1990) developed the model of optimal taxation. In this model, the government's objective of maximizing social welfare is equivalent to minimizing the total social cost of evasion, where the total cost of evasion is equal to the excess burden associated with an uncertain tax liability plus the administrative cost of auditing taxpayers. Cowell and Gordon (1988) demonstrated solving of an audit problem by audit game in which: a taxpayer chooses whether or not to report income y. He pays tax t_y if reports and pays 0 if he does not report and concealment is not discovered. If he does not report and concealment is discovered, he pays tax t_y plus fine F. Tax authority (TA) chooses whether or not to audit taxpayer. It incurs resource cost c if its audits. TA receives due tax ty plus fine F if concealment is discovered. The tasks in this problem are: to examine equilibrium in pure and mixed strategies and examine best responses of each player to another.

There are numerous models based on different games which were developed for the analysis of tax system agents and behavior of taxpayers. In such models psychological aspects of behavior are taken into the account. Thus, in the standard models of tax

compliance, it is assumed that the honest or cheating behaviour of the taxpayer is driven primarily by payoffs she gets from her behavior. Frey and Hollet (1998) suggest that, contrary to standard criminal choice theory, deterrence does not increase tax compliance. Their model is based on a peculiarity of the mixed-strategy Nash equilibrium in 2-by-2 games which was used to explain this observation theoretically. They proved that the strategy choice of a player is not affected by changes in his or her payoffs induced by deterrence. Due to empirical observations and experiments Frey and Hollet (1998) showed that increased deterrence tends to undermine tax morale under relevant conditions. Thus, the tax policy should not focus to deter but should make an effort to maintain and raise citizens' tax morale.

The role of social norms and tax compliance are also discussed by game theorists. Panayiotis (2014) considered the relationship between endogenous tax compliance norms, formed by the interactions of rationally-bounded individuals in a network, and the quality of institutions that collect taxes and distribute the public goods to the individuals. He used the evolutionary game theory framework to characterise social norms and developed an agent-based model of tax compliance with both institutional quality effects and local interactions. This paper shows that the effectiveness of the government to collect taxes increases the determinacy of public good provision. Nevertheless it does not ensure its maximisation which depends also on the level of inefficient government expenditure. Using the simulation model he proves, that if the government is ineffective in performing audits, the welfare from public good provision becomes subject to social norms.

In search for experimental support Palfrey and Rosenthal (1988) analyzed the results from a laboratory experiment of equilibrium tax rates, inequality, and income redistribution. This experiment varies the amount of inequality and the collective choice procedure to determine tax rates. Authors demonstrate that higher wage inequality leads to higher tax rates; the average implemented tax rates were equal to the theoretical ideal tax rate of the median wage worker and   negligible deviations from labor supply behavior or voting behavior in the directions implied by altruism or inequality aversion.

It should be noted that a lot of theoretical as well practical papers are devoted the problems of optimal tax and income redistribution policy based on the peculiarities of the institutions and population in different countries (e.g. Sandmo, 1981, Bolton and Ockenfels, 2006, Brokešová et al., 2014, Clark and D'Ambrosio, 2014). Alesina and Argeletos (2002) demonstrated the model for explanation of the cross-country variation in perceptions of income inequality and choices of redistributive policies. They defined what determines income inequality; influence the redistributive policy chosen in a society. They showed two or more equilibria related with traditional behaviour and beliefs in different countries. If a society believes that individual effort determines income, and that all have a right to enjoy the fruits of their effort, it will decide for low redistribution and low taxes. In equilibrium, effort will be high and the role of luck will be limited, in this case market outcomes will be quite fair and social beliefs will be self-fulfilled. If instead a society believes that luck, birth, connections and/or corruption determine wealth, it will tax a lot, thus distorting allocations and making these beliefs self-sustained as well. Authors argued that the composition of income in equilibrium depends on tax policy and how the interaction between social beliefs and welfare policies may lead to multiple equilibria or multiple steady states.

Other example of using game theory is based on the experimental approach. J. Seldon and P. Tsigaris from Thomson Rivers University, Canada, in their article "The Ultimatum Game, Distribution of Income and Re-Distribution Policy" considered application of modified ultimatum game. They used classroom experiments to explore the social welfare implications of the game, income distribution and re-distributional policies imposed on the parties (Seldon and Tsigaris, 2012).

2 Methodology

We use simple matrix game analysing the dilemma between taxes and transfers, and ideas for optimal tax-transfers policy. In general approach, the main parameters such as tax rates, minimal personal labour income, amounts of social support can be changed and new equilibrium are analysed. This game may be developed to solve experimental economic problem, where participants represent workers and state bodies can choose their strategies according to their preferences and behavioural aspects. In such cases the frequencies of players strategies and their payoffs can be analysed and tendencies of their behaviour during certain time period can be studied.

Assumptions for the Model

Let government of some state considers the possible social policy to support the population with low income. The government developed three types of strategies to support the population with quite low incomes: S_1, S_2 and S_3. There are three possible forms of social support: money payment (euro, in cash), food stamps for certain amount (euro) and payment to public health insurance fund (euro).

According to the social support strategies we set the rules, based on the magnitude of income after tax (IAT). If personal labour income is less than 500 euro per month, the tax rate is 5%. In the case if personal labour income is greater than 500 euro per month, but less than 700 euro per month, the tax rate is 10%. If personal labour income is greater than 700 euro per month, the tax rate is 15%.

Thus, *IAT* is defined as:

$$IAT = \begin{cases} (1-0.05) \cdot I, if\_I \leq 500 \\ (1-0.1) \cdot I, if\_500 < I \leq 700 \\ (1-0.15) \cdot I, if\_I > 700 \end{cases}$$

The government social strategies based on the different combination of social support (*SS*): money payment (euro, in cash), food stamps for certain amount (euro) and payment to public health insurance fund (euro).

Strategy S_1:

- if $IAT < 550$,
  $SS = 150\_euro\_cash + 50\_euro\_food\_stamps + 100\_euro\_health\_insurance$;
- if $550 < IAT \leq 700$,
  $SS = 150\_euro\_cash + 100\_euro\_health\_insurance$;
- if $700 < IAT < 700$,
  $SS = 100\_euro\_health\_insurance$.

Strategy S_2:

- if $IAT < 400$,
  $SS = 100\_euro\_cash + 100\_euro\_food\_stamps + 50\_euro\_health\_insurance$;
- if $400 < IAT \leq 600$,
  $SS = 100\_euro\_cash + +50\_euro\_food\_stamps + 50\_euro\_health\_insurance$;
- if $600 < IAT < 800$,
  $SS = 50\_euro\_health\_insurance$.

Strategy S_3:

- if $IAT < 500$,

$$SS = 50\_euro\_cash + 50\_euro\_food\_stamps + 50\_euro\_health\_insurance;$$

- if $500 < IAT \leq 650$,
  $$SS = 50\_euro\_cash + +50\_euro\_health\_insurance;$$
- if $650 < IAT < 800$,
  $$SS = 50\_euro\_health\_insurance$$

3 Results and Discussion

In this section we will demonstrate results for combination of strategies in order to achieve optimal outcome. One person considers his three possible employment strategies: W_1 - to find part-time job and get 450 euro per month; W_2 - to find full-time job as sales assistant and get 650 euro per month and W_3 - to find full-time job as bookkeeper and get 750 euro per month.

We can define elements of payoff matrix for each combination of strategies for this person and government.

If this person chooses strategy W_1 and

- strategy for government is S_1. In this case his labour income is 450 euro per month, income after tax IAT is $0.95 \cdot 450 = 427.5$ euro. Because $427.5 < 550$ euro, he gets social support of 300 euro from government as: 150 euro (in cash) + 50 euro (food stamps) +100 euro (health insurance). In total, this person has disposable income 727.5 euro (427.5+300).
- strategy for government is S_2. In this case his labour income is 450 euro per month, income after tax IAT is $0.95 \cdot 450 = 427.5$ euro. Because $400 < 427.5 < 600$ euro, he gets social support of 200 euro from government as: 100 euro (in cash) + 50 euro (food stamps) +50 euro (health insurance). In total, this person has disposable income 627.5 euro (427.5+200).
- strategy for government is S_3. In this case his labour income is 450 euro per month, income after tax IAT is $0.95 \cdot 450 = 427.5$ euro. Because $427.5 < 500$ euro, he gets social support of 150 euro from government as: 50 euro (in cash) + 50 euro (food stamps) +50 euro (health insurance). In total, this person has disposable income 577.5 euro (427.5+150).

If this person chooses strategy W_2 and

- strategy for government is S_1. In this case his labour income is 650 euro per month, income after tax IAT is $0.9 \cdot 650 = 585$ euro. Because $550 < 585 < 700$ euro, he gets social support of 250 euro from government as: 150 euro (in cash) +100 euro (health insurance). In total, this person has disposable income 835 euro (585+250).
- strategy for government is S_2. In this case his labour income is 650 euro per month, income after tax IAT is $0.9 \cdot 650 = 585$ euro. Because $400 < 585 < 600$ euro, he gets social support of 200 euro from government as: 100 euro (in cash) + 50 euro (food stamps) +50 euro (health insurance). In total, this person has disposable income 785 euro (585+200).
- strategy for government is S_3. In this case his labour income is 650 euro per month, income after tax IAT is $0.9 \cdot 650 = 585$ euro. Because $500 < 585 < 650$ euro, he gets social support of 100 euro from government as: 50 euro (in cash) +50 euro (health insurance). In total, this person has disposable income 685 euro (585+100).

If this person chooses strategy W_3 and

- strategy for government is S_1. In this case his labour income is 750 euro per month, income after tax IAT is $0.85 \cdot 750 = 637.5$ euro. Because $500 < 637.5 < 650$ euro, he gets social support of 100 euro from government as: 50 euro (in cash) +50 euro

(health insurance). In total, this person has disposable income 737.5 euro (637.5+100).

- and strategy for government is S_2. In this case his labour income is 750 euro per month, income after tax IAT is $0.85 \cdot 750 = 637.5$ euro. Because $600 < 637.5 < 800$ euro, he gets social support of 50 euro from government as health insurance. In total, this person has disposable income 687.5 euro (637.5+50).
- strategy for government is S_3. In this case his labour income is 750 euro per month, income after tax IAT is $0.85 \cdot 750 = 637.5$ euro. Because $500 < 637.5 < 650$ euro, he gets social support of 100 euro from government as: 50 euro (in cash) +50 euro (health insurance). In total, this person has disposable income 737.5 euro (637.5+100).

Table 1 The payoff matrix

Strategy	S_1	S_2	S_3
W_1	727.5	627.5	577.5
W_2	835	785	685
W_3	737.5	687.5	737.5

Source: Author´s own calculations

Using principles of maxmin and minmax we can prove that in this game we have not Nash equilibrium in the pure strategies.

Using principle of maxmin means that player 1 (Person or tax payer) considers the lowest possible gains for each its strategies W_1, W_2, W_3, and chooses the maximum from them.

$\alpha^0 = \max_{1 \leq i \leq 3} \min_{1 \leq j \leq 3} a_{ij}$. This value a_0 is called as low value of the game.

For strategy S_1 of the State 1-st player (Person or tax payer) has lowest gain as $\min(727.5; 627.5; 577.5) = 577.5$

For strategy S_2 o the State 1-st player (Person or tax payer) has lowest gain as $\min(835; 785; 685) = 685$

For strategy S_3 of the State 1-st player (Person or tax payer) has lowest gain as $\min(737.5; 687.5; 737.5) = 687.5$

Then 1-st player choose maximum value from this set: (577.5; 685; 687.5), i.e.

$\max(577.5; 685; 687.5) = 687.5$. The player 1 (Person or tax payer) has guaranteed at least 687.5 euro if State choose strategy S_2, which is the worst for player 1.

So, the best pure strategy for player 1 is W_3.

Using principle of minmax means that player 2 (State) considers the highest possible loses for itself and chooses the minimum from them.

$\beta^0 = \min_{1 \leq j \leq 3} \max_{1 \leq i \leq 3} a_{ij}$. This value β_0 is called as high value of the game.

According to the basic Lemma in simple matrix game, $\alpha_0 \leq \beta_0$.

If Nash equilibrium exists for the pure strategies in the game, then $\alpha_0 = \beta_0$.

For strategy W_1 of the Person 2-st player (State) has highest lose as

$\max(727.5; 835; 737.5) = 835$

For strategy W_2 of the Person 2-st player (State) has highest lose as

$$\max(627.5; 785; 687.5) = 785$$

For strategy W_3 of the Person 2-st player (State) has highest lose as

$$\max(577.5; 685; 737.5) = 737.5$$

Then player 2 (State) chooses the minimum from the highest possible its looses, so $\min(835; 785; 737.5) = 737.5$. The player 2 (State) has lowest lose 735.5 euro if player 1 (Person or tax payer) chooses the strategy W_3.

In this game we have not Nash equilibrium for pure strategies, because $\alpha_0 \neq \beta_0$.

But we can find Nash equilibrium for mixed strategies.

At first we can simplified the payoff matrix:

$$\begin{pmatrix} 727.5 & 627.5 & 577.5 \\ 835 & 785 & 685 \\ 737.5 & 687.5 & 737.5 \end{pmatrix} \underset{\sim}{} \begin{pmatrix} 835 & 785 & 685 \\ 737.5 & 687.5 & 737.5 \end{pmatrix},$$

because strategy W_2 dominates strategy W_1.

Then

$$\begin{pmatrix} 835 & 785 & 685 \\ 737.5 & 687.5 & 737.5 \end{pmatrix} \underset{\sim}{} \begin{pmatrix} 785 & 685 \\ 687.5 & 737.5 \end{pmatrix}$$

For last payoff matrix we can write simple system of equations:

$V_1 = 785 \cdot p_1^* + 687.5 \cdot p_2^* = V$ - the expected gain of player 1, if he chooses strategy S_1 from last payoff matrix with probability p_1^* and chooses strategy S_2 with probability p_2^*, and player 2 realized his strategy S_1 from the last payoff matrix. So, for player 2 his vector of probabilities q is $(1,0)$.

$V_2 = 685 \cdot p_1^* + 737.5 \cdot p_2^* = V$ - the expected gain of player 1, if he chooses strategy S_2 from the last matrix with probability p_1^* and chooses strategy S_2 with probability p_2^*, and player 2 realized his strategy S_2 from the last payoff matrix. So, for player 2 his vector of probabilities q is $(0,1)$.

So, p_1^* and p_2^* are the probabilities of strategies of player 1 from the last matrix.

In addition, $p_1^* + p_2^* = 1$.

Solve this system and find optimal p_1^* and p_2^*, and V.

$$p_1^* = \frac{737.5 - 687.5}{785 - 685 - 687.5 + 737.5} = \frac{1}{3}, \quad p_2^* = \frac{785 - 685}{785 - 685 - 687.5 + 737.5} = \frac{2}{3}$$

$$V = \frac{785 \cdot 737.5 - 687.5 \cdot 685}{785 - 685 - 687.5 + 737.5} = \frac{10800}{150} = 720.$$

In similar way we can find optimal probabilities for player 2 (State).

$$q_1^* = \frac{737.5 - 685}{785 - 685 - 687.5 + 737.5} = 0.35 \quad , \quad q_2^* = \frac{785 - 687.5}{785 - 685 - 687.5 + 737.5} = 0.65 \quad .$$

So, the recommendation for player 1 (Person or tax payer) is to realize strategy W_2 with probability $\frac{1}{3}$ and to realize strategy W_3 with probability $\frac{2}{3}$.

So, the recommendation for player 2 (State) is to realize strategy S_2 with probability 0.35 and to realize strategy S_3 with probability 0.65.

4 Conclusions

Nowadays a lot of examples of game theory applications are developed for the different problems in tax theory and taxation. Models, which based on the game theory approach, allow to find the optimal strategies for the different players in the condition of conflicts of their interests. Problems of taxes and transfers are the example of problems with conflict of interests of two opposite side players: (1) State is interested to get more revenues from taxes and provide less social transfers and (2) tax payers wish to pay as low taxes as possible, but they are interested in more social benefits. So for the analysis of this social dilemma it is possible to use game theory and matrix model.

Acknowledgments

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The Options of Adaptive Modeling Environment in Cyberspace of Secure Electronic Banking

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Abstract: The aim of the contribution is, based on the solving tasks of specific researches, express systematically adaptive environment of the modern intelligent cashless payment system as a cybernetic model aimed to the safety profile of the future system integrated electronic banking. To inform mainly experts of the possible use of the environment modeling in the new cybernetic space (cyberspace). Furthermore express methodology of the research work of an investigator team with regard to the necessary integration processes in the areas of banking and business. This all is in the systematic concept of modern electronic background processes in information and especially in the beginning knowledge economy of globally conceived world which is supported by new tools of cybersecurity progressively resist to cybernetic war (cybernetic attacks and cybernetic terrorism). The contribution is expressed in terms of the application of system theory, cybernetics and artificial intelligence, from the other side it is expressed in terms of the expected practical applications in the new economy of the world and especially in the new economic cybernetics.

Keywords: economic cybernetics, electronic banking, system integration, cybersecurity, cyberspace

JEL codes: 032, F15

1 Introduction

The new economy (now seen as an electronic economy (e-economy) and gradually formed as economic cybernetics - Fig.1) will be based on quality and high - accurate, **secure** and accurate (especially deterministic) **information**. It is also based on identifiable **knowledge** (Dvorak, 2015) come from **dynamic processes** of civilized, cultural and information - globalization world. Thus accepted the new economy will be high - **adaptable** and sensible to changes of the basic systems of the economic environment and global geopolitical relationships in terms of structures and behaviors of the system center of the environment. The system environment will depend on perfect and safe working managed processes in hierarchical and adaptively structured spatial and time organized **cyber systems**. Especially existentially related cyber systems (specific defined information systems) with safe and powerful **information and communication technologies (ICT)**. Modern economic cybernetics must also define the necessary cyberspace (the cyberspace) as an integrating environment for defined cybernetics (Norbert Wiener - 1945) as the science of *"management and communication of information in living and inanimate organisms."*

The basis of partial specific - defined knowledge (Jankova and Dvorak, 2014a), (Jankova, 2015) the mentioned world will be philosophical background of theoretical disciplines derived from the modern concept of the laws and regularities of Theoretical Physics, and

especially Systems Theory and other disciplines incorporated into **Theoretical Cybernetics**. Further to Applied Cybernetics which is presented by number of areas represented by the Information Theory, Model Theory and modeling, etc.

The essence of systemic understanding (Jankova and Dvorak, 2014b) of the world will be **transformation of the system to the model** and exploration of these models by **modeling** process to the modern environment represented by the Technical Cybernetics (today represented by a powerful **computer system**- represented, for example, networks, PCs or fast and large computers with high massiveness). Process modeling and simulation can provide a range of results suitable for optimal structures and behaviors of the analyzed systems with the aim of realizing in the economic systems. Even finding **safety criteria** as very interesting area of current and high-cruel future cyber war of investigated and implemented cyber security in that new economy.

The important areas of the new economy will be the system (Dvorak and Urbanovsky and Jankova, 2014) of the financial markets with active areas of the banking system and in this period, especially the development of electronics represented by **electronic banking** (e-banking).

Research tasks on which was created specific challenges represented by solutions of tasks "*Analysis, creation and testing of models for valuing financial, investment and hedging assets and their usage for prediction the emergence of financial crises*'' and "*Effective Use of ICT and Quantitative Methods for Business Processes Optimization".*

Based on the above-mentioned specific research tasks were now made the contribution "*The options of adaptive modeling environment in cyberspace of secure electronic banking".* It is an integral part of the modeling and survey of the selected options of the safe electronic banking in the newly conceived environment - cyberspace management of electronic banking with aim to introduce to the professionals selected tasks in the conference focused on the European financial systems.

Figure 1 Cyberspace of modeling of electronic banking in the dynamic environment of information globalized world
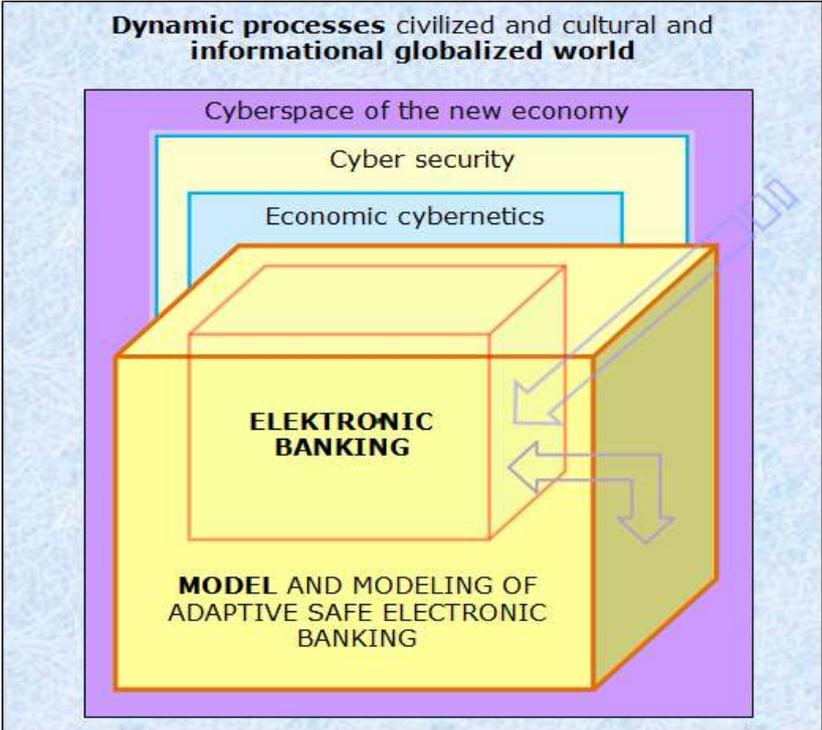
Source: Own resources

Nowadays the topicality of solved tasks in the new cyberspace is expressed especially in the information resources of the world primarily as partially understood problems which

are focused for example on the legal, economic and technical environment of safety of electronic background of modern trades banking (Mason, 2012), (Philips, 2012) (Wechsler, 2012), (Li Feng, 2001), (Joshi, 2010), (Collins, 2013).

2 Methodology and Data

Research methodology oriented to a defined cyberspace

Very quick - developing methodology of science and research (particularly in the current revolution in the information technology area) is now focused on **the systematic expression of the real environment** and method applications of artificial intelligence and theory of recognition of the environment with considering of identification of appropriately selected systems. Attention is also focused on the possibility of using digital environment and ICT tools for solving of the models with the preferences of **modern cybernetic systems.** In the contribution we focus on the creation of models and modeling **adaptable and safety electronic banking**.

In the proposed and solved specific studies was accepted **research methodology** and corresponding **methods of applied cybernetics**. All for the gaining of appropriate model systems and modern modeling with respect to the possibility to identify abstract models for electronic banking in the **modern cybernetic space (cyberspace) of the economic cybernetics**. The necessary binding element in the whole methodology is a system concept of philosophy and suitable expressed methodology with considering of the applications of the **theory creation and exploration of the found results on the modeling** the digital environment modeling.

Figure 2 The options of adaptive modeling environment in cyberspace of secure electronic banking

Source: Own resources

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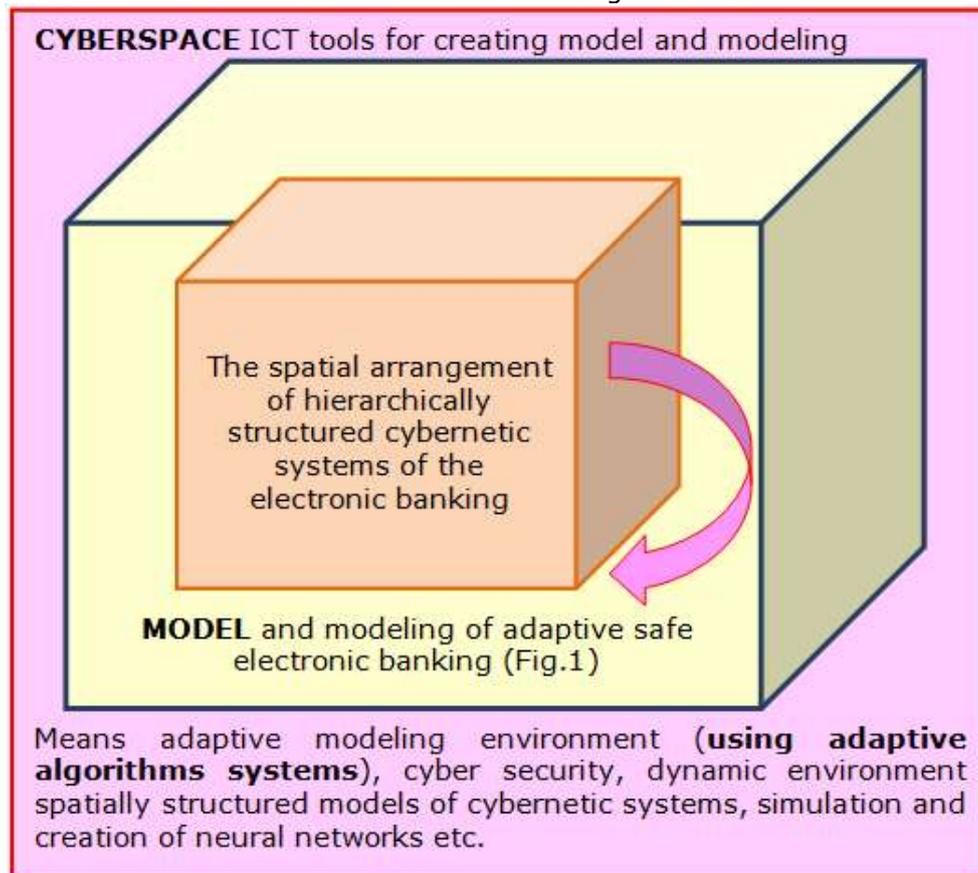
The options of adaptive modeling environment in cyberspace of secure electronic banking

The creation of cybernetic electronic banking system (Fig. 2) is based mainly on spatially arranged three-dimensional link of control and managed subsystems and organized sets of input information - known as cybernetic strategy subsystems of the complex cybernetic system, organized sets of input information- known as the target behavior of cybernetic subsystems and substantive feedback as a set of specific links of cybernetic subsystems and the entire complex cybernetic system). The whole spatially organized cybernetic electronic banking system is located in the dynamic environment of information globalized world (the external real-time environment). Further, the cybernetic system and its model located and temporally presented in a dynamic environment of cyberspace of the ICT tools (Fig. 1) and is dependent on the internal real-time conditions of use of adaptive algorithms according to Fig. 2.

3 Results and Discussion

The options of mathematical modeling for system solution of subtasks (modules)

We can express the required module characteristics by mathematical model (subsystem of cybernetic system), for example using frequency-phase characteristics, stability cybernetic system modules, subsystems cyber limit states corresponding with crisis situations of the systems, optimal structures and behavior of systematically conceived object management, **adaptability options of cybernetic systems** and others.

The possible proposal of an adaptive system algorithm with the model can be summarized by the equation (1), and be created on the PC using the gradient method (Krupka, 2009). Default mathematical model: objective function

$$\mathbf{J} = J(\mathbf{w,v,q,a}) = \mathbf{a}(t)^2 = [\mathbf{y_m}(t) - \mathbf{y_s}(t)]^2 \tag{1}$$

where: $\mathbf{w}$ **–** vector of the control variable,

$\mathbf{v}$ **-** vector of the defective variable (deviations),

$\mathbf{q}$ **-** vector of adjustable parameters of the regulator,

$\mathbf{a}$ – adaptive deviation,

$\mathbf{y_m}$ – output model variable,

$\mathbf{y_s}$ - output system variable.

During system adaptation we are looking for the value $\mathbf{q^*}$ (vector of control adjustable parameters) in the model when it will be valid that in case of given values $\mathbf{w}$ (vector of control variables) and $\mathbf{v}$ (vector of disturbance variable expressed by deviation in the system) is a sub-task of finding of extreme values of criterion features:

$$\mathbf{J} = \mathbf{J(w,v,q^*,a)} = \min_q \mathbf{J(w,v,q,a)} \tag{2}$$

it is valid if

$$\text{grad}_q \, J(w,v,q^*,a) = 0 \tag{3}$$

Then it leads to the determination of the parameters $\mathbf{q}$ (vector of adjustable parameters of the regulator). Change the parameters can be determined by the algorithm when we use the gradient method to adapt the system which is expressed by the total model:

$$d\mathbf{q/}dt = -c.\text{grad}_q \, J(w,v,q^*,a) \tag{4}$$

where c is the appropriate selected constant.

During solving of specific subtasks we creating systemic definition of "*sub-models*" for example, using a regulator with variable gain $\mathbf{q}$ (vector of adjustable parameters of the regulator) which actually represents the regulator as proportional part with transfer $\mathbf{q.}$

The aim of the modeling is to find a suitable (optimal) coefficient of the controlled object expressed mentioned variable **α** (like adaptive deviation). Thus it is possible to use obtained transfer function as a set of state variables in cyberspace of various parts of the adaptive system suitable for comprehensive assessment of secure electronic banking. Comprehensive in that very complex hierarchical environment with segmented models of the environment of the adaptive secure system (presented in the literature as environment cybernetic system model).

4 Conclusions

The aim of the contribution is to express and describe the new methodology of modeling and therefore partial solutions of the adaptive system of secure electronic banking. The new cybernetic view of the solving of the difficult banking environment was gradually solving on the basis of specific research tasks. Further to express the methodology the research project of the team comprising investigators with regard to the necessary integration processes in the areas of banking and business. The contribution is expressed in terms of applications theory, cybernetics and artificial intelligence and from the other side expected possibilities of mathematical modeling of practical problems of the mentioned environment - especially in the new economic cybernetics.

The foundation was to express systematically the adaptive environment and the example was finding the possible modern intelligent cashless payment system as a cybernetic model towards a safety profile of the future – systematic integrated electronic banking.

Acknowledgments

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Holding Company, Reasons for Creation, Advantages and Disadvantages

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Abstract: Research projects in the area of financial management of holdings deal mainly with transfer pricing, an overall assessment of mergers and acquisitions and valuation of concerns. This paper presents research on holding companies in relation to cash management. The research included 15 holdings, comprising 188 business enterprises on the date of the research. The research was performed at holding companies (parent companies) and selected subsidiaries. The research was carried out in two stages. The first stage consisted of a questionnaire survey. The second stage consisted of meetings, interviews, phone and email communication with representatives of the holding companies. The research identified the reasons for the creation of a holding, and the advantages and disadvantages of a holding with an emphasis on cash management. The benefits of a holding were found especially in reducing risk, reducing the volume of invested capital and the ability to effectively manage cash flow.

Keywords: holding company, reasons for creating a holding company, diversification of business risk, advantages and disadvantages of a holding company, net working capital, cash management

JEL codes: G32, G34

1 Introduction

The Article deals with research into the specifics of the financial management of holding companies. Researches show that concentrated ownership is positively linked to efficiency and in addition, that vertically or horizontally related enterprises are very common. This is confirmed by researches carried out by Hanousek, Kočenda and Mašika (2012), who examined the development of enterprise efficiency using an extensive panel with more than 190,000 observations per enterprise and per annum in the period of 1996–2007. They found that concentrated and foreign ownership is positively linked to efficiency. Holdings are an intensively used form of business enterprise, La Porta and Shleifer (1998). Khanna and Yafeh (2005) explored business groups. It was found that business groups, both vertically (pyramids) and horizontally related, occur very frequently in developing markets. There are various kinds of integrated ownership researches, Kočenda and Hanousek (2012a and 2012b).

As Stern and Chew indicate (2003), the basic content of financial management is the maximization of the value of an enterprise. A holding may achieve the maximization of enterprise value, in particular, through the following:

- Tax savings – using transfer pricing, taxation in low-tax countries;
- Increasing the market share by means of acquisition of another company or the existing companies;
- Reducing the volume of the invested capital – unused capital in individual subsidiaries of a holding can be transferred to other companies, thus reducing the volume of the total invested capital. A way to reduce the volume of the capital invested is cash management.

The research aim of the article is to describe and analyse the reasons for creating holdings, the advantages and disadvantages of the holding structure of enterprises as perceived by managers of such enterprises. In addition, it aims to identify synergetic effects resulting from mergers of enterprises with an emphasis on cash management.

2 Methodology and Data

The crucial problem within the research into holdings in the Czech Republic is the difficult identification of holdings. Unless a company declares itself to be part of a holding, it is very difficult to determine such a fact.

Pursuant to Czech legislation, entrepreneurial entities are obliged to publish accounting and legal information which demonstrates the transparency of their business. Such information is published through the Commercial Register. The published documents include, in particular, financial statements, annual reports and related party transaction reports. In particular, the last of the afore-mentioned documents is important as it informs about relations between the individual companies and describes control. Control is a means to create a holding. The problematic aspect is the very low number of enterprises which publish this information. An audit performed by the Supreme Audit Office in 2012 showed that for 2010, a total of 74.01% of limited-liability companies and 57.33% of joint-stock companies failed to publish their financial statements or annual reports.

The article has been put together based on information obtained by researching primary and secondary data.

The primary data consists of holding companies and their subsidiaries. The research involved a total of 15 holdings which brought together, as of the date of performing the research, a total of 188 entrepreneurial entities (i.e. independent accounting units). With respect to 12 holdings, research was carried out in the parent company. Only in the case of three holdings was the research carried out in just one of their subsidiaries as they are international holdings into which the particular subsidiaries were integrated.

In the first stage, research was done based on a questionnaire survey. The questionnaire survey was followed by a part of the research which consisted of specifying, completing and understanding the answers. It included personal meetings, interviews, phone calls and email communication with the representatives of individual companies. Great emphasis was put on questioning persons disposing of sufficient information about the operation of the holding. This involved, in particular, owners, directors, chief financial officers of holdings, chief financial officers of individual companies and chief accountants.

The follow-up survey can be divided into the following parts:

1. Identifying the group in terms of the duration of existence of the holding, the area of business, number of companies within the holding, the total amount of consolidated revenues, locating the registered office of the company, etc.;
2. Identifying the ownership and organizational structure of the examined holdings;
3. Identifying the reasons for creating a holding and verifying the fulfilment of expectations as well as defining the advantages and disadvantages of a holding structure.

Questions were formulated based on the published literature which summarizes the reasons for the creation of holdings (see, for instance, Machoň, 1997; Marek, 2009; Mařík et al., 2011; Pavelková, 2009; Valach et al, 1999), or derived from the reasons for mergers and acquisitions (see, for example, Sedláček, 2015 and 2014; and Křížová, 2014).

In the next stage, research was carried out based on secondary sources, in particular, financial statements, annual reports and related party transaction reports on relations between the controlling and controlled persons and other persons controlled by the same person. The research involved the data of companies having their registered office in the Czech Republic. In this case, 32 entrepreneurial entities were examined. The objective of this research was to identify the characteristics of a holding in relation to cash management. The author of the paper proceeds on the fact that the effect resulting from the merger of enterprises (the creation of a holding) means a cash management advantage.

As pointed out by Režňáková, M. et al., (2010), enterprises amalgamated to create a group attempt to profit, in particular, from the central management of cash flow and from generating income tax savings resulting from a higher rate of indebtedness of subsidiaries. Holdings that manage cash flow effectively may achieve competitive advantages with respect to other entrepreneurial entities; see Ficbauer, D. and Režňáková, M. (2014).

Cash management represents, in the conditions of holdings, the use of specific tools of financial management, among which the respondents included loan agreements, intra-holding factoring, the payment of dividends in favour of the parent company, the use of transfer pricing and cash pooling. Cash pooling represents a high form of cash management in a holding company. It enables the pooling of cash from all the enterprises in the group in a joint bank account and the transferring of cash from surplus entities to enterprises with a temporary lack of cash. See Režňáková (2010).

As it has already been mentioned, the research concerned a total of 15 holdings. Although the number of examined holdings was low, the information obtained may be regarded as relevant considering the difficult identification of holdings.

The number of holdings active in the Czech Republic was also verified based on the information obtained from the AMADEUS database. The number of enterprises that reported consolidated financial statements in 2009–2012 was as follows: 2009 – 45 enterprises, 2010 – 43, 2011 – 37, 2012 – 26.

Holdings included in the research have existed in the holding structure for several years. Only one of the examined holdings was created in 2013. The duration of holdings is important in order to assess the financial management policy in relation to cash management. The longer a holding exists, the more easily comparable are changes in financial management. The respondents answered in the affirmative that they were interested to remain in the holding as long as possible. The respondents also indicated that the results of individual companies, and of the holding as a whole, were assessed based on monthly, or quarterly financial statements. Most companies did not prepare any interim financial statements. They only entered all the relevant accounting cases in the particular month (or quarter) so that individual months (or quarters) were mutually commensurate. This concerns, in particular, the posting of depreciation/amortization, accruals, contingencies, provisions, etc.

With respect to the branches of business, the examined holdings operated in various sectors. The most represented sectors included the processing industry (43% of all the holdings) and services (28%).

As regards the number of companies which make up a holding, most holdings can be regarded as small. Holdings with 1 to 5 enterprises (53%) and holdings with 6 to 10 enterprises (27%) prevailed in the research. One of the examined holdings reported up to 80 enterprises within the group.

Theoretical Framework

Czech law, specifically Act No. 90/2012 Coll. (Collection of Laws) on commercial companies and cooperatives (Law on commercial corporations), does not define the minimum number of companies which make up a holding. Only the relationship between the controlling and controlled persons is identified. Hence, theoretically, a grouping which consists of only two companies, one of which is the parent company while the other one is its subsidiary, can be regarded as a holding. It can be inferred from the practice that certain companies where the parent company owns one or two subsidiaries often do not approach financial management as if it was a holding. Only holdings were included in the research in which the controlling party recognizes the existence of a holding structure and its specifics.

The size of holdings by the amount of revenues varies. Again, it can be stated that as regards the amount of revenues, they are rather smaller holdings. One third of the respondents reported a turnover of up to 100 million CZK, while another third a turnover

ranging from 101 to 500 million CZK. In total, three examined holdings exceed a turnover of one billion CZK.

The registered office of parent companies of the examined holdings is located, in most cases, in the Czech Republic (60% of all the holdings), or in other EU countries (26% of all the holdings), such as Slovakia and Netherlands. Some parent companies have their registered offices located in the U.S. and Japan. Most respondents reported that the registered office of the parent company is mostly determined by the historical development of the company and mostly follows the incorporation of the first company (which means the first company before the creation of a holding). Largely, the parent company is the main recipient of dividends obtained from other subsidiaries. Therefore, the registered office of the parent company is usually, according to what was reported by the respondents, analysed with respect to the tax burden of dividend payment; both from subsidiaries towards the parent company and from the parent company towards the shareholder. As mentioned below, tax planning is not the focus of interest of holding companies.

3 Results and Discussion

The research showed that 46% of the respondents were 100% owners of subsidiaries, while a total of 80% of holdings owned more than 61% in their subsidiaries. The respondents reported that there were two options to enforce the parent company's interests in a subsidiary:

1. the ownership of the highest possible share, or
2. the ownership of the highest possible share but only up to the value which triggers control of a subsidiary.

All the respondents positively mentioned their endeavour to apply the first option. The ownership of the highest possible share, which should be close or equal to 100% ownership of a subsidiary, means for the respondents fewer problems with minority owners and the opportunity to influence the situation in a subsidiary in a fast and efficient way. In particular, it concerns the ability to replace the members of the governing bodies. The respondents believe their endeavours are mostly limited by the high financial requirements of minority owners, as regards the repurchasing of their shares. According to the respondents, financial means are the only distinctive limitation in achieving 100% ownership of a company. In certain cases, the law provides for squeeze-out. This refers to the compulsory cash compensation of minority owners, even against their will. If there is a possibility of squeeze-out, the respondents always use it. The ownership of the highest possible share only up to the value which triggers control of a subsidiary usually represents a 40% share in the company's voting rights.

The research showed that a total of 67% of companies under review had a pyramidal structure (the parent company owns subsidiaries and the latter own other subsidiaries – second-tier subsidiaries). The remaining holdings under review used a radial structure (the parent company owns both first-tier subsidiaries and second-tier subsidiaries), or it was a mixed type. This form of holding arrangement in developing markets is also confirmed by Khanna, Yafeh (2005).

Another part of the research focused on distinguishing between horizontally-integrated holdings (companies with similar objects), vertically-integrated holdings (companies at different points of the same production path) and the conglomerate type of holdings (companies with different objects). All these types of holdings were almost equally represented in the research. The respondents said:

1. In principle, holdings stick to one or two scope of business.
2. The primary objective of all the examined holdings is a horizontally-integrated holding. The follow-up objective is to obtain the highest possible market share and to maximise the value of an enterprise (or the entire holding).
3. A vertically-integrated holding is, according to the respondents, a secondary influence which is related to the fact that it is not possible to continue to build a horizontally-

integrated holding. The reason why this happens results from the restrictions represented by the market and legislation.

    a. Legislation restricts horizontal holdings, in particular, at the level of mergers of enterprises with similar or identical objects due to the risk of taking control over the market. Law compliance is monitored by the anti-monopoly authority.

    b. The market restricts horizontal holdings especially by the fact that obtaining a higher market share through the acquisition of another competitor is usually more expensive, the more acquisitions have been previously made. The more a holding is known to be interested in its competitors, the more it increases their price.

Consequently, a vertically-integrated holding is the by-product of the holding's operations as any further continuation of a horizontally-integrated holding is not possible. Most frequently the respondents indicated the efforts to take control over one or several key suppliers, or customers. As regards suppliers, they were in particular suppliers of key raw material or semi-finished products. As regards customers, it mainly involved influencing the distribution chain – the acquisition of a wholesale business or an established e-shop.

4. A conglomerate holding is, according to the respondents, the result of coincidence rather than efforts. It occurs when a holding has already been through both previous holding stages: horizontal as well as vertical. With respect to the conglomerate holding, the respondents largely reported the negative characteristics of this type of holding rather than its positive characteristics. Certain negative characteristics of a conglomerate holding did not appear with the horizontally- or vertically-integrated holdings. It mainly concerned the following:

    a. Unclear management of all the companies within the holding;

    b. The impossibility to apply standardised methods of management (especially in cash management) to subsidiaries which are, due to their objects, outside the horizontally- and vertically-integrated holding;

    c. A low level of satisfaction with the ownership of companies which are outside the horizontally- and vertically-integrated holding due to their objects.

The reasons for creating a holding company may vary for individual holdings. Based on the respondent's answers, the most frequent reasons were the ones described below.

• Obtaining a competitive advantage in a certain area consists of the coordination of selected activities with all the companies within the holding. It means coordination in the purchasing, manufacturing and sales policies. When purchasing commodities, the holding's individual companies act as a whole, thus improving their bargaining position. They achieve better prices and better sales conditions (for instance, warranties, service, packaging). Manufacturing processes are being coordinated. According to the respondents, individual processes are often dislocated in various subsidiaries which do not create a product for the final customer but only an intermediate product for another subsidiary. Mostly, only one or more selected companies within the holding enter the market and offer a product for the end customer. Sales policy is usually synchronized with individual companies. Outwardly, companies act as a single enterprise and are often represented by a single logo (trademark).

• Increasing the market share:

    o Increasing the market share through the existing companies which try to obtain a higher business share to the detriment of their competitors – this method is usually considered by the respondents to be lengthy and, from the point of view of obtaining a higher market share to the detriment of competitors, less effective.

o   Increasing the market share through the acquisition of another company – this method tends to be regarded by the respondents as faster but bearing a considerable risk potential. Almost a half of acquisitions are considered by the respondents to be unsuccessful, which corresponds with the information indicated by Cartwright and Schoenberg (2006). The acquisition of a company is also a means for the holding to distribute the risk. A holding company behaves in this way if it has a surplus of financial means. The acquisition represents another part of the portfolio, similar to the financial portfolio of a small saver.

The creation of a holding is assessed by the respondents as being generally positive. A total of 94% of the respondents reported the fulfilment of expectations as a result of creating a holding higher than 50%. Of which a total of 40% of the respondents reported the fulfilment of expectations as a result of creating a holding equal to 100%. On the other hand, some respondents were not able to answer the question regarding the fulfilment of expectations as the holding had already existed for a long time (in one case for over 50 years).

The respondents indicated the following advantages of holdings as being the most important ones:

• Cash management
• Market share increase
• Investment Savings
• Liability

Cash management and investment savings were reported by the respondents as the main advantage in 43% of answers. In addition, the research showed that parent companies which manage cash flow effectively dispose of a higher net working capital, while subsidiaries dispose of a lower net working capital.

The possibility of transferring funds between the individual companies reduces requirements for the volume of the invested capital. If funds were not transferred within the holding (for instance, loans), more capital would have to be invested. At the same time, the possibility of transferring funds represents the possibility of managing the capital costs of the individual companies. Hence, this enables the influencing of capital costs, control of their minimization, or the optimization of the capital structure of the entire holding.

More detailed inquiry regarding liability optimization showed that the respondents indicated two ways of perceiving the advantages of liability.

• Each company is responsible for its liabilities independently, which is considered to be the main advantage in the event that any of the enterprises grouped within the holding is unsuccessful in business (for instance, the lack of liquidity, problems in the payment of liabilities, failure of the business plan, etc.).
• Individual companies within the holding have mutual liability. A relatively small subsidiary with small assets can offer large guarantee, for instance, in the case of loans.

It results from the above that the holding ownership structure diversifies business risks.

The respondents reported not only positive but also negative aspects of a holding company. The following elements were mentioned as disadvantages of a holding:

• Profitability
• Taxes
• Unclear management

The research showed that the acquisition of another company either reduces the profitability of the entire holding company or maintains its profitability at a constant

level. The respondents said that during an acquisition, profitability increase expectations within the holding often tended to be high, but remained unrealized.

It was interesting to see that the respondents did not at all mention tax planning as an advantage of the holding but rather as a disadvantage of it. A more thorough examination of this fact showed that the primary objective of a holding is neither tax planning nor the subsequent tax optimisation. The respondents reported the high requirements determined by the accounting and tax laws applicable in the various countries according to the registered office of individual subsidiaries as being disadvantages. A holding often uses the established methods of financial management. If it enters another market via acquisition, these methods are usually inapplicable. By way of example, the respondents mentioned, in particular, accounting and tax laws. It is often impossible to use standardized financial statements (i.e. balance sheet, income statement, cash flow and statement of changes in equity) and trial balance, standardized account assignment, etc. Financial statements and trial balance are usually the basic documents and a source for the related reports, such as net working capital, liquidity level or assets turnover ratio.

Different legislation in individual countries results in high costs of financial management of the entire holding and also of external services, such as legal, auditing as well as accounting and tax services. In this regard, it should be mentioned that certain holdings are publicly designated as companies which consciously avoid the payment of taxes in the country of the parent company's registered office, taxing most of the profit in the country of one of its subsidiaries. This applies to, for example, such companies as Apple, Google or Starbucks.

Most respondents indicated that with the increasing number of companies within a holding or with the growth of the existing companies of a holding (as regards the amount of revenues, headcount, the size of assets, etc.), the demands of the entire holding management, especially from the financial and HR perspective, increased. In this regard, it should be mentioned that most managers did not realize (and confirmed during interviews) that unclear management is noticeable also with companies which have no subsidiaries if they have an elevated number of employees, higher revenues and more assets. Therefore, it is not the sole preserve of holdings. As a consequence of increasing business activities, managers of such a company would basically be forced to create certain parts – departments or divisions (manufacturing division, sales division, and more). Without such differentiation it is very problematic to follow the performance of individual activities. Equally problematic is to clearly answer the question of which activities are profitable and which are loss-making. Differentiation by parts is crucial for monitoring expenses and revenues, and in particular, for calculations.

4 Conclusions

The article aimed to find out the reasons for creating a holding and what advantages and disadvantages a holding structure brings. Answers of the respondents, who represented holdings, were used. The reasons for creating holdings were identified: they involve obtaining a higher market share as well as a competitive advantage in a certain area. This represents the coordination of selected activities with all the companies within the holding. Synergetic effects were identified resulting from the merger of enterprises, with cash management being indicated as the main benefit for holding companies.

Using specific tools of financial management, holdings can control their cash flows. Loan agreements, intra-holding factoring, the payment of dividends and cash pooling were identified as the prevailing tools. It was found that companies which effectively manage cash flow and can transfer funds between individual companies within the holding reduce requirements for the volume of the capital invested. Another important advantage of a holding company was seen in liability, both in risk diversification and in the possibility of mutual liability between the individual companies.

The disadvantages of a holding structure were identified as being complex tax planning, the differing accounting and tax laws in the various countries according to the registered office of individual subsidiaries, the inability to apply standardised financial statements and accounting operations and the consequent unclear management.

As already mentioned, the basic problem within the research into holding is the difficult identification of holdings. The research involved a total of 15 holdings which brought together, as of the date of performing the research, a total of 188 entrepreneurial entities. The author highlights limitation of research conclusions which gives this research sample. The author refers to the similar research of authors Vitali, Glattfelder and Battison (2011), who similarly state that is not yet appropriate methodology for carrying out a qualitative research on a large sample of holdings.

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Influence of Volatility on Hedging Strategies

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Abstract: *Subjects of financial markets who invest their funds in financial derivatives undergo high risks. The way how to protect from risk portfolio that includes warrants may be delta-hedging and gamma-hedging. The former is immune to the small changes in underlying asset's price and the letter even for greater changes in price. In this paper we try to answer the question what is the small change in price of an underlying asset. For this purpose we construct 50 portfolios which are delta-neutral and observe and compare how their value reacts to the certain levels of volatility of the underlying asset's price. The results show that there is no certain level of volatility which may be stated as small, however we found out that for medium level of volatility delta-hedging is successful for approximately 87% of reducing risk. The research is based on prospecting real financial markets. Data is gathered from Frankfurt Stock Exchange from year 2015.*

Keywords: warrants, delta-hedging, portfolio, Frankfurt Stock Exchange

JEL codes: G11, G12, G15

1 Introduction

When investors construct their portfolios they might be interested in avoiding risk associated with the securities involved in the portfolio. Otherwise they may face unpredictable losses in the future. Assuming investing to warrants one method which may be used is delta-hedging. The basic idea in this case is that we add certain amount of underlying shares of that particular warrant to the portfolio and make it delta-neutral. Having done that our portfolio is resistent to the small changes in price of the underlying asset, e.g. share. We can imagine several numbers in relation to the term *small changes*.

This method, delta-hedging, is derived from Black-Scholes option pricing model (Black and Scholes, 1973) which we can under certain assumptions apply on pricing warrants as well. We have decided to follow their approach although Bakshi et al (2003) states that stochastic volatility modelling is stronger than standard Black-Scholes model. Also Nandi (2000) and Clewlow (1997) tried to investigate optimal delta-hedging strategies.

Another feature of delta-hedging is that it is expensive in terms of transaction costs as we have to rebalance the portfolio often to stay in the delta-neutral position. In our paper we omit these transaction costs as we do not rebalance the portfolio during its existence. As we have shown in previous paper even if the portfolio is not rebalanced more than 70% of risk might be avoided (Florianová, 2015). The relationship between volatility of the underlying asset's price and the amount of avoided risk of the portfolio has not been found yet.

2 Methodology and Data

We make analysis in the standard Black-Scholes option pricing model. We use warrants which have shares as underlying assets. We assume that the price of a warrant is approximately equal to the price of an option. Also we assume that the price of an American call warrant is approximately equal to the price of an European call warrant:

$$W(S_t, K, r, T, \sigma) = S_t N(d_1) - K e^{-rT} N(d_2) \tag{1}$$

where S_t stands for a spot price of an underlying asset of a warrant, K is a strike price, T is time to maturity, r is riskless interest rate, σ stands for volatility and N(·) represents distribution function of normal distribution and

$$d_1 = \frac{\ln\frac{S_0}{K} + \left(r + \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}} \tag{2}$$

$$d_2 = \frac{\ln\frac{S_0}{K} + \left(r - \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}} \tag{3}$$

Variable Delta (Δ) is a characteristic of a warrant which shows how the change in price of a warrant depends on changes in the price of an underlying asset (Hull, 2012). It is a coefficient measuring the dependence of one price moving on another. It can be derived from Black-Scholes model as follows:

$$\Delta_W = \frac{\Delta W}{\Delta S_0} \approx \frac{\partial W}{\partial S_0} = \frac{\partial S_0 N(d_1) - Ke^{-rT}N(d_2)}{\partial S_0} \tag{4}$$

After calculation of equation (4) we get:

$$\Delta_W = N(d_1) = \int_{-\infty}^{d_1} \frac{1}{\sqrt{2\pi}} e^{-\frac{x^2}{2}} dx \tag{5}$$

Similarly we have to calculate Delta of a share:

$$\Delta_{S_0} = \frac{\Delta S_0}{\Delta S_0} = 1 \tag{6}$$

We construct 50 portfolios consisting of N_W warrants and corresponding amount of shares. To hedge one warrant in portfolio we need the amount of Δ_W shares, which are the underlying assets of that particular warrant. For call warrants we have to sell shares, for put warrants we have to buy shares. We assume we currently hold N_S shares in each case.

We are in delta-neutral position if $\Delta_P = 0$. Therefore we need $N_S - n$ shares in a portfolio where:

$$n = N_W \cdot \Delta_W \tag{7}$$

Because we do not rebalance portfolios during their existence, we are in delta-neutral position with certainty only at time t = 0, when the price of a warrant is equal to W_0 and the price of a share is S_0. We calculate the value of the portfolio and compare it with the present value, when the price of a warrant is W_t and the price of a share is S_t.

$$P_0 = N_W \cdot W_0 + (N_S - n) S_0 \tag{8}$$

$$P_t = N_W \cdot W_t + (N_S - n) S_t \tag{9}$$

For the purpose of simplifying the problem and minimizing transaction costs we do not rebalance our portfolios during their existence and we exercise all of them on 03/23/2015.

We calculate how much the delta-hedged portfolio value P_D relatively grew within given period of time and compare it with the unhedged portfolio value P_N. We get the amount of risk which was avoided thanks to delta-hedging from the following equation:

$$AR = \begin{cases} 100\% & for \; P_N < 0 \; \wedge \; P_D > 0 \\ 0\% & for \; P_N > 0 \; \wedge \; P_D < 0 \\ \dfrac{P_N - P_D}{P_N} \cdot 100\% & otherwise \end{cases} \qquad (10)$$

where AR stands for avoided risk.

We state following presumptions: no transaction costs, no spread between bid and ask price. We use daily opening prices.

For the deviation of the share's price within the time period we use historical volatility σ in annualized form:

$$\sigma = \frac{\sigma_{SD}}{\sqrt{T}}$$

$$(11)$$

where σ_{SD} is a standard deviation of daily logarithmic returns of a share, T is time period from the issue date of a warrant to its exercise date.

Having computed all the volatilities, we put them into order from the lowest to the highest and divide into three similarly great sets - low volatility set, medium volatility set and high volatility set. In each of them we calculate the expected value of AR and the standard deviation of AR. Consequently we can compare the results in these three groups.

Data was gathered from Frankfurt Stock Exchange. It has been chosen because in the European area it is the most liquid stock exchange in terms of trading warrants. From plenty possibilities warrants on shares were chosen. These shares belong to well-known companies from different business areas which provide smooth and liquid conditions for further examination.

The dataset consists of 50 types of warrants, each 10 of them on the same share belonging to the following companies:

- Adidas
- Lufthansa
- Microsoft
- Nestlé
- Volkswagen

These warrants were issued by huge financial corporations – DZ Bank AG, Bank Vontobel AG, BNP Paribas, UBS AG, Société Générale S.A., Interactive Brokers Group, Inc., The Goldman Sachs Group, Inc. and Raiffeisenbank eG.

The features which all of the warrant in the dataset have in common is the exercise date 06/19/2015, type: American call and denomination in Euros.

Table 1 Sample of characteristics of warrants used in portfolios

WKN	Underlying Share	Issuer	Issue Date	Issue Price of Warrant	Delta of Warrant
DZL6S7	Adidas	DZ BANK	06/19/2013	1.606	0.35
T99LA	Adidas	Bank Vontobel	07/18/2013	0.69	0.03
UA7KC3	Lufthansa	UBS	08/01/2013	3.53	0.58
PA0S7Y	Lufthansa	BNP Paribas	10/01/2013	1.54	0.21
VZ80JK	Microsoft	Bank Vontobel	02/02/2015	0.18	0.60
AP5XEH	Microsoft	Interact. Brokers	02/20/2015	0.40	0.77
RC0BUA	Nestle	Raiffeisenbank	02/09/2015	0.11	0.87
GT96C3	Nestle	Goldman Sachs	10/14/2014	0.05	0.48
PA0R0T	Volkswagen	BNP Paribas	10/01/2013	2.06	0.98
SG6LX4	Volkswagen	Société Générale	11/24/2014	3.31	0.99

Source: Own adjustment based on Frankfurt Stock Exchange Data

3 Results and Discussion

We have constructed fifty portfolios consisting of 100 warrants of one type and corresponding amount of shares. The results of calculations of the values, both current and at t=0, of portfolios delta-hedged (P_d) and non-hedged (P_n) and their profit or loss in relation with avoided risk are available at table 2.

Table 2 Sample of portfolio profits and avoided risk

Warrants	Underlying Share	Profit of P_d (in %)	Profit of P_n (in %)	AR (in %)
DZL6S7	Adidas	-18.045	-87.547	79.388
VT99LA	Adidas	-18.402	-97.101	81.049
UA7KC3	Lufthansa	-29.575	-68.839	57.037
PA0S7Y	Lufthansa	-13.656	-86.364	84.188
VZ80JK	Microsoft	10.38	11.111	6.583
AP5XEH	Microsoft	2.611	-17.5	100
SG6LDC	Lufthansa	-12.264	12.5	0
GT96C3	Nestle	28.815	220	86.902
PA0R0T	Volkswagen	118.198	244.175	51.593
SG6LX4	Volkswagen	160.024	237.764	32.693

Source: Own adjustment based on Frankfurt Stock Exchange Data

Having calculated all the volatilities we can put them in relation to the AR and divide them into low/medium/high volatility sets. See table 3. The criterion for low volatility set is that volatility is less than 25, for medium volatility set is that volatility is greater than 25 and at the same time less than 35, for high volatility set is that volatility is greater than 35.

Table 3 Avoided risk and volatility

Low volatility set		Medium volatility set		High volatility set	
AR	Volatility	AR	Volatility	AR	Volatility
81.05	14.41	85.63	26.53	46.17	35.54
87.2	14.46	87.51	26.67	100	36.40
77.35	15.24	84.17	26.71	100	36.40
81.27	15.90	83.91	26.89	96.2	37.41
100	18.89	84.09	27.55	100	37.44
6.75	19.14	83.74	28.50	100	37.44
100	20.47	89.29	28.64	89.84	37.86
86.69	20.55	80.93	29.25	100	39.20
34.13	21.06	84.25	29.92	100	39.20
100	21.66	86.97	30.01	92.93	40.98
100	22.05	87.2	32.71	100	42.51
0	22.61	82.42	33.19	75.51	43.47
100	22.61	83.68	33.30	0	47.50
100	24.58	100	33.44	0	47.50
		100	33.59	98.94	50.77
				83.53	51.71
				100	55.76

Source: Own adjustment

From 50 portfolios 4 were omitted due to many observations unavailability.

For each group we calculated expected value of AR and standard deviation, see table 4.

Table 4 Expected value and standard deviation of AR

Low volatility set		Medium volatility set		High volatility set	
E[AR]	SD	E[AR]	SD	E[AR]	SD
75.32	35.16	86.92	5.72	81.36	33.57

Source: Own adjustment

We have got following results:

In low volatility set, expected value of avoided risk is approximately 75% with the standard deviation of 35. That means that we cannot be really sure about the results of delta-hedging in this group of portfolios.

In medium volatility set, expected value of avoided risk is approximately 87% with the standard deviation of 6. That is a good result. It means that we can be fairly sure that the delta-hedging in this group of portfolios will avoid 87% of risk.

In high volatility set, expected value of avoided risk is approximately 81% with the standard deviation of 34. The situation is similar to low volatility set meaning that we cannot be really sure about the results of delta-hedging in this group of portfolios.

4 Conclusions

Assuming portfolios consisting of warrants and underlying shares, delta-hedging is a reasonable method to hedge a portfolio and avoid unnecessary risk. Under the presumptions of Black-Scholes model and moreover no rebalancing of portfolio we can conclude that there is no valid definition for the term *small changes* in price of an underlying asset when speaking about the fact that delta-neutral portfolio is immune to these *small changes*. If the changes in price of an underlying asset are less than 25% volatile or more than 35% volatile, the expected value of avoided risk has such a great standard deviation that we cannot make any valid conclusions about the relationship.

On the other hand, when the volatility is between 25 a 35 percent, we can fairly anticipate strong hedging with around 87 percent of risk avoided.

In general when we want to be relatively sure that our portfolio will be effectively hedged we should find shares whose volatility is not very small but also not very high, because the results are very uncertain.

The contribution to the literature is broadening theoretical knowledge of hedging strategies towards warrants and finding a relationship between volatility of underlying assets and success of hedging strategies with conclusion that theoretical term *small changes* is not applicable on real markets.

Acknowledgments

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Premium Calculation for Critical Illness Products

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Abstract: According to the World Health Organization (WHO) Europe had the highest incidence of the cancer disease in 2008 and by the World Bank the cancer incidence rates rises as the country income increases. In this framework, people are stepping up their requests for the welfare services or for the insurance companies' financial backing in order to face up to the risks concerning the human health and life, like the risk of becoming invalid, losing the own physical or mental ability to live independently or contracting a critical illness. Critical Illness Insurance is an insurance product where a fixed sum (lump sum) is payable on the diagnosis of one of a specified list of critical illnesses. The aim of this paper is to calculate premiums of Critical Illness policy, specifically for the homogeneous groups generated by sex and relation to smoking. In the calculation of the actuarial value of the insurer's payments, we have employed the claim diagnosis rates for accelerated Critical Illness Insurance estimated by the members of the Continuous Mortality Investigation Critical Illness Committee (UK). We have shown that a single premium increases gradually until about the age 46 years (for both sex).

Key words: premium, mortality, life table, dread disease, critical illness policy

JEL Classifications: G22, I14

1 Introduction

We are interested in the pricing of a policy providing the whole assured sum if the insured is diagnosed with a dread disease or dies within the expiry of the contract that we assume to fall on the end of the fifth year from the policy issue. In the calculation of the actuarial value of the insurer's payments, at the time of policy issue, we employ the claim diagnosis rates for accelerated Critical Illness Insurance estimated by the members of the Continuous Mortality Investigation Critical Illness Committee. These data were published by UK Institute and Faculty of Actuaries in January 2011 in the Working Paper 50 entitled "CMI critical illness diagnoses rates for accelerated business "2003-2006" and consist in four sets of rates: "ACMNL04", "ACMSL04", "ACFNL04" and "ACFSL04", concerning male non-smokers, male smokers, female non-smokers and female smokers, respectively. The diagnosis rates have been derived by adjusting the base table CIBT02 diagnosis rates to get expected settled claims likely close, by age and duration, to the actual settled claims paid, over the period from 2003 to 2006, by the participating insurance companies after one of the following critical illness was ascertained: cancer, heart attack, stroke, coronary-artery by-pass grafts, multiple sclerosis, total and permanent disability.

2 Methodology

We make use of all-causes diagnosis rate and a two-state model. The first state is that in which the insured is alive and does not suffer from any critical illness specified in the policy, and the second state in which the individual is not active anymore because he (or she) has fallen ill or he has died of a cause different from a dread disease.

The calculation of the actuarial value of benefits premiums is carried out in the field of the time-discrete Markov chain (Haberman, Pitacco, 1999), because we need to scan the time on an annual basis. Thus, in this framework, the variable t takes integer values.

The policyholder takes out the Critical Illness policy at time zero. The waiting period lasts 30 days from the policy issue. According to the CMI, the 2003-2006 dataset points out an

average observed interval between the date of diagnosis and the date of settlement of the claims equal to 187 days. A part of the delay in the insurer's payment is due to the policyholder (the period between the diagnosis and the notification) while the length of the time interval between notification and settlement is an attribute of the insurer. The policyholder is entitled to receive the benefit if the insured event occurs after the end of the waiting period and within the expiry of the contract. The policy lapses after the lump sum payment. We assume that the benefit amounts to £ 100 000.

Let us calculate the actuarial value at time zero of the lump sum benefit that represents also the single premium according to the equivalence principle. The annual insurer's undertaken is to pay the benefit if the insured risk will occupy second state (ill or died) at an uncertain time between the beginning and the end of the year. The uncertainty on the moment in which the insurer will have to make his payment involves the assumption that, if the insured event happens, the lump sum is paid in the middle of the year. The inclusion of the time interval between the date of diagnosis of the critical illness and the date of settlement of the claim, that is roughly equal to 0,5. Let us take into account such uncertainty. Equation (1) points out our remarks:

$$P = 100000 \cdot A_{x,6} = 100000 \cdot \left({}_{0/1}\mu_x \cdot v^{\frac{30}{365}+\frac{1}{2}} + \sum_{h=1}^{5} {}_{h/1}\mu_x \cdot v^{h+\frac{1}{2}} \right),$$ (1)

where μ_x is the transition rate between states "live" and "ill or dead",

v is the discount factor, $v = \dfrac{1}{1+0,025}$. We assume 2,5 % p.a. interest rate.

We assume that people aged 18 to 65 enter the Critical Illness policy under observation and we calculate the actuarial value of the benefit for each of these ages. So x takes value within the interval [18, 65].

Table 1 Female non-smokers diagnosis rates for a subset of ages

Age	Duration					
	0	1	2	3	4	5
18	0.00019	0.00028	0.00028	0.00028	0.00028	0.00029
19	0.00021	0.00031	0.00031	0.00031	0.00031	0.00032
.	.	.	.	.	.	.
35	0.00082	0.00120	0.00120	0.00120	0.00120	0.00122
36	0.00088	0.00129	0.00129	0.00129	0.00129	0.00132
.	.	.	.	.	.	.
64	0.00776	0.01142	0.01142	0.01142	0.01142	0.01174
65	0.00849	0.01251	0.01251	0.01251	0.01251	0.01286

Source: Author´s processing

The diagnosis rates are organized in the form of matrix, whose rows represent the age and whose columns represent the policy durations, meant as period between the commencement of the policy and the beginning of the year of the exposure or diagnosis.

Let us examine a part of the whole matrix of diagnosis rates. In particular, we focus on the central diagnosis rates for female non-smoker, reported in Table 1.

The probability that an insured female aged 35 at time zero becomes a dread disease sufferer or dies, within the end of the first year of the policy, takes the value of 0,00082. We denote this by ${}_{0/1}\mu_{35}$. The value ${}_{1/1}\mu_{35}$ is the probability that the insured female aged 35 at the time of the policy issue keeps her as active until age 36 and falls ill or dies before the second year of the policy lasts, i.e. she's 37. The value of the diagnosis rates for an insured aged 35 characterizing durations from 1 to 4 is 0,00120, i.e. ${}_{1/1}\mu_{35} = {}_{2/1}\mu_{35} = {}_{3/1}\mu_{35} = {}_{4/1}\mu_{35} = 0,00120$. ${}_{5/1}\mu_{35}$ is the probability that the insured, being alive and healthy at the beginning of the fifth year of the policy, falls ill with a critical illness or dies

within one year, $_{5/1}\mu_{35}$ = 0.00122. The diagnosis rates concerning a policyholder, who's 36 when the policy is issued, are slightly higher than the diagnosis rates regarding an insured aged 35.

3 Results

By equation (1) the single premiums are pointed out in the following table (Table 2) and depicted in Figure 1. Calculation was done in **R**, which was also used for all graphs.

Table 2 The single premiums in the framework of a Critical Illness policy providing £100 000 to female non-smoker insured people aged 18-65

18	148.04	**26**	279.48	**34**	585.84	**42**	1052.91	**50**	1975.60	**58**	3648.66
19	163.78	**27**	305.38	**35**	633.04	**43**	1142.73	**51**	2147.79	**59**	3930.00
20	173.94	**28**	332.25	**36**	681.11	**44**	1239.85	**52**	2333.74	**60**	4230.67
21	185.08	**29**	364.59	**37**	732.90	**45**	1340.70	**53**	2532.70	**61**	4589.69
22	200.82	**30**	406.22	**38**	785.67	**46**	1444.38	**54**	2747.39	**62**	5022.79
23	216.55	**31**	448.83	**39**	839.32	**47**	1558.34	**55**	2960.23	**63**	5508.66
24	236.87	**32**	491.44	**40**	898.54	**48**	1683.34	**56**	3179.51	**64**	6031.46
25	258.18	**33**	538.64	**41**	971.52	**49**	1826.68	**57**	3410.92	**65**	6606.04

Source: Author´s processing

The total cost that the insurer expects to incur throughout the life of the Critical Illness policy increases when the insured's age at the time of the commencement of the insurance gradually rises. The single premium increases gradually until about 46 and considerably until age 65. Since we have assumed that the insurer has designed a policy characterized by the same features regardless of the individual who buys it, the different values of the diagnosis rates bring about the different premium amount. The higher is the insured's age the greater is the probability that such individual can fall ill a dread disease or dies within a year.

Figure 1 The actuarial values for female non-smoker at time zero of the single premium
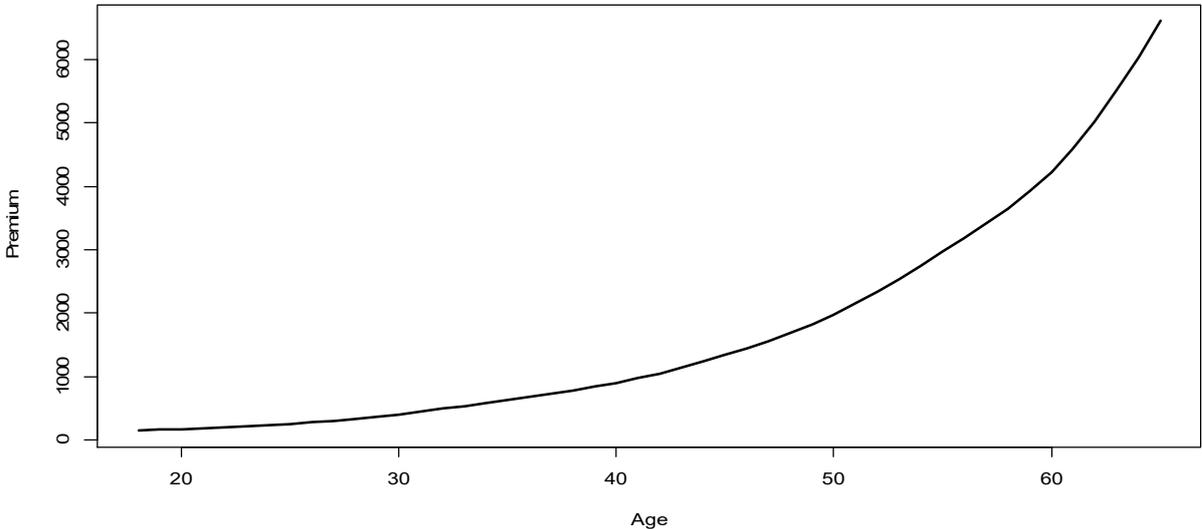
Source: Author´s processing

Let us now suppose that the active female insured has to pay regular premiums, at a constant instalment $P_{x:\overline{6}|}$, at the beginning of each year all through the policy life. We want to get the amount of $P_{x:\overline{6}|}$ such that the equivalence principle is fulfilled, like in the following equation:

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$$A_{x,6} = P_{x:\overline{6}|} \cdot \ddot{a}_{x:\overline{6}|} ,$$ (2)

where $\ddot{a}_{x:\overline{6}|} = \sum_{h=0}^{5} {}_h p_x \cdot v^h$ is the actuarial value at time zero of a contingent temporary annuity at a unit rate, whose payments are made at the beginning of each year depending on the survival of the insured. The event giving rise the insured's payment is simply her survival, because the occurrences that would exempt her from the premiums payment are the diagnosis with a dread disease or death, which would bring about the termination of the insurance cover. Therefore when the policy is in force we are able to believe that the insured is active, so she has to pay the premiums.

${}_h p_x$ is the probability that the further insured's lifetime is higher than h, so that the insured survives the age $x+h$. In order to calculate $\ddot{a}_{x:\overline{6}|}$ we use values of the probabilities ${}_h p_x$ with h from 0 to 5 in the framework of a policy beginning on January 2007. Therefore we take the Human Mortality Database data. They are available until 2011.

We bring in **R** the above-mentioned data about the death rates and the average number of English & Welsh people, aged equally and survived among the initial homogeneous population by each year of the observation period. These data are concerning the time interval 1922-2011 and the ages from 0 to 110.

Figure 2 Death rates for UK female population in selected years

Source: Author´s processing
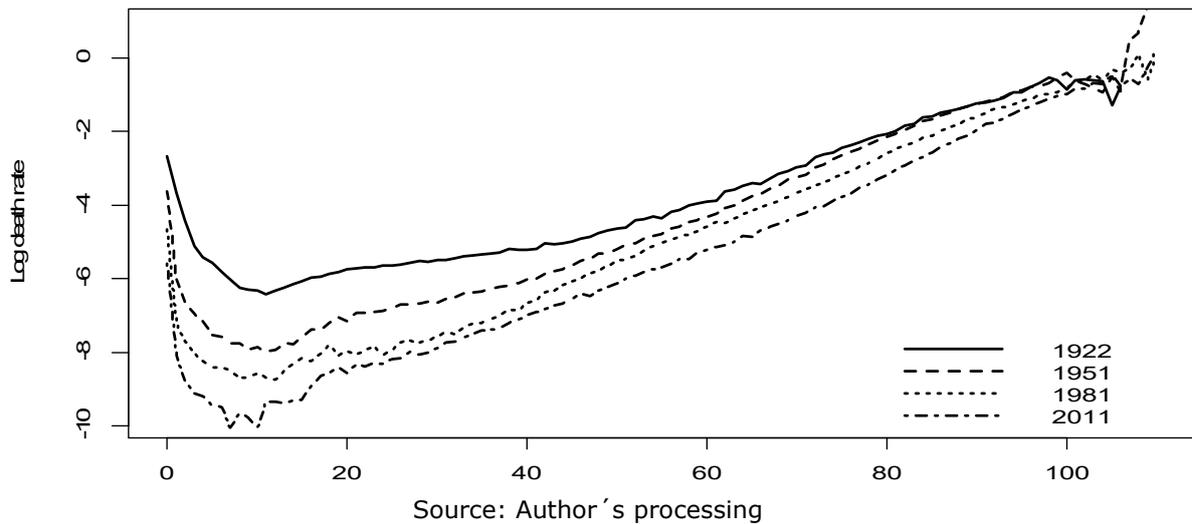
Figure 2 represents the ages on the *x*-axis and the corresponding log-death rates on the *y*-axis in selected years. As we can see in any year of the observation period death rates increase when the age rises, except for the ages from 0 to nearly 15. Moreover, the lifetime has increased by each age as the time has moved.

Now we construct the life tables by each age included in the range 18-65 and by each year. Therefore we have to calculate the following probabilities: ${}_1 p_x = \dfrac{l_{x+1}}{l_x}$, ${}_2 p_x = \dfrac{l_{x+2}}{l_x}$,

${}_3 p_x = \dfrac{l_{x+3}}{l_x}$, ${}_4 p_x = \dfrac{l_{x+4}}{l_x}$, ${}_5 p_x = \dfrac{l_{x+5}}{l_x}$ and ${}_0 p_x$ is equal to 1.

We draw the dataset about l_x, from the life table, selecting from 18 to 65.

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Table 3 Probabilities $_h p_x$ for female population in England and Wales from 18 to 65

Age x	$_0 p_x$	$_1 p_x$	$_2 p_x$	$_3 p_x$	$_4 p_x$	$_5 p_x$
18	1	0.999740	0.999485	0.999225	0.998972	0.998716
19	1	0.999745	0.999485	0.999231	0.998976	0.998729
20	1	0.999740	0.999486	0.999230	0.998984	0.998702
.	.	.	.	.	.	.
.	.	.	.	.	.	.
63	1	0.992042	0.983453	0.974484	0.964375	0.953245
64	1	0.991343	0.982301	0.972111	0.960892	0.948466
65	1	0.990880	0.980600	0.969283	0.956749	0.944018

Source: Author´s processing

Now we have all necessary elements for the calculation of $\ddot{a}_{x:\overline{6|}}$.

Table 4 The value of $\ddot{a}_{x:\overline{6|}}$ for female age from 18 to 65

18	**19**	**20**	**21**	**22**	**23**	**24**	**25**
5.642299	5.642324	5.642303	5.642268	5.642125	5.641936	5.641557	5.641275
26	**27**	**28**	**29**	**30**	**31**	**32**	**33**
5.640974	5.640846	5.640503	5.640474	5.640029	5.639747	5.638959	5.637988
34	**35**	**36**	**37**	**38**	**39**	**40**	**41**
5.637433	5.636452	5.635391	5.634549	5.633521	5.632256	5.631086	5.629513
42	**43**	**44**	**45**	**46**	**47**	**48**	**49**
5.627816	5.626169	5.624154	5.621884	5.619495	5.616418	5.613319	5.610818
50	**51**	**52**	**53**	**54**	**55**	**56**	**57**
5.607256	5.604607	5.600414	5.597197	5.593175	5.587994	5.582539	5.577799
58	**59**	**60**	**61**	**62**	**63**	**64**	**65**
5.570702	5.562452	5.556011	5.54497	5.535339	5.525022	5.51366	5.501279

Source: Author´s processing

The value of $\ddot{a}_{x:\overline{6|}}$ decreases when the insured's age rises, because older individuals have progressively lesser probabilities to survive.

The constant instalment of the premiums is obtained dividing each actuarial value of the benefit amounting to £100 000, expressed in Table 5, by the annuity calculated for the same age.

Table 5 The amount of $P_{x:\overline{6}|}$ for each age from 18 to 65.

18	19	20	21	22	23	24	25
26.24	29.03	30.83	32.8	35.59	38.38	41.99	45.77
26	**27**	**28**	**29**	**30**	**31**	**32**	**33**
49.54	54.14	58.91	64.64	72.02	79.58	87.15	95.54
34	**35**	**36**	**37**	**38**	**39**	**40**	**41**
103.92	112.31	120.86	130.07	139.46	149.02	159.57	172.58
42	**43**	**44**	**45**	**46**	**47**	**48**	**49**
187.09	203.11	220.45	238.48	257.03	277.46	299.88	325.56
50	**51**	**52**	**53**	**54**	**55**	**56**	**57**
352.33	383.22	416.71	452.49	491.2	529.75	569.54	611.52
58	**59**	**60**	**61**	**62**	**63**	**64**	**65**
654.97	706.52	761.46	827.72	907.4	997.04	1093.91	1200.82

Source: Author´s processing

Figure 3. points out that the higher is the insured's age the higher is the amount of the premium instalment $P_{x:\overline{6}|}$.

Figure 3 Premium $P_{x:\overline{6}|}$ for female non-smoker insured aged from 18 to 65.
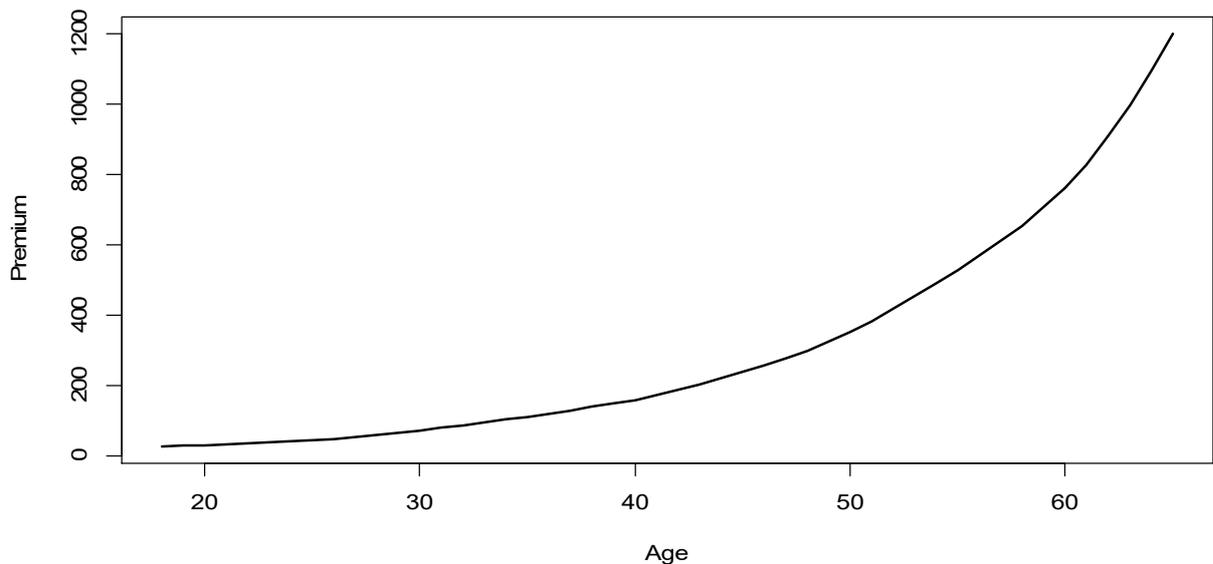
Source: Author´s processing

Let us compare the diagnosis rates relating to male non-smoker insured people with those concerning female non-smoker insured people.

Table 6 contains the diagnosis rates for male non-smokers with reference to some ages only. Analyzing the matrixes of the diagnosis rates of male and female, it comes out that the diagnosis rates concerning females are lower than those relating to males within age ranges: 18-29 and 50-65. It follows that a female insured (whose age is included in one of such ranges) has to (or should) pay a smaller single premium than the one paid by a male insured at the same age. We have calculated the single premiums as the actuarial value at time zero of the lump sum (£100 000) probably paid by the insurer, employing the same method (equation (1)). The outcomes are pointed out in the Table 7.

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Table 6 Male non-smokers diagnosis rates for a subset of ages

Age	Duration					
	0	**1**	**2**	**3**	**4**	**5**
18	0.00050	0.00066	0.00066	0.00066	0.00066	0.00071
19	0.00050	0.00066	0.00066	0.00066	0.00066	0.00071
.	.	.	.	.	.	.
.	.	.	.	.	.	.
35	0.00069	0.00091	0.00091	0.00091	0.00091	0.00101
36	0.00075	0.00099	0.00099	0.00099	0.00099	0.00110
.	.	.	.	.	.	.
.	.	.	.	.	.	.
64	0.01192	0.01585	0.01585	0.01585	0.01585	0.01757
65	0.01329	0.01767	0.01767	0.01767	0.01767	0.01959

Source: Author´s processing

Table 7 The single premiums in the framework of a Critical Illness policy providing £100 000 to male non-smoker insured aged 18-65.

18	356.41	**26**	356.41	**34**	460.85	**42**	891.23	**50**	1982.06	**58**	4600.99
19	356.41	**27**	364.71	**35**	494.18	**43**	961.48	**51**	2253.12	**59**	5072.00
20	356.41	**28**	369.29	**36**	537.66	**44**	1036.43	**52**	2545.50	**60**	5592.95
21	356.41	**29**	371.15	**37**	586.72	**45**	1132.68	**53**	2850.88	**61**	6193.54
22	356.41	**30**	373.88	**38**	641.35	**46**	1253.96	**54**	3167.51	**62**	6883.84
23	356.41	**31**	385.90	**39**	696.85	**47**	1393.59	**55**	3494.31	**63**	7701.86
24	356.41	**32**	401.64	**40**	757.93	**48**	1548.19	**56**	3828.31	**64**	8595.81
25	356.41	**33**	429.39	**41**	822.72	**49**	1730.44	**57**	4183.62	**65**	9583.18

Source: Author´s processing

Let us suppose that smoker people take out a Critical Illness policy characterized by the same features of the policy that non-smoker people endorse. Let us compare the single premiums that male smoker insured people have to pay at time zero with those due by the male non-smoker policyholder (Table 7).

Figure 4 The actuarial values at time zero of the single premium for male smoker and male non-smoker insured people aged from 18 to 65.
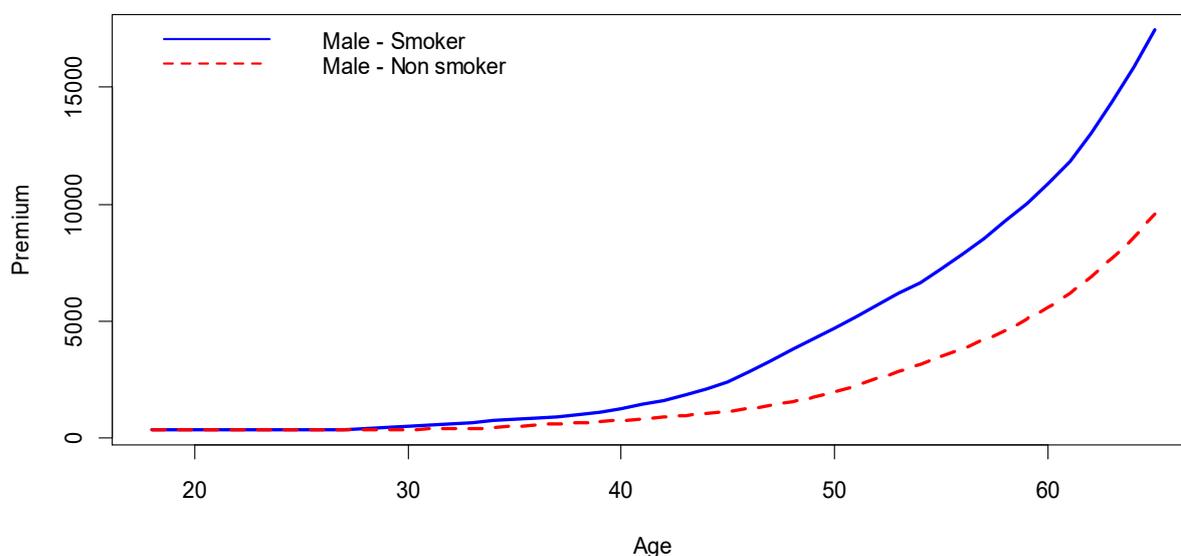

Source: Author´s processing

Table 8 The single premiums in the framework of a Critical Illness policy providing £100 000 to male smoker insured people aged 18-65.

18	367.43	**26**	367.43	**34**	731.94	**42**	1620.44	**50**	4718.59	**58**	9262.02
19	367.43	**27**	379.84	**35**	789.37	**43**	1841.89	**51**	5196.63	**59**	10030.08
20	367.43	**28**	406.78	**36**	852.37	**44**	2082.74	**52**	5680.25	**60**	10894.58
21	367.43	**29**	450.38	**37**	909.80	**45**	2418.07	**53**	6169.43	**61**	11844.11
22	367.43	**30**	494.76	**38**	999.68	**46**	2855.40	**54**	6664.19	**62**	13013.38
23	367.43	**31**	546.61	**39**	1120.11	**47**	3314.04	**55**	7223.85	**63**	14379.92
24	367.43	**32**	608.63	**40**	1261.84	**48**	3776.34	**56**	7863.03	**64**	15849.38
25	367.43	**33**	672.61	**41**	1434.12	**49**	4245.14	**57**	8532.96	**65**	17450.41

Source: Author´s processing

A male smoker insured has to pay a higher single premium than a male non-smoker individual at any age. For instance, a male non-smoker insured aged 35 has to pay approximately the same single premium like the premium due by a male smoker insured aged 30 and the difference between the premiums paid by the two kinds of insured both aged 35 is almost £300. The reason of these differences in the premium amounts lies in the higher probabilities that smoker falls ill with a dread disease or die, whatever their age is, compared to the probabilities concerning non-smoker people.

4 Conclusion

We have presented the pricing of the Critical Illness policy. The single premium increases gradually until about 46. The higher is the insured's age the greater is the probability that such individual can fall ill a dread disease. It comes out from diagnoses rates that female insured should pay a smaller single premium than the male insured in both category non-smoker and smoker, as well. The insurer can correctly determine premiums only if they use correctly estimated probabilities of claims. For this purpose they can apply permanently updated Bayesian estimates of the event probabilities, in this case an event that a critical illness occurs (Jindrová, 2013), (Jindrová, Pacáková, 2014).

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Competitiveness in Slovak and Czech Public Procurement and its Effect on the Final Price

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Abstract: *Public expenditures via public procurement accounts for a significant percentage of GDP – around 15 %. Most authors agree that there is an inversely proportional relation between competitiveness and the final price of the public procurement (Kuhlman and Johnson, 1983; Brannman, 1987; Rose-Akerman, 1999; Gupta, 2002; Pavel, 2010; and many others). According to some authors, price decreases caused by increasing competitiveness stop when there are 6-8 participating competitors and they describe this point as fully competitive procurement. When full competitiveness is reached, subsequent additional competitors have only a minimal or no impact on the final procurement price. The aim of our paper is to summarize and calculate competitiveness in Slovak and Czech public procurement between 2008 and 2014, and to evaluate the impact of the level of competition in public procurement on the final price, using regression analysis and weighted summary statistics. In the final part of our paper we compare our findings to those of the above noted experts.*

Keywords: public procurement, competitiveness, savings, final price

JEL codes: H50, H57

1 Introduction

Countries from the V4 region (which include Slovakia and the Czech Republic) have similar problems in public procurement. According to Pavel (2013), the "new" EU member states (which joined the EU after 2004) have experienced a low competitiveness rate[3] in their public procurement. An analysis of over the threshold public procurement in the EU (Strand, Ramada et al, 2011) for 2006-2010 showed that Slovakia had the smallest number of competitors in public procurement in the whole EU, and the Czech Republic was also in the bottom six for the EU27. But existing empirical studies argue that greater competitiveness in public procurement leads to lower prices, and the macroeconomic theory of supply (Uramová, Piteková, Paľa, 2010) makes the same assumption.

This paper provides new data on this issue and its main aims are to summarize and calculate competitiveness in Slovak and Czech public procurement between 2008 and 2014, and to evaluate the impact of the level of competition in public procurement on the final price.

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[3] Competitiveness/competitiveness rate in our paper means the number of competitors in public procurement. This phrase is also used in other papers (e.g. Gupta, 2002).

2 Literature Review

Gupta (2002) found that 6 to 8 candidate competitors are needed in order to reach full competitiveness[4]. Above this number additional candidates did not affect the final price. The author analyzed the public procurement of highway infrastructure construction in Florida (USA) from 1981 to 1986, using a total sample of 1937 tenders. He divided the public procurement market into two types: collusive and competitive. As shown in Figure 1 the public procurement market is fully competitive by the entry of candidate number X. Subsequent additional candidates have no impact on price.

Figure 1 Impact of number of candidates on the final price in public procurement
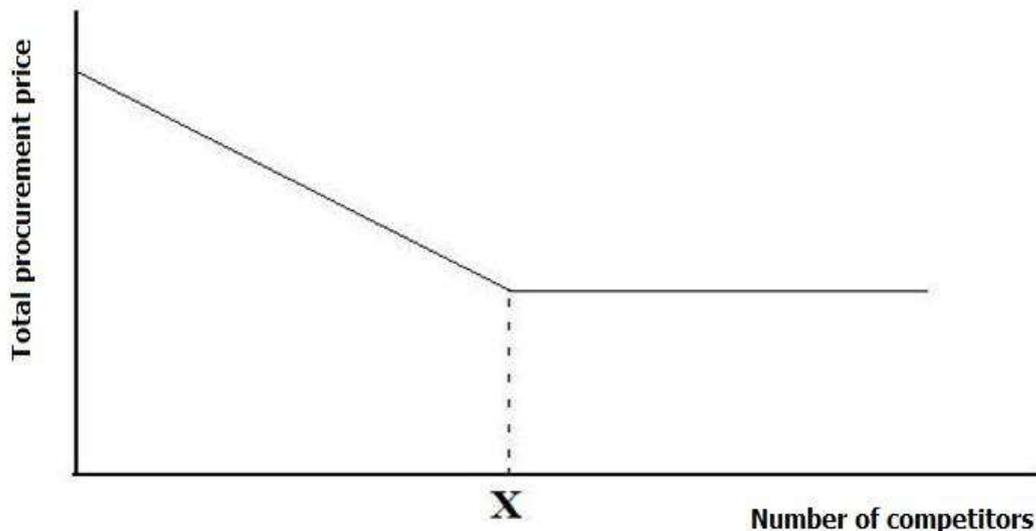
Source: Gupta (2002)

Gupta (2002) calculated that the increase in the number of candidates from two to eight implied achieving additional savings of, on average, 12% to 14%. When the data analysis was adjusted for extreme values, and full competitiveness was reached with 6 candidates, the increase in the number of candidates from 2 to 6 led to additional average savings of 9% to 10%. The author puts into context the number of candidates and their collusive behaviour. The higher the number of candidates, the more difficult and costly is to reach an agreement and create a cartel.

Also Brannman et al. (1987) identified some determinants of the final auction price: type of goods/service, characteristics of competitors, sector characteristics, type of auction used (in our case public procurement) and the number of candidates. They found in four out of six types of auction (dividing them according to their evaluation method and in the case of oil areas according to the time period) the status of full competitiveness was achieved with an average of 7 to 8 participants, and in the other two cases with an average of 5 participants. Brannman et al. (1987) thus confirmed the results of Gupta (2002), who estimated that full competitiveness required 6 to 8 candidates.

Rose-Ackerman (1999, p.68) produced an interesting finding, claiming that "if the possibilities for collusive behaviour and corruption are reduced, a public procurement with three candidates does not seem to be worse than a public procurement with six candidates". Although the author did not substantiate her claim with an analysis, several other authors have made similar claims (e.g. Brannman et al., 1987; Kuhlman and Johnson, 1983). We therefore assume that with minimized preconditions for corruption and collusion, full competitiveness may be achieved with fewer than 5 to 8 candidates.

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[4] An analysis of the entire data sample suggested full competitiveness status was achieved with 8 candidates, but after adjusting the extreme values full competitiveness was already attained with 6 candidates.

Ilke, Rasim and Bedri (2012) analysed the competitiveness in public procurement in Turkey from 2004 to 2006, using data from 90,089 tenders. The results were similar to those of the authors above: namely that every additional candidate lowered the final price of public procurement by an average of 3.9%. Ilke, Rasim and Bedri (2012) found that the more valuable the public procurement, the higher the number of candidates, and the size has a directly proportional impact on the number of candidates. The average competitiveness in public procurement in Turkey in 2004-2006 was 3.09 candidates. This only serves to highlight the problem of Slovak public procurement which had lower competitiveness than Turkey in 2004-2006.

Kuhlman and Johnson (1983) analysed the public procurement for highway infrastructure construction in two American states 1975-1980. In these cases, drawn from then on-going anti-trust cases, the size of public procurement (derived from the estimated contract value) did not have an impact on the number of candidates. But the inversely proportional relation between the number of candidates and the final price of the public procurement, noted above in other studies, was confirmed.

Soudek and Skuhrovec (2013) examined the public procurement of two homogeneous products in the Czech Republic - electricity and natural gas. The advantage of studying the procurement of homogeneous goods is that their procurement price is easy to compare with the market price, which the authors obtained from the short-term commodity exchange of electricity and gas OTE, a.s. in the Czech Republic. However such market prices are lower than the price to ordinary consumers, therefore the authors refer to them as "solid bottom-line benchmarks", i.e. the lowest possible prices that can be achieved on the market (assuming that the seller will not charge any administrative, handling or other additional fees).

The practice, however, showed that the price achieved by some procurers was lower than the market price. This may be related to special conditions, such as the length of contracts, hidden fees, cheaper energy supply during the night and other factors. Soudek and Skuhrovec (2013) made several important discoveries. Public procurers regularly overvalued the estimated contract value and therefore their price estimation does not correspond to the actual market price. This partly supports our assumptions. Also they found that the procedures used in public procurement had larger impacts on the final price than did the number of candidates. In particular the use of an open tender decreased the average achieved price by 7%. Each additional candidate in the electric energy procurement decreased the average final price by 1%.

Pavel (2010) analysed the influence of competitiveness in the price for construction of road and railway infrastructure in the Czech Republic from 2004 to 2009. He calculated the relation of the estimated contract value and the winning price, and found that on average every additional candidate decreased the final price by 3.275 % ceteris paribus. An important finding is that while increasing the numbers of offers reduces the winning price, the share of the five largest construction companies in the total volume of contracts does not decrease. The author argues that a stronger competitive environment forces the five strongest companies in the market to lower their prices to win the contract and keep their market share.

According to Millet et al. (2004) the most important determinant of e-auction success is the participation of suppliers (candidates) and therefore competitiveness. They argue that it was optimal to invite approximately five or six high-quality suppliers. Inviting more than that led to lower price decreases and so to less successful auctions. As soon as the candidates found out that they were competing in the e-auction with several other candidates, the submission of offers slowed down. This loss of interest was probably due to anticipated smaller profits because of greater competition (Millet et al., 2004). Rose-Ackerman (1999) reached a similar conclusion, arguing that this phenomenon is caused by companies (candidates) weighing potential profits against the costs of participation: the higher the number of competitors, the lower the potential profits.

Most of the authors agree on the fact that there is an inversely proportional relation between competitiveness and final price of the public procurement. According to some authors the price decrease by increasing competitiveness stops with 6-8 participating competitors and they described this point as fully competitive procurement. After full competitiveness is attained any additional candidate has either no or only a minimal impact on the final procurement price.

3 Methodology and Data

The studies reported in Section 1 above conclude that competitiveness in public procurement has a significant impact on the final price. Therefore our first goal is to measure competitiveness in Slovak and Czech public procurement. Strand, Ramada et al. (2011) only include data from over the threshold procurement in the EU. This threshold is procurement with an expected value over 200 000 euros for goods and services and over 5 000 000 euros for public works. We decided to also include below the threshold procurement in calculating Czech and Slovak competitiveness rates, because in the Czech Republic 78% of procurements, and in Slovakia 85% of procurements are below the threshold procurements (OECD, 2011).

There was no need to calculate competitiveness in the Czech Republic, because it has already been done by the Ministry of Regional Development (Ministerstvo pro místní rozvoj). In Slovakia the public procurement office does not directly supply procurement data, but there is a website, tender.sme.sk, managed by Transparency International Slovakia, which collects all procurement data from Slovakia, and offers it in open data format. We used this data to measure average weighted competitiveness in public procurement, using the following formula:

$$\bar{X} = \frac{\sum_{i=1}^{n} x_i * w_i}{\sum_{i=1}^{n} w_i} \qquad (1)$$

where:

$\bar{X}$ = weighted average of competitiveness in procurement for selected year,

x_i = individual values, in our case the number of competitors,

w_i = weight of public procurement (size of expected public procurement value).

Our second task was to evaluate the impact of increasing competition in public procurement on the final price. Since we had open data from Slovakia, which were used for measuring the competitiveness, we analyzed the impact of competition on the final price using the weighted average - to adjust for extreme values - as shown above, but we divided procurement not by years, but by the number of competitors. The weighted average can be helpful, but it is not very suitable for regression analysis. Therefore we used OLS regression analysis, see below, which showed, as we expected, that there are other significant factors that can influence final price, and so also need analysis.

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_i X_i + \varepsilon_i \qquad (2)$$

where:

Y = the amount of savings (in percentage) - compared to the expected price,

X_i = the observed value of the ith independent variable,

α = is a constant, the point at which the line crosses the Y axis when X=0,

β_i = is a coefficient representing the slope of the line.

In the regression analysis, we used Slovak data from "above the threshold procurement" 2009-2013, which we got from the European Commission. This data can also be found, though not in open data format, in Tenders Electronic Daily – a European public

procurement journal. In almost all cases the data contained fields such as estimated value, final value and number of candidates.

4 Results and Discussion

In Slovakia, the public procurement office neither provides data in open format, nor measures competitiveness. To measure competitiveness we used data[5] that covered different years from the Czech calculations, but the results are similar – the highest average number of bids is in public procurement of works, then services, and the lowest number is in the public procurement of goods. In general, we can see that competitiveness in public procurement is a little bit higher in the Czech Republic – see figure 3 (compare to Slovakia – figure 2). This finding is consistent with those of Strand, Ramada et al., (2011).

Figure 2 Competitiveness in Slovak public procurement 2010-2014
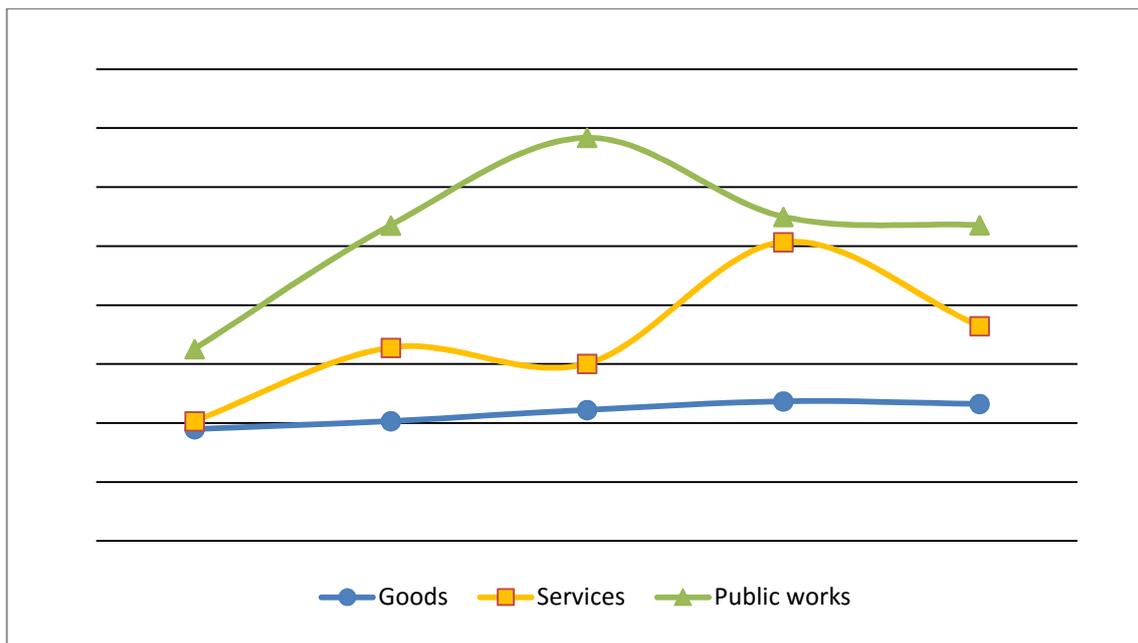
Source: Own research based on data of tender.sme.sk, 2015

Figure 3 shows the competitiveness in Czech public procurement 2008-2013. As for Slovakia, the highest competitiveness is in public procurement of works and the lowest is in procurement of goods.

Limited competitiveness may have a negative impact on prices. For our Slovak sample (27,000 cases) we try to calculate relation between number of competitors and decrease of final price by comparing estimated and final price (Figure 4).

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[5] For 2014 we had data only until August, so our research does not cover the whole year.

Figure 3 Competitiveness in Czech public procurement 2008-2013
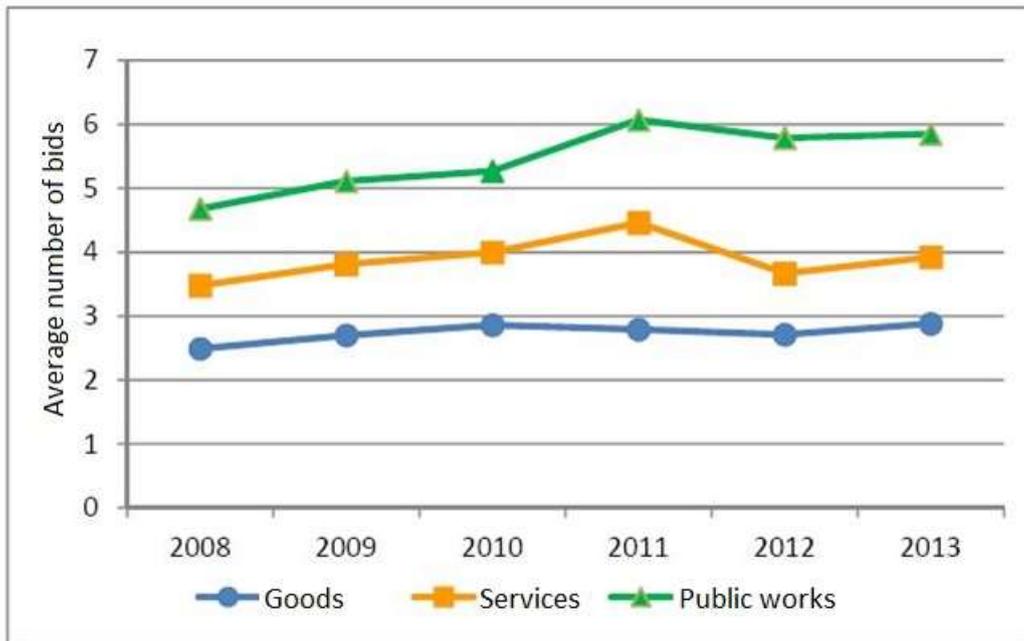
Source: Public procurement annual report for 2013, Ministerstvo pro místní rozvoj ČR, 2014

We are well aware that prices from public procurement should be compared with market prices, but due to extensive data set and missing/inaccurate data about market price, we decided to measure savings using the estimated price, as do most of the studies noted in section 1.

Figure 4 Average savings and number of bids in Slovak public procurement (2010-2014)
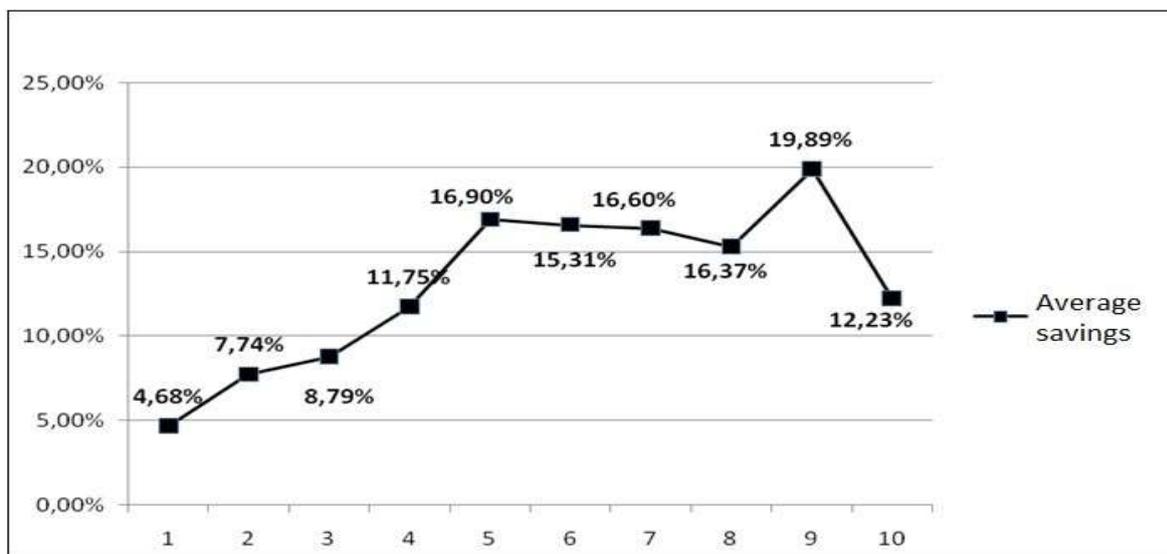
Source: Own research based on data from tender.sme.sk, 2014

Figure 4 clearly shows the relation between number of competitors/bids and final price. In 2014 the average number of competitors in Slovak public procurement was 3.19. If the number of competitors had risen from 3 to 5, at which procurement would be fully competitive, ceteris paribus, the average final price would have fallen by 8%. An 8% average decrease in Slovak public procurement final prices would have saved procurement expenditure equivalent to 1% of Slovak GDP.

From regression analysis, where the dependent variable was the total percentage change in savings, the following independent variables were statistically significant: the number of candidates (level of significance at 1 %), EU funds used (level of significance at 1 %), award criterion and assumption of subcontracts (level of significance at 10 %, p-value 0.06). The results are summarized in table 1.

Table 1 Factors influencing total savings in procurement – data from regression analysis

Variable	Total difference in savings
Number of candidates	2.63 %
EU funds used	- 1.54 %
Usage of lowest price criterion	1.06 %
Assumption of subcontracting	1.05 %
Additional information	
Sample (adjusted)	8426
R-squared	0.136
Adjusted R-squared	0.136

Source: Data from European Commission, own research, 2014

The regression results confirm an inverse relation between the number of candidates and the final price. With every additional competitor/candidate, there is a 2.63 % increase in savings. If public procurement was at least partly financed by EU funds, final savings decreased by 1.54 %, which seems to reflect economic reality in Slovakia.

If the procurer used the lowest price as the award criterion (instead of the most economically advantageous tender, known as the MEAT criterion), savings increased by 1.06 %. A similar increase in savings was achieved if there was assumption of subcontracting in procurement. This is possible, especially in particularly big procurements (above threshold procurements), or technically difficult projects. Because these two factors are important only at the 10% level of significance, we do not consider them as crucial, but will take them under consideration in future regression analysis.

Our regression analysis failed to identify either the use of electronic auctions or of open/restricted procedures as statistically significant. Pavel (2010) found that the use of the latter was significant. In particular when there was a restricted procedure, the final price increased by 11.56 %. One of the reasons why our regression analysis did not replicate his results may be that an open procedure was used in almost 81% of the sample of procurements. This is often to avoid the risk of being categorised as a "corrupted" procurement. Another reason may be the rather low R-Squared value of our analysis.

The adjusted R-Squared value was only 0,136, which seems to be too low to make predictions or draw conclusions. But we are using cross-sectional data, which commonly leads to lower Adjusted R-Squared values, and Pavel and Kubík (2011) report similar low adjusted R-Squared values. In our future regression analysis, we will divide the data into the three groups (goods, services and public works). Also instead of the OLS regression model, a GLM regression model will be used. Despite the regression model`s limitations the results indicate that, up to a point, the higher the number of candidates in public procurement, the lower the final price.

5 Conclusions

Competitiveness in public procurement has a significant influence on the final price – the more competitors the lower the final price. Our findings are consistent with those for other countries (e.g. Kuhlman and Johnson, 1983; Gupta, 2002; Pavel, 2010).

For Slovakia we find fully competitive procurement if there are 5 or more competitors. As the average number of competitors in 2014 was 3.19, we are still some way from full

competitiveness. Regression analysis also confirms the inverse relation between the number of competitors and the final price. Each additional competitor decreases the final price by 2.63 %, ceteris paribus.

There are many other factors influencing the results of public procurement. For example there is corruption, collusive behavior, the business environment and transaction costs. But our view is that without sufficient competition, lower prices, improved efficiency and better quality are not attainable.

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Efficiency of National Life Insurance Markets in Europe

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Abstract: *The European insurance market is expanding rapidly. Currently, is has a larger share of premiums written than North America or Asia. However, there are big differences between national insurance markets. The paper is aimed at assessing the efficiency of national life insurance markets in Europe by applying DEA models. DEA models are nonparametric methods for assessing the efficiency and which use linear programming. For each analysed subject the efficiency score is expressed, and this score is then used to compare the transformation of multiple inputs into multiple outputs. Subject will be rated as fully efficient according to available evidence if and only if the performances of other subject does not show that some of its inputs or outputs can be improved without deterioration of some of its other inputs or outputs. The aim of this paper was to estimate and compare the efficiency score of national life insurance markets in Europe focusing on the analysis of the relative efficiency of national insurance markets in Slovakia and the Czech Republic. Eight national life insurance markets out of the 22 analyzed DMUs were efficient. It was the life insurance market in Denmark, Spain France, Iceland, Italy, Luxembourg, Latvia and Norway. The smallest value of the efficiency score had Turkey,*

1 Introduction

The insurance market is a component of the financial system. Financial system is the heart of each market economy. (Nečas and Čejková, 2014) The level of the insurance market and the results of the insurance sector are closely linked to the economic performance of the country. (Masárová et al., 2015) A dynamically developing insurance market positively affects the economic growth. Recently, however, national insurance markets have experienced large fluctuations caused by the financial and economic crisis. The development of the efficiency of insurance companies and the efficiency of national insurance markets is not stable.

The insurance market is divided into life insurance and non-life insurance market. In most European countries, life insurance accounts for a larger proportion of the premiums than non-life insurance. In some European countries, life insurance accounts for 80% of the premiums. Total life insurance premiums in Europe in 2012 amounted to around 57.8% of the total premiums but have not reached the value of 2007, which was 63%.

Our paper is aimed at analyzing the efficiency of operational activities of national life insurance markets in Europe. When comparing efficiency, efficiency scores are used. They can be expressed using several methods. A group of methods for estimating the efficiency score is data envelopment analysis. (DEA model). In our analysis, we apply the input-oriented and output-oriented BCC models of efficiency. Measuring the performance and efficiency of production units and the identification of their inefficiency are an important prerequisite for their improvement. (Havierniková and Krajčo, 2013)

National insurance markets vary greatly in size. In some countries there is a long tradition of the life insurance market and national insurance markets have a large volume of premiums. Our intention will be to determine whether these insurance markets are on average more efficient. Our goal will be to compare whether there is a statistically significant difference in the probability distribution of the efficiency score of operational activities of national life insurance markets in countries with an above-average proportion

of the premiums and the probability distribution of the efficiency score of operational activities of national life insurance markets in countries with a below-average proportion of the premiums.

Life insurance markets vary in size and are influenced also by what proportion of the premiums is represented by life insurance. For example, in Denmark and Sweden, life insurance represents a large proportion of the premiums. In these countries, life insurance forms a proportion of more than 80%. In Iceland and Turkey, life insurance represents a small proportion of the premiums. The life insurance market in the Czech Republic forms a smaller proportion of the premiums than non-life insurance. In 2012, the proportion of premiums in life insurance was 49.3%. One of the reasons for the greater proportion of premiums in non-life insurance in the Czech Republic may be the fact that non-life insurance has a longer tradition because of frequent floods and other natural elements affecting the territory of the Czech Republic. The proportion of life insurance in the Czech Republic is growing but it still does not reach the average value of developed European countries. The subtask of this paper is to analyze the efficiency of operational activities of the life insurance market in the Czech Republic in relation to the life insurance market in other European countries.

2 Methodology and Data

To compare the efficiency scores of national life insurance markets in European countries, DEA models were used. These models enable us to analyze the efficiency of transformation of multiple inputs to multiple outputs. DEA models are based on a non-parametric approach.

Our analysis was based on data from the database of the company Insurance Europe, which brings together national associations of insurance companies from 34 countries. However, data of some countries are not available in the database. Therefore, we will analyze the efficiency of 22 national life insurance markets. The markets are listed in Table 1.

Our assessment of efficiency was based on the fact that the operating activities of insurance companies are focused on acquiring income from the premiums in the effort to minimize costs for claims and operating expenses. Claims incurred (net of reinsurance) and net operating expenses are the inputs. Earned premiums is the output. We have taken the data from the database of Insurance Europe 2012. We used data from the technical account of national insurance markets with life insurance.

Model Specification

DEA models are based on the characteristics of relative efficiency. Based on the data available, the DMU is evaluated as fully (100%) effective if and only if the values of other DMUs do not show that its inputs or outputs can be improved without worsening its other inputs or outputs. (Cooper et al., 2004)

DEA models use linear programming to construct nonparametric angled data envelopments. The efficiency scores are calculated for each DMU relative to this data envelopment.

To express the efficiency score, we will use the BCC model proposed by Banker, Charnes and Cooper (1984) for the conditions of variable returns to scale. In BCC models, the data envelopment is convex.

BCC model

We assume that we have n homogeneous DMU and we monitor m inputs x_i and s outputs y_i, then assuming variable returns to scale model expressing efficiency in input-oriented model for the kth, DMU has the form

$$\min \theta_k \qquad\qquad (1)$$

s.t.

$$\sum_{j=1}^{n} x_{ij}\lambda_j \le \theta_k x_{ik}, \qquad\qquad i=1,...,m, \qquad\qquad (2)$$

$$\sum_{j=1}^{n} y_{ij}\lambda_j \ge y_{ik}, \qquad\qquad i=1,...,s, \qquad\qquad (3)$$

$$\sum_{j=1}^{n} \lambda_j = 1, \;\; \lambda_j \ge 0, \qquad\qquad j=1,...,n. \qquad\qquad (4)$$

We assume that we have *n* homogeneous DMU and we monitor *m* inputs x_i and *s* outputs y_i, then assuming variable returns to scale model expressing efficiency output-oriented model for the kth DMU has the form

$$\max \; \phi_k \qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad (5)$$

s.t.

$$\sum_{j=1}^{n} x_{ij}\lambda_j \le x_{ik}, \qquad\qquad i=1,...,m, \qquad\qquad (6)$$

$$\sum_{j=1}^{n} y_{ij}\lambda_j \ge \phi y_{ik}, \qquad\qquad i=1,...,s, \qquad\qquad (7)$$

$$\sum_{j=1}^{n} \lambda_j = 1, \; \lambda_j \ge 0, \qquad\qquad j=1,...,n. \qquad\qquad (8)$$

(Jablonský and Dlouhý, 2004) $\lambda = \left(\lambda_1,...,\lambda_n\right)$ is the vector of weights. θ_k is the technical efficiency score for the kth DMU in the input-oriented BCC model. Its values in percent are less than or equal to 100%. The greater the value θ_k, the more favourably assessed the efficiency of the DMU. ϕ_k is the technical efficiency score for the kth DMU in the output-oriented BCC model. Its values in percent are greater than or equal to 100%. The smaller the value ϕ_k, the more favourably assessed the efficiency of the DMU. Efficient DMUs have an efficiency score of 100%.

3 Results and Discussion

In 2012, insurance markets in many European countries felt the effects of the adverse economic development and the effects of fluctuations on financial markets. 12 out of the 22 analyzed national life insurance markets had higher values of claims incurred than premiums earned. The Czech Republic ranked among national insurance markets with a lower value of claims incurred. Values of the parameters analyzed are shown in Table 1.

At the beginning of the analysis, we expressed descriptive statistics of the indicators used and the arithmetic average, median and standard deviation of earned premiums, claims incurred and net operating expenses. The values of descriptive statistics are in Table 2.

For all analyzed indicators, the arithmetic average is larger than the median. 50% of all analyzed national insurance markets have a value lower than the arithmetic average. The arithmetic average of the indicators is affected by extreme values of some national insurance markets. Above-average values of earned premiums were reached by the life insurance markets in Belgium, Switzerland, Spain, France, Italy and Netherlands. France had the largest volume of earned premiums from all the countries analyzed. The volume of earned premiums of France was up to 7 times greater than the arithmetic average. Earned premiums of the life insurance market in the Czech Republic had a value lower than the arithmetic average of this indicator. The arithmetic average of the earned premiums was lower than the arithmetic average of the claims incurred.

Table 1 Values of the parameters in 2012 (million EUR)

Table 1 Values of the parameters in 2012 (million EUR)

	Earned premiums	Claims incurred	Net operating expenses
Austria	6128	6077	994
Belgium	20675	17807	1656
Switzerland	27544	30220	2753
Czech Republic	2730	1861	627
Denmark	16583	12061	681
Estonia	71	59	22
Spain	25340	27126	870
Finland	12463	17600	556
France	117869	123175	12299
Greece	2123	2135	239
Iceland	17	5	5
Italy	70376	75296	3521
Luxembourg	14468	19600	373
Latvia	35	19	4
Malta	255	187	61
Netherlands	18024	35886	2843
Norway	12374	7209	1461
Poland	8677	6245	1559
Portugal	1926	3878	146
Sweden	10350	7792	1381
Slovenia	486	309	116
Turkey	1099	3127	358

Source: Insurance Europe (2012)

In the next step, we focused on expressing the efficiency score of operational activities of national life insurance markets. As the order may vary when using the input-oriented and output-oriented model, we used both models. The values of the efficiency scores and the order of national life insurance markets are in Table 3.

Table 2 Descriptive statistics

	Arithmetic average (million EUR)	Median (million EUR)	Standard deviation
Earned premiums	16800.6	9513.5	27446.2
Claims incurred	18076.1	6727.0	29251.1
Net operating expenses	1478.4	654.0	2616.1

Source: Own processing in Statistica

The order of the national life insurance markets based on the efficiency scores in the input-oriented model does not significantly differ from the order based on the efficiency scores in the output-oriented model. The arithmetic average of the efficiency score in the input-oriented model was 79.95%. Eight national life insurance markets out of the 22 analyzed DMUs were efficient. It was the life insurance market in Denmark, Spain France, Iceland, Italy, Luxembourg, Latvia and Norway. The smallest value of the efficiency score had Turkey, which had high values of claims incurred. They were up to 2.85 times higher than the net operating expenses. The life insurance market in the Czech Republic was not efficient, but the level of efficiency in the input-oriented model had above-average values.

Table 3 Efficiency score in the BCC model

	Efficiency score in the input-oriented model	Range	Efficiency score in the output-oriented model	Range
Austria	62.0	18	161.2	19
Belgium*	92.5	9	105.8	9
Switzerland*	79.6	14	120.4	12
Czech Republic	85.3	11	117.2	11
Denmark	100.0	1-8	100.0	1-8
Estonia	61.8	19	154.4	18
Spain*	100.0	1-8	90.6	1-8
Finland	74.4	16	133.7	16
France*	big	1-8	100.0	1-8
Greece	66.0	17	151.4	17
Iceland	100.0	1-8	big	1-8
Italy*	100.0	1-8	100.0	1-8
Luxembourg	100.0	1-8	100.0	1-8
Latvia	100.0	1-8	big	1-8
Malta	76.9	15	129.1	15
Netherlands*	37.9	21	210.6	20
Norway	100.0	1-8	100.0	1-8
Poland	80.9	12	123.6	13
Portugal	48.0	20	210.8	21
Sweden	80.2	13	124.5	14
Slovenia	90.1	10	110.8	10
Turkey	23.2	22	429.9	22

Source: Own processing in EMS

In Europe there are countries where the life insurance market has a long tradition and national insurance markets have a large volume of premiums. These insurance markets are developing rapidly and their volume of premiums to GDP increases too. A lot of competition on national insurance markets is forcing insurers to operate efficiently. We wanted to find out whether we can say that insurance markets with a large volume of premiums are on average more efficient.

Based on the results of estimating the efficiency score, only three national insurance markets, which had above-average values of earned premiums, were efficient. They were Spain, France and Italy. Three national insurance markets, which had above-average values of earned premiums, were not efficient. Based on this comparison, we can assume that there is no correlation between the value of the efficiency score and the size of the market expressed by earned premiums. We will confirm the assumption by testing the hypothesis

Based on the expressed efficiency scores, we used the non-parametric Mann-Whitney U test to test the two-sided null hypothesis at the significance level of 0.05. Our null hypothesis was that there is no statistically significant difference in the probability distribution of the efficiency score of operational activities of national life insurance markets with an above-average value of premiums and the probability distribution of the efficiency score of operational activities of national life insurance markets with a below-average value of premiums. National insurance markets with an above-average value of earned premiums are in Table 3, marked with *.

The null hypothesis was: there is no statistically significant difference in the probability distribution of the efficiency score of operational activities of national life insurance markets with above-average values of premiums and the probability distribution of the efficiency score of operational activities of national life insurance markets with below-average values of premiums.

The alternative hypothesis was: there is a statistically significant difference in the probability distribution of the efficiency score of operational activities of national life insurance markets with above-average values of premiums and the probability distribution of the efficiency score of operational activities of national life insurance markets with below-average values of premiums. The U–statistics values and p-levels are in Table 4.

Table 4 Mann-Whitney U Test

U	p-level
36.5	0.396

Source: Own processing in Statistica

Based on the Mann-Whitney U test, we can conclude that at the significance level of 0.05 there is no statistically significant difference in the probability distribution of the efficiency score of operational activities of national life insurance markets of countries with above-average values of premiums and the probability distribution of the efficiency score of operational activities of national life insurance markets of countries with below-average values of premiums. The average efficiency score of large national life insurance markets does not significantly differ from the average efficiency score of national life insurance markets with a below-average value of premiums.

4   Conclusions

In this paper we analyzed the efficiency of the operational activities of national life insurance markets of some European countries. We used the DEA models. The advantage of these models is that they do not require determination of the balance of inputs and outputs and it is not necessary to estimate the shape of the production function. They estimate the level of efficiency relative to the value of other DMUs. The results can be part of benchmarking. National life insurance markets vary in size and efficiency. In the BCC models, eight national life insurance markets were efficient. However, we did not confirm the claim that there is a statistically significant difference in the probability distribution of the efficiency score of operational activities of national life insurance markets of countries with above-average values of premiums and the probability distribution of the efficiency score of operational activities of national life insurance markets of countries with below-average values of premiums. The national life insurance market in the Czech Republic was not efficient. The efficiency score, however, had above-average values.

Based on the above conclusions, we can conclude that it is not possible to say that large national life insurance markets achieve greater efficiency. Even relatively small insurance markets, such as in Iceland and Latvia, are efficient. Conversely, not all insurance markets with an above-average value of earned premiums are efficient.

Future research in this area should be aimed at detecting changes in the efficiency of national life insurance markets in the period ahead and identifying the factors that most influence these changes. Such a research could be of an important practical significance.

Acknowledgements

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Efficiency in Two-stage Data Envelopment Analysis:
An Application to Insurance Companies

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Abstract: *The paper is focused on the application of the two-stage DEA in assessing the efficiency of Slovak and Czech commercial insurance companies. DEA models are nonparametric methods for assessing the efficiency, which use linear programming. The efficiency score is expressed for each subject analyzed and used to compare the transformation of multiple inputs into multiple outputs. Two-stage models allow comparing the efficiency of subprocesses, into which the whole process is divided. By adding the sequence of steps consisting of the application of various statistical methods, two-stage models allow to assess the efficiency of the subprocesses and thereby to determine the strengths and weaknesses of the analyzed subjects, respectively of individual subgroups of subjects. The aim of this paper was to compare the efficiency of Slovak and Czech insurance companies using the two-stage models. At the same time, efficiency score values from the classical DEA model and the two-stage model are compared. Methods of analysis, synthesis, comparison and mathematical-statistical methods are used in this paper. A part of the analysis is the traditional DEA model and the two-stage model. There was no statistically significant difference in the probability distribution of the efficiency score for both subprocesses in the traditional and two-stage model. There was a statistically significant difference in the probability distribution of the efficiency score of the second subprocess for insurance companies in Slovakia and the Czech Republic in the two-stage model.*
Keywords: two-stage data envelopment analysis, efficiency, insurance companies

JEL codes: G22, C52

1 Introduction

Financial system is the heart of each market economy. Over the last few decades, the insurance industry has been influenced by globalization. The international concept of insurance (and especially reinsurance) operations brings certainty and helps to balance the economic results. (Nečas and Čejková, 2014) However, the current period is characterized by large fluctuations on the financial markets that affect also the insurance market.

As part of the financial market, the insurance market is a rapidly growing sector of the national economy. (Masárová et al., 2015) Business entities acting on this market must continuously adapt to external conditions. A lot of competition leads to the permanent need to assess the efficiency of their operations. They receive important information from the efficiency scores, which are expressed relative to other subjects operating in the area. The efficiency score can be an important part of benchmarking and can provide the analyzed subjects with information on the need to improve. The objective of the efficiency measurement is to detect weak areas so that appropriate measures can be taken to improve performance. (Kao and Hwang, 2008)

The aim of the paper is to analyse the efficiency of operating and investment activities of Slovak and Czech commercial insurance companies on the common insurance market. The measurement and assessment of economic efficiency use several mathematical, statistical and analytical methods the use of which depends on several factors. (Haverniková and Krajčo, 2013) One group of methods is the relatively young data envelopment analysis (DEA). The characteristic of DEA models was first published in the paper Measuring the Efficiency of Decision-making Units in European Journal of

Operational Research by Charnes, Cooper, and Rhodes (1978) This model is also known as the CCR model (traditional model).

Traditional DEA models were gradually modified according to the needs of practice and were gradually applied in many fields. Financial markets were no exception. Their use in the analysis revealed that it is important not only to compare the efficiency of the process, but also to assess the efficiency of partial processes – subprocesses- into which the whole process is divided. Such a comparison can be made using the two-stage data envelopment analysis.

This model was first published by Seiford and Zhu (1999). Two-stage data envelopment analysis is based on the fact that some processes can be divided into two subprocesses. The first and second subprocesses are interconnected and outputs from the first subprocess are used as inputs for expressing efficiency scores in the second subprocess. The efficiency scores are expressed in both subprocesses. In this way this model enables comparing the "contribution" of the efficiency score of both subprocesses with the efficiency of the whole process. By complementing the approach with statistical methods it can be concluded whether a subgroup has a weakness in the first or second subprocess. At the same time, based on the efficiency scores of the subjects in both subprocesses, it is possible to accurately determine their strategy for improving their efficiency. A schematic representation of the inputs and outputs in both subprocesses is in Figure 1.

Figure 1 Two-stage DEA technique - inputs and outputs

Inputs x_i → 1st subprocess → Intermediate products z_d → 2nd subprocess → Outputs y_r
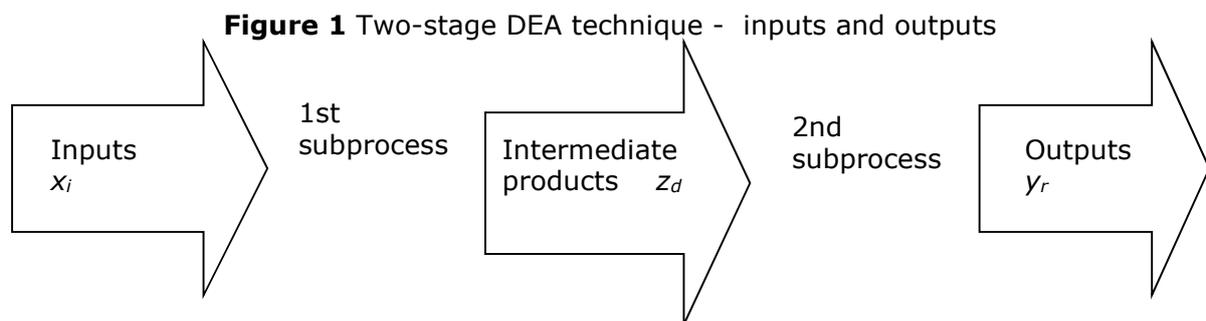
Source: Chen, Zhu (2004)

In our paper we focused on characterising the two-stage data envelopment analysis and comparing the model with the traditional CCR model, as well as applying the two-stage data envelopment analysis in assessing the efficiency of Slovak and Czech insurance companies on the common insurance market. We will focus on the differences in efficiency scores of the two subprocesses - into which the whole process is divided. Our objective will be to find out whether there is a statistically significant difference in the probability distribution of the efficiency score of commercial insurance companies in Slovakia and the Czech Republic on the common insurance market in the first and second subprocess in the two-stage data envelopment analysis model and the traditional model and whether there is a statistically significant difference in the efficiency score of Slovak insurance companies and the efficiency score of Czech insurance companies in the first and second subprocess. Such an approach may have practical benefits and reveal whether the weakness of Slovak or Czech insurance companies is the first or second subprocess.

2 Methodology and Data

DEA models were used to compare the efficiency of insurance companies in the Czech Republic and in Slovakia. These models enable us to analyze the efficiency of transformation of multiple inputs to multiple outputs. DEA models are based on non-parametric approach. They use linear programming methods to construct envelopment of data. (Grmanová and Jablonský, 2009) They assess the efficiency score for each subject analyzed.

The subjects analyzed are called Decision Making Units and are referred to as DMUs. Efficiency scores are calculated as values relative to the envelopment of data. In our analysis we used CCR models that are based on constant returns to scale. DMU is to be rated as fully efficient on the basis of available evidence if and only if the performances of other Decision Making Units does not show that some of its inputs or outputs can be improved without worsening some of its other inputs or outputs. (Bogetoft and Otto, 2011)

In our analysis, DMUs are Slovak and Czech commercial insurance companies. We analyzed 14 Slovak and 15 Czech insurance companies on the common insurance market. When assessing the efficiency of the insurance companies, we assume that the activities of the insurance companies can be divided into two subprocesses. The first subprocess is focused on acquiring income from the premiums in an effort to minimize the costs of claims and operating costs. The second subprocess is focused on investment. Part of the premiums is used for investment and thus affects the final profit of the insurance company. Based on this, the inputs x_i in the first subprocess are the costs of claims and operating costs. The output z_i is premiums earned. The input z_i in the second subprocess is the premiums earned and the output y_i is the income from financial investments. Data on Slovak insurance companies were taken from annual reports of the insurance companies for 2013. Data on Czech insurance companies were taken from annual reports of the insurance companies for 2013 and from the database of the Czech Insurance Association.

Model Specification

We will use the traditional CCR model and the two-stage CCR model for expressing the efficiency score.

Traditional CCR model

We assume that we have n homogeneous DMU and we monitor m inputs x_i and s outputs y_i, then assuming constant returns to scale model expressing efficiency in input-oriented model for the kth DMU has the form

$$\min \theta_k \tag{1}$$

s.t.

$$\sum_{j=1}^{n} x_{ij}\lambda_j \leq \theta_k x_{ik}, \qquad\qquad i=1,...,m, \tag{2}$$

$$\sum_{j=1}^{n} y_{ij}\lambda_j \geq y_{ik}, \qquad\qquad i=1,...,s, \tag{3}$$

$$\lambda_j \geq 0, \qquad\qquad j=1,...,n. \tag{4}$$

We assume that we have n homogeneous DMU and we monitor m inputs x_i and s outputs y_i, then assuming constant returns to scale model expressing efficiency output-oriented model for the kth DMU has form

$$\max \phi_k \tag{5}$$

s.t.

$$\sum_{j=1}^{n} x_{ij}\lambda_j \leq x_{ik}, \qquad\qquad i=1,...,m, \tag{6}$$

$$\sum_{j=1}^{n} y_{ij}\lambda_j \geq \phi y_{ik}, \qquad\qquad i=1,...,s, \tag{7}$$

$$\lambda_j \geq 0, \qquad\qquad j=1,...,n. \tag{8}$$

(Jablonský and Dlouhý, 2004) $\lambda = \left(\lambda_1, \ldots, \lambda_n \right)$ is the weight vector. θ_k is the technical efficiency score for the kth DMU in the input-oriented CCR model and ϕ_k is the technical efficiency score for the kth DMU in the output-oriented CCR model.

Two-stage model

We assume that we have n homogeneous DMUs and we monitor in the first sub-process m inputs x_i and D outputs z_d which are inputs of the second sub-process and in the second sub-process we have n subjects with s outputs y_r, then assuming constant returns to scale model expressing efficiency for the kth DMU has the form

$$\min_{\alpha, \beta, \lambda_j, \mu_j, \tilde{z}} \alpha - \beta \tag{9}$$

s.t.

1. sub-process (Stage 1)

$$\sum_{j=1}^{n} \lambda_j x_{ij} \leq \alpha x_{ik}, \qquad\qquad i = 1, .., m, \tag{10}$$

$$\sum_{j=1}^{n} \lambda_j z_{dj} \geq \tilde{z}_{dk}, \qquad\qquad d = 1, .., D, \tag{11}$$

$$\lambda_j \geq 0, \qquad\qquad j = 1, \ldots, n, \tag{12}$$

$$\alpha \leq 1, \tag{13}$$

2. sub-process (Stage 2)

$$\sum_{j=1}^{n} \mu_j z_{dj} \leq \tilde{z}_{dk}, \qquad\qquad d = 1, .., D, \tag{14}$$

$$\sum_{j=1}^{n} \mu_j y_{rj} \geq \beta y_{rk}, \qquad\qquad r = 1, .., s, \tag{15}$$

$$\mu_j \geq 0, \qquad\qquad j = 1, .., n, \tag{16}$$

$$\beta \geq 1. \qquad\qquad\qquad\qquad \text{(Zhu, 2008)} \tag{17}$$

We can draw some conclusions from the comparison of the models. The two-stage model enables to assess the contribution of the efficiency of the two subprocesses into which the process is divided. Unlike the traditional model, DMUs with efficiency equal to one, i.e. efficient DMUs, may not exist. The traditional model, however, enables easier interpretation of the assessed efficiency scores than in the case of using the two-stage model. The efficiency score in stage 1 is input-oriented and less than or equal to one. The greater the value of the efficiency score, the closer the DMU to the limit of efficiency and the more favourable efficiency of the DMU. The efficiency score in stage 2 is output-oriented and greater than or equal to one. The lower the value of the efficiency score, the closer the DMU to the limit of efficiency and the more favourable efficiency of the DMU. Efficient DMUs have an efficiency score equal to one in both subprocesses.

To test the hypothesis about the identical distribution of the efficiency score, we used the nonparametric Mann-Whitney U test based on the order of values. We expressed descriptive statistics and evaluated the testing of the hypothesis on the basis of U statistics and p-levels in the program Statistica.

3 Results and Discussion

At the beginning of the analysis, we expressed descriptive statistics of the indicators used, i.e. the arithmetic average, median and standard deviation of the operating costs, costs of claims, earned premiums and income from financial investments of insurance companies. The data are in Table 1.

The arithmetic average of all indicators analyzed was lower in Slovakia than in the Czech Republic. The most different values of the arithmetic average had the income from financial investments, which was 5.2 times lower in Slovakia than in the Czech Republic. The least different values of the arithmetic average had the operating costs that were 1.7 times less for Slovak insurance companies than for the insurance companies in the Czech Republic. In the next step we focused on expressing the efficiency scores of the Slovak insurance companies and Czech insurance companies on the common insurance market. We expressed their efficiency scores.

Table 1 Descriptive statistics

		Arithmetic average (thousand EUR)	Median (thousand EUR)	Standard deviation
Operating costs	SR+CR	54807.3	27651.0	62288.6
	SR	40262.3	25535.5	47141.0
	CR	68382.7	47867.0	72713.0
Costs of claims	SR+CR	135465.7	73187.0	174675.1
	SR	79616.2	44694.0	97184.1
	CR	187591.9	84257.0	214993.6
Earned premiums	SR+CR	201089.5	119984.0	241977.6
	SR	118393.7	72922.0	140127.1
	CR	278272.3	200030.0	292663.6
Income from financial investments	SR+CR	45119.8	17225.0	70912.7
	SR	14198.7	8485.0	16787.0
	CR	73979.5	48618.0	89146.3

Source: Own processing in Statistica

In the first subprocess in the two-stage model, three Slovak insurance companies and one Czech insurance company were efficient. The other 25 insurance companies were not efficient. No insurance company was efficient in the second subprocess in the two-stage model. The difference and the order of the insurance companies in both subprocesses were considerably different for some insurance companies. Based on the efficiency score expressed in the traditional model, two Czech insurance companies were efficient in the first subprocess and one Slovak insurance company was efficient in the second subprocess. Only one of the efficient insurance companies in the first subprocess in the two-stage model was efficient also in the first subprocess in the traditional model.

Descriptive statistics of the efficiency scores in the two-stage model and the traditional model are shown in Table 2. The arithmetic average of the efficiency score in stage 1 in the two-stage model was not significantly different from the arithmetic average of the efficiency score in the traditional model. The arithmetic average of the efficiency score in stage 2 in the two-stage model was lower than the arithmetic average of the efficiency score in the traditional model.

Based on the expressed efficiency scores, we used the Mann-Whitney U test to test the two-sided null hypothesis that there is no statistically significant difference in the probability distribution of the expressed efficiency scores of insurance companies in Slovakia and the Czech Republic in the two-stage model and the traditional model.

The first null hypothesis was: there is no statistically significant difference in the probability distribution of the efficiency scores in the two-stage model in stage 1 and the traditional model in stage 1. The alternative hypothesis was: there is a statistically significant difference in the probability distribution of the efficiency scores in the two-stage model in stage 1 and the traditional model in stage 1. The values of U-statistics and p-levels are shown in the first row in Table 3.

Table 2 Descriptive statistics

	Arithmetic average	Min	Max	Standard deviation
Two-stage model, Stage 1	0.541	0.133	1.000	0.317
Two-stage model, Stage 2	3.580	1.006	14.955	3.362
Traditional model, Stage 1	0.521	0.225	1.000	0.225
Traditional model, Stage 2	4.513	1.000	22.222	4.348

Source: own processing in Statistica

The second null hypothesis was: there is no statistically significant difference in the probability distribution of the efficiency scores in the two-stage model in stage 2 and the traditional model in stage 2. The alternative hypothesis was: there is a statistically significant difference in the probability distribution of the efficiency scores in the two-stage model stage 2 and the traditional model in stage 2. Values of U-statistics and p-levels are shown in the second row in Table 3.

Table 3 Mann-Whitney U Test

	U	p-level
Stage 1.	402.8	0.780
Stage 2.	338.0	0.200

Source: Own processing in Statistica

Based on the Mann-Whitney U test we can conclude that there is no statistically significant difference in the probability distribution of the efficiency score of insurance companies in the traditional model and the two-stage model in stage 1 and stage 2 at the significance level of 0.05. In the next step, we focused on the differences between the efficiency scores of Slovak insurance companies and the efficiency scores of Czech insurance companies in stage 1 and stage 2. Descriptive statistics of the efficiency scores in the two-stage model of Slovak and Czech insurance companies are in Table 4.

The arithmetic average of the efficiency score of Czech insurance companies in stage 1 in the two-stage model was not significantly different from the arithmetic average of the efficiency score of Slovak insurance companies in stage 1 in the two-stage model. The arithmetic average of the efficiency score of Czech insurance companies in stage 2 in the two-stage model was different from the arithmetic average of the efficiency score of Slovak insurance companies in stage 2 in the two-stage model.

We tested whether there is a statistically significant difference in the efficiency score of both subprocesses in the two-stage model for the Slovak and Czech insurance companies. The null hypothesis was: there is no statistically significant difference in the probability distribution of the efficiency scores in the two-stage model for the Slovak insurance companies and the efficiency scores in the two-stage model for the Czech insurance companies. The alternative hypothesis was: there is a statistically significant difference in the probability distribution of the efficiency scores in the two-stage model for Slovak insurance companies and the efficiency scores in the two-stage model for Czech insurance companies. Values of U-statistics and p-levels are in Table 5.

Table 4 Descriptive statistics

	Arithmetic average	Min	Max	Standard deviation
Two-stage model, Stage 1, Czech Insurance	0.487	0.133	1.000	0.291
Two-stage model, Stage 2, Czech Insurance	2.414	1.006	11.203	2.695
Two-stage model, Stage 1, Slovak Insurance	0.599	0.134	1.000	0.345
Two-stage model, Stage 2, Slovak Insurance	6.216	2.123	22.222	5.297

Source: Own processing in Statistica

Table 5 Mann-Whitney U Test

	U	p-level
Stage 1.	87.5	0.445
Stage 2.	45.5	0.009

Source: Own processing in Statistica

Based on the Mann-Whitney U test we can conclude that there is a significant difference in the probability distribution of the efficiency score of the second subprocess for insurance companies in Slovakia and the Czech Republic in the two-stage model at the significance level of 0.05. Insurance companies in Slovakia have a greater average efficiency score in the CCR model in the second subprocess, reflecting the fact that the weakness of Slovak insurance companies is their investment activities.

4 Conclusions

In this paper we used the two-stage model. Its advantage is that it analyzes the "contribution" of the efficiency score of two subprocesses, into which the process is divided. The reason for applying the two-stage DEA method in empirical research is that it shows the relationship between the subprocesses. Based on the efficiency score of the insurance companies in the two subprocesses it can be determined whether the subjects are efficient in terms of operating and investment activities and which subjects achieve the best results in individual subprocesses. The results can be part of benchmarking and may serve for detailing business strategy.

Three Slovak and one Czech insurance company were efficient in the first subprocess. No insurance company was efficient in the second subprocess. In this paper we focused on the differences between the traditional model and the two-stage model. There was no statistically significant difference in the probability distribution of the efficiency score for both subprocesses in the traditional and two-stage model at the significance level of 0.05. However, there was a statistically significant difference in the probability distribution of the efficiency score of the second subprocess for insurance companies in Slovakia and the Czech Republic in the two-stage model at the significance level of 0.05. The investment activities of Slovak insurance companies are weaker compared to the investment activities of Czech insurance companies. It might be possible to achieve positive changes on the Slovak insurance market by improving the investment strategy of Slovak insurance companies.

In our previous research, the results of which are summarized in a monograph (2010), we concluded upon analyzing the efficiency of insurance companies in 2006-2008 that the indicators of insurance companies that were their weakness in terms of efficiency did not change significantly. Our current research highlights the need to address mainly the investment activities of Slovak insurance companies. Improving investment activities of Slovak insurance companies could significantly influence their efficiency.

Future research in this area should be aimed at detecting changes in the relative efficiency score of commercial insurance companies in the following period. Comparing changes in Slovak and Czech insurance companies in the two sub-processes is of vital importance. It will allow them to identify their weaknesses which may be of great practical significance.

Comparing the results of the efficiency score in several efficiency models in further research may lead to broader conclusions and may also contribute to expanding the importance of using them.

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Foreign Currency Loans in Central and Eastern Europe: Did Regional Euro Internationalization Worsen Credit Quality?

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Abstract: We compile data about Euro denominated lending in Central and Eastern European Countries (CEE EU) during 2001-2011. Our analysis of the determinants of non-performing loans (NPL) with panel regressions for CEE EU suggests that foreign currency loans contributed significantly to the increase in NPLs, reinforced by effective changes in exchange rates, which cannot be sustained by the local borrowers. We find that there are serious limits to Euro-globalization with Euro denominated loans.

Keywords: non-performing loans, Euro loans, foreign currency lending, foreign banks, CEE

JEL codes: E44, F31, G21, O16, P34

1 Introduction

Internationalization of a currency takes place when a) other (local) currencies do not properly provide important functions of money, e.g. as a storage of value; b) when other (local) currencies are not convertible at given exchange rates and thus not suitable for international payments; and c) when the large scale use of a foreign currency offers some economic advantage over the use of a domestic (local) currency (Ize and Levy Yeyati, 2003; Haiss and Rainer, 2012). An example for case a) was the use of the German D-Mark as storage of value in Central, Eastern and Southeastern European countries (CESEEC) before the fall of communism; for case b) the irreplaceable function of the US-Dollar for international payments in the Bretton Woods agreement; and for c) the most important feature are foreign currency loans to local borrowers, which play an increasingly important role since 1995 and are induced by perceived interest rate advantages.

The CEE EU countries have shown a tremendous convergence process in the last decade, resulting in close ties with the core EU Member States. Especially the financial sector was driven by liberalization, integration and cross-country foreign direct investment (FDI; Eller et al, 2006). These developments have triggered an unprecedented credit growth throughout the region (Aydin, 2008; Liikanen et al, 2012). Funding of the catching-up process was to a significant extent financed by core EU countries and the large Western banks with operations in CEE. A significant share of the new bank loans was extended in foreign currency, with the Euro as the dominant currency and to a lesser degree the Swiss Franc and the US Dollar. This development, which is also referred to as Euroization, exposes the financial system to a number of additional risk factors (see e.g. Brown and De Haas, 2012; Chitu, 2012; Cuaresma et al, 2011; Haiss and Rainer, 2012; Levy-Yeyati, 2006; Steiner, 2011). Especially unhedged borrowers like most households do not have foreign currency income and, thus, are directly exposed to exchange rate fluctuations. The situation is less severe for corporate borrowers, as export revenues can to some degree provide a hedge against adverse currency movements associated with foreign currency debt (Brown et al., 2010).

The 2007 financial crisis has led to a materialization of the risks associated with foreign currency lending. Across the region, local currencies depreciated significantly against the Euro and Swiss Franc, causing stress to unhedged foreign currency borrowers. Non-performing loans (NPL) have increased significantly in all CEE EU countries since 2007 (Beck et al, 2013). These developments raise the question, whether foreign currency loans have contributed to the increasing shares of NPLs in CEE EU.

Understanding the impact of foreign currency loans on non-performing loans is important, because of the feedback mechanism of NPLs which can have a negative impact on future growth (see e.g. Espinoza and Prasad, 2010; Nkusu, 2011; ECB, 2011). Klein (2013) investigates the feedback effect for a panel of Central, Eastern and Southeastern European countries, showing indications of strong macro-financial linkages. He finds that a positive shock (increase) in NPLs leads to a decrease in GDP growth and an increase in unemployment. If countries with a higher share of foreign currency loans are at risk of recording higher NPLs in crisis situations, policies designed to curtail foreign currency lending might lead to increased financial stability and a smoother catching-up process. Against this background the aim of this paper is to empirically investigate the impact of foreign currency (FX) loans on NPLs in CEE EU countries for the period 2001-2011.

Figure 1 FX-Loans pre-crisis (2001-2006) vs increase in NPLs since crisis (2006-2011)
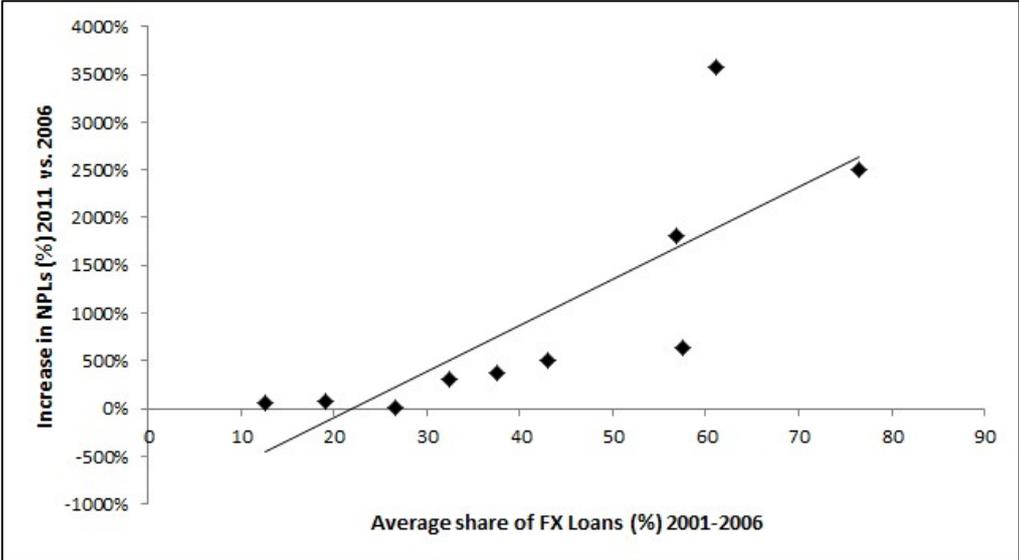
Source: Compiled by the authors

Figure 1 shows that over the period 2007 to 2011 countries with higher shares of foreign currency loans in total loans also recorded a higher share of non-performing loans. In theory, the link between foreign currency loans and non-performing loans seems straight forward. Without any hedging mechanism, exchange rate fluctuations directly impact the interest and principal payment on foreign currency denominated loans. Increasing debt burden in local currency terms leads to increased defaults and non-performing loans.

- Hypothesis 1: A higher share of foreign currency loans in total loans is associated with a higher share of non-performing loans in an economy.

We argue that this general relationship needs to be refined in two ways. First, a weakening currency increases the burden for foreign currency borrowers. While small fluctuations might not impact the borrower's ability to service the loan, a severe depreciation of the home currency might well lead to a situation where the liability in local currency terms becomes so great that the borrower has to default. Such a situation could e.g. be triggered by an exogenous shock like the current global financial crisis, which has e.g. caused significant depreciations of CEE currencies.

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- Hypothesis 2: The current global economic crisis has triggered significant currency devaluations in Central and Eastern Europe which have had an adverse impact on non-performing loans in the region.

Second, we argue that the link between foreign currency loans and non-performing loans depends on the share of unhedged foreign currency borrowers, i.e. whether foreign currency borrowing is mainly to households or corporates. Unhedged foreign currency borrowers are directly impacted by adverse currency movements and thus non-performing loans should be higher in countries with a higher share of unhedged foreign currency borrowers. We argue that households tend to be unhedged, while corporates are a least to some degree hedged by export revenues. Therefore we expect to find a stronger relationship between the level of foreign currency loans and non-performing loans in countries with a high share of household foreign currency loans.

- Hypothesis 3: A higher share of household foreign currency loans vs. corporate foreign currency loans is associated with higher share of non-performing loans.

The main contribution of this paper lies in investigating directly the impact of foreign currency loans on non-performing loans empirically for CEE EU countries. This is a topic that has implications for the respective countries´ path for joining EMU respectively for increasing the global role of the Euro, though has not received ample empirical attention, with the ECB (2011) and Nkusu (2011) as rare exceptions. Both studies include the nominal exchange rate as explanatory variable of NPLs, which also indirectly measures the impact of foreign currency loans on NPLs.

2 Model

The model presented in this paper aims to test the impact of foreign currency lending on NPLs in CEE EU member states. The basic model can be specified as

$$NPL_{it} = NPL_{i,t-1}Y^{it}\beta + u_i + \varepsilon_{it} \tag{1}$$

Where NPL is the share of non-performing loans in total bank loans, Y is a vector of macroeconomic variables (some of which are also included as lags), u covers the individual unobservable effects and ε is the error term. Based on the review of the most tested macroeconomic determinants of NPLs we selected the following macroeconomic variables:

- Real GDP growth (RGDP)
- Inflation (INFL)
- Lending rate (LR)
- Nominal effective exchange rate (NEER)
- Unemployment (UNEMPL)
- Change in stock market index (STOCK)
- Share of foreign currency-loans to the private non-financial sector (FXL)
- Share of foreign currency loans to non-financial corporations (FXL_C)
- Share of foreign currency loans to non-financial households (FXL_H)

Additionally, and as an alternative to the stock variables FXL, FXL_C and FXL_H we include two variables FXL_C_PRE and FXL_H_PRE that measure the average pre-crisis (2001-2006) share of foreign currency loans to non-financial corporations and households, respectively. We expect NPLs to be higher in countries with a higher share of foreign-currency loans in the years before the crisis. Due to data limitations, no such sectoral split was possible for NPLs.

3 Data and Methodology

The sample covers annual data of the ten CEE EU countries (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia) for the time period 2001 to 2011. Our data sample thus covers two time periods, pre crisis (2001-2006) and crisis (2007-2011). Data sources are the National Banks of the

individual countries, the IMF, the EIU Country Data and Eurostat. The following Table 1 contains descriptive statistics on the individual variables. Annual recordings for ten countries result in 110 observations per variable, with the exception of NPL (108), LR (108) and STOCK (106) because of missing values. The panel is therefore unbalanced.

Table 1 Summary Statistics

	Observations	Mean	Standard Deviation	Min	Max
NPL	108	5.62	5.14	0.20	21.20
FXL	110	43.99	25.90	0.65	92.17
FXL_C	110	48.28	26.08	1.26	94.31
FXL_H	110	34.68	29.12	0.02	90.47
FXL_C_PRE	110	48.53	18.84	19.18	80.54
FXL_H_PRE	110	27.74	23.06	0.73	70.78
RGDP	110	3.74	4.97	-17.73	11.15
INFL	110	4.97	4.51	-1.08	34.47
LR	108	9.34	5.78	2.91	45.40
NEER	110	102.12	9.41	86.53	138.38
UNEMPL	110	10.24	3.89	4.10	19.92
STOCK	106	17.26	35.97	-62.68	124.14

Source: Compiled by the authors

The correlation matrix (Table 2) reveals that the independent variables are not highly correlated, with the exception of the lending rate (LR) and inflation (INFL). Because of this high correlation, we opt to include only LR in the investigation. The high correlation between FXL, FXL_C, FXL_H, FXL_C_PRE and FXL_H_PRE is obvious and these variables are not simultaneously incorporated as independent variables. FXL_C_PRE and FXL_H_PRE are derived from FXL_C and FXL_H measuring the average pre-crisis (2001-2006) level of foreign currency loans in a country. These variables are constant over time.

NPL is measured as bank nonperforming loans to total gross loans. There exist some problems with this variable, because of cross-country differences in accounting rules and regulations. A detailed discussion of this problem goes beyond the scope of this paper. An in-depth analysis of different NPL classification systems in Central, Eastern and Southeastern Europe (CESEE) can be found in Barisitz (2011) or EBCI (2012).

Table 2 Correlation matrix

	NPL	FXL	FXL_C	FXL_H	RGDP	INFL	LR	NEER	UN-EMPL	STOCK
NPL	1.00									
FXL	0.06	1.00								
FXL_C	0.01	0.97	1.00							
FXL_H	0.13	0.90	0.79	1.00						
RGDP	-0.42	-0.08	-0.05	-0.16	1.00					
INFL	-0.18	0.22	0.24	0.04	0.10	1.00				
LR	0.08	0.24	0.26	0.05	-0.08	0.81	1.00			
NEER	-0.18	-0.24	-0.22	-0.25	0.00	0.15	0.10	1.00		
UNEMPL	0.54	-0.13	-0.15	-0.14	-0.13	-0.30	-0.13	-0.09	1.00	
STOCK	-0.16	0.04	0.09	-0.07	0.55	0.00	0.03	-0.15	0.13	1.00

Source: Compiled by the authors

4 Results and Discussion

We analyze whether the high share of non-performing loans (NPL) in the EU CEE countries was, among others, driven by foreign currency (FX) lending which thus may have hampered economic development and convergence. This link between NPL and FX-lending has not yet received ample attention. We started out with simple OLS regressions with White standard errors and tested for the impact of the variables FXL_H_PRE (Model 1) and FXL_C_PRE (Model 2) which record the average level of foreign currency loans in the pre-crisis period 2001-2006. In a second step, we also performed cross-sectional panel data regressions. For Model 3 and 4, which include the variables FXL_H_PRE and FXL_C_PRE we opted for random effects, since these variable are time-invariant. As an alternative to the average pre-crisis level of foreign currency loans we also tested for the impact of the whole time series of the share of foreign currency loans on NPLs. Therefore we ran Models 5-7, which test for FXL, FXL_C and FXL_H, respectively. For these Models the Hausman test also suggested using random effects.

Table 3 Results

	Simple OLS, robust standard errors		Random effects GLS, robust standard errors				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
NPL (-1)	0.846 ***	0.869 ***	0.792 ***	0.856 ***	0.857 ***	0.845 ***	0.854 ***
	(19.430)	(21.480)	(13.620)	(20.660)	(22.010)	(20.630)	(22.350)
RGDP	-0.385 ***	-0.384 ***	-0.355 ***	-0.388 ***	-0.367 ***	-0.361 ***	-0.375 ***
	(-5.060)	(-5.050)	(-4.170)	(-5.250)	(-5.220)	(-5.160)	(-5.240)
RGDP (-1)			-0.091				
			(-1.610)				
NEER	-0.080 **	-0.070 *	-0.073 **	-0.071 *			-0.069 *
	(-2.150) **	(-1.750)	(-1.990)	(-1.760)			(-1.830)
NEER (-1)	0.101	0.101 **	0.088 **	0.099 **	0.052 ***	0.044 **	0.107 ***
	(2.330)	(2.280)	(2.140)	(2.220)	(2.280)	(2.030)	(2.600)
FXL_H_PRE	0.014		0.013				
	(1.530)		(1.270)				
FXL_C_PRE		0.026 **		0.025 *			
		(2.190)		(1.720)			
FXL					0.027 ***		
					(2.840)		
FXL_H						0.024 ***	
						(3.150)	
FXL_C							0.022 **
							(2.070)
Constant	0.098	-1.974	1.193	-1.450	-4.001	-2.915	-2.462
	(0.050)	(-0.860)	(0.570)	(-0.580)	(-1.500)	(-1.160)	(-0.920)
Number of observations	97	97	97	97	97	97	97
R2	0.8499	0.8539	0.8544	0.8538	0.8556	0.855	0.8579

Source: Compiled by the authors

Similar to previous research, we find a strong negative impact of real GDP growth on NPLs across all Models. A rise in real GDP translates into a decline in the ratio of non-performing loans in total loans, underpinning the counter-cyclical behavior of NPLs.

The autocorrelative nature of NPLs can be seen by the significant positive first-order autocorrelation of NPLs in all Models. Again, this is in line with past research.

With regards to the impact of foreign currency lending on NPLs, we find a positive relationship in all Models. Both the average variables (Models 1-4), as well as the stock variables (Models 5-7), produce significant results. With regards to hypothesis 1 and 2, these results show that higher shares of foreign currency loans in CEE EU countries over the investigated period are associated with higher non-performing loan ratios. This confirms the finding of Chitu (2012) that euroisation was an important contributor to the severity of the crisis and thus hampered economic convergence.

The results do not show a significantly different impact of foreign currency lending to household or non-financial corporation on NPLs (Models 5-7). However, we do find a negative relationship between the nominal effective exchange rate and NPLs in 5 out of the 7 Models. This means that a depreciation of the local currency (lower value of the NEER) is associated with a higher share of NPLs. This finding is supportive of the theory that the exchange rate impacts NPLs via (unhedged) foreign currency borrowers and not via the export channel. A significant depreciation of the local currency increases the debt burden of unhedged foreign currency borrowers, which in turn increases NPLs. In combination with the findings above, this points to the important role of foreign currency loans as determinants of NPLs in crisis situations.

With regards to the other macroeconomic variables, we do not find a significant impact of unemployment, stock price development and the lending rate on NPLs in the sample under investigation.

5 Conclusion

Granting loans in foreign currency in CEE EU was driven by strong convergence optimism by investors and the banks competing for clients, and as well as by borrowers, politicians and regulators. This business model did not go as planned and showed unintended effects: individually rational actions created a collectively damaging, systemic risk (Szpunar and Glukowski, 2012). In this paper, we argue that the increase in non-performing loans (NPLs) since 2007 in many CEE EU countries was to a significant degree driven by foreign currency (FX) lending. Local currencies depreciated significantly since the onset of the crisis, leading to increases in the debt burden of unhedged foreign currency borrowers and subsequently higher NPLs.

The results suggest that foreign currency lending is indeed associated with higher shares of NPLs in crisis situations. The findings give rise to the following discussion points.

The widespread use of foreign currency loans increases the risk in crisis situations and can have negative cyclical effects via the feedback mechanism of NPLs on GDP growth. In the case of CEE EU, when Euro-zone accession seems unlikely within the foreseeable future, one should discuss how to mitigate the negative effects of internationalization of the Euro via the lending channel.

Joining EMU respectively enlarging the Eurozone and its global appeal might be delayed by premature Euro-denominated, large scale lending outside the Eurozone. Regulators might consider policies depending on the closeness to EMU entry, e.g. linked to participation in the ERM

We suggest that designing policies to curtail the use of foreign currency loans to unhedged households could be one such measure to increase financial stability via lower NPLs particularly when EMU entry is still further out. Loan-to-deposit ratios, FX reserve requirements, or currency-dependent loan-to-value ratios may be among possible solutions. Concerted regulatory efforts like the ESRB´s (2011, 2013) recommendations to establish best practices in terms of foreign currency lending to unhedged borrowers which highlight the need for an orderly, non-disruptive cleanup process as also recommended by Klein (2012) are most helpful in this matter. The case of Hungary, where the government unilaterally introduced a "fixed" exchange rate allowing customers to refinance their existing foreign currency loans at this favorable rate at the expense of the (mostly EU) banks, shows that there is need for a common procedure on how to deal with household foreign currency loans in crisis situations.

Investigations on whether the speed (growth rate) of aggregate lending is healthy and supporting economic growth should also pay attention to the currency mix of loans granted. E.g. the benchmark used by Cottarelli et al (2005) and Haiss and Ziegler (2011) is derived with the assumption of domestic currency lending. In the light of our findings with regard to the impact of foreign currency lending on NPLs, these studies results may need further interpretation and adjustment by including foreign currency issues. This equally applies to analyzing country risk in countries prone to foreign currency lending.

Acknowledgments

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Financial Models in the Nonprofit Sector

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Abstract: *In this paper the corporate bankruptcy and creditworthiness models are applied to the Czech health care sector, particularly, on the inpatient healthcare providers. To test and compare the selected three models we use the data from hospitals, which are different from the management perspective. Concretely, we focus on the hospitals from Vysočina region, whose legal form is a contributory organization and hospitals from Southern Bohemia region, which have the legal form of a joint-stock company. Our research is based on the financial data from the hospital annual reports for the year 2012. From the analysis we get very heterogeneous results when comparing selected regions.*

Keywords: hospitals, financial ratios, bankruptcy models, creditworthiness indexes, contributory organizations

JEL codes: H2

1 Introduction

Decision making in each organization should be based on a thorough financial analysis. With it, the company management can have a comprehensive view on the so-called financial health of their company. The analysis should in particular be used for operational, tactical and strategic decision making.

From financial statements are derived mostly statements for working with financial ratios. One of possible approaches is to use the so-called multivariate models. These are linear combinations of selected financial ratios, whereas the selection of optimum weights and appropriate types of ratios is still developing. The result of these models is one value (index), on the basis of which you can assess the current financial status (creditworthiness models). There are also models for early detection of impending bankruptcy (bankruptcy models) of the company (Sedláček, 2001). These models were constructed primarily for profit sector using classificatory mathematical and statistical methods. To construct these models are mainly used the multiple discriminant analysis, logistic regression, cash flow simulation and neural networks (Kennedy, 2008). These multivariate models include the Altman index (Altman, 1968), the creditworthiness index (Kralicek, 2007), the Taffler index (Taffler and Tisshaw, 1977) and Czech domestic indexes IN (Neumaierová and Neumaier, 2002, 2014). A comprehensive overview of the development of bankruptcy models in the period 1930-2007 gives the article by Bellovery et al (2007).

In this paper we will focus on the inpatient healthcare sector, which has its own specifics. It includes hospitals, which operate on the principles of non-profit sector, because their main aim is not to make profit, but to provide treatment for the residents. Moreover, revenues at hospitals are obtained primarily from public health insurance and in this regard, hospital financial management is more accountable. Despite this fact, in the year 2013, 38% of hospitals resulted in a loss (ÚZIS, 2014). Thus, using an appropriate financial model, the hospital management can early detect a bad financial condition. In terms of legal form, however, most hospitals in the Czech Republic are business entities. The legal form of the company comes from the legal regulations. That is why we are interested in whether the contents of financial statements are closer to business entities that have a different goal - to make profit.

The aim of this paper is to test basic bankruptcy/creditworthiness models, which were constructed primarily for profit sector, on the pilot sample of Czech hospitals from two

regions. The issue of bankruptcy models in healthcare studies is handled by foreign authors e.g. for American (Wertheim, Lynn, 1993) and Korean hospitals (Noh et al, 2006). Czech hospitals are examined mainly for their efficiency (Votápková, Šťastná, 2013). In the healthcare sector the bankruptcy/creditworthiness models were used to analyze spa facilities (Pešková, 2012).

We verify the following working propositions:

P1: Bankruptcy/creditworthiness models based on the Czech environment reflect the financial situation of hospitals better than foreign models.

P2: Evaluation based on selected indexes will be more similar for hospitals in the form of business company, which are closer to profit sector, than in the form of contributory organizations.

P3: Although the indexes will vary, they will retain the same comparison between regions.

2 Methodology and Data

For evaluation we used publicly available profit and loss statements and balance statements for 2012 (MFČR, 2015). Given the objective of the article, the data is processed from selected hospitals of South Bohemia and Vysočina region which are adjacent to each other and can, in terms of health care, compete. Universal bankruptcy/creditworthiness model should be successful regardless of the analyzed data, which is another reason for choosing these two regions. In given region prevails the same type of owner of hospitals - the regional authority, but the legal statuses of hospitals differ between these regions.

In the South Bohemia region are hospitals of the joint-stock company type. In contrast, in the Vysočina region are hospitals with legal form of contributory organization. For the Vysočina region, the hospital in Velké Meziříčí was excluded from analysis because of different legal form (joint-stock company) and a different owner (Agel company). As for the South Bohemia hospitals, the study doesn't include hospital in Dačice because it only provides aftercare. All surveyed hospitals have achieved in the reference year 2012 profit in the range from CZK 9 thousand to CZK 20,700 thousand, except for one hospital from the Vysočina region, which ended in a loss of CZK 14,230 thousand. The study includes a total of 12 hospitals (see Table 1), while in the whole Czech Republic there were 156 acute care hospitals registered to 31 December 2012 (ÚZIS, 2013).

Table 1 Summary of hospitals included in the analysis, data for the year 2012

Region	Hospital	Number of beds	Number of hospitalizations
South Bohemia (joint-stock companies)	České Budějovice	1 213	51 702
	Český Krumlov	283	10 193
	Jindřichův Hradec	362	14 670
	Písek	377	15 386
	Prachatice	168	6 408
	Strakonice	335	13 813
	Tábor	497	18 044
Vysočina (contributory organizations)	Havlíčkův Brod	554	21 383
	Jihlava	742	27 787
	Pelhřimov	350	11 117
	Třebíč	468	20 433
	Nové Město na Moravě	429	19 457

Source: ÚZIS, 2013ab

To analyze the provided sample of hospitals we selected one foreign bankruptcy model and one foreign and one Czech creditworthiness model.

THE ALTMAN MODEL

Among the most famous foreign bankruptcy models belong the Altman models. From these models we have chosen for our purposes the so called Z''-Score model, which was created to evaluate the financial situation of non-US non-manufacturing companies (Altman, 2006).

$Z'' = 6.56 \ x_1 + 3.26 \ x_2 + 6.72 \ x_3 + 1.05 \ x_4$

x_1 – net working capital / total assets ,

x_2 – retained earnings from previous years / total assets ,

x_3 – earnings before interest and tax (EBIT) / total assets,

x_4 – market value of equity / total equity.

THE CREDITWORTHINESS INDEX

Another model used predominantly in German speaking countries (Rejnuš, 2014) is the creditworthiness index (IB):

$IB = 1.5 \ x_1 + 0.08 \ x_2 + 10 \ x_3 + 5 \ x_4 + 0.3 \ x_5 + 0.1 \ x_6$

x_1 – cash flow / liabilities,

x_2 – total assets / liabilities,

x_3 – earnings before tax (EBT) / total assets,

x_4 – earnings before tax (EBT) / revenues,

x_5 – stocks / revenues,

x_6 – revenues / total assets.

This model, unlike the previous one, is not intended to predict bankruptcy.

INDEX IN99

The last selected index is of Czech origin, i.e. it was compiled based on the financial situation of Czech companies. Its authors are the Neumaier couple (Neumaierová and Neumaier, 2002, 2014). The form of this index since the first appearance in 1995 evolved (IN95, IN99, IN01, IN05). Although the latest index is derived on the basis of the financial situation of companies in 2004, we considered IN99 as the most appropriate for our needs. The index is again presented as a creditworthiness index and is constructed from the perspective of the owner (Sedláček, 2008).

$IN99 = - 0.017 \ x_1 + 4.573 \ x_2 + 0.481 \ x_3 + 0.015 \ x_4$

x_1 – total assets / liabilities,

x_2 – earnings before interest and tax (EBIT) / total assets,

x_3 – revenues / total assets,

x_4 – current assets / (short-term liabilities + short-term bank loans).

For the sake of the evaluation comparison based on the individual indexes, in the case of the creditworthiness index IB we have chosen a more coarse scale rating, which do not distinguish the degree of good or poor financial condition, see Table 2.

Table 2 Evaluation of hospitals based on selected indexes

Evaluation of hospital	Color	Altman Z''	IB	IN99
Good financial condition	Green	≥ 2.6	≥ 1	≥ 2.07
Indefinite result	Gray	(1.1, 2.6)	(0, 1)	(0.684, 2.07)
Bad financial condition	Red	≤ 1.1	≤ 0	≤ 0.684

Source: Altman, 2006; Rejnuš, 2014; Sedláček, 2008

3 Results

For comparison we used both initial values of selected indexes and their transfer on the ordinal scale (see Table 2). Due to the small number of hospitals included in the study we used for comparison only descriptive statistics. In terms of average values of Altman Z''-score and creditworthiness index, the better performing are South Bohemian hospitals. In contrast, using the Czech IN99 index, the better evaluated were hospitals in Vysočina region (Table 3, Figure 1).

Using the IB index, none of the hospitals identified as financially unhealthy (see Table 4 and Figure 1 - red zone near bar graphs). In contrast, in the case of South Bohemia hospitals, the poor financial situation has been evaluated on the basis of Czech IN99 index in all 7 hospitals and based on the Altman Z''-score in three hospitals. In the Vysočina region as financially unhealthy were evaluated, using both the Altman Z''-score and IN99, three specific hospitals. It is therefore obvious that the creditworthiness index IN99 is significantly different from the two other indexes used and evaluates the selected hospitals more strictly. Classification based on the Altman Z''-score and IN99 is different for the South Bohemian hospitals in the form of joint-stock companies than for the Vysočina region hospitals in the form of contributory organizations.

Our propositions P1 - P3 were unfortunately not confirmed with presented results.

Table 3 Average values (standard deviations) of the individual indexes by region, including their comparison in the form of difference of averages

Region	Altman Z''	IB	IN99
South Bohemia	1.063 (0.844)	0.665 (0.295)	0.389 (0.119)
Vysočina	0.730 (0.931)	0.398 (0.342)	0.574 (0.198)
Difference	0.333	0.267	-0.185

Source: Authors' work

Table 4 Absolute (relative) number of hospitals evaluated on the basis of individual indexes in the red zone of companies with poor financial situation

Region	Altman Z''	IB	IN99
South Bohemia	3 (42.9%)	0 (0.0%)	7 (100.0%)
Vysočina	3 (60.0%)	0 (0.0%)	3 (60.0%)
Total	6 (50.0 %)	0 (0.0%)	10 (83.3%)

Source: Authors' work

Figure 1 Scatterplots: the values of individual indexes for each hospital with a marked value of the average (yellow square) in a given region (1 - South Bohemia, 2 - Vysočina) with marked borders of individual zones (gray dashed line); Stacked column charts: distribution of hospitals to individual zones (red - bad, gray - indefinite, green - good financial situation)
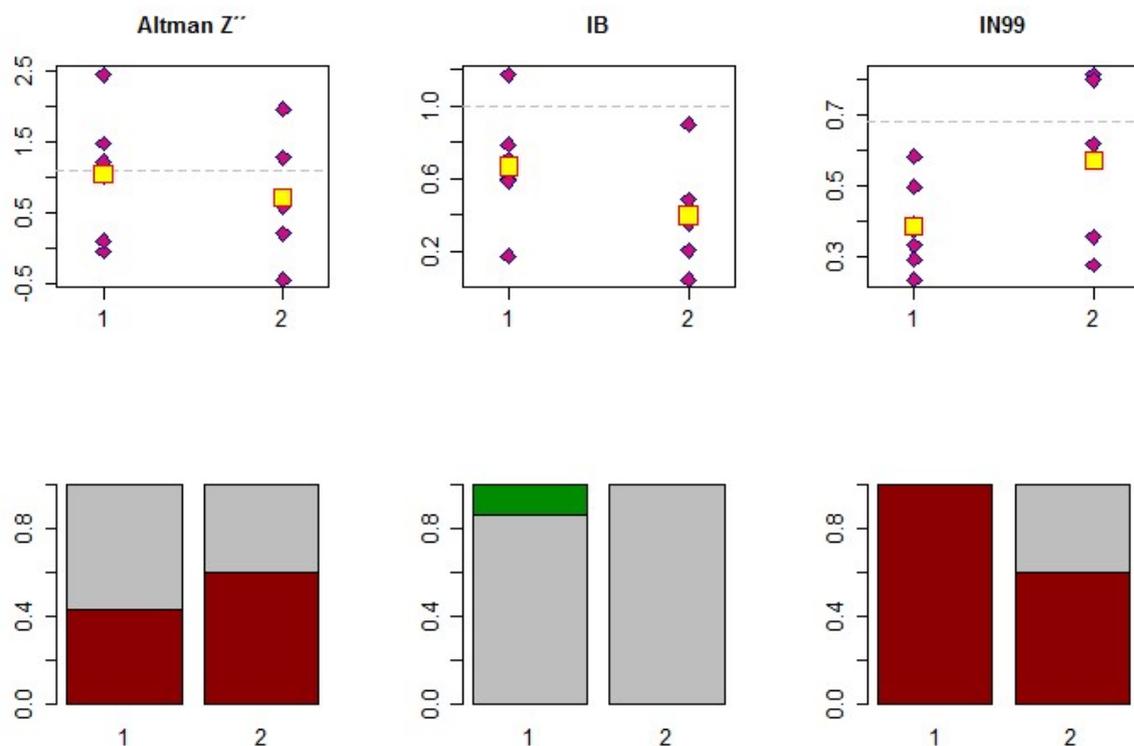
Source: Authors' work

4 Conclusions and Discussion

For our pilot study, we used the Altman bankruptcy model and two creditworthiness models, one foreign and one Czech. From the analysis we found that when using different models we get very heterogeneous results both for comparison of hospitals within each region and comparison between regions. We conclude that the chosen bankruptcy/creditworthiness models in this form are not suitable for the hospital environment. We assumed that at least the IN99 model applied to the Czech environment will draw better results, but in this case the results were unsatisfactory. However, our findings are consistent with the results of Sušický (2011), who applied the bankruptcy/creditworthiness models to the Czech environment for the sector of agriculture, food industry and manufacturing of motor vehicles.

Both the Altman index and the IN99 index imply that some of the hospitals included in the study are near bankruptcy, which does not reflect the real situation. During expert interviews with representatives of one hospital from each region, we made sure that hospitals have a balanced financial management from 2012 until now and do not face any financial difficulties. As the most appropriate of all selected indexes appears to be the creditworthiness index (IB). Hospital economists do not work with b / b models when evaluating the economy of hospitals. From their perspective, these models contain too many indicators, which include earnings before taxes. Economists evaluate the economy of hospitals more from the perspective of performance indicators rather than the financial ones. Classification of hospitals in terms of profit - the profit / loss cannot be entirely ignored. Each organization, profit or nonprofit, cannot show a financial loss in the long term. The problem still remains in the variety of suitable indicators used for b / b models

and their applicability to different legal forms of hospitals located in the Czech Republic. In the future, it is important to determine the applicability of b / b models on the available data for all hospitals, to adjust scales and indicators of existing models and to ascertain whether there is an individual indicator needed for each type of hospital. It is necessary, however, to test the index on a larger number of hospitals, which will be the subject of further research. In the case of unsatisfactory results it will be necessary to modify one of the existing models or to suggest a different model applicable to Czech hospitals.

Acknowledgments

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Analysis of Banking Fees and Clients' Needs

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Abstract: *The banking market (like other business fields) is faced with growing competition. The last six years were characterised by the increasing entry of new low cost banks, which are based on lower monthly cost but in some cases limited services. The first part of the paper is devoted to an introduction to the topic, it describes the situation in the banking market of the Czech Republic and the literature search is carried out. This paper aims to analyse products and services from banks on the market and compares them with the needs and wishes of bank clients, and using the Client index to verify that indeed there was a decrease in average monthly costs for bank accounts due to the entry of low-cost banks. The paper includes scientific questions whether there is an account on the market which is truly free of charge, and whether clients have a personal account with a well-chosen package of products and services. The analysed data is from a questionnaire located on "bankovnipoplatky.com", which over 2,000 respondents fill-in every month. The individual parts of the questionnaire will analyse the needs and wishes of individual respondents regarding a current account.*

Keywords: Retail core banking services, needs, account, costs, survey

JEL codes: G21, G14

1 Introduction

In essence since the mid-19th century in the financial sector there has been reduction in the significance and importance of banks and their intermediary functions. They often talk about the process of disintermediation, which has several phases. First, a part of clients' savings was "taken" from banks by investment and mutual funds, pension funds and life insurance funds. Later, the development of finance markets led to the fact that banks have lost their dominant position in savings as well as loans - through the financial markets, companies can get (except bank loans) resources for their activities. The third phase of disintermediation is associated with the advances in information technologies, which allow direct "back-office" operations. In the fourth phase, the development of information technologies (begins with expansion of ATMs and telephone banking) allowed "disintermediation" of the distribution of financial products. This phase of disintermediation gives space to the banks and banks are often among the most active financial institutions that offer such services. They begin to speak also about the fifth phase of disintermediation associated with online banking - it means that banks are "omitted" during payments, clearing and settlement of financial transactions. (Polouček, 2006, p. 6)

The number of individual types of finance institutions is very different in individual countries, as well as the size of banks and their share in the financial market. The market is also affected by the economic, technical, social, political and other factors shaping business conditions in banking and financial sectors in the relevant economy. Significant influence also belongs to the legislation, regulation and supervision. All the factors influence each other, work together and not separately, and not all of them have the same short-term or long-term impact. (Polouček, 2006, p. 6, 7)

According to the Czech National Bank, in March 2015 in the Czech Republic, there was a total of 45 banks and branches of foreign banks. In the last six years there have been mainly banks, which bear the designation of a "low-cost" bank. Although their names are often not so well-known and time-tested, it is this different approach and low cost, which

ensure them a large clientele. The best known mainly include FIO bank, mBank, AirBank, etc.

This was also confirmed by a survey of SANEP company from May 2015, which monitored that in choosing a bank domestic clients increasingly prefer small and especially Czech financial houses, compared to the largest domestic banking houses.

In comparison with the data obtained by SANEP in 2012, there is currently a noticeable decrease in the clients of Česká Spořitelna, ČSOB and Komerční banka. In contrast, within three years, a visible increase in demand for services occurred in Fio bank, Air Bank and Equa Bank or Sberbank. The largest absolute increase was recorded by Air Bank, i.e. by 3.3 percentage points (from 0.6% to 3.9%), GE Money Bank by 2 percentage points (from 5.6% to 7.6%). While the largest decrease was seen in Česká Spořitelna, i.e. by 4.7 percentage points (from 30.4% to 25.7%) and Komerční Banka by 3.8 percentage points (from 12.7% to 8.9%). (SANEP, 2015)

Banks like other businesses try to maximise their profits. One of the potential income are the fees for management of current and business accounts.

The aim of the paper is based on a questionnaire survey to carry out an analysis of bank fees and needs of the bank clients in the Czech Republic and compare them with the offer of individual banks. Based on the results of the Client Index, which analyses the average monthly and quarterly expenses for the management of bank accounts in the Czech Republic, it tries to determine whether there is growth or decline in the Client index with respect to the entry of new low-cost banks. In the last part of the paper, will data from a questionnaire survey be closely analysed and identify the requirements for current accounts.

2 Methodology and Data

To choose the best bank account with the lowest account management costs, data from the bank charges Calculator (hereinafter Calculator) will be used, which is available from: http://www.bankovnipoplatky.com/kalkulator.html. The aim of the Calculator is to compare the services and products of individual retail banks in the Czech Republic within the offer of basic banking services. The Calculator provides a calculation and comparison of individual banks based on individual demand of banking clients. According to the bank account statement, a client fills the questionnaire in seven steps and the results will outline the most appropriate accounts (in terms of cost). Due to maximum accuracy of the data, the form does not include questions regarding irregular activities - for example, one-off establishment of a service or change processes (change of address, PIN, standing order, etc.). (Bankovní poplatky, 2015)

The data is evaluated monthly and quarterly by Martina Hedvičáková (co-author of the paper) and Ivan Soukal. The bank charges Calculator has been used by 88,711 bank customers so far. The co-author has been analysing the data from the Calculator since 2010 and using the Client and Banking index it monitors the level of prices on the retail core banking services (thereinafter RCBS).

In terms of marketing research, it includes the following data:

- multi-dimensional - 54 variables are monitored on the use of service, 2 system variables for each element in the set and 45 variables regarding pricing on individual accounts,
- primary – data was obtained directly from the users of banking services,
- subjective - data based on the client's judgment regarding their own use of banking services. (Bankovní poplatky, 2015)

Based on the data obtained from the Calculator, the Client and the Bank index are calculated.

Calculations and statistical analysis were performed using the statistical IBM PASW 18 software (formerly SPSS) and MS Excel 2013. Calculation is performed on a monthly and

quarterly basis for the selection of the population obtained in the reference month or quarter. The calculation precedes verification-validation part to avoid skewing of results e.g. by the respondents who should not use the retail products (self-employed individuals, small businesses with the frequency of use of banking services, which in practice a client can never reach with a civil account), and the respondents who only clicked through the form without filling the key services. More information on the methodology of calculation: bankovnipoplatky.com (Bankovní poplatky, 2014; Draessler et al, 2011)

a) Client index

The Calculator follows the behaviour of clients very closely and captures the use of retail banking services of respondents. The Calculator therefore reflects accurate costs that the clients actually pay to their banks. It is a precise monitoring of tariff headings: mainly the number of times the clients use the services and the amount they are charged. For this reason, if it is an active client then in an averagely expensive bank they will pay hundred crowns monthly. If someone hardly ever uses a bank, then even in an expensive bank they can get below 100 CZK per month.

The methodology for calculating the average cost per account is based on information regarding the bank as well as the particular account. The average costs of a particular account are obtained by the arithmetic average of the clients computed by the Calculator, who have chosen the monitored account. This methodology is more accurate, but it requires a greater number of clients. The number of accounts with a lack of respondents for calculation is much higher. More information on the methodology of calculation: http://www.bankovnipoplatky.com/klientsky-index---metodika-12507.html. (Hedvicakova, Soukal, 2014)

b) Banking index

An alternative view on fees is provided by Banking index, which analyses the best bank accounts for 4 main groups of clients (Active, Branch, Average internet, Passive internet).

The calculation methodology is available from http://www.bankovnipoplatky.com/bankovni-index---metodika-12509.html. (Soukal, Hedvicakova, 2014; Hedvicakova, Pozdilkova, 2015)

The aim of this paper is to confirm the scientific issues:

- The market is currently lacking a current account in which the clients would actually pay 0 CZK/month in average.
- Clients have a poorly chosen service package for their bank account and pay higher average costs for account management than indicated in the bank's Tariff.

3 Results and Discussion

Banks are trying to retain their existing clients and attract new ones. For this reason they constantly analyse the factors that lead to greater customer satisfaction and consequently also to increasing loyalty. The research of Capgemini - World Retail Banking Report 2012 – shows the following results:

For the second year in a row, quality of service emerged as the leading reason customers leave their banks. Globally, more than half of customers (53%) said they would leave their banks because of the quality of service they received (see Figure 1). Close behind, at number four, was ease of use, cited by 49% of customers. These findings indicate that banks able to offer high-quality, easily understood, and convenient services have an opportunity to differentiate themselves in the market.

The second and third reasons customers leave their banks are price-related, including fees, cited by 50% of customers, and interest rates, cited by 49%. Factors that are less important to the decision to leave include reward and loyalty programs at 28%, and a

bank's brand image or reputation, at 29%. Emerging relatively low on the list was a desire for personal relationships, cited by 34% of customers. (Capgemini, 2012)

Figure 1 Factors That Affect why Customers Leave a Bank (%), 2011- 2012
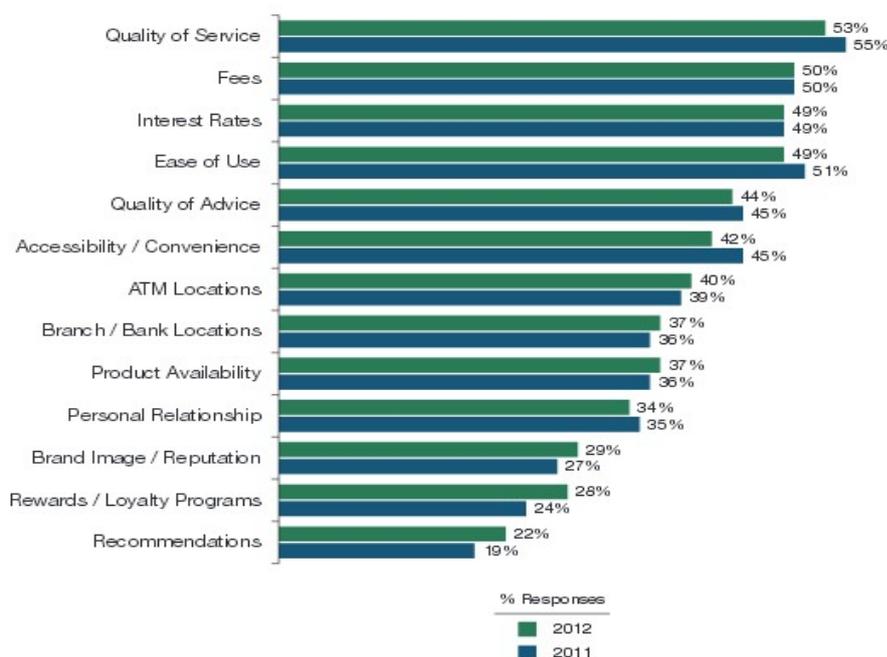
Increasingly, more and more clients of Czech banks are interested in the monthly cost paid to their banks for management of their account. Also, due to the growing competition in the banking market, banks must adapt their offer to the needs and wishes of their customers.

Based on data analysis from the Calculator, currently a client pays 184 CZK/month on average to a bank for the management of their current account. The figure 2 shows the development of average monthly costs in CZK in individual quarters. Compared to the first quarter of 2013 when the average monthly cost was 176 CZK/month, the Client index rose to the current 184 CZK/month.

Figure 2 Client index
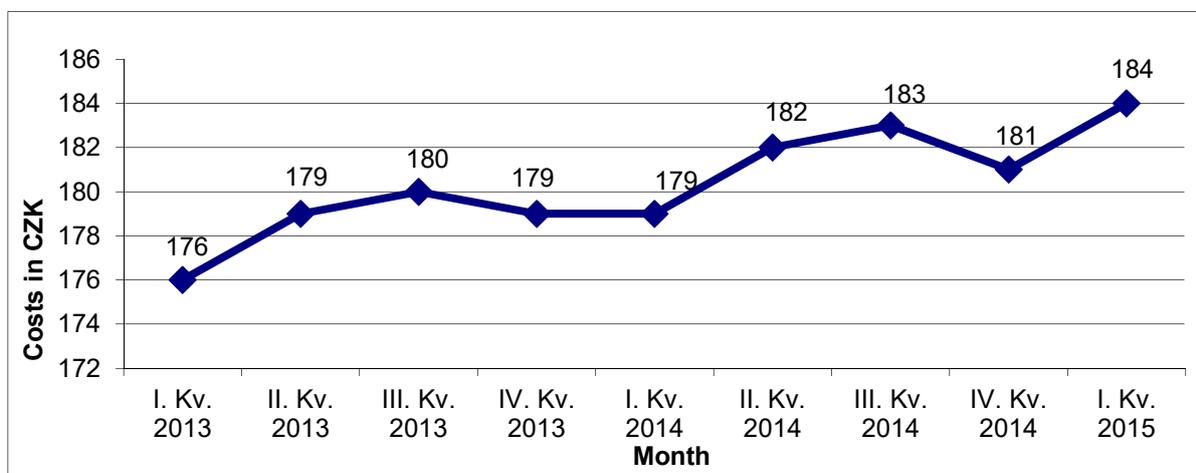
Figure 2 shows that although in the last five years the banking market has been entered by new "low-cost" banks that offer account management for free, there is still growth in the value of the Client index. However, these results may be distorted by the fact that the questionnaire on http://www.bankovnipoplatky.com/kalkulator.html could be filled in by respondents who are not satisfied with the amount paid to the bank for managing their account and using the Calculator they try to find better current account, wherein they would pay lower cost. The second aspect is choosing the wrong package of services, where the increased number of operations or non-standard operations are highly charged. Another reason for the high average cost for maintaining a bank account may be the failure to meet the conditions for maintaining the account free of charge. Banks often impose one or more conditions that must be met in a given month, otherwise the account is not maintained free of charge (e.g. GE Money Bank, Komerční banka, etc.).

The average cost for maintaining bank accounts can be seen in the Table 1. The table lists only those accounts for which customers do not pay more than 150 CZK/month. The table is missing the majority of current accounts from large banks such as ČSOB, Komerční banka and GE Money Bank, which average costs repeatedly did not fit into that line. The evaluation does not include accounts in Česká spořitelna due to the variability of the price list. ČSOB clients in the 1st quarter paid 162 CZK/month on average for the Active account, KB clients with MůjÚčet with reward paid 187 CZK/month. When calculating the average costs, the clients of Česká spořitelna paid 153 CZK/month. Conversely, the accounts from small banks such as ZUNO etc. are not included in the evaluation for lack of valid data. (See more in the quarterly report at: http://www.bankovnipoplatky.com/klientsky-index-i-ctvrtleti-2015-prumerne-bankovni-poplatky-184-kc-mesicne-28044).

Table 5: The average cost for clients for accounts for the first quarter of 2015

ACCOUNT	Average cost in CZK
Equa bank Běžný (active client)	8
UniCredit Bank U account (conditions met)	26
mBank mKONTO	33
Air Bank Malý tarif	34
Fio Current account	49
Sberbank Fér account, Start option	61
ERA Online account	97
Air Bank Velký tarif	100
Expobank account 5 for 50	127
Raiffeisen bank eKonto KOMPLET (conditions met for turnover)	129

Source: Soukal, Hedvičáková, 2015

Table 1 shows that even in "low-cost" banks that advertise free account management, the account management is not absolutely free. In the cheapest current account of Equa bank, clients pay an average of 8 CZK/month. It always depended on the specific use of services and products. It confirmed the first scientific premise that even for the cheapest account, which is free, the clients pay an average of 8 CZK/month and must also meet certain conditions. To meet the conditions specified by the bank is also necessary for the clients with a U Account from UniCredit Bank so they can have free maintenance of the account. Yet they will pay 26 CZK/month. The cheapest account without any conditions is mBank with mKonto where the average monthly cost is 33 CZK.

What is important is that this is the average monthly cost from all clients, who use that account. If a client meets the conditions set by the bank or does not perform "non-standard" toll operations, the management of accounts for all low-cost banks is really free of charge. This can be achieved even by the large banks.

The second scientific assumption is that clients have poorly chosen the service package for their bank account can be confirmed only partly, because none of the "Big Three"

banks, i.e. ČSOB, Komerční banka and Česká Spořitelna fit into the border of 150 CZK. Due to the fact that all these banks offer accounts up to 150 CZK according to their tariffs, the clients have incorrectly chosen the package or do not qualify for the rewards and discounts.

The questionnaire survey (see fig .1) states that clients change their banks mainly due to the quality of service and fee. The traditional big banks offer the best quality and above-standart service with a large number of stone branches and ATMs. That is one reason why Czechs prefer to pay higher costs for current account management than in low-cost banks. Although upon dealing with a bank it is possible to achieve individual conditions and gain free account management even with big banks. It just depends on the motivation and willingness to work with your account and in case of dissatisfaction to change the bank. Because of that the calculator provides an overview of banks which shows what bank accounts have the lowest average cost exactly to their needs.

The demand on retail core banking services market for physical entities carries the impacts of the price information asymmetry. Soukal's and Draessler's model (the Stigler's model adjustment) shows that more than 50 % of account suitable for the mainstream client profile can be replaced by cheaper one even under the influence of information asymmetry. (Soukal, Draessler, 2012)

Results from the Investigation

This part of the paper closely analyse the data obtained from respondents regarding how they use and what they need from their current accounts. The online questionnaire of the Calculator on http://www.bankovnipoplatky.com/kalkulator.html is divided into seven parts. During the first quarter of 2015, 1,782 respondents completed the questionnaire, after filtering 1,364 valid data left.

The most important findings about the behaviour of bank clients can be summarised as follows:

- Step 1. – Account

The minimum monthly turnover is 28,354 CZK/month. When this condition is met, some banks cancel the fee for account maintenance (e.g. Raiffeisenbank).

The average monthly balance is 32,212 CZK/month. This information is important for cancelling the fee for account maintenance at some banks (e.g. GE Money Bank, Citibank and others).

The average monthly balance shows uneconomic behaviour of bank clients that do not transfer financial assets to better saving or investment instruments.

- Step 2. – Statement of account

95.4% of the respondents have electronic account statements sent to them. This result may be affected by a group of respondents. 86.3% of clients require account statements each month, and the remaining percentage require account statements on a quarterly basis.

- Step 3. – Credit card

86.5% of the respondents require establishment of a credit card for their account. Only 13.5% of the respondents do not want a credit card. 171 respondents request a non-embossed debit card, 837 respondents a debit embossed card and 363 respondents are interested in a credit card. Neither respondent in the first quarter of 2015 chose all three types of cards simultaneously. In 42.6% of cases the respondents wanted a combination of an embossed debit card with a credit card. Interestingly, the clients who want a non-embossed card, do not want a credit card (only 5.8%).

The respondents on average collect from the ATM for their own bank 3 times per month and once per month from another bank. The average amount for withdrawals from ATMs is 2,242 CZK.

- Step 4. – Direct banking

78% of clients require direct banking. 76% of respondents require internetbanking and 1.6% of respondents require phonebanking. 13% of respondents want internetbanking as well as phonebanking. 22% of clients do not want direct banking.

- Step 5. - Payments – single orders

A good estimation of the number of payments and standing orders (step 6.) is crucial to correctly select the package of products and services for individual banks.

On average, the respondents have 1.8 incoming payments from other banks and 1 payment from their own bank. Respondents implement 2.2 payment orders to their own bank and 3.5 payment orders to other banks through internetbanking.

- Step 6. - Payments – standing orders

Respondents on average implement 1.3 standing orders in their own bank and 3.5 standing orders to other banks through internetbanking.

- Step 7. - Payments – Direct debit authorisation (or SIPO payment)

Respondents perform an average of 0.4 pc of direct debit in their own bank and 0.8 pc to other banks through internetbanking monthly.

- Step 8. - Cash transactions

In this section, only 2.3% of clients stated that they realise excessive deposit to the account at a branch. The average inserted amount is 30,000 CZK.

- Step 9. - Other services

Other services used by the respondents primarily include a cash-back service (if the bank provides this service – e.g. Citibank, ČS, GE Money, KB, mBank, Poštovní spořitelna, Raiffeisenbank, ČSOB). This service is used by an average of 12.3% respondents per month.

Based on the above summary of 9 steps from the Calculator, we can read the real demands and needs of respondents to a personal account. If banks do not want to lose their customers, they will need to analyse their needs and adapt their offers to them.

It will depend on whether the clients prioritise quality services and products or low cost for maintaining current accounts.

4 Conclusions

If bank customers are actively interested in the amount of their average monthly cost for maintaining their account and will know their needs, they can achieve significant savings annually for the management of their retail accounts. As an aid in understanding the banking market, there is a number of comparators of current accounts that track the monthly costs of maintaining accounts. One of them is the Calculator of bank charges on www.bankovnipoplatky.com. Based on the analysis of the data obtained from this Calculator, both scientific questions have been confirmed: in accounts for "free" at the "low-cost" banks as well as accounts where a client must meet certain conditions, there is no personal account in the market, where the clients would pay an average of 0 CZK/month. The second question is whether clients have a well-selected package of products and services. By a detailed analysis of banks' offers and actually paid average costs it was discovered that in all the large banks clients pay more than the bank declares. Clients therefore do not have a well-chosen package or do not meet the conditions set by the bank.

Clients must decide themselves whether they want to stay with their large traditional bank and pay an average of one hundred crowns for maintaining their current account or to select one of the smaller banks without a long tradition, which try to gain clients by

pricing policy. The costs are in some cases offset by lower product and service offerings, which reduces the comfort of taking advantages of a current account.

The development of the Client index also shows that although new low-cost banks entered the (RCBS market) retail core banking services, its value continues to rise, despite an increase in the number of clients using these banks.

Acknowledgments

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Financial Results of the Company Depending upon Accounting Procedures (Comparison of the Czech Accounting Standards and IAS/IFRS)

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Abstract: *This texts is concerned with financial results of the company depending upon chosen procedures of accounting. Accounting procedures based on the Czech accounting standards (CAS) and accounting procedures based on the International accounting standards/International financial reporting standards (IAS/IFRS) are compared. The comparison of achieved financial results is based on the known synthetic index of the financial analyses – Altman Z-score – of the bankruptcy model.*

Keywords: Czech accounting standards, International financial reporting standards, International accounting standards, CAS, IAS/IFRS

JEL codes: G00, G12, G30, G33, G39

1 Introduction

The financial analysis is widely used within the company management, evaluation of investment and planning and evaluation of the company. It is also an important document for acquisition of investors, leasing financing and bank loans.

The success of financial analysis depends on the quality of information sources. It is necessary to keep in mind that erroneous data can misrepresent the results of financial analysis. The information sources are mostly taken from account statements that are part of final accounts. But, there are some differences between final accounts compiled according to IFRS and Czech final accounts and this can cause different conclusions of the financial analysis.

The Ministry of Finance consistently attempts to harmonize the Czech accounting system with EU directives in order to approach it to IFRS standards. In spite of this effort there are still numerous differences between these accounting systems.

This text aims to indicate possible differences in results of financial analysis depending upon used accounting procedures.

2 Methodology and Data

Methodology

The synthetic model of financial analysis, made by professor Altman, known as Altman Z-score, was used for comparison of both accounting systems.

Professor Altman determined the discrimination function leading to the calculation of Z-score, separately for companies that trade shares in public, and separately for other companies. The Z-score for companies with publicly traded shares is calculated as follows: (Sedláček, 2009)

$$Z_i = 1,2 * X_1 + 1,4 * X_2 + 3,3 * X_3 + 0,6 * X_4 + 1,0 * X_5 \tag{1}$$

X_1 – operating assets/ total assets

X_2 – retained profit/ total assets

X_3 - EBIT/total assets

X_4 – market value of shareholders' equity/ accounting value of total debts

X_5 – total turnover/total assets

If the Z-score of the company is higher than 2,99, then we can talk about satisfactory situation. When the calculated value varies from 1,81 till 2,99, the company is found in the so-called grey zone and it is not possible to clearly state whether it is successful or in troubles. Values under 1,81 are signs of potential bankruptcy. (Knápková, 2013)

Data

The company PRE, a.s., that duly compile its final accounts according to IAS/IFRS standards, will be the economic entity on which the possible differences between accounting procedures will be demonstrated.

The duty to compile the consolidated final accounts according to IFRS is valid since 2005 for all companies with publicly traded shares, registered at the territory of the European Union. This fact is included in Czech regulations in the Act No. 563/1991 Coll., on accounting in which it is defined which companies are obliged to compile their final accounts according to IFRS which companies are free to decide on their own. (Růčková, 2011)

Data for the analysis of financial results by using IAS/IFRS were drawn from annual reports of the company PRE, a. s. for the period 2009-2013. The Z-score (Tab.1) was counted according to the data from annual reports. These data were next modified according to the summary of CAS effects (Tab.2). The results of Z-score of modified data shows Table 3.

3 Results and Discussion

The comparison is based on comparing of Altman Z-score results achieved with both above-stated accounting procedures. The table 1 shows results of Altman Z-score in case of accounting according to IAS/IFRS. Subsequently the simulation of accounting following the Czech accounting standards will be performed.

Table 1 Altman Z-score in case of accounting following IAS/IFRS.

	Weights	2009	2010	2011	2012	2013
Net operational assets/ total assets	1.2	-0.09	-0.13	-0.18	-0.12	-0.12
Retained profit/ total assets	1.4	0.37	0.36	0.37	0.37	0.36
EBIT/total assets	3.3	0.36	0.36	0.50	0.47	0.40
shareholders' equity/long-term and short-term liabilities	0.6	0.68	0.75	0.81	0.80	0.71
Sales/total assets	1.0	1.13	1.20	1.18	1.18	1.11
Altman Z-score		**2.45**	**2.54**	**2.68**	**2.70**	**2.45**

Source: Own preparation

When looking at results of this index we can state that the company PRE, a. s. achieves average values and belongs to the so-called "grey zone". For companies found in the grey zone it is not possible to unambiguously define whether they will go bankrupt or not in following years. The total results of Altman Z-score were negatively influenced by the negative value of operational assets that is typical for energetic companies. Other partial indexes show above-average values.

The system IFRS is based on the principle of provision of true economic situation picture. Thus the companies are forced to behave economically and to provide clear and transparent reports. (Knápková, 2013)

Main differences of accounting between CAS and IFRS

IAS 16 Lands, buildings, equipment:

- Following CAS the spare parts are recorded and shown within material stocks, which, in case their value is high, misrepresents the liquidity of the accounting entity stated in its final accounts. (Dvořáková, 2008)
- Increasing of accounting values of long-term assets, during fair value re-evaluation, upwards is not possible according to the Czech legislation. Thus the original (historic) undervalued purchase prices remain the basis for determination of long-term assets depreciations. Due to this the companies cannot show the preservation of company substance within the production concept. (Dvořáková, 2008)

When comparing depreciations in the Czech Republic and in the standard IAS 16, it is obvious that the standard attaches importance to the period of assets usability. Many companies do not treat this topic at all, and simply use the tax-allowed depreciations. This means that instead of determination of usability period they use depreciations given by tax limits which does not need to conform with specific conditions of assets use in the company.

IAS 38 Intangible assets:

- According to CAS, the goodwill is amortized. (Dvořáková, 2008)
- The intangible assets created for own needs must not be activated. (Dvořáková, 2008)
- Contrary to the standard IAS 38 it is not possible to re-evaluate the long-term intangible assets for their fair value, the evaluation of intangible assets in the Czech Republic is based only on historic prices.

IAS 39/IFRS 9 Financial tools:

- Long-term bonds are, following IFRS, recorded in their actual value and the amortization will be based on the effective interest rate. (Strouhal, 2012) According to the Czech legislation they are recorded with their nominal value which is, as per the balance date, corrected by their amortization. (Strouhal, 2012)

IAS 23 Borrowing costs:

- According to CAS the accounting entities can choose whether to include interests of purpose-provided credits into the purchase price of long-term assets. Under no circumstances the interests can be activated with values of inventory. (Dvořáková, 2008)

IAS 36 Value decreasing of assets:

- The Czech accounting rules do not consider the usability value when testing the value decrease and do not require its determination. (Dvořáková, 2008)

IAS 2 Inventories:

- In the Czech Republic, the important spare parts are not differentiated. The standard IAS 2 determines more strict rules for evaluation of produced inventory. Only a part of overhead fixed costs, corresponding to the standard level of production capacity use, can be activated with the production value. (Dvořáková, 2008)

IAS 17 Leasing:

- There is an important difference between the Czech accounting rules and the standard IAS 37. The lessee cannot include assets purchased in form of financial leasing as the balance liability. (Dvořáková, 2008)
- Thus the information on accounting entity indebtedness, on the effectivity of long-term assets etc., is considerably misrepresented.

IAS 37 Reserves:

- The reserve for repairs of long-term property, that belongs to the most frequent reserve in the Czech Republic, thanks to its possible tax deduction, is in direct contradiction with requirements of the standard IAS 37. According to IFRS it is not possible to approve such reserves as a liability and thus its creation is not in accordance with IAS 37. The definition of liabilities is totally missing in the Czech accounting standards and this can cause the reserve creation is undervalued in practice, except for the tax-deductible reserve. (Dvořáková, 2008)

IAS 20 Grants:

- The standard requires the income approach for recording of state grants and requires the observation of the accrual principle. If grants for assets acquisition are received, this principle can be observed in two ways. The first option is to decrease the assets value by received grant as this influences the economic result in periods when the assets will provide incomes through the depreciation decreases. This option is used also in the Czech Republic. The second option consists in the accruing of grants as of incomes of future periods.

The table 2 shows the summary of effects of accounting based on Czech accounting standards when compared with accounts of the company accounting following IAS/IFRS.

Table 2 Summary of CAS effects

Domain of accounting	Effect of CAS
Long-term tangible assets	They decrease the value of long-term tangible assets (historic prices are undervalued due to the inflation). They increase the value of long-term tangible assets (they include also important spare parts). They decrease the value of long-term tangible assets (the object of financial leasing is not an asset). They decrease the value of long-term assets (borrowing costs don´t need to be activated).
Long-term intangible assets	They decrease the value of long-term intangible assets (they do not allow for fair value, the goodwill is depreciated.)
Long-term financial assets	They increase the value of long-term bonds (today, they are not recorded with actual value on the base of effective interest rate).
Inventory	They decrease the value of inventories (borrowing costs must not be activated). They increase the value of inventories (enable to activate the overhead costs for evaluation of produced inventories). They increase the value of inventories (include also important spare parts).
Liabilities	They decrease the value of liabilities (undervalued creation of reserves). They increase the value of liabilities (evaluated in current value).

Source: Own preparation

Procedure of simulation of Altman Z-score in case of accounting based on CAS

The table 2 shows the summary of effects of accounting following the Czech accounting standards on accounting held so far following international accounting standards.

Every change (decrease/increase) is reflected in original records by 10% of decrease, or increase.

Long-term tangible assets, long-term financial assets and inventories were increased by 10 %, long-term intangible assets were decreased by 10%. The increase of assets was

compensated by increase of liabilities, under the original ratio of shareholders' and foreign capital. The item of profit was increased within the shareholders' equity, the item of total liabilities was increased in the foreign capital. The profit increase affected also the profit and loss statement where the item of sales was increased by profit change.

The resulting Z-score for statements adapted for accounting following Czech accounting standards is shown in the table 3.

Table 3 Altman Z-score in case of accounting based on CAS

Altman Z-score	Weights	2009	2010	2011	2012	2013
Net operational assets/total assets	1.2	0.27	0.27	0.29	0.19	0.24
Retained profit/ total assets	1.4	0.39	0.38	0.39	0.39	0.38
EBIT/Total assets	3.3	0.13	0.13	0.17	0.16	0.14
Shareholders´ equity/Long-term and short-term liabilities	0.6	0.67	0.74	0.79	0.78	0.70
Sales/total assets	1.0	1.14	1.20	1.20	1.20	1.12
Altman Z-score		**2.60**	**2.72**	**2.86**	**2.72**	**2.58**

Source: Own preparation

By comparing resulting values of Altman Z-score (Tab. 2 and Tab. 3) we can state that the procedure of accounting following Czech accounting standards shows better results of financial analyses as the value of Altman Z-score is higher for CAS. Nevertheless the difference is not so important.

After more detailed analysis of individual variables entering the Altman model it is possible to interpret how individual variables influence the resulting score.

The index relating the working capital to assets shows positive values for procedures according to CAS, in contradiction with accounting based on IAS/IFRS. Due to higher inventories the working capital was positive according to CAS. On the contrary the profitability was higher in accounting based on IAS/IFRS. Indexes of indebtedness and of activity were basically the same for both procedures of accounting.

4 Conclusions

The main difference consists in the purpose for which the final accounts are used. The main purpose of final accounts prepared according to IFRS is to provide quality information for decision making of investors. The final accounts made following Czech rules fights with troubles linked to tax regulations. When the account statements are prepared, their potential effects are considered which leads to the use of all legal options, regardless their expedience. Another difference is that accounts based on IFRS require to record transaction following their economic principle. On the contrary, the Czech accounts are based on the legal standard. (Knápková, 2013)

Changes given by transform from accounting with IAS/IFRS to accounting with CAS were simulated at the sample case. Even it can be seen that accounting based on IAS/IFRS requires more strict rules in reporting leading to the lower profit and lower assets evaluation, it was proven that the influence of rules on presented economic results is not fundamental. Differences in both accounting procedures are mostly eliminated in particular domains (see Tab. 2) and thus presented results are slightly better according to CAS.

After all we can state that chosen procedures of accounting do not influence the results of financial analysis.

Acknowledgments

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Development of Oil Prices and Key Determinants Influencing its Development

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Abstract: *Oil is one of the most important and liquid commodities, which development is highly focused by traders and theoretical economists. The practice showed that change in oil prices is positive correlated with inflation, when there is even indirect influence of oil because oil is oil necessary in delivering goods. Prices of oil influences positive the energetically stocks and negative with airlines stocks. The most important prices are formed in New York WTI crude oil and in London Brent oil. They are important because US consumption is one fourth of world production and in London is traded almost half of oil sold worldwide. In my contribution based on regression analyses I will try to find out what is the most important determinant of WTI price and then use is in partial correlation to show how the strongest US determinant influences the Brent, because historically WTI and Brent correlate together when we can say Brent price represents the world price of oil in general.*

Key words: WTI Price, Brent Price

JEL codes: Q02

1 Introduction

Production of oil in the U.S. had decreasing tendency for two decades since half of the 80´s. The reason was decreasing amount of conventional oil and higher costs for drilling and workforce in the U.S. than in other traditional oil drilling countries like on Arabian peninsula in combination with stagnating prices on the world market. Turning point came around of year of 2010 when oil drilling in the USA was increased by the drilling oil of shelves and USA became the world production leader after decades.

According to situation of past years we can expect that increase of oil production has negative effect of oil price, because producers form abroad tries to deliver at least same amount of production into US market, what caused over demand and lately decrease of oil price.

2 Methodology and Data

The most imported oil prices are quoted in New York –WTI and in London –Brent. Both of them are positively correlated. WTI oil price is important because it is the benchmark for US market and USA is responsible for quarter of oil consumption. London Brent Oil price is benchmark for the rest of the world because nearly half of world consumption is traded there. The aim of this contribution is to find out the most powerful US variable that has influence on Brent price, which represent world oil price using regression analyses. For purpose finding out some expected relations we used statistical analyses and data from Bloomberg terminal. Analyses of chosen factors of WTI and Brent oil prices.

3 Results and Discussion

Questions oil prices exceed its importance of commodity markets, but also affect the a wide economic relations of economic and political stability.

Issues of commodity markets in relation to oil deal with multiple authors. In terms of commodities analyzed oil markets Arendaš, P. and Chovancová, B.

Well-known author in Slovakia, who take into account the geopolitical and economic context include, for example Baláž, P. and Trenčianska, E.1

Jankovská is engaged in oil prices as a factor in international finance.

Using correlation method in 242 observations of average month prices, shows that coefficient of significance is lower than 0,05, what means that we can cancel null-hypothesis and model is relevant to study. Statistical significance is also proved by Pearson coefficient which 0,915 what means that average monthly prices of WTI oil and Brent oil are highly positively correlated.

Table 1 Correlation between month prices of WTI and Brent prices

Correlations		WTI_month_average_price	Brent_month_average_price
WTI_month_average_price	Pearson Correlation	1	0,915**
	Sig. (2-tailed)		0,000
	N	242	242
Brent_month_average_price	Pearson Correlation	0,915**	1
	Sig. (2-tailed)	0,000	
	N	242	242
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: Own processing in IBM SPSS

This is also proved by scatter/dot diagram where we can compare artificial 45° degree curve with the best fitting curve conducting points at statistical significance of 95% what means that in long run the development of prices is at same direction.

Figure 1 Scatter/dot graph of WTI and Brent prices in comparison of 45° curve
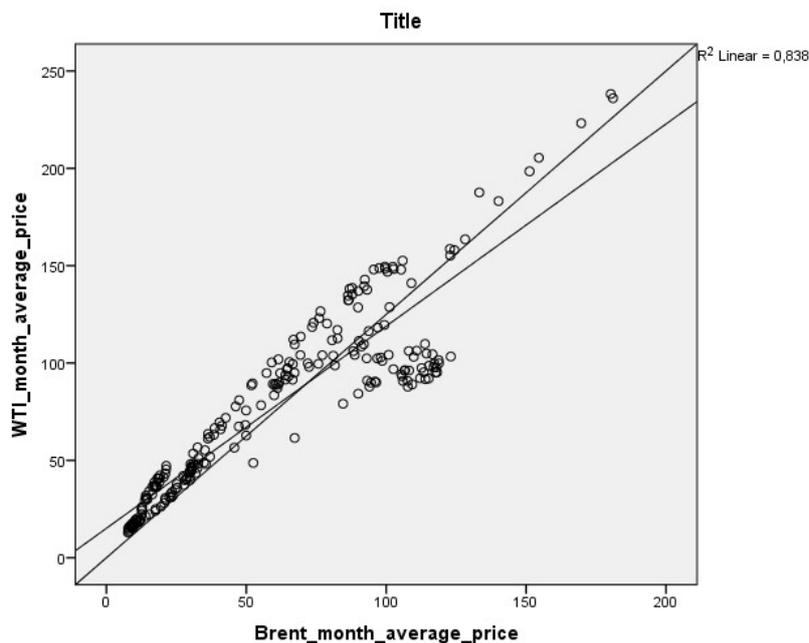
Source: Own processing in IBM SPSS

For determination of most important coefficients determining WTI oil prices which I use in regression analyses, I chose three factors. Specifically it is US crude oil production, import of oil to USA and US oil storage.

In following graph of daily US production we can see that production in US had decreasing momentum nearly two decades, since the half of 80´s. The reason was that those traditional commercial drills were getting dry causing rising costs of production drilling and also costs in the US were rising faster than of workers in traditional drilling countries like Saudi Arabia, Nigeria etc. with combination with stagnating oil prices at the world markets. Turning point is around the year of 2010 when new technologies came out and shale production began.

Figure 2 Amount of oil drilled in the US
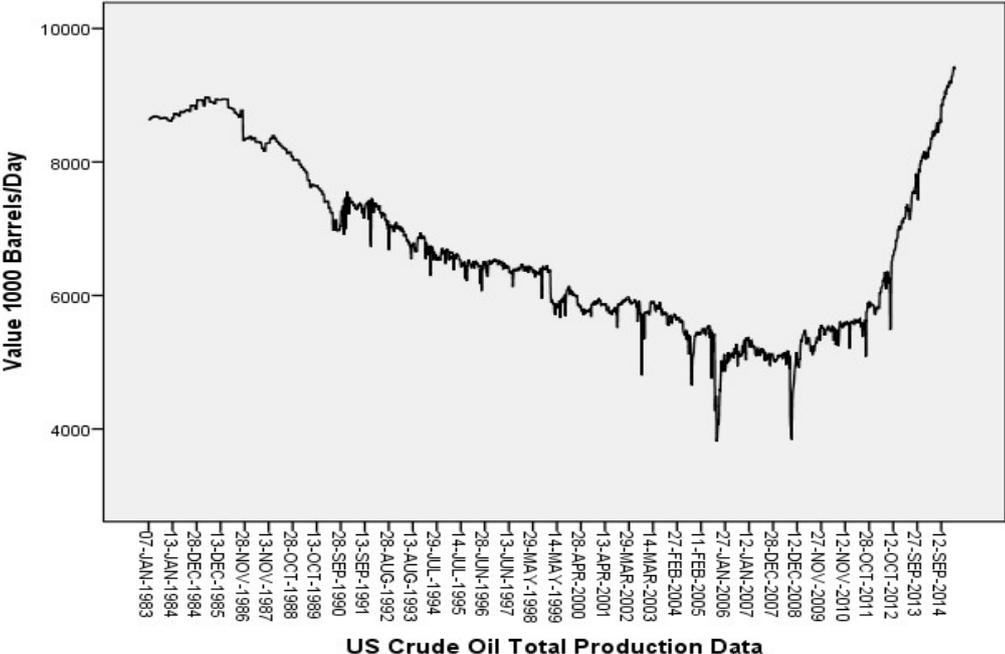
Source: Own processing Bloomberg data

In the next graph we can see the development of oil import to American market. USA began to import oil in 1995 and the pace of import was increasing rapidly nearly 15 years. During the darkest times of financial crisis fell to amount of import from 2005 and then again began to consolidate. Comparing graphs no.2 and no.3 we can say that the pace of import and domestic production between years 2009 and 2011 was increasing at the same time what means that the general US consumption was increasing as well. Comparing these two graphs we find out that after year of 2011 situation was game-changing because oil production in the US began to replacing oil import what was caused of increase of domestic oil production made out of shales.

Graph 3: Import of oil in the US in 1000 barrels a day

Source: Own processing Bloomberg data

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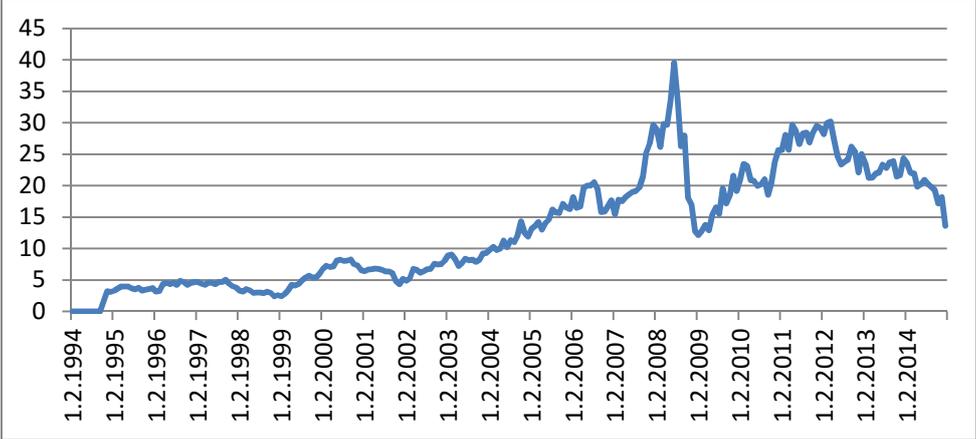
Using regression analyses, where dependent variable is WTI oil price and independent variables are amount of production in US, amount of imported oil and oil storage, we get few tables. First table shows the amount of signification of the model and sum of squares which is revealed by the method least squares. Significance shows if the model is proper or not. Significance in this model is lower than 0.05 what means that we can cancel null hypothesis what means that model is proper to take into account.

Table 2 Regression analysis

	ANOVA[b]					
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	395342,324	3	131780,775	255,707	0,000[a]
	Residual	122655,211	238	515,358		
	Total	517997,535	241			
a. Predictors: (Constant), DOEASCRD Index, US Imports Crude Oil 1000 Barrels/Day, US_Crude_Oil_Total_Production_Data						
b. Dependent Variable: WTI_month_average_price						

Source: Own processing in IBM SPSS

In the next table the most important data is coefficient of determination R^2, which is proportion of total squares and regression contents what means that variability of average WTI price can be described for 76% what is high amount.

	Model Summary			
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0,874[a]	0,763	0,760	22,701498390774530
a. Predictors: (Constant), DOEASCRD Index, US Imports Crude Oil 1000 Barrels/Day, US_Crude_Oil_Total_Production_Data				

Source: Own processing in IBM SPSS

In table "coefficients" relevant significance for independent variables "import of oil in the US"and "US production", significance is higher than 0,05 for independent variable „oil in storage". From that model we can say that the factor with the direct influence on WTI oil price for more than 20 years has „import of oil in the US" and indirect influence has production of oil in the US, what means if production in the US is increased oil price decrease what are we witnesses in fact today.

	Coefficients[a]					
		Unstandardized Coefficients		Standardizdd Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	107,69	10,447		10,309	,000
	US_Crude_Oil_Total_Production_Data	-0,015	0,002	-0,282	-8,889	,000
	US Imports Crude Oil 1000 Barrels/Day	4,215	0,167	0,802	25,283	0,000
	DOEASCRD Index	4,24E-6	0,000	0,001	0,028	0,978
a. Dependent Variable: WTI_month_average_price						

Source: Own processing in IBM SPSS

According to prove direct relation between oil price in New York and London using correlation analyses we will use the most powerful independent variable from the regression analyses to explain Brent oil price. Significance is lower than 0,05 so null hypothesis can be rejected, what means that model is proper and also independent variable was well selected at the same time, because we use simple linear regression this time. Coefficient of determination is 86,2% what means that with average month oil

import to the US we can explain the change of average month price Brent oil traded in London for 86,2%.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0,928[a]	0,862	0,862	15,2077180 0482680

a. Predictors: (Constant), US Imports Crude Oil 1000 Barrels/Day

Source: Own processing in IBM SPSS

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	347036,263	1	347036,263	1500,537	0,000[a]
	Residual	55505,925	240	231,275		
	Total	402542,188	241			

a. Predictors: (Constant), US Imports Crude Oil 1000 Barrels/Day

b. Dependent Variable: Brent_month_average_price

Source: Own processing in IBM SPSS

Coefficient of regression has positive amount and dependent and independent variables are in the direct relation what means that increase or decrease of independent variable will cause the same direction of dependent variable. Increase of average month import of oil of a 1000 barrel per day will cause the increase of 4,304 USD per barrel of Brent oil what is world benchmark of oil price. On another hand the decrease of oil import will cause the decrease of price at the same amount.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,191	1,803		,660	0,510
	US Imports Crude Oil 1000 Barrels/Day	4,304	0,111	0,928	38,737	0,000

a. Dependent Variable: Brent_month_average_price

Source: Own processing in IBM SPSS

Conclusions

The import of oil to the US market is leading changing factor the price at the world markets because at these market places (New York and London) are responsible for nearly 75% of all oil is traded around the world. Comparing these two regression analyses, we can see that independent variable import of oil imported to US has higher influence on the Brent oil (London) than on the WTI oil price (New York). This also confirms assumption that change in US consumption of oil will cause the change of oil import and that consequently has the dependency on world prices. Also the change of oil import we can consider as a partial variable between US economic activity and oil prices at the markets.

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Coverage of Mortgage Bonds as Important Condition of Investor's Confidence

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Abstract: *In terms of countries of Central and Eastern Europe has developed mortgage banking in a form that puts the emphasis on mortgage loans. Several times we pointed out that these markets are not sufficiently benefit from mortgage bonds. The mortgage system in the developed countries of the world should benefit mainly of mortgage bonds as a source for funding and for investors as an appropriate object of investment with moderate returns and low risk. Mortgage bonds have been sensitively linked to the mortgage credit market and it is therefore necessary to consider the development of a mortgage system in this mutual connection between sources (mortgage bonds) and loans.*
Key words: mortgage covered bonds, mortgage credits, credit portfolio

JEL Classification: G21, G11

1 Introduction

Mortgage cover bonds may issue only institutions with the license to provide mortgage deals. The obtaining of the mortgage bank license requires the minimum amount of bank equity capital. Mortgage bank capital is higher than the equity of commercial bank.

Bank shall use the sources from the issue and sale of mortgage covered bonds only for providing of mortgage credits under a separate regulation.

In the standard mortgage system are two types of mortgage bonds coverage: duly coverage and substitute coverage. For a duly coverage of mortgage bonds are addressed receivables of mortgage banks from mortgage credits not exceeding 70 % of the real estate value set under a separate regulation.

The most important condition for the standard working mortgage system is the preferential right of the covered bonds owners. It means that mortgage bond owners shall have preferential right to assets used to secure issued mortgage bonds. The role of pledge has mortgage bank.

2 Methodology and Data

Based on theoretical and methodological foundations we determine what the rules of safe mortgage trading. We are pointing out, as reflected in Slovak legislation, and what there is still margin for improvement. The specific terms of mortgage transactions in the Slovak Republic are improving; but they relatively little stimulus for the mortgage bonds issuing and trading. On the one hand, the large overhang of mortgage loans creates excessive over collateralization, which could be positive. On the other hand, excessive over-collateralization points to the insufficient use of the potential that they have mortgage bonds to investors. In this paper I focused the examining the matter in conditions of the SR.

We use theoretical knowledge, statistical analytical approaches and data sources from NBS, Eurostat and the ECB. For data processing we use software IBM SPSS, Expert Modeler and Excel.

The mortgage bonds and municipal bonds owners are the „secured creditors" in connection to the mortgage bank.

The preferential right of mortgage and municipal bonds owners is contained in the separate regulations on Bankruptcy and Restructuring. The regulations shall secure the receivables of mortgage bond owners for the payment of nominal values and yields of mortgage bonds.

In case if were insolvent mortgage bank, and then would be separately managed the property substance for the mortgage bonds covering. This separately managed substance includes the mortgage and municipal loans.

For this purpose it is necessary to ensure that the covering block has sufficient asset value. Therefore, we can recall the basic rules of healthy mortgage trading (Pavelka, 1996):

*1-st rule: ∑ MB ≤ ∑ MC + T ≤ k * N*   (1)

2-nd rule: iMC – iMB ≤ MARGIN   (2)

Where:
MB   = Mortgage (covered) Bonds;
MC   = Mortgage Credits;
T   = Tolerance = Substitute Covering;
LTV   = Loan to Value Ratio
N   = Value of Real Estates;

The substitute covering (T) is possible in amount to 10 % from the value of issued mortgage bonds. The roles of substitute covering have the special groups of assets and property values in portfolio of the mortgage banks:

a) Deposits in the central bank;
b) Deposits in banks;
c) Cash;
d) Treasury bonds;
e) Treasury bills; and
f) Covered bonds issued by another banks.

The duly coverage of issued mortgage bonds may be replaced by the substitute coverage at most up to the level of 10 % (maximum 30 % in selected countries) of the total par value of issued mortgage covered bonds.

All mortgage banks in Slovakia were created as universal banks with the license for mortgage business conduct. These banks do not report separate margins from mortgage business. The complication follows from the difference in interest on mortgage loans (are based on income from annuities) and mortgage bonds (are established as a direct interest). Therefore, the interest income cannot be calculated as simple difference in interest rates on mortgage bonds and loans.

The real margin of mortgage businesses has to be calculated as sum of net present values of all future incomes from mortgage credits repayments:

$$issued\ \mathrm{cov}\mathit{ered\ bonds\ amount} + \mathrm{int}\mathit{erest\ of}\ \mathrm{cov}\mathit{ered\ bonds} \langle$$

$$\langle \sum_{t=1}^{n} (\frac{1-st\ credit\ repayment}{(1+i)^1} + \frac{2-nd\ credit\ repayment}{(1+i)^2} + ... + \frac{n-t\ credit\ repayment}{(1+i)^n} \qquad (3)$$

It should be underlined that the annuity payments generated less interest compared to a simple rate. There is therefore a risk that the amount of loans in coating unit will generate enough revenue to pay the interest on mortgage bonds. To determine the

interest rate on loans to generate sufficient interest to cover bonds method is used to zoom.

In this paper we will not deal in detail margin mortgage bank, but we need show the need to keep a sufficient amount of a profitable high-quality mortgages in order maintain confidence in the bonds.

To evaluate the status of mortgage loans as a tool to properly cover the mortgage bonds will be used portfolio creation by the Markowitz modern portfolio theory. We are aware that portfolio theory takes into account the evolution of revenues and covariance between them.

According to Markowitz modern portfolio theory portfolio expected return is a weighted average of the expected return of its individual components. To the expected return of the portfolio contributes each component (in our case a loan) by its expected return and its share of the initial market value of the loan portfolio (Sharpe, W. F., Alexander, G. J. 1994).

$$r_P = \sum_{i=1}^{N} X_i * r_i = X_1 * r_1 + X_2 * r_2 + \cdots + X_N * r_N \tag{4}$$

Where:
r_p = expected portfolio profitability;
r_i = expected profitability of component (credit) i;
N = number of components (credits) in portfolio;
X_i = weight of component „i" in initial value of the portfolio

The Markowitz modern portfolio theory is based on the normal probability distribution of income portfolio. For a portfolio composed of N loans we apply the following formula for the standard deviation (Sharpe, W. F., Alexander, G. J. 1994):

$$\sigma_P = \left[\sum_{i=1}^{N} * \sum_{j=1}^{N} X_i X_j \sigma_{ij} \right]^{1/2} \tag{5}$$

Where:
X_i = = weight of component „i"in initial value of the portfolio;
X_j = = weight of component „j"in initial value of the portfolio;
σ_{ij} = covariance between credits „i"and „j".

Covariance is calculated according to the formula:

$$\sigma_P = \rho_{ij} * \sigma_i * \sigma_j \tag{6}$$

Where:
ρ_{ij} = The correlation coefficient between loans i and j;
σ_i = standard deviation of the yield of credit „i";
σ_j = standard deviation of the yield of credit „j".

3 Results and Discussion

The issuer of the mortgage bonds is the originator of the cover assets too. The issuer owns the cover assets and holds it in his balance sheet. The holder of the bond has a direct recourse to the credit institution. The issuer has a position of the permanent issuer, what means, that they may issue bonds according to their economic needs and does not need a permit supervisory authority.

Prepayment of mortgage loans is not permitted; prepayment can increase neither the risk of banks nor the risk of mortgage bonds owners.

In accordance to European Covered Bonds Regulation – the Article 45(Paragraph 7) of Collective Investment Act, states: "The value of bonds issued by a single bank, or by a foreign bank in a Member State which is subject to supervision that protects the interests of bondholders, may not constitute more than 25% of the value of an open-end fund's

assets. Funds raised by the issue of bonds shall be invested in such assets which, until the maturity of the bonds, cover the issuer's liabilities related to the bond issue and which may, in the event that the issuer becomes insolvent, be used to redeem the nominal value of the bonds and to pay the income on them. The aggregate value of bonds acquired for an open-end fund's assets under the first sentence may not exceed 80% of the value of the open-end fund's assets" (ACT ON COLLECTIVE INVESTMENT).

Article 45(Paragraph 11) states: "Bonds which are issued in the Slovak Republic and meet the criteria laid down in paragraph 7 shall be deemed to include mortgage bonds and municipal bonds (municipal debt) issued by a bank which, with the funds raised from their sale, provides a municipal loan to a municipality or higher territorial fund share, and provided that these municipal bonds are guaranteed in accordance with the conditions stipulated by a separate law (Act on Bonds)."(Source: ACT ON COLLECTIVE INVESTMENT). Finally, the legislation allows to institutional investors to invest: Mutual funds may to invest up to 25% of the assets in mortgage covered bonds; Insurance companies may invest up to 20 % of the technical reserves in mortgage covered bonds, and Pension funds may invest up to 15 % of the assets in mortgage covered bonds.

At the following chart we can see the lag of mortgage bonds volume in the volume of provided mortgage loans. This situation is adequate to the rule (1), but the lag in volumes is too high and it may indicate very high "over-collateralisation" of the mortgage bonds.

Figure 1 Amount of mortgage credits and cover bonds in the Czech Republic
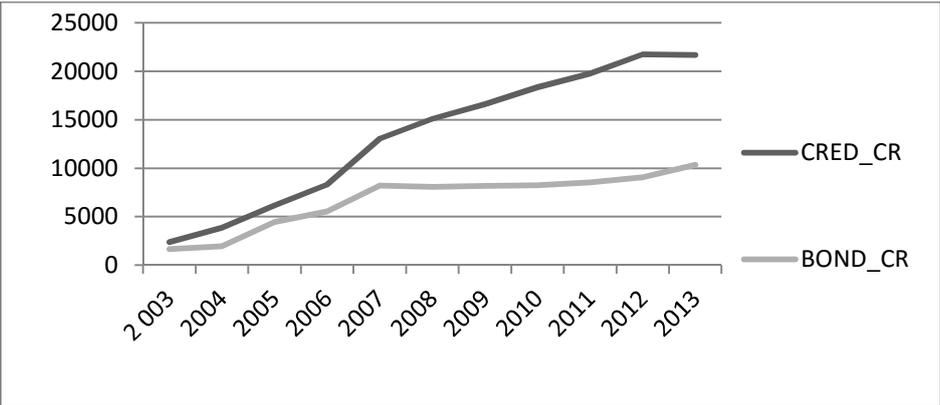
Source: Hypostat 2014. A Review of Europe's Mortgage and Housing Markets. Editors Isgró, L., Johnson, J.: European Mortgage Federation – European Covered Bond Council, 2014, p. 69-94.

Figure 2 Amount of mortgage credits and cover bonds in the Slovakia
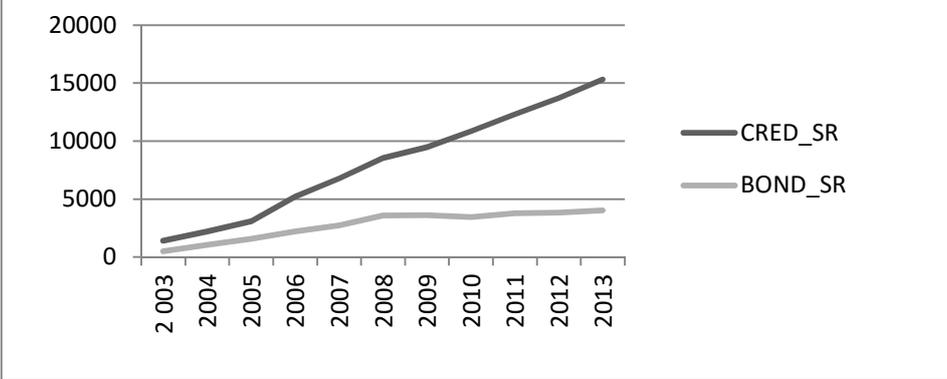
Source: Hypostat 2014. A Review of Europe's Mortgage and Housing Markets. Editors Isgró, L., Johnson, J.: European Mortgage Federation – European Covered Bond Council, 2014, p. 69 - 94.

Figure 3 Amount of mortgage credits and cover bonds in Hungary
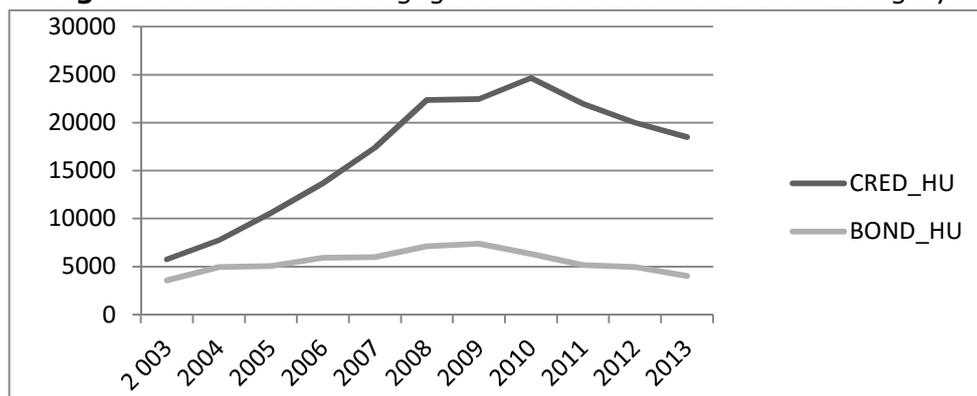
Source: Hypostat 2014. A Review of Europe's Mortgage and Housing Markets. Editors Isgró, L., Johnson, J.: European Mortgage Federation – European Covered Bond Council, 2014, p. 69 - 94.

Figure 4 Amount of mortgage credits and cover bonds in the Poland
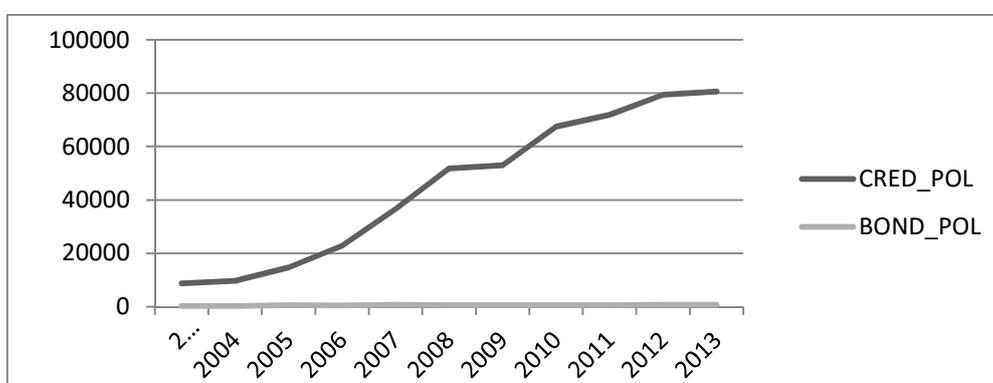
Source: Hypostat 2014. A Review of Europe's Mortgage and Housing Markets. Editors Isgró, L., Johnson, J.: European Mortgage Federation – European Covered Bond Council, 2014, p. 69 - 94.

Slovak mortgage banking was built on the basis of the basic principles implemented in German mortgage banking system and taking into account the limits resulting from the small financial market including some specifics of Slovak small open economy.

Since beginning can be observed an improvement of mortgage banking system; it is faced with the deal to improve the status of the mortgage bonds owners and to keep the adequate liquidity, stability and efficiency of the mortgage banks.

Initial problems connected with the issue of mortgage covered bonds were connected with the problems on the underdevelopment of financial market. Especially – there were high interest rates from state bonds in the 90s and they caused problems in issuing mortgage bonds. Later, when interest rates on the banking market reached a standard level, these problems have been overcome.

For the purposes of issuing of covered bonds are set special additional requirements in comparison to general supervision regulation. The cover pool trustee is independent from the mortgage bonds issuer. The supervision of mortgage transactions is standard and adequate, performed by the National Bank of Slovakia. For the purposes of issuing of mortgage covered bonds are set additional requirements in comparison to general banking regulation.

Banks in Slovakia are obliged to finance mortgage lending from sources that are 90% of the mortgage bonds. At the same time is there the condition of cover, which determines that banks cover for income from mortgage bonds and mortgage bonds through mortgage loans to at least on the level of 100%. These two conditions are difficult to meet at the same time.

The trustee has to record in the cover register all of assets solving to cover of issued mortgage bonds, or other bank assets serving as substitute coverage. These assets shall be kept separately from other businesses of mortgage banks.

Owners of the mortgage bonds have the preferential right and they are „the secured creditors" in case of bankruptcy of the mortgage bank.

These "secured creditors" and their status are included into the Act No 7/2005 on Bankruptcy and Restructuring Coll. This legislation requires that the receivables of mortgage bond owners for the payment of nominal values and yields of mortgage bonds are guaranteed. The mortgage covered bonds owners are protected against claims of other banks creditors in case of insolvency of bank as mortgage bonds issuer.

"In case of insolvency of a mortgage bank, a separate substance for the covering of mortgage bonds must be created. If it is not possible to satisfy the secured claim of a secured creditor, the claim is satisfied as a claim of unsecured creditor. There is possible recourse to the insolvency institutions property upon a cover pool default, with the unsecured creditors. The use of derivatives in the cover pool is not permitted." (Múčková, V., Sobolič, J.: European Covered Bond Fact Book. 2014)

Prepayment of mortgage loans is solved in a standard way; it does not increase the risk of banks and risk of owners' mortgage bonds. Banks allow the prepayment in part or in full only when the interest rate of mortgage loans is changing. Cash flow mismatch between cover assets and cover bonds is furthermore reduced by the prepayment rules applicable to fixed interest rate mortgage loans. Prepayments of mortgages are only permitted in cases of 'legitimate interest' of the borrower or after a period of the fixation term (This is a part of loan agreement). In other cases, if the mortgage is prepaid, the borrower has to compensate the damage of the lender caused by the prepayment.

The primary method for the mitigation of market risk is used natural matching and stress testing on the entire bank portfolio, not only mortgage portfolio. Stresses testing of coverage calculations are not applied separately. There is not set the mandatory overcollateralization by the regulation. In practice is usually kept coverage of the pools on required level and over it 1 – 2 %. Minimum mandatory overcollateralization is not required, but the amounts are protected. Banks have to report to the supervisory authority the residual maturity of financial instruments, including mortgage assets and liabilities instruments.

Article 16(4) of the Act on Bonds requires that "the total HZL outstanding amount must be covered at all times by assets of at least the same amount and with at least the same interest income". Thus, the nominal value of the cover assets must permanently be higher than the respective total value of the HZL and the interest yield must be at least the same.

Figure 5 Interest margin on the level of bank sector SR (thous. EUR)

Source: www.nbs.sk

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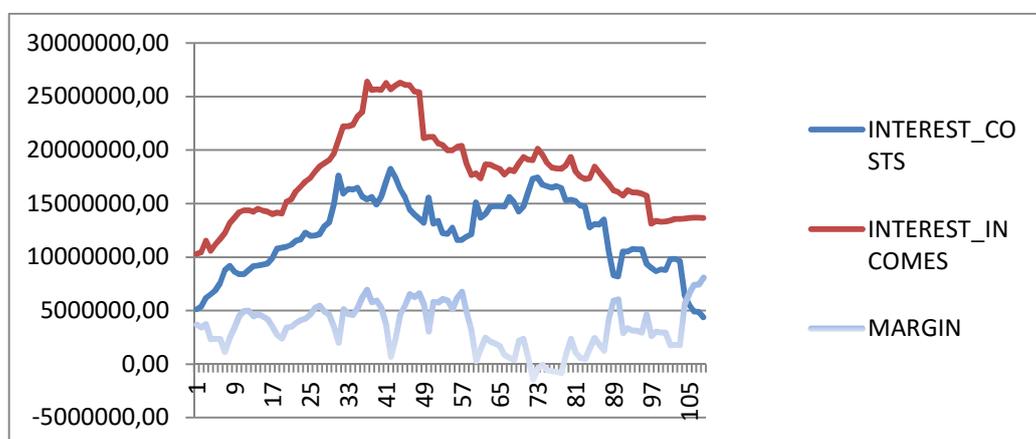
Simply interest margin (M) was calculated as:

M = INC – COSTS   (7)

INC = IRCRED * AMOUNTCRED   (8)

COSTS = IRBONDS * AMOUNTBONDS   (9)

Where:

M   = simply interest margin
INC   = interest incomes
COSTS = interest costs

Lending was carried out in the competitive environment in time of financial crisis. This was reflected in reducing interest rates, which was faster than the reduction of interest rates on mortgage bonds.

Consequently, the simply margins in mortgage transactions have declined. If we take into account the difference between the annuity and direct compounding, the difference would be even greater.

Figure 6 Interest rates of mortgage credits in Slovakia
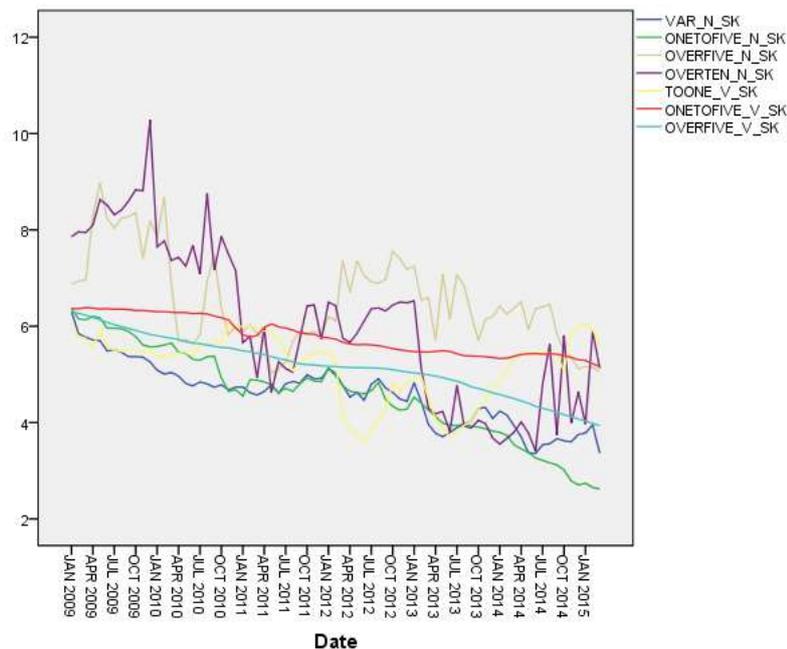
Source: www.nbs.sk

Interest rates on mortgages in the Eurozone have long been at a lower level compared to the Slovak Republic. It shows the following graphs, as well as distribution of interest rate developments. While in SR are the means the interest rate on the mortgage rate of 5% in the euro area are mean values of the interest rate at 3, 5 %.

Figure 7 Interest rates of mortgage credits in the EU

Source: ECB, http://sdw.ecb.europa.eu/browse.do?node=bbn3506
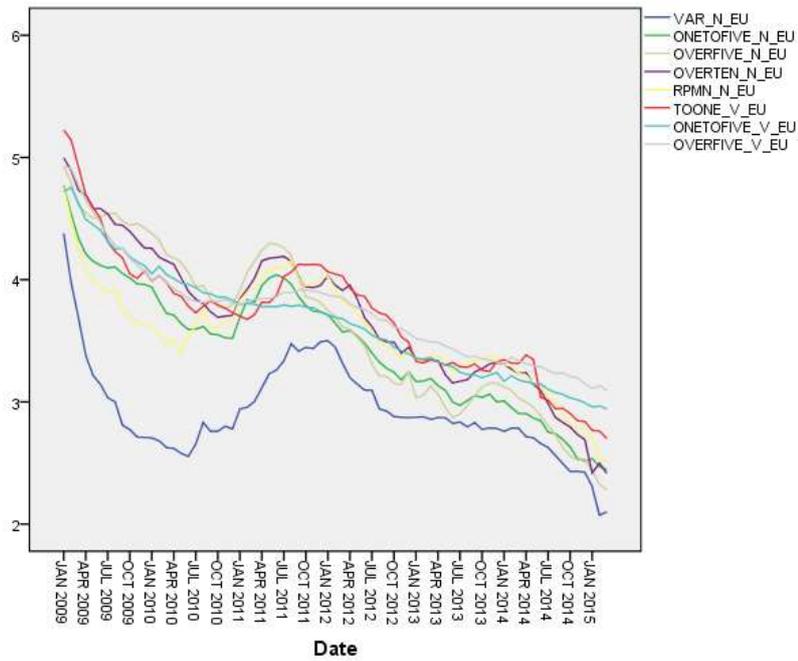
Figure 8 Interest rates fixed for 1 – 5 years distribution in Slovakia

Source:http://www.nbs.sk/sk/statisticke-udaje/menova-a-bankova-statistika/urokova-
statistika/bankova-urokova-statistika-uvery

Figure 9 Interest rates fixed for 1 – 5 years distribution in EU

We analyzed the composition of the recommended portfolios for banks and we compared recommendations on consumer credit, mortgage credit, and recommendations for a portfolio mix of consumer and mortgage loans in Slovakia. Current development shows that mortgage credits the rate fixed for 1-5 years are most appropriate to the portfolio of banks. Therefore, we think that mortgage credit is the most important generator of profit banks in the retail segment in Slovakia and the financial crisis has a significant impact.

Table 1 Recommendation for the composition of the portfolio of consumer loans

PORTFOLIO CONS_CRED	Recommended % in portfolio
OVERDRFT	**0,841856974**
CONSVARTOOY	-0,001162566
CONSFIXONTOTOFIVE	0,140415869
CONSFIXOVERFY	0,018889723

Source: Own processing on the basis of Markowitz modern portfolio theory.

Table 2 Recommendation for the composition of the portfolio of mortgage loans

PORTFOLIO MORTGAGE_CRED	Recommended % in portfolio
VAR_N_SK	0,244677595
ONETOFIVE_N_SK	**0,751350057**
OVERFIVE_N_SK	0,004264953
OVERTEN_N_SK	-0,000292605

Source: Own processing on the basis of Markowitz modern portfolio theory

Table 3 Recommendation for the composition of the mixed portfolio of the most recommended consumer and mortgage loans

PORTFOLIO MIX_CONS_MORTG	Recommended % in portfolio
VAR_N_SK	**0,841856974**
ONETOFIVE_N_SK	-0,001162566
OVERDRFT	**0,140415869**
CONSFIXONTOTOFIVE	0,018889723

Source: Own processing on the basis of Markowitz modern portfolio theory

4 Conclusions

The contribution shows the current situation in the mortgage market in Slovakia. It shows focus on mortgage loans and issued mortgage bonds lag. At the same time, it appears that at present the conditions are suitable for the mortgage bond, but under the influence of the current situation, especially cheap resources, these benefits are not used. In the future, if the interest rates rise, banks should benefit from that.

Mortgage loans are capable of forming the basis for proper coverage of mortgage bonds, and it is therefore appropriate recommendations to support the development of the mortgage market in Slovakia.

1. Banks in Slovakia are not forced to gains on mortgage transactions, because profits can compensate for other types (not mortgage) of transactions.
2. Certain problems also lead to legislative conditions, which require banks excessive requirements compared with other countries.
3. The use Markowitz modern portfolio theory shows that mortgage loans are generating the most profits and are therefore also suitable collateral for covered bonds. This is for investors with legislation to protect them the best signal for investing in bonds.

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Optimal Sampling for the Detection of Market Microstructure Noise

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Abstract: *Volatility patterns and its dynamics are the core measures of risk in the financial theory. However, given the algorithmic nature of modern securities trading, frequently used parametric volatility models should be used with great caution when applied on high frequency data. Modelling volatility in high frequency data is fairly complex since such data contains a disruptive volatility component, which only occurs in this kind of data and is not observable in lower frequency data. This phenomenon is usually called market microstructure noise. It is mostly caused by bid ask bounce, so its presence is not so significant in assets with lower spreads. This paper focuses on the comparison of two approaches and simulations to identify market microstructure noise and derive optimal samples for measuring volatility. These tests are implemented on the high frequency trading data from the German Stock Exchange. Our paper provides high-frequency data optimal sampling solutions for risk managers and active investors.*

Keywords: market microstructure noise, optimal sampling, LM test

JEL codes: G11, G14

1 Introduction

Security trading on the main exchanges has been dominated by computers since the 1990s. Securities exchanges are now fully electronic and floor trading is inevitably coming close to its extinction. Rapid algorithmic trading certainly changed the nature of financial markets with no common consensus whether this change improves market efficiency and liquidity or increases volatility and deteriorates prices in turbulent situations. Both academics and practitioners cannot agree on the effects of high-frequency trading (HFT). On one hand, algorithmic traders certainly proclaim that their activities are increasing market liquidity, lowering spreads and reducing transaction costs. On the other hand, there are so called "low frequency traders" (mostly long term investors) who are criticizing algorithmic traders for scaling their orders, manipulating the market and boosting volatility. Academics are usually inclining to praise benefits of high frequency trading, but there are also some studies confirming the HFT fault in volatility outbreaks. Few minor financial market crashes, such as the 2010 Flash Clash or the case of Knight Capital, are believed to be at least partially caused by algorithmic trading, when sudden withdrawal of algorithmic traders significantly decreased market volatility. After such events regulators are calling for responsible behavior of high-frequency traders and searching for ways and methods to control the HFT market. For example, circuit breaks are now implemented on the markets to shut down trading in case of increased volatility to prevent flash crashes.

Several issues should be addressed before analyzing the effects of high-frequency trading on the volatility of securities' prices, with market microstructure noise (MMN) being the most important and complex one. Market microstructure noise - high-frequency order book information that reflects fluctuations in supply/demand of the analyzed security - complicates the estimation of volatility while making standard estimators unreliable. The effect of the market microstructure noise is certainly negligible in the long run, but should be dealt with in the short run. Market microstructure noise is basically a disruption in the financial time series that is corrupting validity of models. For instance, estimations of realized volatility are biased due to MMN effects. The higher is the frequency of observations the greater is the bias. It is also correlated with efficient price and its properties are changing substantially over time (for elaborate discussion see Hansen and Lunde 2006).

Market microstructure noise might be caused by bid-ask spread bounce, transaction costs (Chan et al. 2006), volumes of trading (Chan et al. 2000) or non-synchronous trading. Easley et al. (1997) state that it should be used in models as a tool for extracting trading related information and market makers intentions from the observed market data.

The structure and effects of microstructure noise have been heavily investigated only for the past decade. Initially, market microstructure noise was considered a covariance stationary stochastic process or an independent and identically distributed random variable. In this regard, Zhang et. al. (2005) derive a conditional MSE expansion for realized variance in presence of i.i.d. noise. Aït-Sahalia (2005) see the same process as a closed form expression for unconditional MSE of constant variance estimator. Dependent noise structure of MMN was first considered by Hansen and Lunde (2006), who suggest a measure of realized variance based on the dependence between noise and equilibrium price. Other estimator of dependent MMN, which is kernel based, might be derived from Zhou (1996). Brandorff-Nielsen et. al (2006) further discuss efficiency of kernel estimations of integrated variance.

MMN research is closely related to the studies of market volatility. A detailed summary of theoretical and empirical studies on realized volatility, including different possibilities for dealing with the problem of microstructure noise in the estimation of the integrated variance (volatility), is provided in McAleer et al. (2008). Andersen (1998) provides first analysis of this problem and later addresses volatility forecasting (Andersen and Bollerslev, 1998), realized volatility (Andersen et al. 2003) and parametric and nonparametric measurements of market volatility (Andersen et al., 2009). For the purposes of our study, Anderson et al. (2011) is the most important study on the relationship of forecasting realized volatility under the influence of MMN.

In this paper, we use two approaches to test the presence of MMN. First approach is the most frequently used test, which was proposed by Bandi and Russel (2008). The test is based on recovering moments of unobserved noise. Second approach by Shin and Hwang (2015) gives a statistical justification for realized volatilities of negligible serial correlation in the log-returns owning to MMN for sampling interval larger than a selected one. Focusing on testing and comparing two MMN, we address the problem of appropriate test procedure selection to detect market microstructure noise and find the optimal test sample with several data frequencies considered.

The aim of this paper is to define the most appropriate procedure for optimal sampling which is important for testing the link between the high-frequency trading and price volatility in the short run. Our paper differs from existing studies in one important respect – we consider the biggest European stock market (instead of testing the frequently analyzed US data) - the German stock market during time periods that have not been examined in the literature. Moreover, previous findings were drawn on the data samples collected mostly before the full algorithmization of securities markets. Spreading of HFT changed trading environment significantly, hence the old conclusions need not to hold under current circumstances.

2 Methodology and Data

We consider asset price measured at the time t as the following continuous diffusion process:

$$d\tilde{p}_t = \mu(t)dt + \sigma(t)dW_t \qquad (1)$$

where $p(t)$ is a logarithmic price at time t, $\mu(t)$ is continuous variation process, $\sigma(t)$ is strictly positive stochastic volatility process and $W(t)$ is a standard Brownian motion. This process can be enhanced with other parameters such us jumps, correlations or bubble growth components.

We also assume that observed log-price $p_t = \tilde{p}_t + \epsilon_t$ is under the influence of market microstructure noise $u_t \sim N(0, \sigma_\epsilon^2)$ which is i.i.d. and independent of W_t.

As the measure of asset risk, we choose to proxy the market variability with realized volatility, because it has significant predictive quality (Andersen et al. 2003). Realized volatility is calculated as the sum of intraday squared logarithmic returns:

$$RV_t = \sum_{j=1}^{\frac{1}{\delta}} r_{t+j\delta,\delta}^2 \tag{2}$$

where $r_{t,\delta} = p(t) - p(t - \delta)$ is discrete δ-period return, which in our case equals to 1 minute.

Bandi-Russel Test

First test assumes additional properties of the log-price process. It requires microstructure fractions in the price process to be i.i.d. with zero mean and finite fourth moment. Hence, observed returns have $MA(1)$ structure with negative first-order autocorrelation, which is justified by presumed bid-ask bounce effects.

Bandi-Russel (BR) statistic provides the formula for optimal number of observations $M *$. If we consider M as number of observation during the day, $M/M *$ is the optimal intraday frequency of sampling. It is defined as:

$$M * \approx \left(\frac{hQ}{(E(\epsilon^2))^2} \right)^{\frac{1}{3}} \tag{3}$$

where h denotes fixed time period (usually one trading day). Q represents bounded integrated quadraticity. It can be estimated by the following measure realized quadraticity proposed by Barndorff-Nielsen (2002):

$$\hat{Q} = \frac{M}{3h} \sum_{j=1}^{M} \tilde{r}_j^4 \tag{4}$$

For $q = 2,3,4$ and in case of finiteness of log-MMN eighth moment holds:

$$\frac{1}{M} \sum_{j=1}^{M} \tilde{r}_j^q \xrightarrow{p} E(\epsilon^q) \tag{5}$$

We estimate BR statistic for every day separately and define optimal sampling period to assure absence of MMN as the mean value of optimal sample size.

Test of Lagrangian Multipliers

The second approach test the null hypothesis of no MMN $H_0: \sigma_\epsilon^2 = 0$. The test is developed assuming homogeneity of $\mu(t) = \mu$ and $\sigma(t) = \sigma$. The sample consists of T days with a time span of $t = 0,1,2,\ldots,(T-1)$ denoting days. Every day sample has n equally spaced observations, thus we use the set of log-prices $\left\{ p_{t+\frac{0}{n}}, p_{t+\frac{1}{n}}, p_{t+\frac{2}{n}} \ldots p_{t+\frac{n}{n}} \right\}$ to calculate the set of observed log-returns $r_{it} = p_{t+i/n} - p_{t+\frac{i-1}{n}}, i = 1,\ldots,n; \ t = 0,1,\ldots,(T-1)$. r_{1t} for each day are excluded from the dataset, since they correspond to the overnight return between end of the previous day and the beginning of current day. That means that vectors of within-day log-returns are independent.

For sufficiently large n and T the test statistic is equivalent to:

$$LM = (nT)^{-1} \left(\sum_{t=0}^{T-1} \sum_{i=3}^{n} r_{ti} r_{t,i-1} \right)^2 \hat{\sigma}^{-4}, \hat{\sigma}^2 = (nT)^{-1} \sum_{t=0}^{T-1} \sum_{i=3}^{n} r_{ti}^2 \tag{6}$$
or
$$LM = (nT)\hat{\rho}^2 \tag{7}$$

where $\hat{\rho}$ is the pooled first order correlation:

$$\hat{\rho} = \left(\sum_{t=0}^{T-1} \sum_{i=3}^{n} r_{ti} r_{t,i-1} \right) \left(\sum_{t=0}^{T-1} \sum_{i=3}^{n} r_{ti}^2 \right)^{-1} \tag{8}$$

LM test follows the χ^2 distribution.

To find an optimal sample for the analysis of volatility using the above described tests, we collect one minute price observations on stocks traded on the German stock market.

Subsequently, we consider only stocks with monthly average trading volume of more than 100 000 euros, excluding shares with small trading activity. The resulting sample consists of 110 shares with observations from October 23, 2014 till May 7, 2015. The number of observations for each stock series varies from 10000 to 70000. All stock prices are acquired from Bloomberg.

Table 1 Lagrangian multipliers test results for various length of samples h (in minutes)

h	LM statistic	p-value	$\hat{\rho}$	H	LM statistic	p-value	$\hat{\rho}$
120	12.2772	0.0005	-0.1386	160	7.1105	0.0077	-0.1187
121	13.5401	0.0002	-0.1461	161	13.6208	0.0002	-0.1646
122	42.9454	0	-0.2607	162	5.5114	0.0189	-0.1050
123	28.9588	0	-0.2142	163	4.3517	0.0370	-0.0935
124	37.6425	0	-0.2450	164	25.2500	0	-0.2252
125	45.4114	0	-0.2702	165	17.9266	0	-0.1899
126	13.7979	0.0002	-0.1493	166	30.4069	0	-0.2489
127	4.8177	0.0282	-0.0884	167	3.4648	0.0627	-0.08426
128	39.2687	0	-0.2531	168	8.5997	0.0034	-0.1330
129	28.1962	0	-0.2152	169	28.0923	0	-0.2412
130	55.5777	0	-0.3031	170	17.1400	0	-0.1890
131	41.8748	0	-0.2648	171	12.8110	0.0003	-0.1635
132	1.3687	0.2420	-0.0482	172	18.2123	0	-0.1956
133	24.8879	0	-0.2073	173	12.3823	0.0004	-0.1620
134	28.1704	0	-0.2217	174	0.3320	0.5645	-0.0266
135	35.2899	0	-0.2490	175	19.1035	0	-0.2033
136	32.1481	0	-0.2383	176	28.9079	0	-0.2515
137	45.0257	0	-0.2836	177	1.6682	0.1965	-0.0608
138	27.2314	0	-0.2211	178	11.0607	0.0009	-0.1582
139	42.6099	0	-0.2778	179	1.4707	0.2252	-0.0578
140	18.7516	0	-0.1850	180	13.5311	0.0002	-0.1762
141	20.2642	0	-0.1930	181	12,5967	0.0004	-0.1704
142	14.7229	0.0001	-0.1650	182	18.7045	0	-0.2086
143	47.6518	0	-0.2973	183	5.7357	0.0166	-0.1160
144	33.5559	0	-0.2507	184	0.0369	0.8476	-0.0093
145	24.9942	0	-0.2168	185	5.3120	0.0212	-0.1125
146	23.3195	0	-0.2100	186	2.326	0.1272	-0.0746
147	29.3773	0	-0.2357	187	13.4109	0.0003	-0.1800
148	47.5643	0	-0.3010	188	9,5951	0.0020	-0.1526
149	30.6991	0	-0.2423	189	3.3571	0.0669	-0.0904
150	18.4660	0	-0.1883	190	1.3608	0.2434	-0.0576
151	26.3187	0	-0.2248	191	14.5193	0.0001	-0.1882
152	13.4855	0.0002	-0.1612	192	8.0423	0.0046	-0.1407
153	30.1875	0	-0.2416	193	18.3154	0	-0.2124
154	26.5838	0	-0.2272	194	4.6888	0.0304	-0.1077
155	20.6410	0	-0.2010	195	0.4085	0.5227	0.0318
156	20.1457	0	-0.1989	196	0.1858	0.6664	-0.0215
157	19.3727	0	-0.1951	197	6.5724	0.0104	-0.1282
158	17.0570	0	-0.1831	198	6,8881	0.0087	-0.1312
159	12.9463	0.0003	-0.1598	199	0.0861	0.7693	-0.0147

Source: authors' calculations based on Deutsche Telecom stock prices acquired from Bloomberg

3 Results and Discussion

Both LM and BR tests were applied on all collected stock prices. Here we only provide an example of some test results for explanatory purposes and overall summary of test statistics for 110 German stocks. Detailed calculation results for each stock return series are available upon request. Test results are compared to ad hoc rule of sampling interval of between 5 to 30 minutes, usually used in the studies of realized volatility.

Table 1 depicts an example of LM test results for Deutsche Telecom samples of 120 to 199 minutes. Shorter samples were also tested and are object to market microstructure

noise (LM statistic has insignificant p-value). The first sampling that seems to not include MMN has 127 minute returns. The next efficient sample is of 132 minutes returns. Therefore, according to the LM test at least 2 hour returns are needed to exclude the effects of market microstructure noise from return series. However, these results are not very convincing, because samplings with longer than 132 minutes period again does not fulfill the requirements for omitting MMN effects.

Nevertheless, LM test results are clear in some cases, where cut off level of periods is firmly identified. All longer periods fulfill the requirement of not rejecting the null hypothesis. But in many cases this test does not converge to any outcome, or as is seen in example in Table 1, even if optimal sampling period is found, there exists longer periods where the null hypotheses of no MMN is rejected. Hence, it is difficult to determine whether these results are biased or there is just some coincidence in the data. In these cases, further testing is required.

BR test are performed on the same data. These test results suggest that optimal number of samples during one day for Deutsche Telecom is around 18, which accounts for approximately 27 minutes sampling period. The result from LM test suggests much longer sampling period than the 5 to 30 minutes rule of thumb, however the second result is much closer to this rule.

We have repeated both tests on the 110 most traded stocks on the German stock exchange. Table 2 shows results of both tests with established optimal sample length of periods with no market microstructure noise effects. These lengths are standardized to show the periods in minutes. Optimal sampling according to the LM test should be from 30 to 220 minutes. BR test is more specific with narrower interval of 37 to 98 minutes. If we stick to using the original sampling measured by the frequency of actual observations, the optimal interval would be in interval of 22 to 30 observations.

4 Conclusions

Comparing to previous research, which was mostly conducted on US markets, we found that 5 to 30 minutes thumb rule is not sufficient for the German market, where much longer sampling periods are required to exclude market microstructure noise effects. The LM test results are quite volatile, inconsistent and difficult to evaluate in certain situations. Therefore, it is more convenient to stick to the BR test which performs more consistently in similar situations. We identify the optimal sampling period to be between 37 to 98 minutes (or 22 to 30 observations). This sampling is still relatively frequent for further analysis of the MMN phenomenon occurring in stock market data. Two intervals were acquired in our research. One is subinterval of the other, which confirms their validity. However further testing with other approaches will be necessary to ensure the validity of the defined intervals.

Market microstructure noise tests are valuable for researchers dealing with outside effects on market volatility and trying to exclude impacts of market microstructure. These tests are also important for those seeking data with the MMN presence for MMN research, assuming they do not have access to tick data. Our further study will follow both groups of researchers and will aim at establishing the effects of market microstructure noise on volatility of the German stock market.

Table 2 Results of Lagrangian multiplier and Bundi-Russel test
on 110 German most traded stocks prices

Company name	LM test	BR test	Company name	LM test	BR test
DEUTSCHE TELEKOM	161.01	37.16	DRILLISCH AG	90.47	60.40
COMMERZBANK	224.26	39.03	SGL CARBON SE	166.42	59.86
DEUTSCHE BANK-RG	158.77	29.89	SKY DEUTSCHLAND	237.36	86.96
E.ON SE	184.53	36.94	XETRA-GOLD	121.44	127.35
DEUTSCHE LUFT-RG	269.95	38.22	DIC ASSET AG	241.81	107.59
INFINEON TECH	212.83	38.47	HUGO BOSS -ORD	18.54	63.45
DAIMLER AG	25.41	41.31	RHEINMETALL AG	19.80	51.00

Company name	LM test	BR test	Company name	LM test	BR test
DEUTSCHE POST-RG	232.97	35.14	DO DEUTSCHE OFFI	409.94	156.14
BASF SE	12.98	39.35	SAF-HOLLAND SA	222.07	77.82
RWE AG	146.22	33.96	EVONIK INDUSTRIE	146.56	57.38
SAP SE	16.62	38.80	ALSTRIA OFFICE	203.84	92.67
SIEMENS AG-REG	50.61	40.86	BRENNTAG AG	64.40	54.74
THYSSENKRUPP AG	144.46	36.56	SMA SOLAR TECHNO	159.40	78.92
TELEFONICA DEUTS	301.72	45.49	AURUBIS AG	10.84	63.88
BAYER AG-REG	41.28	42.46	KION GROUP AG	82.95	64.69
HEIDELBERG DRUCK	241.70	74.80	SOFTWARE AG	225.33	63.45
AIXTRON SE	189.89	50.65	RHOEN-KLINIKUM	203.68	65.52
ALLIANZ SE-VINK	20.28	42.79	WINCOR NIXDORF	65.44	60.79
K+S AG-REG	158.47	35.57	SUSS MICROTEC	242.86	142.00
BAYER MOTOREN WK	38.50	43.18	JENOPTIK AG	241.16	88.47
ADIDAS AG	11.82	39.89	ZALANDO SE	99.80	60.62
FRESENIUS SE & C	15.04	39.00	LEONI AG	16.05	58.78
QSC AG	293.51	83.92	DEUTSCHE EUROSHO	83.75	69.99
DEUTSCHE ANNINGT	60.37	40.46	MTU AERO ENGINES	8.95	60.90
LANXESS AG	34.30	69.60	TALANX AG	242.66	60.29
FRESENIUS MEDICA	179.70	90.96	GRAND CITY PROPE	193.58	69.14
DEUTSCHE WOHN-BR	207.67	59.96	HANNOVER RUECK S	43.68	44.35
HEIDELBERGCEMENT	80.18	42.06	PAION AG	357.00	132.05
DEUTZ AG	285.97	143.61	BALDA AG	175.94	140.50
KLOECKNER & CO	131.34	55.74	LPKF LASER & ELE	124.64	112.92
PROSIE SAT.1-REG	65.81	43.62	RIB SOFTWARE AG	206.66	85.67
DEUTSCHE BOERSE	13.37	43.06	PNE WIND AG-REG	106.36	171.79
DIALOG SEMICOND	174.33	48.91	ADLER REAL EST	156.43	106.15
DMG MORI SEIKI A	139.37	59.11	HAMBORNER REIT	200.18	114.71
MUENCHENER RUE-R	18.90	41.36	GERRY WEBER INTL	45.23	79.82
FREENET AG	200.02	48.52	LEG IMMOBILIEN A	31.25	62.91
EVOTEC AG	242.93	90.96	KUKA AG	19.10	62.74
CONTINENTAL AG	15.05	45.06	GRAMMER AG	112.12	91.18
HENKEL AG -PFD	18.85	42.95	ROCKET INTERNET	38.31	86.31
MERCK KGAA	74.15	43.04	CELESIO AG	266.91	82.86
BEIERSDORF AG	10.65	37.86	KONTRON AG	305.04	149.61
AAREAL BANK AG	14.28	57.73	HOCHTIEF AG	21.54	68.49
STADA ARZNEIMITT	16.62	38.80	AXEL SPRINGER SE	32.02	63.82
GAGFAH SA	81.46	68.73	PATRIZIA IMMOBIL	150.28	109.97
SALZGITTER AG	129.78	46.12	CANCOM AG	99.66	89.02
GEA GROUP AG	111.48	47.22	ADVA OPTICAL NET	183.75	142.70
LINDE AG	54.34	44.41	WACKER CHEMIE AG	19.72	70.91
TAG IMMOBILIEN	214.81	80.86	MORPHOSYS AG	28.35	61.92
OSRAM LICHT AG	38.94	46.60	ELRINGKLINGER AG	191.48	66.43
BORUSSIA DORTMUN	365.89	92.25	COBA 4X NAT GAS	60.76	60.79
BILFINGER SE	190.83	52.43	GERRESHEIMER AG	28.77	83.26
PORSCHE AUTO-PRF	21.47	51.47	NORMA GROUP SE	50.74	84.41
WIRECARD AG	90.41	38.20	TOM TAILOR HOLD	179.26	101.28
UNITED INTERN-RE	55.82	43.37	DUERR AG	18.57	65.71
SYMRISE AG	32.97	47.29	CAT OIL AG	159.71	95.03

Source: authors' calculations based on German stock prices acquired from Bloomberg

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Sovereign Bond Spreads as a Predictors of Gross Domestic Product Growth in North America

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Abstract: *The yield curve – specifically the spread between long term and short term interest rates is a valuable forecasting tool. It is simple to use and significantly outperforms other financial and macroeconomic indicators in predicting recessions two to six quarters ahead. The steepness of the yield curve should be an excellent indicator of a possible future economic activity. A rise in the short rate tends to flatten the yield curve as well as to slow real growth the near term. This paper aims to analyze the dependence between slope of the yield curve and an economic activity of countries of North America (Canada, Mexico, the United States of America) between the years 2000 and 2014. The slope of the yield curve can be measured as the yield spread between sovereign 10-year bonds and sovereign 3-month bonds. The natural and probably the most popular measure of economic growth is by GDP growth, taken quarterly. The results showed that the best predictive lags differ in each country and each time span we chose. The most common lags of spreads are lag 6 and 5 quarters. The results presented confirm that 10-year and 3-month yield spread has significant predictive power for real GDP growth. These findings can be beneficial for investors and provide further evidence of the potential usefulness of the yield curve spreads as indicators of the future economic activity.*

Keywords: GDP prediction, yield curve, slope, spread

JEL codes: E43, E44, E47, G01

1 Introduction

The yield curve simply plots the yield of the bond against its time to maturity. Many market observes carefully track the yield curve's shape, which is typically upward sloping and convex. However when the yield curve becomes flat or slopes downward (the spread between sovereign 10-year and 3-month bond is negative) it may signal GDP decrease (recession).

The yield curve – specifically the spread between long term and short term interest rates is a valuable forecasting tool. It is simple to use and significantly outperforms other financial and macroeconomic indicators in predicting recessions two to six quarters ahead.

This paper builds on a wide range of previous researches, but differs in some ways. Bernard and Gerlach (1998) in their paper showed empirically on eight countries that the slope of the yield curve is a good predictor of the real economic activity. Berk and van Bergeijk (2001) examined 12 euro-area countries over the period of 1970-1998 and found that the term spread contains only limited information about future output growth. Their work is based on the previous theoretical researches of Estrella and Hardouvelis (1991), Estrella and Mishkin (1996). There was proven the evidence that the slope of the yield curve and the future GDP activity are related together. However it is necessary to say that this rule was true until the end of 20th century and it mostly disappeared at the beginning of 21st century and appeared again during the financial crisis (from 2008) and later on (De Pace, 2011; Giacomini and Rossi, 2005; Chinn and Kucko, 2010). Most of the studies are focused on the relationship of the yield curve and GDP activity of United States of America.

The aim of this paper is to show if the yield spread possesses the predictive power of future economic activity in the countries of North America – Canada, Mexico and the United States of America and to examine which time lag of the spread is the best for prediction of the future GDP growth.

Despite various researches, there is not any comprehensive theory that would prove the correlation between the yield spread and economic development of the country yet. Often we come across the statements that have only theoretical basis without generally valid empirical evidence. Economic models are largely based on the argument that the yield curve tends to be flatter in the situation of the tight monetary policy and the economic slowdown typically occurs with a slight time lag (Szarowská, 2013).

Almost perfect tool containing the relevant future data provides the yield spread of government bonds. The simplest interpretation of the yield spread is through monetary policy of the country. Based on this criterion - relatively low spread reflects the restrictive and tight monetary policy and vice versa - high spread reflects loose monetary policy. We can find the theoretical justification for using of the spread in expectations hypothesis. It assumes that long term rate of return is the average of the current and expected future short term yields. The investor's decision to invest in short term or long term asset is completely irrelevant (Mishkin, 1990).

Dependence of the yield spread and GDP can be derived from their connection to the monetary policy of the state. As bond yields react to monetary policy as well as monetary policy is able to respond to the output of the economy, the yield curve assumes overlapping of policy measures and responses. The yield curve had the ability to reflect future production either directly or indirectly. Indirectly it comes to predicting of the future interest rate and the future monetary policy. It may also reflect the future production directly because of the 10-year yields may depend on estimates of the output of the economy in 10-years.

A question arises – how many months, quarters, years of future economic activity can be predicted by the yield spread? Based on the study of Bonser-Neal and Morley (1997) as well as Chinn and Kucko (2010) spread has the greatest ability in predicting one-year horizon (four quarters ahead). As it was mentioned above, to prove if the spread has the best predictive power in one-year horizon is one of the aims of this paper.

2 Methodology and Data

There are many ways of using the yield curve to predict the future real activity. One common method uses inversions (when short term rates are higher than long term rates) as recession indicators. Obtaining predictions from the yield curve requires much preliminary work. There is the principle which needs to be hold: keep the process as simple as possible.

A yield curve may be flat, up-sloping, down-sloping or humped. The standard solution uses a spread (difference between two rates). The problem is to choose the spread between the right terms. The most used spread is between 10-year and 3-month bonds. The problem is that there are rarely bonds which mature exactly in 10 years (or 3 months). In that case the best solution is to use the yield curve, which shows the yield of each maturity. Creating and calculating of the yield curve is a rather difficult task because there are many ways how to do it and every country uses different model of constructing.

The yield curves are constructed by Bloomberg, therefore the data for spreads were gained from Bloomberg. For the spreads were chosen 10-year government bond rates minus 3-month sovereign bond rates (Estrella and Hardouvelis, 1991; Estrella and Mishkin, 1996). Quarterly data were used for the spreads because the data for the economic activity are taken on quarterly basis as well. The data for real GDP can be found at Eurostat, OECD statistics or Bloomberg. The data of real GDP obtained and used in this paper are from OECD statistics.

The selected countries are Canada, Mexico and the United States.

As a measure of real growth four-quarter percent change in real GDP growth was used (thus the percent change of the quarter against the last year's same quarter was calculated, e.g. the change from 1Q2004 and 1Q2003 real GDP was used). GDP growth is standard measure of aggregate economic activity and the four-quarter horizon answers the frequently asked question – what happens the next year?

The sample period starts from 1Q2000 and ends on 4Q2014. This time range covers the period before financial crisis, period of financial crisis and period after financial crisis. The basic model is designed to predict real GDP growth/decrease two to six quarters into the future based on the current yield spread (Bonser-Neal and Morley, 1997).

This was accomplished by running of a series of regressions using real GDP activity and the spread between 10-year and 3-month bond yields lagged two to six quarters (e.g. if the spread was lagged by 4 quarters, the interest rate spread used for 3Q2003 is actually from 3Q2002).

The last step is to find out which spread lag is the best for which country and to prove the assumption that the lag of four quarters is the best one.

Model Specification

To generate the GDP predictions the regression using the whole sample was run, and later on two divided samples of real GDP and spreads of each selected country (the sample is divided in 4Q2007/1Q2008, because this year was the previous year of financial crisis and should show some changes in prediction of the yield curve spread) were run.

The following equation (1) was estimated for each country:

$$Real\ GDP_{t+n} = \propto + \beta * spread_t + \varepsilon_t \qquad (1)$$

Where:

$Real\ GDP t + n$ is a prediction of the future real GDP in time $t + n$

n is the lag of spread, value of the lag can be 2, 3, 4, 5 or 6

$spread_t$ is spread between 10-year and 3-month state bonds in time t

ε_t is a white noise

3 Results and Discussion

Does the yield curve accurately predict the future GDP?

To generate the GDP predictions a regression using the whole sample to generate each predicted data point was run.

Results of Regression – Whole Sample

The whole sample of dataset contains the real GDP from 1Q2000 to 4Q2014. A regression of the whole sample was run and we got the results as seen in Table 1.

For Canada, Mexico and the United States the best results were gained with lag of spread by six quarters.

We can say that all models are statistically significant, because the p-values are under 1%, respectively 5%, however the R^2 are not very high. These models could be used as predictive models though. The R^2 coefficients (coefficients of determinations) show us how many percentage of the sample can be explained by these models.

Table 1 Results of All Countries and Whole Sample from OLS Regression

Whole sample	Constant	Spread	P - value (F - test)	R²
Canada (n=6)	0.0339189	-0.007573	0.0008 ***	0.176825
Mexico (n=6)	0.0556371	-0.013384	0.0039 ***	0.152161
USA (n=6)	0.0289785	-0.004863	0.0112 **	0.105791

Source: Author's calculations

For example we can say that future real GDP of Canada will be:

$$\text{Real GDP Canada}_{t+6} = 0{,}0339189 - 0{,}007573 * \text{spread}_{\text{Canada } t}$$

By this model we can predict future real gross domestic product growth for Canada six quarters ahead.

We can test the hypothesis that the behavior of the spread and gross domestic product has changed during the financial crisis, therefore the sample was divided into two samples in order to prove this hypothesis.

Results of Regression – Divided Samples

The research continued as follows – the whole sample was divided into two samples. The first one is from 1Q2000 to 4Q2007, the second one is from 1Q2008 to 4Q2014 in order to show if there is any change of behavior and dependency between the variables before or after the financial crisis. Regressions of the first sample and the second sample were run. The results for the time span of 1Q2000 – 4Q2007 (first sample) are possible to see in Table 2, the results for the period of 1Q2008 – 4Q2013 (second sample) are in Table 3.

Table 2 Results of All Countries and Sample from 1Q2000 to 4Q2007

1Q00 – 4Q07	Constant	Spread	P - value (F - test)	R²
Canada (n=3)	0.0229011	0.00377363	0.0775 *	0.100239
Mexico (n=6)	0.0506211	-0.009906	0.0430 **	0.166384
USA (n=5)	0.0199897	0.00433139	0.0078 ***	0.213485

Source: Author's calculations

In the first period the best results for Canada were gained with lag of spread by three quarters, for Mexico by six quarters and for the United States of America by five quarters.

We can say that all models are statistically significant, because the p-values are under 1%(***), 5%(**) or 10%(*) and R²are at the same level as in the whole sample in the previous calculations.

In the second period the best results for Canada were gained with lag of spread by 6 quarters, for Mexico by four quarters and for the United States of America for five quarters.

All the models are statistically significant, because the p-values are under 10% (*). We may see the change in R² when the coefficients of determinations are higher, it means we got better results than before. It may be caused by different behavior of financial markets after the financial crisis (after year 2008).

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Table 3 Results of All Countries and Sample from 1Q2008 to 4Q2014

1Q08 – 4Q14	Constant	Spread	P - value (F - test)	R²
Canada (n=6)	0.0394083	-0.013222	0.0070 ***	0.247810
Mexico (n=4)	-0.0403561	0.0243937	0.0004 ***	0.389892
USA (n=5)	-0.0032611	0.00694160	0.0505 *	0.139208

Source: Author's calculations

The best predictive models are as follows:

$$\text{Real GDP}_{\text{Canada } t+6} = 0.0394083 - 0.013222 * \text{spread}_{\text{Canada } t}$$

$$\text{Real GDP}_{\text{Mexico } t+4} = -0.0403561 + 0.0243937 * \text{spread}_{\text{Mexico } t}$$

$$\text{Real GDP}_{\text{USA } t+5} = -0.0032611 + 0.0069416 * \text{spread}_{\text{USA } t}$$

The data used for models of all models should start from 1Q2008, because these models have better predictive power than the models that start in 1Q2000. Models which describe the behavior and dependence of the gross domestic product and bond spreads from 1Q2000 to 4Q2007 cannot be used as predictive, because this trend was already broken by financial crisis. Therefor it is better to use the model with data from 1Q2008 and both of them end on 4Q2013.

For example if there would be a change of 1% up in the spread of the United States of America then the GDP would decrease about 2.567% (-0.032611+0.00694160*1%).

At the end we can summarize the findings.

However we can use the models for predicting of the GDP, we cannot summarize any new theoretical finding about which lag of spread (measured in quarters) is the best for predicting of the future GDP activity. We can see that the best lag of spread always differs in all countries and even in every observed period. At the end we can write down a short summary about which lag is the best for which country (Table 4) and make some conclusions.

n_1 = whole sample (1Q2000 – 4Q2014)
n_2 = 1st period (1Q2000 – 4Q2007)
n_3 = 2nd period (1Q2008 – 4Q2014)

Table 4 The Best Lags of Spreads for Each Selected Country

	n_1	n_2	n_3
Canada	6	3	6
Mexico	6	6	4
USA	6	5	5

Source: Author's calculations

The most common lag for Canada is a lag of six quarters, the most common lag for Mexico is a six quarters and for the United States of America is a five quarters.

We can see that every country has different the most suitable lag in order to predict the future GDP.

At the end we can say that the most common and possibly the most suitable lags of spreads for GDP predictions are lags six and five. The theoretical background says that the lag of four quarters is the best for GDP prediction in the United States of America.

4 Conclusions

Does the yield curve accurately predict the real economic growth? Answering this seemingly simple question requires a surprising amount of preliminary work. The 10-year, 3-month spread has substantial predictive power and should provide good forecast of real growth two to six quarters into the future. Nevertheless we showed that the best predictive lags differ in each country and each time span we chose. The most common lags of spreads are lag 6 and 5 quarters. The results presented above confirm that 10-year and 3-month yield spread has significant predictive power for real GDP growth and the models which can be used as predictive for GDP growth in Canada, Mexico and the United States of America were computed from the data which start in 1Q2008.

The simple yield curve growth forecast should not serve as a replacement for the predictions of companies, who deal with predicting of many economic indicators, it however does provide enough information to serve as a useful check on the more sophisticated forecasts.

Future research could be extended to a wider examination of the best lags of spreads in more countries around the world. It would be interesting to see if there is any rule which would prove the theoretical hypothesis that the lag of four quarters is the best for predicting future GDP growth in the countries of the world (it was empirically proved that in the USA during 1970 and 2000 the best lag of spread was a lag of four quarters).

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Behavioral Biases: Analyzes of Investment Strategies

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Abstract: The study is based on the knowledge of behavioral finance that financial markets are strongly influenced by the psychology of financial markets. Besides investment strategies are affected by behavior of participants of financial markets. By referring to psychology the study proves particular features of investment strategies for presence of behavioral biases. Conducted analyzes shows that each feature of investment strategy inclines to several biases and some biases repeat frequently. The findings of the paper may help to avoid psychological effects on investment strategies, which could be useful especially for investors.

Keywords: behavioral finance, investment strategies, heuristics and biases

JEL codes: G02, G11

1 Introduction

"*The investor's chief problem – even his worst enemy – is likely to be himself.*"

Benjamin Graham

Investment strategies are one of major topics of investors, fund managers, financial advisors and researchers as well. Many studies were conducted to analyze investment strategies, but the question: how to choose the best strategy is still waiting for answer. Behavioral finance view on investment strategies seems to be meaningful in order to answer that question. The impact of human emotions and especially the decision making process on financial markets and thus also on investment strategies is indisputable. "Choosing investment styles is like matching personality types in relationships. To maximize returns and minimize risk, you need to find the best investment styles and strategies." To simplify the process of finding investment styles the article focuses on behavioral analyzes of investment strategies in generally. The goal of the article is not to describe particular investment strategies, but to analyze different attributes of investment strategies.

2 Methodology

The study uses general methods, with the respect to the analyzed area there are used also deduction and induction. In the theoretical part there is used description to define basic terms and their links. There are also used methods of naïve rationalism and epistemology.

3 Theoretical Background

Behavioral finance defined a number of heuristics and biases that avoid investors to conduct correct decisions. "For every decision, we don't always have the time or resources to compare all the information before we make a choice, so we use heuristics to help us reach decisions quickly and efficiently." As the number of defined heuristics and biases is huge, based on the knowledge of behavioral finance there were chosen ten biases to be analyzed in the study. The chosen biases and heuristics are proved for their presents at different features of investment strategies.

- Overconfidence[1]

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[1] Overconfidence Availability - is a cognitive bias in which someone believes subjectively that his or her judgment is better or more reliable than it objectively is. Data collected show that a person's confidence usually

- Representativeness[2]
- Anchoring and adjustment[3]
- Availability[4]
- Cognitive dissonance[5]
- Self attribution[6]
- Illusion of control[7]
- Status quo[8]
- Loss aversion[9]
- Framing bias[10]

To enable the behavioral analyzes of investment strategies it seems to be essential to define investment strategy and its features. According to some definition an investment strategy is a "systematic plan to allocate investable assets among investment choices such as bonds, certificates of deposit, commodities, real estate, stocks (shares). These <u>plans</u> take into <u>account</u> <u>factors</u> such as <u>economic trends</u>, <u>inflation</u>, and <u>interest rates</u>. Other factors include the <u>investor's</u> age, <u>risk tolerance</u> level, and short- or <u>long-term</u> <u>growth objectives</u>."

Another definition describes investment strategy as investor's plan. "An investor's plan of attack to guide their investment decisions based on individual goals, risk tolerance and future needs for capital."

For the purpose of this study we consider investment strategy every consistent behavior in order to allocate capital. Each investment strategy has some significant features. In this study we will consider as the main features capital management, time horizon, time requirements, regularity and risk.

4 Investment Strategies Seen by Behavioral Finance

First feature of an investment strategy that is discusses in the study is investment management, which is for the purpose of this study seen as the activity of the investor. On one side the management of an investment can be active on the other side it can be passive.

Passive investment management is considered such as management that is chosen at the beginning and reviewed periodically. Investor's goal is to reach the same gains as the market does. Passive strategy does not require changes and a lot of involvement of the investor. Investments are threatened especially by status quo bias. Investors are doing nothing as the plan is already set up and just maintain their portfolio. At the time of setting the strategy, there can occurre also other biases listed above. However the goal to reach the same gain as the market is realistic and should help the investors to overlap any decisions mistake. From that point of view passive strategy seems to incline less to be biased.

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exceeds their objective accuracy, which implies that people are surer of their answers and abilities than they should be.

[2] Representativeness – is the estimation of the likelihood of an event by comparing it to an existing prototype that already exists in our minds. Our prototype is what we think is the most relevant or typical example of a particular event or object.

[3] Anchoring and adjustment - is a cognitive heuristic in which decisions are made based on an initial 'anchor.' Different starting points yield different estimates, which are based toward the initial values.

[4] Availability - is a cognitive heuristic in which a decision maker relies upon knowledge that is readily available rather than examine other alternatives or procedures.

[5] Cognitive dissonance – the *feelings of discomfort* that result from holding two conflicting beliefs.

[6] Self attribution - refers to individuals' tendency to attribute successes to personal skills and failures to factors beyond their control.

[7] Illusion of control - is the tendency for human beings to believe they can control or at least influence outcomes that they demonstrably have no influence over.

[8] Status quo - is a cognitive bias, doing nothing or maintaining one's current or previous decision.

[9] Loss aversion –describes the emotion of regret experienced after making a choice that turns out to be either a bad or inferior choice

[10] Framing bias – decisions are done based on the frame they are presented in.

Active management is typically aimed to beat the market and usually higher involvement of the investor is needed. This implies potential problems by decision making and thus by choosing the right investment. The most obvious seem to be the inclination to illusion of control. The activity gives the investor the feeling that the investment is completely under his control. By choosing the investment availability of information in particular moment can affect the decision making process together with the representativeness. Anchoring and adjustment can influence the choice of an active style as well. Another story seems to be overconfidence of active investors and its growth after a successful investment, of course there cannot be omitted the self attribution bias. Active investors face also the cognitive dissonance and loss aversion.

Table 1 Features of investment strategies: investment management

Passive	Active
- Status Quo	- Illusion of Control
	- Availability
	- Representativeness
	- Anchoring and adjustment
	- Overconfidence
	- Self attribution
	- Cognitive dissonance
	- Loss aversion

Source: Own, based on conducted analyzes

Another of the features of investment strategies that are discussed by this study is time, in the meaning of duration of the particular investment strategy. For the purpose of the study we distinguish between long term investment and short term investment. Long term investment is considered such an investment that is hold longer than for one year. On the other side short term investment duration is expected to be within one day.

Long term investment is characteristically not requesting fast actions, threatened by selling winners and keeping looses (status quo), "Individuals have a strong tendency to remain at the status quo, because the disadvantages of leaving it loom larger than the advantages. Samuelson and Zeckhauser (1988) have demonstrated this effect, which they term the status quo bias." Status quo is more probable in long term, when the strategy worked that long, why it would not work now or why it would not recover.

In long term investors are not expected to review the investment status frequently which can prevent them from cognitive dissonance as well as availability or representativeness. However self attribution seems to be present in long term as well. "The higher the returns in a previous period are, the more investors agree with a statement claiming that their recent performance accurately reflects their investment skills (and vice versa); and while individual returns relate to more agreement, market returns have no such effect."

Short term investment is on contrary characterized by fast decision making, not complete information, and strong emotion. Investment decision is influenced by availability of information at the given moment which also indicates some level of representativeness. Short term investment can motivate the investor to overoptimism, when extreme growth in short period is expected. "We find that overestimation of the subjective probabilities can cause overreaction and underreaction of expectations and, subsequently, asset prices." Short term seem to be also affected by confirmation bias, as already listed above, good results in previous period are considered to be reflecting own skills and knowledge. In short period the emotions can be even stronger and can lead to more risky decisions as well as to the illusion of control. In short time period the investors can have the feeling they can influence the investment better. When the investment goes wrong or contrary come to the investor it can lead to cognitive dissonance. "Cognitive dissonance can be seen as an antecedent condition which leads to activity oriented toward dissonance reduction just as hunger leads toward activity oriented toward hunger reduction. It is a very different motivation from what psychologists are used to dealing with but, as we shall see, nonetheless powerful."

Table 2 Features of investment strategies: time – duration

Long	Short
- Status Quo - Self attribution	- Illusion of Control - Availability - Representativeness - Overconfidence - Self attribution

Source: Own, based on conducted analyzes

Time requirements can be seen as another feature of investment strategies, some strategies are completely automatically others need the attention of the investor frequently. The study distinguishes between time demanding and time undemanding strategies. Time demanding strategies are considered such as strategies that require attention weekly at least 4 hours. Time undemanding strategies are on contrary considered to be strategies that need to be updated about once a month.

Time demanding strategies are influenced especially by the quantity of information and their availability. The fast decision making – emotions – framing bias, anchoring and adjustment, representativeness, availability, overconfidence.

Not time demanding strategies are expected to be set up at the beginning and further during the investment do not require any changes. As such protect these strategies the investors from precipitous emotions. They seem to be most sensitive to status quo bias, once again could motivate the investor to keep an disadvantageous investment in the changing market environment and miss more profitable investment.

Table 3 Features of investment strategies: time requirements

Time demanding	Time undemanding
- Status Quo	- Framing - Anchoring and adjustment - Representativeness - Overconfidence

Source: Own, based on conducted analyzes

Another feature analyzed by the study is regularity of the investment strategy. The analyzes considers regular and disposable investments. As regular investment there are considered investment that repeat at least once during a time period. As disposable investment there are considered investment that are done only once and never repeat again.

The study defines regular investment as any action that repeats regularly, which means that the investment is expected to be done repeatedly, but is not set up automatically. Investor decides at the beginning that he will invest into the chosen asset in the future and always conducts an analyzes of current asset situation. As such regularity makes the investor thinking more about the future and making new analyzes can point out any doubts, which could prevent overconfidence. On the other side the future judgment is treated by anchoring and adjustment and cognitive dissonance as well.

On the other side disposable investment are based more on current analyzes and do not require any future proves, which can at the decision making level influence the cognitive ability of the investor. The single decision making process can be mislead because of availability of information in the given time. Representativeness is another bias that can negatively influence the decision of disposable investment. Investor can be mislead also by own overconfidence towards their skills to judge the investment in the given time with given level of information. And not considering any future analyzes can cause their overoptimism about the future development.

Table 4 Features of investment strategies: regularity

Regular	Disposable
- Anchoring and adjustment - Cognitive dissonance	- Availability - Overconfidence

Source: Own, based on conducted analyzes

One of the most discussed features of an investment is risk. For the study it is differentiate between high and low risk level. Risk is in general not desired and when expected than there are expected higher returns. This fact can cause that investors accepting higher risk are more often overconfident and overoptimistic.

On the other side risk aversion (loss aversion) can lead investors to choose investment with low risk level and run a suboptimal investment. "Investors who are influenced by anticipated regret are motivated to take less risk because this lessens the potential of poor outcomes." To run a low level investment strategy can be motivated by the illusion of control, because as already mentioned investors consider outcomes with high probably to be sure.

Table 5 Features of investment strategies: risk

High risk	Low risk
- Overconfidence	- Loss aversion - Illusion of control - Representativeness

Source: Own, based on conducted analyzes

The analyzes shows that studied features of investment strategies are subject of different biases and most of them incline to more than one bias. The study shows, that some biases repeat more frequently than the others as availability or overconfidence. And thus seem to be more dangerous than the others. Especially for features as short time requirements, disposable investment or active investment management the number of identified biases is higher. As each strategy compares number of features, it seems to be logical that some combination of features could avoid some biases. And on contrary the combination of features inkling to same biases can lead to higher probability that the particular bias will appear, thus to misleading of the investment strategy.

It comes up with another question, is it possible to find for current psychological state of an investor the right investment strategy based on the knowledge of behavioral finance.

Conclusions

Conducted analyzes shows that each of analyzed features of investment strategy inclines to several biases. The study also shows that some biases repeat by the features of investment strategies more frequently. Especially endangering for decision making process of an investment seems to be emotion that cannot be mitigated by time. This study shows that all analyzed features of investment strategies have different structure of biases they incline to and that there are significant differences among the analyzed features. These differences could help to define particular investment strategies by behavioral finance knowledge and thus enable to simplify the process of choosing an investment strategy.

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Size of Compensation for Personal Injuries Offered by the Current Coverage Plans in Medical Liability Insurance

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Abstract: *Medical Liability Insurance is a financial product that covers the individual physician's liability and the liability of a healthcare facility. Liability insurance protects the insured against the financial consequences of the potential claims of persons or entities to whom the insured causes injury and, according to law, is obliged to provide reparations to. At the same time liability insurance protects third parties who are injured as a result of the events for which the insurance holder is responsible. It should be remembered that the responsibility of the insurer in liability insurance is limited by the amount of cover defined in the contract, representing mostly the limit of liability. This paper attempts to investigate how the proposed amounts of cover are sufficient to cover potential claims made by patients after they have come to harm. Simulations have been carried out to answer the question of how high the benefit may get injured party may be paid a certain amount in the assumed amount of the amount of cover. Simulations will be conducted by gender and age of the patients.*

Keywords: Medical Liability Insurance, personal injuries, provision for capitalized value of pensions

JEL codes: G22, G28, J17

1 Introduction

In Poland and in some European countries (for example in Austria and France) Medical Liability Insurance is compulsory and therefore the most popular insurance product. The issue of liability for medical mistakes is discussed in the literature, although mainly in the legal literature (Koch, 2011; *Tort Law and Liability Insurance*, 2005) and economic literature (Simon, 2008). However, there are not many studies in the literature that present a calculation of potential claims.

In recent years, European markets have seen a noticeable increase in benefits paid in respect to personal injury. According to Munich Re (see more in Mayr, 2011), in recent years there has been an increase in payments in connection with the same only damages associated with the loss earning by as much as 14% within 5 years. In the Polish insurance market in 2008, roughly 37% of the amount of benefits paid was related to large claims (over EUR 100,000), which accounted for only slightly more than 1% of number of all personal injury claims.

Liability insurance covers damage to the property of the victim as well as to the body of the victim. In the case of personal injury, the people directly affected as well as their close relatives may be able to make a claim. The system of compulsory insurance provides protection for both sides in the event of a medical accident. The obligatory MLI system protects patients (and those indirectly affected, such as family members of a person who has died due to a medical mistake), giving them a guarantee of compensation that is payable by financial institutions (insurance companies).

It is necessary to remember that one of the essential elements of compensation for personal injury is annuities, which are paid for many years; annuities should cover the financial damage that affected relatives have suffered due to, for example, a death in the family. This annuity has to be paid by an insurer (according to the Polish Civil Code, Articles 444–447):

- to directly injured patient (disability annuities) – this benefit should cover loss of

income and increased needs, in most of the cases annuity has to be paid for life,

- to close relatives (compensation for loss of income because of death of victim of medical mistake) – annuity payable for life or to the age of majority or end of education.

The aim of this article is to investigate whether the proposed amounts of cover are sufficient to cover the potential claims made by patients after harm has been inflicted on them. The takeover by the insurance financial obligations related to the medical mistake raises confidence that the benefit will be received, as well as separating its payment from the lifespan of the responsible doctor. On the other hand, the protection also covers medical workers, as a lack of such insurance would require medical personnel to cover the cost of the claims themselves. However, limitations associated with the acquisition of a liability by the insurance company should be borne in mind. This limitation, which is called the amount of cover, represents the maximum amount to which the insurance covers claims. If claims exceed this amount, the obligation to cover the excess returns to the perpetrator of the accident. The law requires the liability insurance contract for the guarantee sum, the amount of which must be at least equal to the minimum amount in cover given in the Act.

The responsibility of the insurer in liability insurance is limited by the amount of cover defined in the contract. Therefore, it is worth analysing the problem of the so-called minimum amount of cover. In different countries the minimum amount of coverage can be set at different levels. In Poland the minimum amounts of cover for:

– a doctor are:

- EUR 75,000 per person,
- EUR 350,000 with respect to any one situation;

– a hospital are:

- EUR 100,000 per person,
- EUR 500,000 with respect to any one situation.

This article aims is to answer the question, what is the present value of an annuity (whole-life and term annuity) and if the minimum amount of coverage is enough cover this value. Because provision of compensation has to restore the financial situation and the quality of life that the injured persons had before the medical mistake and take into account the realities of the economic and social environment the injured comes from, the calculation have a few assumptions (discussed in the section concerning the methodology). In an actuary's methodology, loss of earnings are calculated factoring in life expectancy (according to Munich Re data – see more in Mayr (2011) – half of the claimants are under the age of 20 at injury, which is why analysing the value of annuity should be divided by age categories) and inflation and then methods based on the Net Present Value (NPV) are in use (see more in Smosna, 2009). Two European research projects – Unification of Accounts and Marginal Costs of Transport Efficiency (UNITE) and Generalization of Research on Accounts Cost Estimation (GRACE) – developed a methodology for estimating the costs of traffic accidents. In Poland, the problem of the depletion of the amount of the guarantee is undertaken primarily by lawyers and the Insurance Ombudsman (see more in Kiziewicz, 2009; Orlicki, 2009, 2011).

It is, therefore, worth answering the question of whether the minimum amount of coverage is high enough to provide coverage for claims relating to the payment of annuities for patients or their family. It should therefore be borne in mind that the financial security of the perpetrator is limited to the amount of coverage for the indicated problem, which is important especially in the case of claims relating to personal injury compensation. In particular, this paper seeks to evaluate whether the minimum sum insured (as a doctor and hospital) is also sufficient to cover claims for people outside from Poland. It is assumed that citizens of countries bordering the Polish, they can use Polish medical services. The study also included Britain, because it is quite common practice dentistry by citizens of for British citizens to come to Poland for dental services.

2 Methodology and Data

The simulation of several typical annuity payment variants is presented in this section. The simulations were conducted with several groups that had mixed age and gender, and that received different remuneration. The analysis was conducted for the Polish economy and for seven other countries: Belarus, the Czech Republic, Lithuania, Germany, Russia, Slovakia, Ukraine, and Great Britain.

The calculation of provisions for annuities can be done using a life annuity, which is created using the actuarial method using data about the probability of survival and death in the following periods. The provision is equal to the expected value of a random variable, the values of which are discounted future payments to the beneficiary. It is assumed that individual payment the disability should have a height such that had lost income (net income). There is no legal regulation that would gave what amount is to be a single disability annuity. Thus, the present value of future benefits for annuity in the amount of EUR 1 payable annually in advance can be expressed as the sum of the product of the discounted payments and the probability of survival to the next payment date. This formula can be expanded by supplementing it, for example by a factor that reflects the future growth of benefits for inflation, etc. (in this paper geometrical grown has been assumed,), and finally, the present value of annuity ($I\ddot{a}_x$ and $\ddot{a}_x$) for an x-year-old person is given by:

Increasing life annuity:
$$I\ddot{a}_x = \sum_{k=0}^{\omega-x} (1+i)^{k-1} v^k \, {}_k p_x \qquad (1)$$

Life annuity:
$$\ddot{a}_x = \sum_{k=0}^{\omega-x} v^k \, {}_k p_x \qquad (2)$$

Term increasing annuity:
$$I\ddot{a}_x = \sum_{k=0}^{n} (1+i)^{k-1} v^k \, {}_k p_x \qquad (3)$$

Term annuity:
$$\ddot{a}_x = \sum_{k=0}^{n} v^k \, {}_k p_x \qquad (4)$$

where: $\quad {}_k p_x$ is the probability that the x-year-old person will survive the next k years,

$v = \frac{1}{1+r}$ is the discount factor, where r is annual interest rate,

i is the rate of annual grown of the annuity payment,

ω is the maximum age to which the life tables are created in a given country, and

n is the time the annuity will be paid for.

The following assumptions were made in the calculations:

• The annuity is paid once a year, at the beginning of the year (this assumption will slightly overestimate the obtained values, but greatly simplify the calculation);
• The probability of survival is calculated using life tables for each country (for most countries the last available tables are from 2012; calculations have been done for men and women separately). The life tables (from Eurostat and Mortality.org) used in the calculations have not been modified to take into account any disability the person the annuity is paid to may have, due to low availability of life tables for disabled persons in particular countries (the probability of living through the successive periods for disabled persons will be lower than it result is for the life tables for the whole populations). The upper limit of the sum is the value equivalent age, which the oldest person accounted for in the creation of the cohort life tables reached;

- The interest rate used to discount payments (*r*) based on the amount of the maximum technical rates used by insurance companies in the calculations related to, among others, life insurance in the calculations is *r* = 2.8%. This is the technical rate determined in 2014.

The annual indexation of benefits for:

– inflation (according to Eurostat), which was adopted at the level of *i* = 3.3%. This value was determined as the average inflation rate based on the average annual rate of inflation calculated on the basis of ten-year data (after the rejection of each series of the two extreme values) for the countries that adopted the analysis (Eurostat data). Due to the unavailability of consistent data on annual levels of inflation in countries used for analysis that are outside the EU (Russia, Ukraine, Belarus), the data from these countries are not included in the calculation of inflation;
– wage growth rate (according to Eurostat), which was adopted at the level of *i* = 2%. This value was determined as the average wage growth rate based on the average annual rate from three years.

3 Results and Discussion

Case 1 (based on the judgment of 8 February 2006, the Court of Appeal in Poznań)

Description: Due to the defective childbirth baby was suffered a heavy four-limb cerebral palsy. Was awarded compensation amounting to PLN 477,000 (including compensation for pain and suffering in the amount of PLN 300,000) and a monthly annuity in the amount of PLN 2,800 for the injured child.

The equivalent annuity payments in euros: EUR 680 (per month).

The following values were obtained for the present value annuities for the victim from Poland:

The present value of an increasing annuity for a boy from Poland: EUR 8,249,544.94;
The present value of an increasing annuity for a girl from Poland: EUR 11,753,388.26;
The present value of annuity for a boy from Poland: EUR 1,438,848.43;
The present value of annuity for a girl from Poland: EUR 1,752,036.72.

The results show that the annuity given to a victim of a medical mistake that occurred at birth is an incredibly significant cost for the doctor (or hospital). It should be noted that the amount of 680 Euro per month in 2006 accounted for 1.3 times the average wage in the Polish economy. Unfortunately, the minimum sum of guarantee in liability insurance in force in Poland does not cover this amount. Present value of increasing annuity for a boy from Poland is cover by minimum amount of cover for medical constitutes less than 1% (PV lower than for girls). Similarly inefficient is to secure for the hospital – a cover for 1.2% of the same pension. With constant annuity cover is obviously better, respectively, 5.2% and 7%.

The present value of annuities for patients from countries bordering Poland and from the UK.

Table 1 Present values for increasing annuities for men (M) and women (F) – case 1

Country	PV (EUR) – M	PV (EUR) – F	Country	PV (EUR) – M	PV (EUR) – F
BY	6,097,891.18	10,018,024.69	RU	5,382,253.88	9,053,791.85
CZ	8,777,157.26	11,389,700.42	SK	7,960,097.27	10,866,703.31
GE	10,107,886.70	12,276,810.70	UA	5,673,569.72	8,960,935.40
LT	6,929,726.33	10,998,573.57	GB	10,626,956.03	12,601,949.00

Source: Own calculations

Table 2 Present values for annuities for men (M) and women (F) – case 1

Country	PV (EUR) – M	PV (EUR) – F	Country	PV (EUR) – M	PV (EUR) – F
BY	1,225,014.39	1,615,450.03	RU	1,126,634.00	1,519,315.58
CZ	1,506,944.20	1,739,101.10	SK	1,423,195.43	1,693,398.78
GE	1,296,980.22	1,691,321.46	UA	1,166,179.14	1,516,573.74
LT	1,627,144.12	1,812,120.49	GB	1,661,504.73	1,819,159.74

Source: Own calculations

Case 2 (based on the judgment of 12 December 2003. District Court in Katowice)

Description: The 34-year-old plaintiff received compensation amounting to PLN 300,000 in respect of damage suffered as a result of mistake by the hospital and the doctor, but unnecessary removal the intestine. The patient also received a lifetime monthly annuity of PLN 850.

The equivalent annuity payments in euros: EUR 206.31 (per month).

The following values were obtained for the present value annuities for victims from Poland:

The present value of an increasing annuity for a man from Poland: EUR 400,934.06;
The present value of an increasing annuity for a woman from Poland: EUR 577,227.77;
The present value of annuity for a man from Poland: EUR 160,835.92;
The present value of annuity for a woman from Poland: EUR 204,831.07.

Case 2 shows an adult who received a monthly annuity that was three times lower than that in case 1. Unfortunately in this case also, the sum of the minimum guarantee medical liability are not enough to fully finance these commitments. Medical liability insurance cover increasing annuity for a man in 18%, and constant annuity at 46.6%. Hospital Civil Liability Insurance cover increasing annuity for a man in 25%, and constant annuity in 62%.

Tables 3 and 4 show the present value of annuities for patients from countries bordering the Poland and the UK. Comparison of these values in relation to the minimum guaranteed sum gives similar conclusions about the lack of security on the part of medical liability insurance even at a minimum level.

Table 4 Present values for increasing annuities for men (M) and women (F) – case 2

Country	PV (EUR) – M	PV (EUR) – F	Country	PV (EUR) – M	PV (EUR) – F
BY	291,979.96	489,379.57	RU	263,992.07	445,960.94
CZ	425,199.05	556,975.18	SK	385,400.22	531,573.51
GE	337,451.87	539,124.30	UA	275,608.02	439,765.00
LT	493,250.35	602,870.01	GB	522,081.75	621,181.09

Source: Own calculations

Table 5 Present values for annuities for men (M) and women (F) – case 2

Country	PV (EUR) – M	PV (EUR) – F	Country	PV (EUR) – M	PV (EUR) – F
BY	130,728.26	185,457.80	RU	120,891.41	174,117.50
CZ	169,531.76	202,340.30	SK	158,430.35	196,335.03
GE	142,151.93	196,223.98	UA	125,011.28	173,211.32
LT	186,889.61	213,140.90	GB	192,723.48	214,725.93

Source: Own calculations

Case 3 (hypothetical)

Description: as a result of medical malpractice dying 40-year-old man, there are three

people indirectly affected – his 30-year-old wife and two children aged 5 and 7 years old.

The victim was earning the average salary in Poland in 2014. The personal consumption was set at 10% of salary. Therefore 90% of the average wage is the basic amount for the calculation of pensions for those indirectly injured. Children receive a pension until they are 25 years old, assuming education (20 and 18 years compensation) amounting to 25% of the basic amount, and his widow has the right to an annuity for the moment when the younger children is majority (13 years compensation) amounting to 50% of the basic amount.

Annual payment in this case is adequate to the size of the average annual net salary in each of the analysed countries (according to Eurostat and national sources for non-EU countries), data presented in Table 5.

Table 5 The average wage in the chosen countries in 2014 (net values)

Country	average annual wages in EUR	Country	average annual wages in EUR
BY	4,338.20	RU	5,952.03
CZ	11,118.31	SK	8,448.00
GE	36,269.23	UA	1,440.00
LT	6,648.00	GB	32,854.89
PL	8,278.27		

Source: Eurostat data available at http://epp.eurostat.ec.europa.eu and national sources

Table 6 shows the present value annuities for victims from Poland in four variants. According to the description, the amounts of the annuities for a wife and child are EUR 3,725.22 and EUR 1,862.61, respectively.

Table 6 Present values for annuities for injured persons in Poland – case 3

	younger child	older child	wife	together
variant	**PV increasing annuity**			
son, son, wife	39,882.21	35,907.40	52,290.91	128,080.52
son, daughter, wife	39,882.21	35,847.80	52,290.91	128,020.42
daughter, son, wife	39,818.88	35,907.40	52,290.91	128,019.19
daughter, daughter, wife	39,818.88	35,847.80	52,290.91	127,957.59
variant	**PV constant annuity**			
son, son, wife	30,164.97	27,987.58	43,987.40	102,139.95
son, daughter, wife	30,146.97	27,950.33	43,987.40	102,102.70
daughter, son, wife	30,127.72	27,987.58	43,987.40	102,104.20
daughter, daughter, wife	30,127.72	27,959.24	43,987.40	102,065.45

Source: Own calculations

In this case, the family of the injured person receives a benefit lower than the average wage in the economy and receives it not for life, but for a limited time. Coverage of this payment is definitely better – although this is still not full coverage.

The foreign simulation counted only the lowest variant – daughter, daughter, wife. The present value of annuities for a whole family from the analysed countries is presented in Table 7.

In this case it is possible to see a difference in the level of benefits that are paid to people from different countries. It must be remembered that the compensation should be set at a level that corresponds standard of living that the victim had before accident . In this case, the minimum amount of cover is not high enough to cover claims, especially for citizens of Great Britain and Germany.

Table 7 Present values for increasing and constant annuities for case 3 in variant: daughter, daughter and wife

Country	PV – increasing	Country	PV – constant
BY	67,047.97	BY	53,603.62
CZ	171,836.58	CZ	137,068.76
GE	560,297.12	GE	446,954.85
LT	102,931.98	LT	82,095.49
RU	92,520.66	RU	73,773.06
SK	134,622.26	SK	104,150.53
UA	23,054.54	UA	17,831.99
GB	523,570.58	GB	405,063.81

Source: Own calculations

In all cases the highest volume of the present value of annuities were obtained for Great Britain, Lithuania, Poland, and Czech Republic. The highest value of life annuities (in each case analysed) was for an injured woman but term annuity is lower for woman (in all variants). The lowest values are for annuity calculations for Belarus, Russia, and Ukraine. The last case takes into account the realities of individual countries. These results therefore show the need to take into account the realities of the victim's economic and demographic environment (country) of origin in the calculation of the damages claim.

Due to the alleged differences in the values of current pensions which may be granted to the victims, it is worth answering the question of what the relationship between the potential amounts of annuity payments and the value of the minimum amount of coverage in medical liability insurance are. As was shown in the above case, the worst secured claims are for the youngest people. The minimum amount of cover does not cover their claims It is not satisfied in a situation where injury was middle-aged person. No less should be aware that the minimum amount of cover of liability insurance should also cover claims relating to the compensation for pain and suffering, and these payments were not included in the cases in this article.

4 Conclusions

The system of compulsory medical liability insurance in Poland is not fully efficient. The minimum amount of cover proposed in the relevant Polish Act is insufficient to ensure safety for the doctor, for the hospital as well as for the victim. Must be noted that amount awarded by the court the compensation for medical malpractice are high and often exceed its the level of the sums guaranteed from Polish law. Especially when the victim is from EU countries (for example German, Great Britain).

The minimum amounts of cover does not fully protect the potential claims of injured patients, especially in situations in which injury to the patient due to a medical mistake proves to be significant. Very important for medical liability insurance are damages related to the treatment of children, and particularly damage caused during childbirth. In these cases, the victim may receive annuity for decades, which is much financial burden for the perpetrator of the damage.

In view of increasing of claims and court judgments maturing it seems to be necessary to consider increasing the minimum amounts of cover for Liability insurance for medicals, having regard to the course that the costs of such insurance will rise.

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Classification of Work-related Accidents as the Basis of Analysis of Employer's Liability Risk and Insurance Decisions

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Abstract: *Increased awareness of victims in the range of claiming and the growing value of those claims in the area of bodily injuries imply an increased risk of employer's liability for work-related accidents. This justifies the need for a more detailed analysis of the category of risk in the risk management process. In the present study, the authors analyse trends regarding the number of accidents in Poland and other countries. Against this background, data on accidents at work in Poland are classified using selected criteria. The object of classification is to verify the importance of some factors to the probability of occurrence and the severity of losses as main risk components. Considerations are based on statistical analysis (descriptive), and analysis of real data on accidents (including cluster analysis).*

Keywords: occupational accidents, liability insurance, risk management

JEL codes: G22, G32

1 Introduction

The liability risk is perceived as one of the most difficult and most important, both from the point of view of enterprises – as evidenced by periodic reports published by Lloyds of London, the "Global business leader surveys" – and insurers – due to the specificity, including dynamic character and long periods of settlement of policies (i.a. Holzheu, Lechner 2009). Analyses of trends in the third party liability insurance market have indicated in recent years that the number and value of claims have been growing in all markets, despite the fact that in many areas the number of events giving rise to claims is limited or stable through preventive actions. As a result, the insurers raise the price or limit the scope of acceptance. As the most significant area that generates problems, the area of bodily injuries is indicated (Mayr, 2011), wherein the multiple – legal, economic and social – factors are identified (i.a. Holzheu, Lechner, 2009, Lowe, 2002, Schmit, 2006 and many reports of Association of British Insurers (ABI)). The impact of these factors is also observed in the Polish market (Kwiecień, Jędrzychowska, Poprawska, 2014).

There is justification for the research undertaken by the authors. The area of employer's liability for work-related accidents constitutes all identified issues. In addition, such accidents cause a wide spectrum of losses in both the individual and the public area. Employers bear some of the burden of these losses, for example, in the UK it is estimated that this share is about 20% of all losses (next to society and individuals), wherein the major costs to employers arise from productivity and compensation costs. While in the UK the employer's liability insurance is compulsory compensation costs are counted as the insurance premiums only (HSE, 2014, p. 12). In Poland, employer's liability insurance is voluntary, and commercial policies usually do not provide complete protection. Claims against employers who are responsible for the accident are allowed as complementing workers' compensation benefits, if they do not cover the full loss. It must be emphasised that this system ensures minimal compensation for the costs of care, rehabilitation and pain and suffering, and these benefits are considered to be the most important elements as to the value of claims for bodily injuries (Werwigk, 2012). This confirms the need for a proactive approach to employer's liability. Unmistakably, as regards enterprise risk management standards, decisions, including the use of insurance, which is seen as one of the best instruments for the liability risk, should be supported by

risk analysis (so the most common standards FERMA or COSO II). An important step in this analysis is risk assessment, which is a combination of two factors: probability (or frequency) and severity of claims (Kwiecień, 2010).

Considerations are based on analysis of data on accidents at work in the Polish market and studies on the EU market.

Browsing the data for other countries and the whole EU, it must be stated that the number of occupational accidents, including the rate of fatal accidents, is falling in most countries (cf. figure 1 and table 1). Nevertheless, despite a downward trend, in individual years, an increased number of accidents in individual countries appears. For example, in chart 1, it can be seen considerably protruding – from the average for the period 2006–2010 – the number of accidents at work in 2011 in the Czech Republic, France and Latvia. Similarly, figures 2 and 3, although showing a general downward trend, also present values deviating from these trends for individual years.

Figure 1 Fatal accidents in EU – standardised accident rate per 100,000 employed
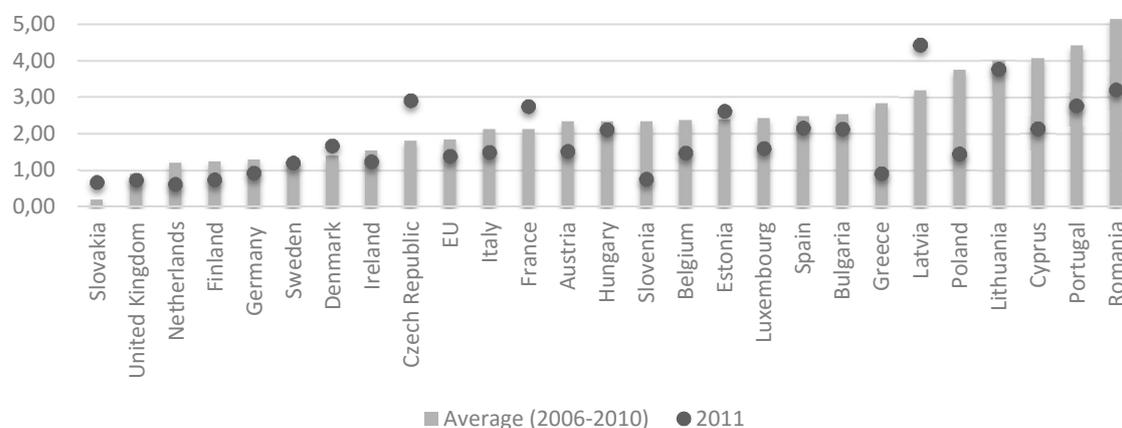
Source: Authors' work based on
Eurostat:http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics

Table 1 Number of work-related accidents and standardised rate per 100.000 persons belonging to labour force

	Fatal accidents		Non-fatal accidents*		Fatal diseases
	Number in thous.	Rate	Number in thous.	Rate	Number in thous.
1998	345	16,4	263.621	12,5	Nd
2003	357	13,8	336.532	12,9	1.945
2008	320	10,7	317.421	10,6	2.022
2010	352	11,0	313.206	9,7	1.979 (in 2011 y.)

Source: Global Estimates of Occupational Accidents and Work-related Illnesses, 2014 (Takala et al., 2014); * non-fatal = at least 4 days absence

Figure 2 Accidental Occupational Death in Europe – countries with highest number per 100,000 population
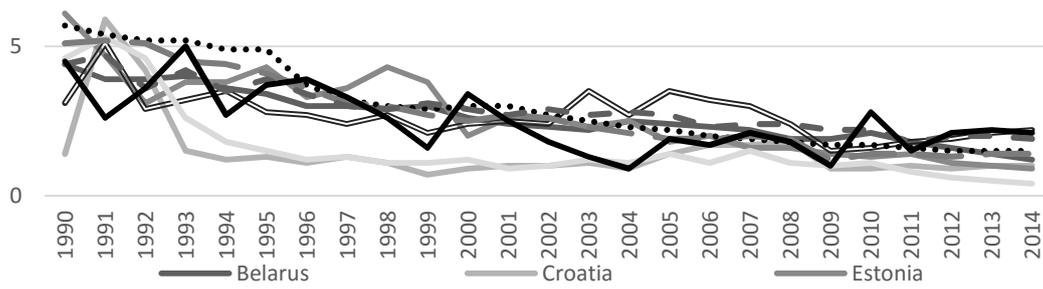
Source: Authors' work based on data from Euromonitor; www.portal.euromonitor.com

Figure 3 Accidental Occupational Death in Europe – countries with smallest number per 100,000 population
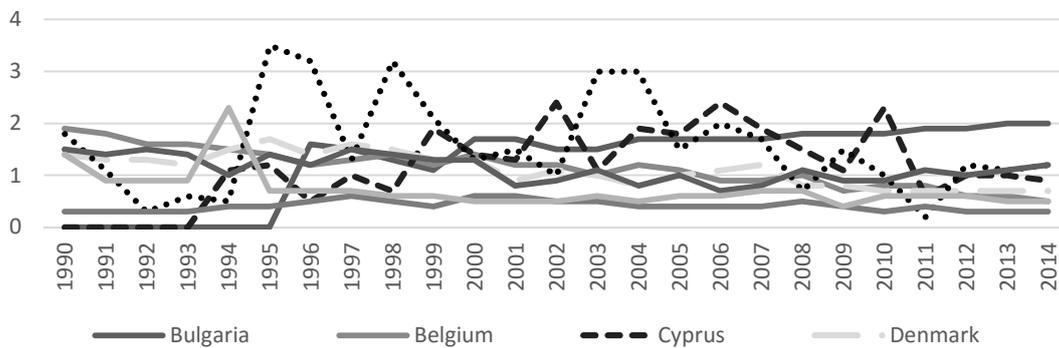
Source: Authors' work based on data from Euromonitor; www.portal.euromonitor.com

Figure 4 Number of accidental occupational injuries (in mln)
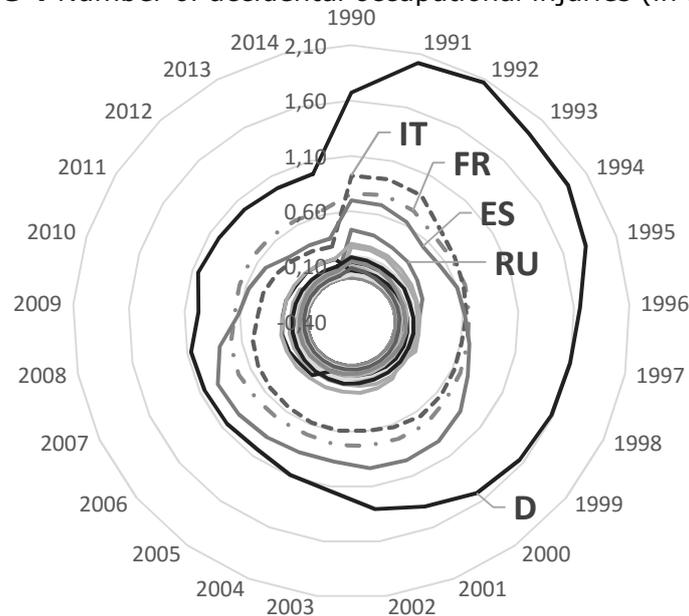
Source: Authors' work based on data from Euromonitor; www.portal.euromonitor.com

Following on from these introductory remarks and an outline of trends in other countries, the data on work-related accidents in the Polish market can be analysed and classified, taking into account the selected criteria.

2 Methodology and Data

In Poland, the largest database on accidents at work is provided by the Central Statistical Office (CSO/pl. GUS). Data are collected on the basis of the European Statistics Methodology Accidents at Work ESAW. By analysing the data and reports presented by the CSO, it is possible to describe how the discussed phenomenon – accidents at work in Poland – is shaped. As further analysis, the authors will use the categories of enterprises according to PKD (Polish data classification) of the CSO reports, namely: Agriculture, forestry and fishing (A); Mining and quarrying (B); Manufacturing (C); Production and supply of electricity, gas, steam, air conditioning supply (D); Water supply, sewage (E); Construction (F); Trade and repair of motor vehicles (G); Transportation and storage (H); Accommodation and catering (I); Information and communication (J); Financial and insurance activities (K); Real estate activities (L); Professional, scientific and technical activities (M); Administrative and support service activities (N); Public administration and defence, compulsory social security (O); Education (P); Health care and social assistance (Q); Cultural activities, entertainment and recreation (R); Other service activities (S, T, U).

The scope of the analysis has been determined by the objective of the work. With respect to the probability of accident occurrence, the authors believe that the risk may be affected by factors such as: sector and the size of the company, age of the worker and his length of service. They assume, at the same time, that these factors (especially age and length of service) can also influence the type of injury (light, serious or fatal) and, consequently, the severity of claims. The amount of liabilities from the employer's perspective sets a potential value of compensation payments; they will have to pay the victims or their families in case of death. An analysis of the insurers' decisions and court judgements shows the determinants affecting the size of liabilities which can be examined using the data on accidents at work:

- type of injury – the authors adopted the following division here: light, serious (an accident resulting in serious bodily harm, i.e. loss of sight, hearing, speech, fertility, or in other bodily harm or health-related problems, disrupting primary bodily functions, as well as that which results in incurable and life-threatening diseases, permanent mental illness, a permanent, total or significant inability to work or a permanent, significant disfigurement or distortion of the body.) and fatal (an accident leading to the death of the injured person at the site of the accident or within six months from the date of the accident). The type of injury is significant, because it implies a range of medical expenses, rehabilitation and other increased needs, including the cost of care. It also affects ability to work and the extent of pain and suffering. Based on the analysed values of claims from the case law, it should be noted that the highest values take benefits in the event of serious disability and death, and also due to long period of compensation.
- age of the victim, which determines here the length of the compensation, but is also perceived as an important factor for determining the level of redress for pain and suffering. Therefore, age is a factor affecting the risk image several times.

In the analysis of whether such relations could exist, independence test χ^2 was used, by assumed significance level $\alpha = 0,01$ (Helliwg 1977)

$$\chi^2 = \sum_{i=1}^{w} \sum_{j=1}^{k} \frac{(F_{ij} - E_{ij})^2}{E_{ij}} \tag{1}$$

The degrees of freedom: $df = (w-1)(k-1)$
where: F_{ij}- value observed, empirical; E_{ij} – theoretical value.
Each time the hypothesis H0 has been verified: the variables are independent.
Furthermore, in order to test the potency of dependency for features, at which hypothesis of independence was rejected, the C-Peareson's ratio was calculated:

$$C = \sqrt{\frac{\chi^2}{\chi^2 + N}} \qquad\qquad (2)$$

3 Results and Discussion

In Poland, for the purpose of social security, the risk of accidents at work is analysed in particular sections of entrepreneurs. The most subject to the risks in this analysis were considered sections A, B i C, and sections with the lowest level of risk of accident at work were N, I, J, K, M. To validate the division, the classification of sections in Poland was carried out based on three characteristics:

- accident incidence ratio (defined as the number of injured persons per 1000 employed in the section),
- serious and fatal accidents ratio (defined as the number of serious injured or dead in an accident in given section per 1000 employed in the section),
- accident incidence ratio of section (defined as the number of injured in given section per number of employed in this section).

Initially, there was one more feature, i.e. serious and fatal accident ratio of section (defined as the number of people injured in a section in the cases considered severe and fatal to the number of people employed in this section). However, duplicate information which requested the classification variable was removed – the accident incidence ratio of section.

The analysis was made with the bond length of 1. It is noticeable that in terms of claims experience the Polish market is divided into four sections with similar claims. The first group (most stable) is composed of sections J, K, M, S, T, U, followed by sections O, L, I, G, R next H i N and the last is group A, C, E, F, which only in the last year is modified, but to a small extent. Notably, section B, despite in the last two years being similar to section E or A, it is the section with another claims course. What gives results similar to those related to social insurance in Poland? By analysing the accident ratio in Poland (figure 5), it can be determined the decrease in the number of occurrences in general as well as in the area of fatal and serious accidents. However, considering the dynamics of the accident ratio calculated in aggregate for serious and fatal events (table 3), it can be noted that in section J, R and C – over the surveyed years – the number of accidents doubled and even tripled. As is also seen, in each year the section in which the accident ratio is higher than in the previous year can be indicated. Additionally, it is not possible to specify a section in which the rate would clearly diminish in subsequent years, although the downward trend can be observed for the indicator calculated for the whole economy (dynamics consistently below 1).

Figure 5 Accident ratio in Poland
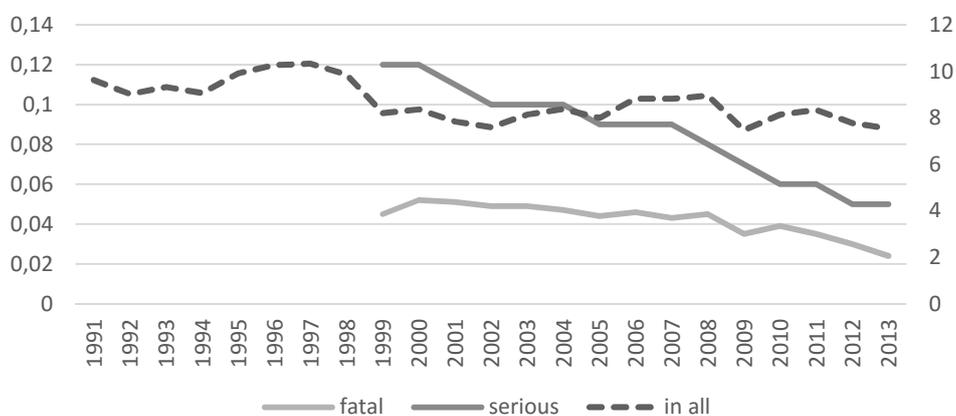
Source: Authors' work based on CSO of Poland (for general data axis on right was used)

Table 3 Dynamics of accident ratio for fatal and serious accidents at work in Poland in 2007–2013

	08/07	**09/08**	**10/09**	**11/10**	**12/11**	**13/12**
together	0,93985	0,84	0,942857	0,959596	0,842105	0,925
A	0,580913	1,075	0,883721	1,496241	0,786432	0,71246
B	0,938272	0,799342	1,135802	0,471014	1,723077	0,638393
C	0,962366	0,748603	0,970149	2,123077	0,449275	1,572581
D	0,729167	1,185714	1,036145	1,052326	0,685083	0,491935
E	na	na	0,990196	1,094059	0,832579	0,728261
F	0,859259	0,931034	0,864198	0,971429	0,889706	0,764463
G	0,861538	0,857143	1,020833	0,959184	0,914894	0,976744
H	1,283688	0,790055	1,118881	1	0,9	0,708333
I	1,090909	0,291667	2	0,607143	1,058824	0,555556
J	na	na	3,214286	0,577778	1,384615	0,583333
K	0,72093	1,16129	0,611111	0,454545	1,3	1,615385
L	0,810127	1,578125	0,39604	1,125	1,555556	0,642857
M	na	na	0,490196	0,48	2,083333	0,76
N	na	na	0,976471	0,807229	1,059701	1,169014
O	0,981481	1,169811	0,903226	0,964286	0,685185	1,081081
P	0,677419	1,238095	1,076923	0,5	1,142857	0,9375
Q	0,777778	0,964286	1,518519	0,439024	1,611111	0,655172
R	0,815385	0,226415	2,25	1,166667	0,904762	0,947368
S, T, U	na	na	0,857143	0,333333	2	1,15

Source: Authors' work based on CSO of Poland. The intensity of the colour indicates the intensity of the phenomenon

It is concluded, therefore, that for the assessment of the risk of accidents at work, it is important in which section an entity conducts its business. In Poland, the sections with the highest level of risk are: A, B, C. The dynamics of accidents is also relevant and in Poland exposure to an elevated level of risk should be considered in addition to sections J i R.

Table 4 presents the results of testing hypotheses about the independence of the number and seriousness of accidents on the size of businesses, the age of the injured employee and his length of service. As already mentioned, the authors believe that these factors also have an impact on the loss ratio in the workplace.

The results presented in the following table show that the relationships exist, but their strength is not significant. Next, in order to analyse the empirical data from the discussed period some "areas" particularly sensitive to the risk of accidents at work can be outlined. In Poland, in the analysed period 2009–2013, the majority of those affected worked in micro, small and medium-sized enterprises. At the same time, the number of people injured in medium-sized enterprises remained relatively stable and in micro and small enterprises rose slightly. The largest groups of victims were persons aged 25–34 years (in 2013, it was 27.0%), most often employees (over 50%) of Section C and G. The second age group were people aged 35–44 years (in 2013 it was 25.2%); in the latter, half of the accidents were also from group C and G. In terms of the consequences of accidents, the largest age group of those injured in fatal accidents (between 22.3 and 28.5% in the analysed period) were persons aged 45–54 years. In terms of accidents causing serious injury, two age groups stood out, which recorded similar numbers of accidents, i.e. approximately 20% among those aged 35–44 and 24.2% among people aged 25–34. Analysing the length of service of victims, it was found that accidents occur most frequently among people with short experience – three years (between 43.3% and 45.0%) – including about 25% of those having worked one year or less. Fatal accidents among those workers with internship up to three years accounted for more than 50% every year, including the largest group of people who had worked one year and less. For such a large percentage of victims of fatal accidents, with seniority not exceeding three years, this mainly affected victims who worked in factories

in sections H and F. Therefore, specific risk groups in terms of employee characteristics should be considered in Poland: workers aged 25–34 and 35–44 (additionally, in the area of size of liability the risk of high annuities increases especially in case of serious injury), age group 45–54 (the risk of high benefits for close family members in case of death) and those who have worked less than three years.

Table 4 Summary of results of testing hypotheses about the variables' independence

H0	χ^2	test	C
Size of enterprise and seriousness of accident are independent (for the years 2009–2013 separately)	573,26	df=6 $\chi^2 = 16,81$	0,078
	446,44		0,068
	334,78		0,061
	303,91		0,059
	160,93		0,066
Age of injured employee and seriousness of accident are independent (for the years 2009–2013 separately)	120,33	df=16 $\chi^2 = 30,58$	0,037
	118,92		0,035
	143,14		0,039
	136,34		0,039
	53,19		0,024
Length of service and seriousness of accident are independent (for the years 2009–2013 separately)	49,42	df=14 $\chi^2 = 29,14$	0,024
	88,01		0,031
	40,68		0,02
	51,21		0,024
	44,06		0,022
Size of enterprise and the number of accident are independent	213,57	df=32 $\chi^2 = 53,49$	0,068
Age of injured employee and the number of accidents are independent	79,27	df =12 $\chi^2 = 26,22$	0,307
Length of service and the number of accidents are independent	329,85	Df = 28 $\chi^2 = 48,28$	0,085

Source: Authors' work

4 Conclusions

The data from both the Polish market and the EU indicate that, although the total number of accidents is falling, the one-off increases of fatal accidents in individual years cannot be ignored (the same for countries with high level of accidental occupational death per 100 000 population – figure 2 – and the smallest level in Europe – figure 3). It should also be borne in mind that – as demonstrated in the Polish example– there are sectors of activity at increased risk, such as groups of workers with specific characteristics who are more likely to produce liability cases for the employer. In the process of identifying the threat for a particular company, it is necessary to take into account these factors identified as a starting point for further risk analysis. Furthermore, the heterogeneity of the analysed risk category shows that the assessment requires a long horizon, because the lack (or law number) of events in a given area or sector in the recent period does not allow to conclude that the risk has been eliminated or significantly reversed.

The above analysis does not exhaust the subject, because the authors believe it should be correlated with the analysis of the second group of factors affecting the risk picture – the value of potential claims. These include, besides the type of injury and age, the number of victims in the incident as well as regulations and trends of jurisprudence in the area of personal injuries compensation.

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Bayesian Estimates of the Regional Costs in Public Health System of the Czech Republic

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Abstract: *Unlike commercial insurance premiums, monthly contribution to the health insurance system depends mainly on the income of the insured person. Amount of revenue of the health insurance companies, however, should be sufficient to cover all costs, especially the cost of health care. Health care costs vary. The paper presents the process of the health care costs estimation in the regions of the Czech Republic by applying the empirical Bayesian credibility models. The credibility costs combines individual regional experience and collective experience through the credibility factor. The credibility factor expresses the level of confidence in individual risk experience and takes into account heterogeneity of portfolio and amount of experience within the portfolio. This paper presents the differences of the health care costs among the Czech regions. Computation of these costs is based on real data. Estimated values of health care costs for the following time period are gained using the Bühlmann Straub model.*

Keywords: health care costs, Bayesian estimation, credibility premium, credibility factor

JEL codes: C11, C31, I11, I13

1 Introduction

Nowadays, questions related to funding of the health care in the Czech Republic are discussed. Health insurance in the Czech Republic is provided through the country's Social Health Insurance. It requires all businesses to provide workers membership in one of several health insurance funds, to which both employers and employees contribute. The Czech government provides contribution for the unemployed so that essentially the population is universally insured.

The health care in the Czech Republic is funded from public health insurance, direct payments, the national budget and regional budgets. The health care system strives to create conditions in which there are no differences in the availability of health care. Solidarity between healthy people and the sick is fostered in health care systems by separation between the provision of health care and its financing. Solidarity of the economically active with the economically inactive people means that every insured person pays an insurance premium as a percentage of their income regardless of what health care they receive or will receive.

Nowadays, there are seven health insurance companies in the Czech Republic. Each of them needs to appraise health care expenses for subsequent time periods. It is possible to determine these expenses by applying Bayesian estimation.

The key difference between classical statistics and Bayesian analysis consists in the perception of an unknown parameter θ. This parameter is supposed to be a random variable instead of an unknown constant. This random variable has a probability distribution $f(\theta)$, called prior distribution.

In the insurance practice, information on insurance payment amount and distribution can be used to determine the prior distribution of the parameter θ. Health insurance companies are then able to specify posterior distribution of the parameter θ using inner information from regions. (Jindrová, 2014) or (Jindrová and Pacáková, 2015).

The Bühlmann Straub model uses a Bayesian approach and belongs amongst free distribution models, so it needs to establish hypothesis neither on the distribution of the

individual risks, nor on the prior distribution of the risk parameters. This model combines individual risk experience with experience from collective of similar risks. See Pacáková et al. (2009) or Pacáková et al. (2014).

The result of the application of the Bühlmann Straub model is the linear credibility premium (or claim frequency or claim size) which uses both the individual experience as well as the collective experience. In other words, the credibility premium combines individual experience and collective experience through the credibility factor. The credibility factor expresses the level of confidence in individual risk experience and takes into account heterogeneity of portfolio and amount of experience with the portfolio. Therefore the Bühlmann Straub models as well as other empirical Bayes credibility models are useful for situation when insurer have to face the problem with a relatively large heterogeneity of portfolio.

2 Methodology and Data

In the Czech Republic, public health system is provided by seven health insurance companies. Všeobecná zdravotní pojišťovna (VZP) insures majority of the Czech population. For this reason, and because VZP releases useful data, information from VZP yearbooks was used for computation in this work.

Let Y_{ij} is a variable, describing total health care costs in the i-th region of the Czech Republic ($i = 1, …, N = 14$) in the j-th year ($j = 1, …, n = 10$).

Let P_{ij} (for $i = 1, …, N$ and $j = 1, …, n$) stands for the number of VZP insurers (in the i-th region of the Czech Republic and in the j-th year).

Real values of Y_{ij} are shown in table 1 and real values of P_{ij} are shown in table 2.

Standardized health care costs, i. e. average health care costs per person $X_{ij} = \dfrac{Y_{ij}}{P_{ij}}$,

satisfy the following conditions:

- For every $i = 1, …, N$ the distribution of variable X_{ij} depends on an unknown parameter θ_i, equal for all the years $j = 1, …, n$.

- For every $j = 1, …, n$ the variables $X_{i1}/\theta_i, X_{i2}/\theta_i,…,X_{in}/\theta_i$ are independent, but not necessarily identically distributed.

Then, two functions depending on j can be defined as:

$$E\left(X_{ij}/\theta_i\right) = m\left(\theta_i\right) \tag{1}$$

$$D\left(X_{ij}/\theta_i\right) = \frac{s^2\left(\theta_i\right)}{P_{ij}} \tag{2}$$

The above mentioned relations express conditions satisfied for every $i = 1, …, N$. Relationships between regions are described by the following conditions:

- Parameters of risks $\theta_1,…,\theta_N$ are random variables, which are independent and identically distributed.
- For $i \neq k$ are $\left(\theta_i, X_{ij}\right)$ and $\left(\theta_k, X_{km}\right)$ independent.

Because parameters of risks $\theta_1,…,\theta_N$ are identically distributed, the values $E\left(m\left(\theta_i\right)\right), E\left(s^2\left(\theta_i\right)\right), D\left(m\left(\theta_i\right)\right)$ are independent on i and we can denote them as $E\left(m\left(\theta\right)\right), E\left(s^2\left(\theta\right)\right), D\left(m\left(\theta\right)\right)$.

For our calculations the following formulas were used:

$$P_i = \sum_{j=1}^{n} P_{ij} \tag{3}$$

$$P = \sum_{i=1}^{N} P_i \tag{4}$$

$$\overline{X}_i = \frac{1}{P_i} \sum_{j=1}^{n} P_{ij} X_{ij} = \frac{1}{P_i} \sum_{i=1}^{n} Y_{ij} \tag{5}$$

$$\overline{X} = \frac{1}{P} \sum_{i=1}^{N} \sum_{j=1}^{n} P_{ij} X_{ij} = \frac{1}{P} \sum_{i=1}^{N} P_i \overline{X}_i \tag{6}$$

$$P^* = \frac{1}{Nn-1} \sum_{i=1}^{N} P_i \cdot \left(1 - \frac{P_i}{P}\right) \tag{7}$$

Then according to Pacáková (2004) or Boland (2007), the rules for the estimates of the parameters $E(m(\theta)), E(s^2(\theta)), D(m(\theta))$ are

$$estE(m(\theta)) = \overline{X} \tag{8}$$

$$estE(s^2(\theta)) = \frac{1}{N(n-1)} \sum_{i=1}^{N} \sum_{j=1}^{n} P_{ij} \left(X_{ij} - \overline{X}_i\right)^2 \tag{9}$$

$$estD(m(\theta)) = \frac{1}{P^*} \left\{ \frac{1}{Nn-1} \sum_{i=1}^{N} \sum_{j=1}^{n} P_{ij} \left(X_{ij} - \overline{X}\right)^2 - \frac{1}{N(n-1)} \sum_{i=1}^{N} \sum_{j=1}^{n} P_{ij} \left(X_{ij} - \overline{X}_i\right)^2 \right\} \tag{10}$$

Credibility factor for the *i*-th region, according to Boühlmann and Straub (1970), is calculated in form

$$Z_i = \frac{P_i}{P_i + \dfrac{E(s^2(\theta))}{D(m(\theta))}} \tag{11}$$

Estimates of the parameters $E(m(\theta)), E(s^2(\theta)), D(m(\theta))$ are the same for all the regions, but the credibility factor Z_i differs from region to region. The higher is value of credibility factor Z_i, the higher is the value P_i which characterizes the extent of the risk.

Then according to Boland (2007), Gogola (2013), Pacáková (2004), for the estimation of credible health care costs the formula

$$E(m(\theta)/X) = Z_i \overline{X}_i + (1 - Z_i) E(m(\theta)) = Z_i \overline{X}_i + (1 - Z_i) \overline{X} \tag{12}$$

is used.

Table 1 Health care costs (VZP) in 1000 CZK

	2004	**2005**	**2006**	**2007**	**2008**
Prague	21 368 341	22 366 121	23 921 832	25 701 895	28 119 299
Central Bohemia	7 747 474	8 017 673	8 197 714	8 695 376	9 254 964
South Bohemia	5 968 130	6 162 715	6 245 152	6 706 019	7 212 709
Plzeň region	6 238 406	6 438 915	6 834 757	7 225 610	7 722 043
Karlovy Vary region	2 954 065	3 036 232	3 100 959	3 313 907	3 440 832
Ústí nad Labem region	7 698 823	8 022 608	8 255 085	8 866 139	9 274 069
Liberec region	4 313 121	4 547 003	4 646 859	4 956 370	5 357 026
Hradec Králové	6 372 730	6 559 284	6 716 078	7 053 563	7 510 843

	2004	2005	2006	2007	2008
region					
Pardubice region	5 012 092	5 304 966	5 359 123	5 798 954	6 130 586
Vysočina	4 929 328	5 177 059	5 398 632	5 768 903	6 144 637
South Moravia	12 554 953	13 016 814	13 396 894	14 321 617	15 182 123
Olomouc region	5 705 928	5 905 399	5 994 144	6 443 783	6 648 192
Moravia-Silesia	9 610 816	9 863 195	10 123 082	10 773 631	11 078 107
Zlín region	5 239 492	5 396 478	5 580 828	5 981 157	6 305 952
	2009	**2010**	**2011**	**2012**	**2013**
Prague	30 542 160	30 543 826	31 285 310	30 641 265	30 915 972
Central Bohemia	10 309 896	10 273 861	10 656 881	10 894 848	10 463 340
South Bohemia	7 810 515	7 842 519	7 852 792	7 731 421	7 637 382
Plzeň region	8 215 827	8 388 922	8 652 443	8 396 101	8 281 999
Karlovy Vary region	3 748 671	3 750 935	3 753 842	3 730 564	3 453 941
Ústí nad Labem region	10 309 876	10 211 936	10 423 650	10 357 916	10 153 319
Liberec region	5 858 866	5 948 440	5 914 874	5 873 086	5 871 138
Hradec Králové region	8 178 496	8 119 808	8 254 215	8 034 703	7 890 529
Pardubice region	6 758 587	6 850 434	6 918 293	6 925 752	6 840 014
Vysočina	6 578 487	6 664 061	6 646 964	6 648 699	6 426 834
South Moravia	16 533 258	16 713 678	16 602 531	16 596 221	16 223 601
Olomouc region	7 174 963	6 907 346	7 072 569	6 699 622	6 697 208
Moravia-Silesia	11 794 911	11 427 693	11 327 721	11 110 212	10 583 795
Zlín region	6 709 975	6 720 951	6 716 690	6 919 266	6 604 994

Source: http://vzp.cz/

Table 2 Number of insured persons (VZP)

	2004	2005	2006	2007	2008
Prague	773 787	759 730	756 471	757 945	753 572
Central Bohemia	731 155	726 666	723 262	723 369	719 064
South Bohemia	425 737	422 178	418 367	416 631	415 757
Plzeň region	366 577	363 953	361 931	362 030	357 580
Karlovy Vary region	223 856	222 030	222 108	221 281	220 153
Ústí nad Labem region	613 494	611 812	607 664	605 504	601 114
Liberec region	338 217	338 948	339 379	340 555	340 887
Hradec Králové region	360 892	357 766	355 127	352 231	349 120
Pardubice region	384 863	382 090	379 889	379 658	378 695
Vysočina	403 238	396 810	394 962	393 035	390 770
South Moravia	731 516	731 083	729 016	724 731	712 678
Olomouc region	339 190	333 147	325 793	317 790	301 857
Moravia-Silesia	559 154	545 611	533 419	524 789	484 608
Zlín region	429 114	425 890	420 299	416 073	403 852
	2009	**2010**	**2011**	**2012**	**2013**
Prague	744 497	744 504	754 029	759 105	760 053
Central Bohemia	711 655	715 111	714 394	707 879	699 688
South Bohemia	405 126	407 710	404 787	399 731	394 977
Plzeň region	347 755	347 335	344 657	339 062	332 724
Karlovy Vary region	212 896	212 288	210 628	206 726	201 910
Ústí nad Labem region	579 731	584 967	583 210	571 520	562 117
Liberec region	331 123	333 562	333 917	330 685	326 769
Hradec Králové region	342 125	341 667	339 015	333 756	328 235
Pardubice region	372 288	372 032	370 871	365 638	359 477
Vysočina	384 364	384 335	382 434	379 072	374 902

	2009	2010	2011	2012	2013
South Moravia	697 709	699 341	696 693	686 853	678 820
Olomouc region	285 474	283 607	277 290	269 242	262 722
Moravia-Silesia	457 485	455 937	449 621	433 652	420 155
Zlín region	389 581	388 726	385 986	379 544	374 178

Source: http://vzp.cz/

3 Results and Discussion

As it was mentioned above, every health insurance company needs to know estimations of health care costs for the next period. Results of the computations applying Bühlmann Straub model are presented in this section. Computations are based on a set of real data extracted from VZP yearbook, namely the amount of persons insured by VZP (table 2) and total health care costs paid by VZP (table 1) in particular regions of the Czech Republic in years 2004-2013.

Bühlmann Straub model is applied to compute credible regional health care costs for the following time period.

According to (3) and (5), total amount of insured person P_i in the whole period in each region, i. e. , $i = 1, …, 14$, and average health care costs per person $\overline{X}_i$ are computed. These characteristics are presented in table 3.

Table 3 Table of calculations

	P_i	$\sum_{j=1}^{10} Y_{ij}$	$\overline{X_\iota}$
Prague	7 563 693	275 406 021	36.41
Central Bohemia	7 172 243	94 512 027	13.18
South Bohemia	4 111 001	71 169 354	17.31
Plzeň region	3 523 604	76 395 023	21.68
Karlovy Vary region	2 153 876	34 283 948	15.92
Ústí nad Labem region	5 921 133	93 573 421	15.80
Liberec region	3 354 042	53 286 782	15.89
Hradec Králové region	3 459 934	74 690 249	21.59
Pardubice region	3 745 501	61 898 800	16.53
Vysočina	3 883 922	60 383 604	15.55
South Moravia	7 088 440	151 141 689	21.32
Olomouc region	2 996 112	65 249 154	21.78
Moravia-Silesia	4 864 431	107 693 162	22.14
Zlín region	4 013 243	62 175 783	15.49

Source: Own calculation

The total amount of insured persons (in all country and every year) P and then the average health care costs per person $\overline{X}$ (in 1000 CZK) were calculated via relations (4) and (6):

$$P = \sum_{i=1}^{14} P_i = 63\ 851\ 175, \quad Y = \sum_{i=1}^{14}\sum_{j=1}^{10} Y_{ij} = 1\ 281\ 859\ 018, \quad \overline{X} = \frac{Y}{P} = 20.08.$$

Then, values of particular health care costs per person $X_{ij} = \dfrac{Y_{ij}}{P_{ij}}$ for each region and each year were computed and used to compute estimation of parameters (8-10).

$$estE(m(\theta)) = \overline{X} = 20.08$$

$$estE(s^2(\theta)) = \frac{1}{N(n-1)} \sum_{i=1}^{N} \sum_{j=1}^{n} P_{ij} \left(X_{ij} - \overline{X}_i \right)^2 = 4\ 213\ 430$$

$$estD(m(\theta)) = \frac{1}{P^*} \left\{ \frac{1}{Nn-1} \sum_{i=1}^{N} \sum_{j=1}^{n} P_{ij} \left(X_{ij} - \overline{X} \right)^2 - \frac{1}{N(n-1)} \sum_{i=1}^{N} \sum_{j=1}^{n} P_{ij} \left(X_{ij} - \overline{X}_i \right)^2 \right\} = 47.86$$

Table 4 presents values of credibility factors Z_i, computed according to (11), and values of credible health care costs, computed according to (12) for each region. The value of credibility factor Z_i shows the effect of the regional data on the value of the credible health care costs. $(1 - Z_i)$ shows the same effect for the national data. Whereas the values of credibility factor are comparable in all Czech regions, the values of credible health care costs differ from region to region. The highest health care cost per person is 36220 CZK in the region of Prague, while the lowest health care cost per person is 13260 CZK in the neighboring region Central Bohemia.

The values of the credible health care costs can be used to estimate the real regional health care costs in the following time period. It means, based on data 2004-2013, the computed values of credible health care costs estimates real regional health care costs in 2014.

Table 4 Credibility factors Z_i and credible health care costs per person (VZP)

	Z_i	Health care costs per person (in 1000 CZK)
Prague	0.9885	36.22
Central Bohemia	0.9879	13.26
South Bohemia	0.9790	17.37
Plzeň region	0.9756	21.64
Karlovy Vary region	0.9607	16.08
Ústí nad Labem region	0.9853	15.87
Liberec region	0.9744	15.99
Hradec Králové region	0.9752	21.55
Pardubice region	0.9770	16.61
Vysočina	0.9778	15.65
South Moravia	0.9877	21.31
Olomouc region	0.9715	21.73
Moravia-Silesia	0.9822	22.10
Zlín region	0.9785	15.59

Source: Own calculation

4 Conclusions

Every health insurance company needs to know the estimations of health care costs for the next time period. Computations in this paper are based on a set of real data (the amount of persons insured by VZP and total health care costs paid by VZP) in particular regions of the Czech Republic in years 2004-2013. Bühlmann Straub model is applied to compute credible regional health care costs for the following time period. As shown in table 4, health care costs per person vary from region to region. The computed values of credibility factors Z_i show that the health insurance companies cannot rely on the national data, because the majority effect on the results relates to the regional information. The computed values of the regional credible health care costs can be used to estimate the real health care costs for the following time period. Using the Bayesian credibility seems to be useful for computations in the field of the health insurance.

Acknowledgments

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The Banking System of the Czech Republic
as a Cybernetic System – a Unit Step Response Analysis

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Abstract: *The aim of this paper is to further describe and analyze the behavior of Czech banking as a cybernetic system. Studying the Czech Republic's banking system using cybernetic methodology has to date given essentialy unambiguous results as regards its static charakteristics (transfer function). It si principially a linear system, which further analysis to some extent simplifies. From a methodological point of view, in order to consider appropriate control interventions, the dynamical charakteristics – i.e. the step response – of the behavior of the system crucial.Here the situation is less clear – the unit step responses of different periods are not identical. The preliminary results of this paper provide solution of this problem.*

Keywords: banking system, cybernetics, market interest rate, unit step response

JEL codes: C67, E58, G21, G28

1 Introduction

Previous analyses of the behavior of the banking system in the Czech Republic have focused on processes for controlling the commercial rate (market interest rate) by using the discount rate. The cybernetic approach depicts these processes as the result of the relationships between the central bank (Czech National Bank) as the control element and the system of commercial banks as the controlled system.

The behavior of the Czech Republic's banking system as a whole is directed towards identifying its static and dynamical qualities. The results achieved so far have been theoretically and practically remarkable. And this is in spite of the fact, or perhaps because of it, that in the formulation of these results both theoretical and practical ambiguities have appeared.

A concise overview of the existing results of the study of the behavior of the Czech banking system in the given area can be summarized in the two points below:

- Linearity of the Czech Republic's banking system (results of the analysis of the static function of the banking system)
  The commercial banks themselves essentially behave as a linear system. The quantity of existing non-linearities identified is so small that linearization is not associated with any significant problems (Kalouda, 2014b). Despite some undoubtedly interesting constituent ambiguities in the sources (Švarc et al., 2011; Kalouda, 2014a; Baláté, 2004), the linearity of the Czech Republic's banking system can be regarded as a fact.
- Dynamical properties of the Czech Republic's banking system - step function response of the banking system.

The step function response of commercial banks, as it has been analyzed to date, leads us to the interim conclusion that, from a dynamic point of view, commercial banks can be perceived as a second-order static oscillating system (Kalouda, 2014b). Nevertheless, the available data does not rule out a tendency to start oscillation with a potential risk of destabilizing the system (Kalouda, 2014a; Kalouda, 2014b).

It is clear that the risks of the system oscillating into an unstable regime (or into system behavior on the threshold of instability - Švarc et al., 2011) are too large to be ignored. The transitional characteristics of the Czech banking system in its different periods are,

after all, not identical to each other, which evokes a risk that the stability of the system may be lost. This is why this paper is devoted to examining in detail the dynamical behavior of the banking system in the Czech Republic in different periods.

2 Methodology and Data

Methodology

In this paper we understand the study of the behavior of the banking system in the Czech Republic primarily to be the study of communication and control within the relevant system. Therefore it is appropriate to test in the given context the application of the methodological tool of a theoretical discipline which in the conditions of main-stream economics in the Czech Republic has so far only been used for such purpose to a limited extent. This theoretical discipline is "*cybernetics* …. as the science of general laws concerning the origin, transfer and processing of information in complex systems and on the general laws for governing such systems." (Kubík et al. 1982).

Of the various methodological tools of cybernetics (more accurately technical cybernetics), the following in particular shall be used for studying the dynamical properties of the banking system in the Czech Republic (in short, for identifying systems):

- theory of the step function response (Švarc, 2003; Kubík et al. 1982; Fikar and Mikeš, 1999), with a special focus on
- interpretation of the meaning of poles and zeros of the transfer of the studied system (Švarc et al., 2011; Baláté, 2004; Houpis and Sheldon, 2014).

The area in which we are applying these methodological tools is usually designated as economic cybernetics (Švarc et al., 2011). We shall respect this convention.

Aside from the above, the methodological apparatus of this paper also comprises a description and the standard analytical synthetic procedures.

The effect of the discount rate on market interest rates is studied on the assumption of ceteris paribus. The subsequent extension to include the effects of specifically chosen elements of the material surroundings of the analyzed system has not been ruled out.

Model Specification

The real-life object which we shall be modelling in this paper is the banking system of the Czech Republic. We shall model the processes of managing the price of capital at a business level (commercial rate) through the use of the discount rate. The model for this real-life system is the step function response, which is one of the deterministic methods for identifying systems (Fikar and Mikeš, 1999).

This is a relatively simple model, based on the assumption that the requirement for the linearity of the modelled system is met (Švarc et al., 2011). The relative simplicity of the model used does not prevent it from being used for primary identification, for acquiring the indicative characteristics of the analyzed system (Fikar and Mikeš, 1999).

Data

This paper draws on freely available output data published by the Czech National Bank (CNB) at http://www.cnb.cz/cs/financni_trhy/penezni_trh/pribor/rok_form.jsp, and at http://www.cnb.cz/cnb/STAT.ARADY_PKG.STROM_DRILL?p_strid=0&p_lang=CS, to which we link here (to save space). This data is taken from the period 31/01/2004 until 30/09/2013. The values of the variable discount rate and commercial rate are monitored. See Figure 1 Commercial rate = f (discount rate).

Figure 1 Commercial rate as a function of the discount rate
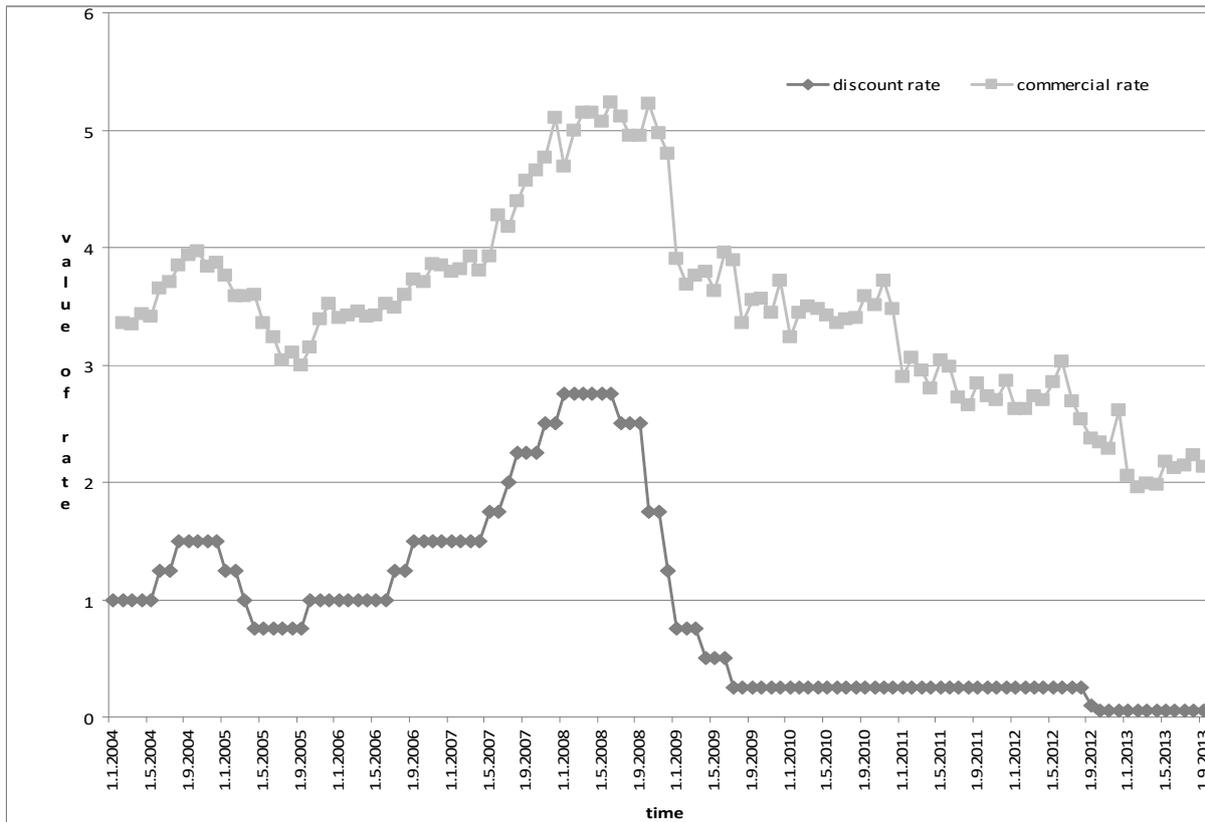
Source: Author's own work

At any given time, we are only analyzing in the sources those reactions of the system that are usually considered, i.e. the reactions to a rise in the discount rate. From Figure 1 it is clear that meaningful data appears in the following periodic intervals:

- 1st interval – 31/07/2004 – 31/12/2004,
- 2nd interval – 30/09/2005 – 30/06/2006,
- 3rd interval – 31/08/2006 – 30/04/2007,
- 4th interval – 31/07/2007 – 31/10/2007, and finally
- 5th interval – 31/12/2007 – 30/06/2008.

3 Results and Discussion

Zeros and Poles of the Transfer Function

The dynamical properties of the studied system, in our case the banking system of the Czech Republic, are perfectly described by the distribution of the poles and zeros of the given system. However, when first trying to identify a system it is not necessary to know the transfer in the form of the distribution of its poles and zeros. Knowledge of the distribution of poles and zeros in the complex plane of the system transfer can be substituted by using the correlation between the step function response and the distribution of the poles and zeros.

Zeros and poles may be theoretically

- real,
- complex (always complexly associated), and even
- purely imaginary (Švarc et al., 2011).

Rules for Interpreting the Position of Poles of Transfers in a Complex Plane

The results acquired from the model and the related discussions are presented in the text below in the order corresponding to the above-stated intervals. By presenting the research results in this manner, they can be integrated into the time contexts of the modelled process (the modelled real-life object). In this context, we are especially interested in the future status of the deciding parameter of the modelled system, i.e. the course of the commercial rate over time.

The poles of the transfer have a special importance in this connection. From their position in relation to the imaginary axis of the complex plane of the system transfer, it is possible to deduce the course of the time response of such system, as well as its behavior.

The result of work on the primary sources contains an immediately successive overview of the results of the positioning of the poles for the course of the time response and the behavior of the analyzed system. In effect, it involves elementary rules for interpreting the position of poles in the complex plane of a transfer with respect to the behavior of the given system:

- The further the poles are from the imaginary axis, the more the transition process is damped (Baláté, 2004) and thereby also becomes shorter (Švarc et al., 2011);
- If the real pole is at least six times further to left than the complex pole, its effect on the time response of the system is negligible, and the time response is designated as "typical";
- The shift of the real pole towards the right along the negative semi-axis generally means a smaller overshoot of the step function response;
- If the real pole comes closer to the level of the complex poles (but is constantly to the left of their level), the first maximum step function response is smaller than the maximum value of the overshoot; the largest overshoot may appear in the form of a second or subsequent maximum,
- If the real pole is situated at the same level as the complex poles, no overshoot of the time response will appear; together with a minor rippling of the time response, it indicates a "critically damped situation";
- If the real pole is located to the right of the level of the complex poles, the time response is "over-damped" (Houpis and Sheldon, 2014);
- In the initial time phases of the time response, deviations can appear on the "opposite" (Švarc et al., 2011) or "wrong" (Baláté, 2004) side; the time response thus acquires temporarily negative values. This indicates a system with a non-minimum phase (Švarc et al., 2011), or a non-minimum dynamical system (Baláté, 2004). The stability of the system is defined however by the position of the poles (Houpis and Sheldon, 2014) and is not connected with the designation of the non-minimum phase (non-minimum dynamical system).

Typical Time Response (Step Function Response)

The effect of the position of the poles of transfer on the course of the studied system's time response (in the form of so-called "typical" step function responses) is set out in Figure 2 below.

Here the poles are marked with a cross. Complex or complexly associated poles are labelled as p_1 and p_2. The real pole of transfer, which has a decisive significance for the character of the time response and thereby for the behavior of the system, is labelled as p_3. The time response itself is labelled $c(t)$.

This is again an illustration, in its own way, of the modelled situation and even on an ideal plane. The real course of the step function response for the specific application (in the given case of the banking system of the Czech Republic) may in the details naturally differ from this ideal. Moreover, assessing the level of its conformity with the ideal or typical course of the time response is to a certain extent inevitably subjective.

From this it follows that estimates for the position of the poles from known real time response may also be subjective. The same applies to the final result of an expert assessment of the specific form of a time response – i.e. the behavior or actual status of the modelled system.

If we wanted to find an analogy for this procedure, an example is provided in medicine by the problem of "reading" the graphic outputs of an ECG examination.

Figure 2 Time response (step function response) as a function of the real pole location
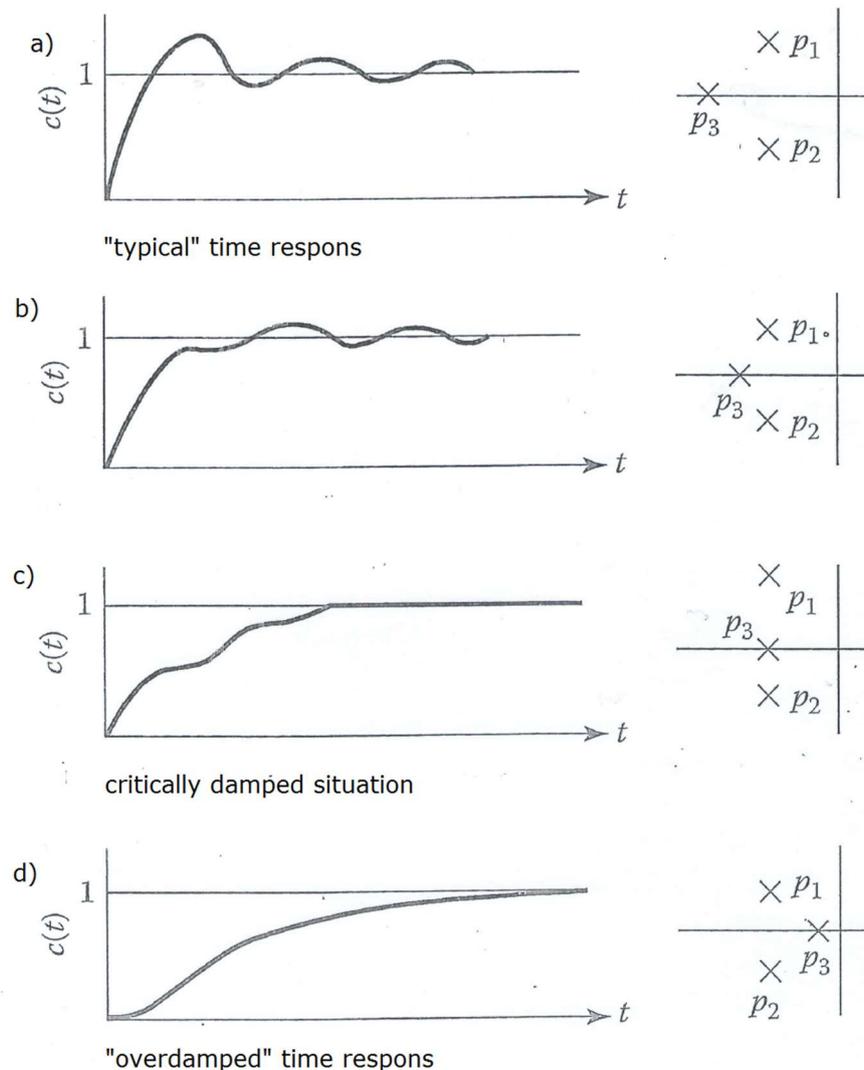
Source: Adapted from Houpis, C.H., Sheldon, S.N. (2014). *Linear Control System Analysis and Design with MATLAB*, sixth ed. New York: CRC Press, p. 341, Figure 13.4

These typical time responses will be compared to further measured real step function responses of the Czech banking system and by analogy we will formulate a conclusion as to the state and behavior of this system, and perhaps make some forecasts.

Time Response 1st Interval (31/07/2004 – 31/12/2004)

The corresponding step function response is illustrated in Figure 3.

Figure 3 - Time Response 1st interval
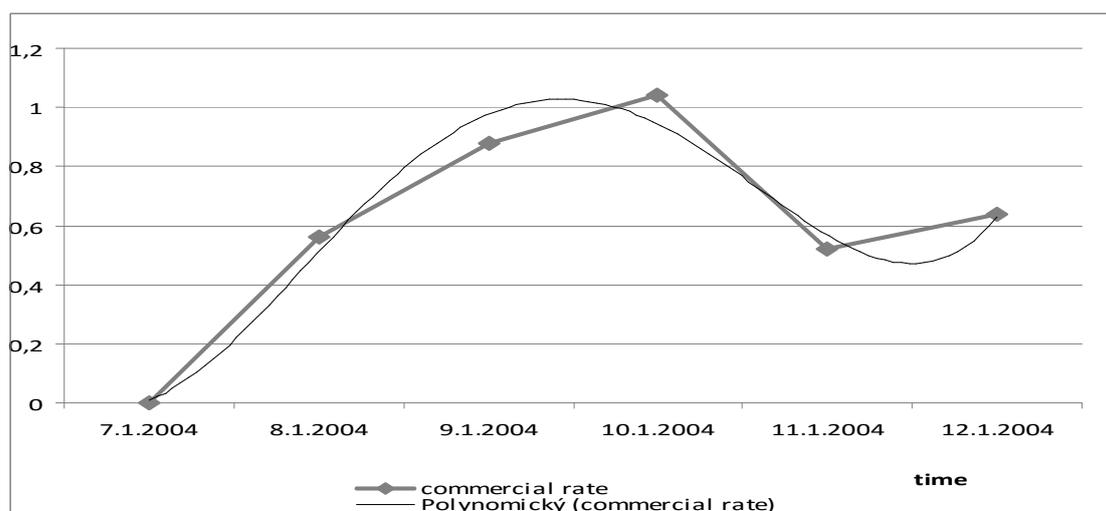
Remark: Refracted curve shows real data.
The smooth curve is an approximation of the real data to polynomial function.

Source: Author's own work

In this case it is possible to deduce the "typical" course of a response time. However, the system of commercial banks is unable to process any regulatory intervention. The time response lacks sufficient length, which can be interpreted as evidence of the premature regulatory intervention of the central bank in the form of reducing the discount rate.

Time Response 2nd Interval – 30/09/2005 – 30/06/2006

The corresponding step function response is illustrated in Figure 4.

Figure 4 - Time Response 2nd interval
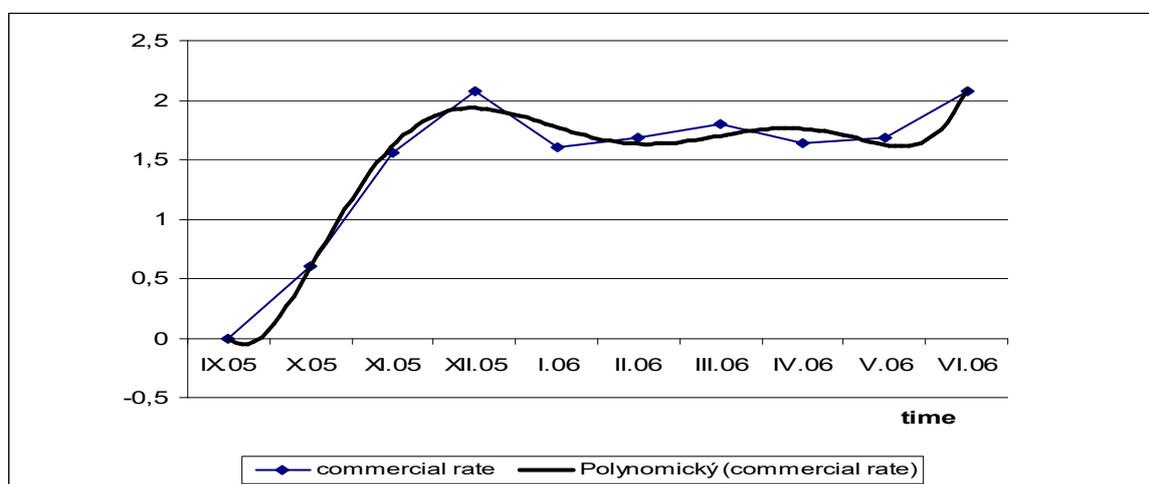
Source: Author's own work

In this case we can also point to a "typical" course of time response. The central bank waited a sufficient time before further increasing its discount rate – the period for the "run-in" of the step function response seems adequate. The problem is the evident inclination of the banking system towards a loss of stability. A subsequent increase in the discount rate may have a stabilizing effect. The indication of the behavior type "system with non-minimum phases" is not, however, connected with stability.

Time Response 3rd Interval – 31/08/2006 – 30/04/2007

The corresponding step function response is illustrated in Figure 5.

Figure 5 - Time Response 3rd interval
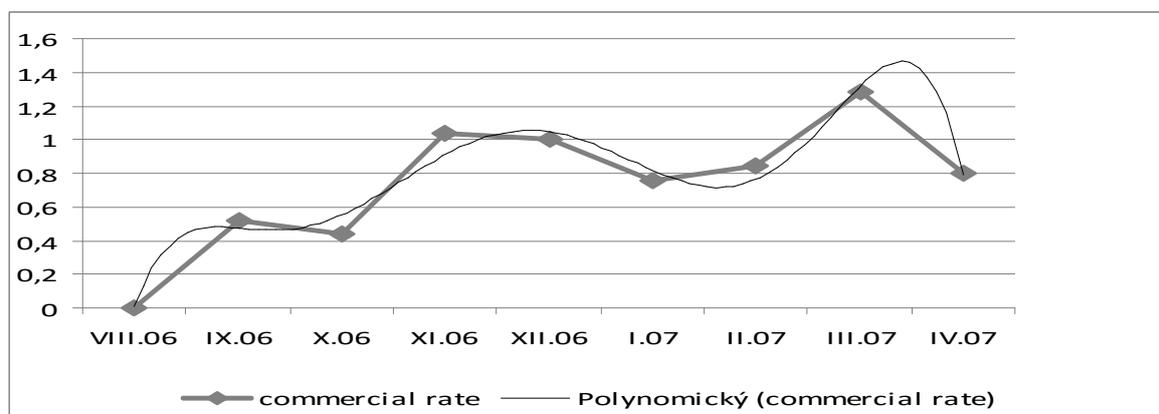
The regulatory intervention of the central bank in this example caused greater damping of the system (see the course of the time response in Figure 1 graph c), where the real pole is shifting towards the right); nevertheless, this did not benefit the system in terms of stability. The system is clearly heading towards oscillation.

The first-signal response is clear – to dampen the system still further, with the objective being to restore its stability.

Time Response 4th Interval – 31/07/2007 – 31/10/2007

The corresponding step function response is illustrated in Figure 6.

The additional raising of the discount rate now meant that the system is damped to a critical extent. This is a clear signal that further corrections aimed at limiting the dynamics of the system are no longer desirable. The central bank proceeded along this course regardless, and repeated increases in the discount rate followed.

Figure 6 - Time Response 4th interval
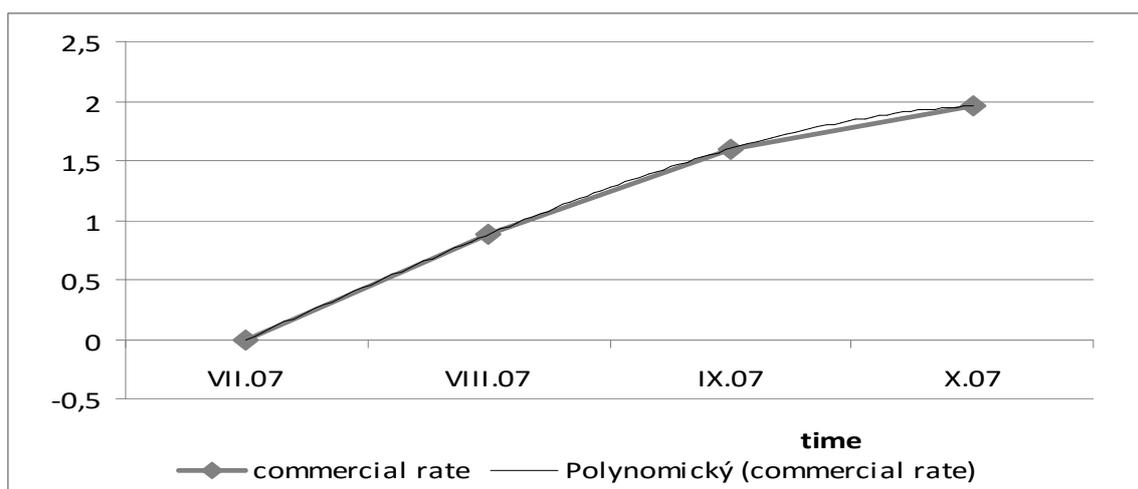
The raising of the discount rate brought about the desired stabilizing effect on the system. The price is high, however: the system shows clear signs of over-damping, from which we can conclude that identical measures in a similar vein will no longer be effective

– the system will not in effect be able to respond. Nonetheless, after a relatively short period of time the central bank began a new series of raising the discount rate.

Time Response 5th Interval – 31/12/2007 – 30/06/2008

The corresponding step function response is illustrated in Figure 7.

Figure 7 - Time Response 5th interval
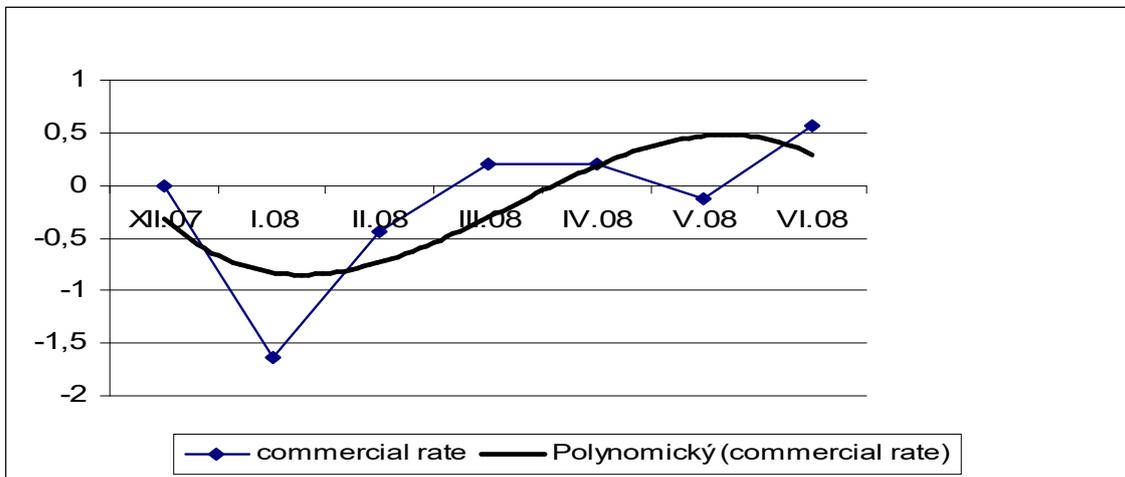
Source: Author's own work

The latest series of increases push the system into a chaotic state. What is more, the behavior type "system with non-minimum phases" again becomes apparent, which fortunately has no bearing on the stability of the system. The next step of the central bank can be predicted – a reduction of the discount rate, ultimately even a series of such control interventions. The final effect will be devastating, however – the discount rate will lose its regulatory potential.

4 Conclusions

The general conclusion for the central bank is devastating. Their series of regulatory measures lead to a situation in which the regulatory tool, i.e. the discount rate, stopped having any effect.

The question is whether or not, in the course of the monitored time interval, any other (partial objectives) of the central bank were achieved. In every case their interventions lead to a situation in which the system (originally clearly linear) began to show the clear non-linearity of a type of hysteresis.

In addition, previous analyses raise the suspicion that the reactions of the central bank were being "dragged along" in the wake of the actual development of the price of capital (at the level of commercial rates): see the second analyzed interval.

There has been no exhaustive discussion about how the position of the poles and zeros of the transfer of the particular system effects behavior. The application of theories for solving differential equations is another possible direction that analysis might take in future.

Acknowledgments

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Exchange Rate Pass-Through in Turkey
under Inflation Targeting Regime

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Abstract: *Exchange rate pass through, the impact of exchange rate change on the domestic price level through changes in the import prices, has long been of interest in international economics literature. Along with the application of inflation targeting regime widely, the focus of this interest has also evolved to examine the changes in degree and speed of exchange rate pass through under inflation targeting regime. Turkey, adopted Inflation Targeting (IT) as a monetary regime between 2001 and 2006 implicitly and then explicitly, exhibits a genuine experience to be analyzed in this respect. From this point of view, the goal of the paper is to provide a time-series analysis of exchange rate pass-through for Turkish Economy based on single equation Error Correction Model estimation using the monthly data under pre-IT period 1995-2000 and post-IT period 2006-2014. Thus, we try to clarify the connection between the effectiveness of inflation targeting regime as monetary policy and the development of exchange rate pass-through.*

Keywords: exchange rate pass through, inflation targeting, error correction model, Turkey

JEL codes: E52, E58, C23

1 Introduction

Along with increasing globalization, international financial and business relationships grow dramatically, which leads exchange rate to be one of the most significant macroeconomic factors. In this context, large fluctuations in nominal exchange rates have also become very important from the perspectives of policy actions aiming at macroeconomic stability. Therefore, dynamics of exchange rate and its relationships with other macroeconomic variables need to be understood intensively. Accordingly, understanding the impacts of exchange rate changes on other macroeconomic variables has been the focus of international economics literature for last decades. In this literature it appears that studies examining the impact of changes in exchange rate on domestic price level, called as "Exchange Rate Pass Through" has a big share.

The changes in exchange rate effect the level of domestic prices through prices of imports. During the process of exchange rates pass through, exchange rate movements are firstly transmitted to import prices and then domestic prices. Accordingly, the literature on exchange rate pass-through previously focuses on the link between exchange rate and import prices (Swamy and Thurman 1994; Webber 1999; Campa and Goldberg 2002; Barhoumi 2006). In detail, exchange rate affects domestic consumer prices through prices of imported consumer goods and the price of imported inputs used in domestic production. To put it another way, exchange rate movements affect domestic consumer prices via either directly prices of imported consumption goods or indirectly prices of imported intermediate goods. Subsequently, much of the research deals with the relationship between movements in exchange rate and producer and consumer prices (Takhtamanova 2010; Jimborean 2013: Ahn and Park 2014).

Recently, it seems that large body of literature devoted to examine the link between the effectiveness of monetary policies adopted in the framework of inflation targeting regime and the exchange rate pass-through process. The findings of empirical studies generally argued that the low inflation environment recently achieved in many countries after adopted inflation targeting regime causes a decline in the impact of exchange rate on domestic prices. Thus, after the adoption of the inflation target regime, the pass-through

effect seems to be diminished in the most of the countries. In this context, Reyes (2007) uses the simulations for the pass through effect analysis under two monetary regimes crawling peg and inflation targeting. Rolling Windows Correlation methodology based on stochastic stimulated data shows that declining pass trough effects in Brazil, Chile and Mexico are results of changes in monetary policy regimes, a switch from a crawling peg regime to an inflation targeting regime. Thus, it is also indicated that the nominal exchange rate effects on the overall inflation rate may no longer be an issue for emerging economies implementing inflation targeting policy.

Odria et al (2012) tries to analyse whether the exchange rate pass-through into prices changed when the inflation targeting scheme was adopted in Peru between 1994 and 2007. In the framework of a vector smooth transition autoregressive model (VSTAR), analysis of the generalized impulse response functions reveals that the decision to adopt inflation targeting significantly decreased the exchange rate pass-through into producer and consumer prices. Thus, they indicate that adopting inflation targeting generates a pass-through contraction. Looking at the European area, Beirne and Bijsterbosch (2011) assess the degree of exchange rate pass through to consumer prices using both a multivariate cointegration approach and impulse responses derived from the VECM for nine central and eastern EU Member States based on monthly data from 1995 to 2008. They find notable differences across countries with fixed exchange rate regimes compared to those with more flexible regimes. Accordingly, while for the four fixed exchange rate countries such as Bulgaria, Estonia, Latvia and Lithuania, a hypothesis test for full pass-through cannot be rejected, for the countries with more flexible regimes like the Czech Republic, Hungary, Poland, Romania and Slovakia, full pass-through is rejected in all cases.

Concerning with the studies focusing on Turkey, Volkan et al (2007) also try to determine if there has been a change in the magnitude of exchange rate passes through for the 2003-2006 periods, when the exchange rates were allowed to float under inflation targeting regime. Their findings indicate that exchange rate pass through has declined for the post-2003 period by nearly one-half compared to the pre-2003 period. In addition, the decline in the exchange rate pass-through impact on domestic prices coincides with a 25 percent decline in the post-2003 consumer price inflation. However, they also argue that the pass-through of exchange rate changes is still important when establishing monetary policies for the Turkish economy. More recently, Dedeoğlu and Kaya (2014) employ a rolling VAR framework to examine exchange rate pass through over the period between 1995 and 2012 in Turkey. They find that the exchange rate pass-through has declined sharply after the adoption of inflation targeting regime. The larger impact of exchange rate pass through on the producer prices compared to consumer prices upwards in the inflation targeting regime. Overall, they indicate that the disinflation period and the implementation of the IT regime appear to play a significant role in the dynamics of ERPT in Turkey.

Contrary to findings presented by two studies relating Turkey above, Civcir and Akçağlayan (2010) prominently argue that the main channel in feeding the inflation in Turkey is the depreciation of the domestic currency even under inflation targeting although exchange rate pass through weakened and slowed compared to its degree in crawling peg system. They analyse the exchange rate pass through and monetary policy reaction function of the Central Bank of Republic of Turkey over the two different periods before inflation targeting (1987-2001) and after inflation targeting (2001-2009). Using VAR model, they shows that there has been strong pass-through during whole period while exchange rate has also been the main reaction variable for the Central Bank. Thus, they also argue that, Central Bank, taking into account of presence of higher level exchange rate pass through, still intervenes in the foreign exchange rate markets against to temporary fluctuations even during the inflation targeting period.

Based on short review indicated above it seems that analyzing the impact of the exchange rate on domestic prices becomes a significant research agenda for Turkey. After adopting Inflation Targeting as a monetary regime in 2001, accompanied by an

increase in the transparency of monetary policy and hence the credibility of the central bank, Turkish Economy has embarked into a process of diminishing inflation. Accordingly, the crucial research question here is whether the lower the inflation rate under inflation targeting regime cause the weaker the exchange rate pass through in Turkey.

From the starting point of consideration above, this paper aims to understand the relationship between changes in nominal exchange rates and domestic prices in Turkey by using of Error Correction Model over two different periods; the pre-Inflation Targeting period between 1995 and 2000 and post-Inflation Targeting period between 2006 and 2014. Thus, we try to investigate how changes in the exchange rate are transmitted to the consumer prices in Turkey after adopting Inflation Targeting Regime explicitly in 2006. Our paper is organised after this introduction as follows. Second section describes the methodology and data. The third section presents empirical results and makes some discussion on the relationship between exchange rate pass through process and implementation of inflation targeting regime. Final section concludes and makes some policy implications.

2 Methodology and Data

We use two basic data set including nominal exchange rate and consumer prices while we explore the exchange rate pass through in Turkey over the period pre-Inflation Targeting (IT) regime between 1995 and 2000 and post-IT regime between 2006 and 2014. Accordingly, the data set consist of monthly observation of TL/USD nominal exchange rate (ER) and consumer prices (CP) covering the periods, pre-inflation-targeting (1995-2000) and inflation-targeting (2006-2014) periods. We do not consider the term between 2001 and 2005 since this term is a transition period to inflation targeting and inflation targeting has only been applied implicitly in this process. All of the data have been obtained from the data base of Central Bank of Turkey (CBRT).

Looking at the econometric approach used in related literature, it seems that different version of single and multiple equation regressions based on Auto regression model introduced by Christopher Sims (1972) and Error Correction Model introduced model by Engle and Granger (1987) are most frequently performed. We preferred Error Correction Model (ECM) while examining the exchange rate pass through, since it presents the significant advantage to estimate the degree and speed of pass through together.

In order conduct an ECM, one can start with a bivariate autoregressive distributed lag (ADL) model such that the current value of the y is a function of its own past value and current and past value of x (Thomas, 1993, p. 153). In this equation, C symbolizes intercept while ε shows white noise error terms.

$$y_t = C + \beta_1 x_t + \beta_2 x_{t-1} + \alpha y_{t-1} + \varepsilon_t \tag{1}$$

subtracting y_{t-1} to both sides of the Equation (1) yields

$$\Delta y_t = C + \beta_1 x_t + \beta_2 x_{t-1} - (1-\alpha) y_{t-1} + \varepsilon_t \tag{2}$$

adding and subtracting $\beta_1 x_{t-1}$ to right side of the Equation (2);

$$\Delta y_t = C + \beta_1 x_t + \beta_2 x_{t-1} - \beta_1 x_{t-1} + \beta_1 x_{t-1} - (1-\alpha) y_{t-1} + \varepsilon_t$$

$$\Delta y_t = C + \beta_1 \Delta x_t + (\beta_1 + \beta_2) x_{t-1} - (1-\alpha) y_{t-1} + \varepsilon_t$$

$$\Delta y_t = C + \beta_1 \Delta x_t - (1-\alpha)(y_{t-1} - \frac{\beta_1 + \beta_2}{1-\alpha} x_{t-1}) + \varepsilon_t \tag{3}$$

re-arranging Equation (3) in terms of $\lambda = (1 - \alpha)$ and $\delta = \dfrac{\beta_1 + \beta_2}{1 - \alpha}$;

$$\Delta y_t = C + \beta_1 \Delta x_t - \lambda (y_{t-1} - \delta x_{t-1}) + \varepsilon_t \qquad (4)$$

$$\Delta y_t = \beta_1 \Delta x_t - \lambda (y_{t-1} - \dfrac{C}{1 - \alpha} - \delta x_{t-1}) + \varepsilon_t$$

finally re-arranging in terms $\mu = \dfrac{C}{1 - \alpha}$;

$$\Delta y_t = \beta_1 \Delta x_t - \lambda (y_{t-1} - \mu - \delta x_{t-1}) + \varepsilon_t \qquad (5)$$

Where $(y_{t-1} - \mu - \delta x_{t-1})$ express long run relationship between x and y. Accordingly, δ means the coefficient of long run equilibrium relationship which shows the degree of exchange rate pass through. The coefficient of λ refers to the speed of adjustment of short run disequilibrium to long run equilibrium between y and x. To put it another way, the value of coefficient λ tells us what rate it corrects the previous period disequilibrium of the system. When λ is significant and contains negative sign, it validates that there exists a long run equilibrium relationship among variables y and x. The coefficient of β represents an immediate or short run effect of x on y. Thus, the coefficient β_1 indicates the effect of the change in x on the change in y, of which will be helpful to know short run dynamics of the system. Consequently, the change in y as a function of the change in x plus an error correction term, where β_1 describes the short-run relationship and λ the speed of adjustment to the long run equilibrium.

Error Correction Model (ECM) indicated above has been applied extensively in the literature to estimate exchange rate pass through. This approach has the advantage of yielding an estimate for the degree and speed of pass through. Accordingly, ECM given by Equation 5 will be estimated separately for both term's consumer prices, pre-inflation-targeting (1995-2000) and post-inflation targeting (2006-2014) periods. Thus, we will try to estimate the long term pass through (δ) as well as the speed (λ) at which the prices indices adjust to a change in the exchange rates for both terms.

3 Results and Discussion

First of all, we check whether our time series are stationary at same level or not since cointegrating necessitates that the variables be integrated of the same order. Cointegrated variables only have a built in error correction mechanism and subsequently cointegrating necessitates that the variables be integrated of the same order. Thus, before setting up the cointegration analysis and error correction model, we start with the determining the order of integration for both of the variables Consumer Prices (CP) and Exchange Rate (ER). The results of Augmented Dickey-Fuller (ADF) test in Table 1 suggest that non-stationary cannot be rejected for the levels of variables. In contrast, when the data are differenced, non-stationary can be rejected in all variables. Thus, both of the variables Consumer Prices (CP) and Exchange Rate (ER) appear to contain a single unit root which cancels out on first differencing. Thus, they clearly appear to be $I(1)$ in both pre-inflation targeting period and post-inflation targeting period.

Table 1 Augmented Dickey-Fuller Unit Root Test

| Variables | Pre-IT period 1995-2000 | | Post-IT period 2006-2014 | |
	Levels	First Differ.	Levels	First Differ.
CP	- 3.231 (0.23)	- 11.231 (0.00)*	-2.089 (0.31)	-10.117 (0.00)*
ER	-1.346 (0.41)	-9.9837 (0.00)*	-0.346 (0.41)	-8.745 (0.00)*

Note: p-values in parenthesis; (*) indicates significance at the 1 percent level.

After determined that all of the variables are I (1) for both periods, a simple OLS regression indicated in Model 1 also runs on the levels of each variable for both periods again.

$$CP_t = \mu + \sigma ER_t + u_t \qquad \text{(Model 1)}$$

where CP and ER are non-stationary variables and u is the residual.

After estimation of the long run relationship in Model 1 by using OLS for both terms, cointegration can be tested using ADF-type unit root tests on the residuals (u_t) by testing the null hypothesis of non-stationary of the residuals (u_t). As can be shown in Table 2, results of unit root tests for residuals performed by ADF asserts that the null hypothesis of non-stationary of the residuals is rejected, which indicates that there is a cointegration between CP and ER for both terms.

Table 2 Augmented Dickey-Fuller Tests for the Residuals

| Pre-IT period 1995-2000 | | Post-IT period 2006-2014 | |
Level	Order of integration	Level	Order of integration
-7,112 (0.00)*	I(0)	-8,834 (0.00)*	I(0)

Note: p-values in parenthesis; (*) indicates significance at the 1 percent level.

As the variables such as CP and ER are cointegrated for two terms, we then can run the error correction model (ECM). Accordingly, the ECM given by Equation 5 has been estimated in the form of Model 2 below for both term's consumer prices separately.

$$\Delta CP = \beta_1 \Delta ER_t - \lambda (CP_{t-1} - \mu - \delta ER_{t-1}) + \varepsilon_t \qquad \text{(Model 2)}$$

Where δ shows the long run relationship between consumer prices (CP) and exchange rate (ER) and hence degree of exchange rate pass through; λ refers to the speed of adjustment of short run disequilibrium to long run equilibrium between consumer prices (CP) and exchange rate (ER) and hence speed of exchange rate pass through.

Estimation results of ECM indicated Model 2 for both terms data is presented in Table 3. For two terms, explanatory power of the models (Adj R^2) and the statistical significance of their regression coefficients (δ and λ) are appropriate. Results of the Breusch-Godfrey LM Test and White test also indicate that there is no serial correlation and no heteroscedasticity, respectively. The estimated results of the degree of exchange rate pass through (δ) as well as the speed at which the prices indices adjust to a change in the exchange rates (λ) are also presented in Table 3.

Speed of pass through or the coefficient of error correcting term (λ) in ECM estimation appears with the expected negative coefficient, which is significantly different from zero at the 5 percent level for both periods. Thus, empirical results support the acceptance of cointegration or the validity of long run equilibrium relationship between CP and ER or

exchange rate passes through for both terms. Consequently, after determination the cointegration between exchange rate and consumer prices by using ADF Test for residuals in Table 2, we also indicated again this fact with the results of error correction model. Besides, the coefficient of speed of adjustment are -0.347 and -0,091 percent meaning that system corrects its previous period disequilibrium at a speed of 34.70 and 9,10 percent monthly for pre-IT and post-IT period, respectively.

Table 3 Error Correction Model Estimation

	Pre-IT period 1995-2000	Post-IT period 2006-2014
Degree of pass-through (δ)	0,665 (0,013) **	0,218 (0,031)**
Speed of pass-through (λ)	-0,347 (0,014) **	-0,091 (0,021)**
Co-integration Relation	Yes	Yes
Complete pass through	No	No
Adj R^2	0.58	0.69
Breusch-Godfrey LM Test	1,123 (0,201)	1,917 (0,241)
White Test	0,513 (0,178)	0,698 (0,271)

Note: p-value in parentheses, (**) indicates significance at the 5 percent level.

Looking at the degree of long term pass-through (δ), although they seems to be statistically significant for both terms, the value of coefficients are 0,665 in the first term and 0,218 in the second term. This means that, in the long run, a change in the exchange rate is poorly transmitted to the consumer prices in post-IT period compared to pre-IT period. Given the fact that δ symbolizes complete exchange rate pass through when it equals one (δ=1), it can be further asserted that exchange rate pas through for both terms are incomplete.

The findings of the study indicate that the pass-through effect dramatically reduce in post-IT period (2006-2014) with the introduction of the inflation targeting practices. This fact can be arisen from several reasons in the implementation of inflation targeting regime. The increase in the transparency of monetary policy may raise the credibility of the central bank regarding the prospects of disinflation and hence lower exchange rate volatility. The effects of price stability may also be reflected by the decrease in the risk premium included in the exchanges rates charged by economic agents.

Besides positive impacts of inflation targeting regime on exchange rate pass through, it also be noted that lower pass-through can be more advantages for central bank adopted inflation targeting regime. A low level of pass-through is beneficial because the high level exchange rate pass through decrease the flexibility of central bank for setting inflation target. Thus, the lower the extent of pass-through the larger will be the effectiveness of central bank's policies. Thus, on the one hand, the degree of exchange rate pass-through into inflation is important for the effectiveness of inflation targeting regime. But on the other hand inflation targeting regime is also the major determinants of the weaker exchange rate pass through process. In conclusion, this positive mutual interaction between weak exchange rate pass through and effective inflation targeting regime may be at the root of developments in post-IT term.

4 Conclusions

Along with globalization, capital account movements and international trade raised dramatically, leading that exchange had a huge significance and played important role in economies. In this context, understanding the process of exchange rate pass-through gains big significance since the size and speed of pass-through is a good estimator for the transmission of the international macroeconomic developments to a domestic economy. After most of the countries adopted Inflation Targeting (IT) Regime, related literature mostly focused to research the impact of inflation targeting regime on exchange rate pass through

This study tries to examine exchange rate pass through in Turkey applying a single equation Error Correction Model for the monthly data over the pre-IT period from 2005 to 2010 and the post-IT period from 2006-2014. With this perspective, the study focused on how changes in the exchange rate are transmitted to the consumer prices in Turkey after adopting Inflation Targeting Regime explicitly in 2006. The findings of the study indicate that the exchange rate pass-through decreases in the post-IT period compared to pre- IT period. Thus, development of exchange rate passes through process in Turkey identifies the effectiveness of inflation targeting policy. This finding advocates the related literature arguing that inflation targeting practices reduces exchange rate pass through. Accordingly, it can also be argued that monetary and correspondingly exchange rate regimes are among the major determinants of the exchange rate pass through process.

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Latest Developments in Banking Regulation in the European Union

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Abstract: *The financial crisis has revealed that there has been no effective system of governance of financial institutions in crisis, and that there are very few measures that should be adopted by banks in the event of a banking crisis. This fact was an important reason to make an effective policy framework, which would be organized managed the financial institutions if they get into trouble, and so could prevent infection of others. Using a crisis management framework, established in the EU, the competent national authorities get their hands on tools that will act preventively and in the event of an emergency situation should ensure financial stability and minimize the loss of taxpayers. This paper focuses on implementation and impact Bank Recovery and Resolution Directive in EU countries, mainly is Slovak Republic.*

Keywords: financial crisis, banks, banking regulation, EU, BRRD

JEL codes: G21, G28

1 Introduction

Recent spreading of infection accross financial markets caused mainly by increasingly intensive mutual links between individual commercial banks, other financial subjects as well as between their clients was frequently potentiated by the knowledge of financial institutions themselves that in the case of financial problems they will be rescued by the state, by the public financial means.

Financial crisis and mainly its suprisingly quick spreading has resulted in the endeavour of the European Union to create transnational systems of regulation and supervision of the financial markets. The solutions suggested modify the regulation of banks as well as almost all other subjects in the financial markets. In this article we are going to concentrate mainly on the sphere of the European Union and adaptation of the prevention as well as solution of the consequences of possible crises in the European area.

The article presents a brief survey of individual institutions which supervise keeping the prudential activities, further we will pay attention to the problem of managing the crisis at the microlevel, i.e. in commercial banks and finally we will concentrate on managing the crisis according to the new criteria at the macrolevel and the proposal of the new indicators which must be met by the commercial banks. There is a question to what extent the present institutions, which garantee the primary deposits in the bank, would be able to realize the rescue of clients in the case of problems in the banking sector. On the other side there is a question how individual commercial banks will be able to meet the new regulations and in what way it will affect the banking sector as a whole.

At the beginning the European coutries applied different ways of rescuing the financial sector. In the first phases of crisis, they granted a financial help to institutions, afterwards their help in the form of monetary solution followed and after defusing the local crises and falls the EU countries started a common solution of the reform of regulation and supervision of financial, i.e. bank markets.

1.1 Methodology and Data

To meet this aim, the influence of new measures of prudential banking to the commercial banks and sector as a whole will be analyzed and the conclusions will be discussed in this paper.

The authors are also in the development contribution based on their experience of research and banking experience.

Table 1 Capital Adequacy and Total Assets

	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Capital Adequacy	11,20%	12,57%	12,68%	13,41%	15,70%	17,20%	17,30%
Total Assets (mio. €)	62 900	52 857	54 502	55 782	57 580	58 704	61 445

Source: Processed on the basis of the data of the National Bank of Slovakia, 2014. The analytical data of the bank sector. [online]. 2014. [2015.03.25] Accessible on the internet: <http://www.nbs.sk/sk/dohlad-nad-financnym-trhom/politika-obozretnosti-na-makrourovni/udaje-a-indikatory/analyticke-udaje-financneho-sektora>

2 Institutional Provision of Supervision of Financial Markets

2.1 European System of Financial Supervisors (ESFS)

„One of the prerequisites of an effective performance of supervision of the supervised subjects is also cooperation and exchange of information with foreign supervision bodies in the sphere of financial markets."

The central banks cooperate with foreign supervisory on the basis of bilateral agreements on mutual cooperation, i.e. Memoranda on Understanding. These agreements make purposeful, effective and proactive exchange of information needed for proper execution of supervision possible. The system is operating on the basis of willingness, confidence and reciprocity. „Besides bilateral agreements on understanding in the sphere of supervision the central banks are signatories of multilateral agreements on cooperation within the European Monetary Union, IOSCO (The International Organization of Securities Commissions) and CESR (The Committee of European Securities Regulators)."

The main aim of ESFS is to secure the rules, which are related to the financial sector to be thoroughly applied with the aim of protecting the financial stability and creating confidence in the financial system as a whole and an sufficient protection of users in the sphere of financial services. The central banks are its members and share decision making in all newly established European bodies (see below). To meet the mentioned tasks the supervision over the financial market has been divided into two main spheres:

- Supervision of prudential activities of financial institutions, which is dealt with by the European bodies of supervision,
- Macroprudential Supervision of the financial system of the EU.

2.2 The European Systemic Risk Board (ESRB)

The European Systemic Risk Board is part of the European System of Financial Supervision. The mission of ESRB is to contribute to preventing or mitigating the systemic risks for financial stability in the EU, which result from the development within the financial system taking into consideration the macroeconomic development in the way of preventing the periods of extensive financial shocks.

The tasks of ESRB are the following:

- to collect and analyse all important information to reach its mission,
- to identify the systemic risks and determine the order of their importance,
- to give warnings if such systemic risks are considered to be important and to publicise these warnings if necessary,
- to make recommendations for taking correction measures as a reaction to the identified risks and when needed to publicise these recommendations, monitor their fulfillment,
- to cooperate with other bodies of ESFS, international and national institutions.

2.3 The European Banking Authority (EBA)

The European Banking Authority is part of the European System of Financial Supervision with headquarters in London. It is a legal successor of the Committee of European Banking Supervisors (CEBS) which has taken over all existing and ongoing tasks and responsibilities of CEBS. The tasks of EBA are the following:

- to provide standpoints for the institutions of the EU and prepare guidelines, recommendations and proposals of regulatory and implementation regulations,
- to contribute to consistent implementation of legally binding acts of the EU, especially by preventing the regulatory arbitration, converging of praxis in executing supervision of the financial market, mitigating and settling of disputes between the relevant bodies and also taking measures in the crisis situations,
- to improve the cooperation of supervisions, delegating tasks, functioning of boards of supervisory bodies, to organize mutual evaluations of supervisory bodies,
- to cooperate with ESRB, to analyse the development of the market within its competence,
- to increase protection of depositors and investors, to strengthen transparency and to publicize information.

2.4 The European Authority and Occupational Pensions Authority (EIOPA)

The European Authority and Occupational Pensions Authority (EIOPA) was established on the basis of regulation of the European Parliament and the Council (EU) No. 1094/2010 of 24 November 2010 and is part of the European System of Financial Supervision. It was setup as a legal successor of the The Committee of European Insurance Supervisors and Occupational Pensions Supervisors (CEIOPS) and took over all existing and ongoing tasks and responsibilities of the (CEIOPS).

2.5 The European Body for the Securities and Markets Authority (ESMA)

The European Body for the Securities and Markets Authority (ESMA) was established as a legal successor of the Committee of European Securities Regulators (CESR) and took over all existing and ongoing tasks and responsibilities of the CESR. The tasks of the ESMA are the following:

- to provide standpoints for the institutions of the EU and prepare guidelines, recommendations and proposals of regulatory and implementation regulations,
- to contribute to consistent implementation of legally binding acts of the EU, especially by preventing the regulatory arbitration, converging of praxis in executing supervision of the financial market, mitigating and settling of disputes between the relevant bodies and also taking measures in the crisis situations,
- to improve the cooperation of supervisions, delegating tasks, functioning of boards of supervisory bodies, to organize mutual evaluations of supervisory bodies,
- to cooperate with ESRB, to analyse the development of the market within its competence,
- to increase protection of depositors and investors, to strengthen transparency and to publicize information. (Klimikova, Vovk, 2012)

3 Preventing Crises at the Microlevel - Bank Crisis Management

„Bank crisis management is a process of preparing for and responding to unforeseen negative events as a manifestation of a particular risk in such a way as to avoid deepening negative impact on the bank. Crisis management includes, inter alia perform well coordinated measures to control the damage and preserve or restore public confidence in the banking system during the crisis from a macro and micro point in the efficient management of a wide range of risks." (Klimikova and Vovk, 2013)

Last but not least the bank crisis management is also influenced by the legislative changes which make limits for creating certain parameters for bank crisis management. At present the bank sector is exposed to large legislative changes not only in our country but also within the whole European Union. Individual countries and of course individual commercial banks as well must keep the part of legislation which is alredy in force (CRD IV. and CRR), as well as the part of legislation which is in the process of final processing and passing (ITS and RTS).

The last crisis of financial institutions reached the top in September and October 2008 when several the world's most important financial institutions failed, went bankrupt or were taken over under the pressure by other institutions or they were helped by the governments. It was especially Lehman Brothers bankrupcy of which on the 15 September 2008 started the crisis. It was followed by the institutions such as Merrill Lynch, Fannie Mae, Freddie Mac, Washington Mutual, Wachovia, AIG.

4 Banking Union

„Banking Union represents an important step towards real economic and monetary union. It is to consist of three basic pillars. On the 4 November 2014 a general mechanism of supervision as one of the first pillars came into existence. The substance of this mechanism lies in a general system of European banking supervision, which is to secure sound operation of credit institutions and stability of financial system." (Barčová, Suchanová, 2014, p.8).

Table 2 Single Rulebook for the Single Market

Source:
http://www.eacb.coop/en/news/banking_union_cooperative_banks_views_pillars_SSM_SRM_DGS_
European_Union_eurozone.html?BackP=1

5 Proposal of Solution of Potential Banking Crises

The European Commission adopted the Directive of the European Parliament and the Council 2014/59/EU issued in the European Journal on the 15 May, which determines the framework for remediating and solving the crisis situations of credit institutions and investment societies. The directive deals with crisis management (preparation, remediation and solving crisis situations) in relation to all credit institutions and some investment societies. The scope is identical with the scope of the Capital Requirements Directive (further CRD), where the prudent requirements for the institutions including the financial institutions being in the banking group and prudent requirements for the investment societies are harmonized. The directive requires the member states to transfer the competence to solve the crisis situations to the public authorities with the

aim of guaranteeing timely realization of the targets. But there is no specific body for solution of crisis situations stipulated, because it is not necessary to guarantee effective solution and there would be a contradiction with the constitutional and administrative procedure of individual member states. Designation of authorities to solve crisis situations (e.g. national central banks, financial supervisory authorities, the Deposit Guarantee Systems, Ministries of Finance or specific bodies) is left to the member states.

Authorities for solution of crisis situations will have to prepare know-how and resources for management of solving crisis situations of banks at the national and cross-boarder levels. With regard to the possibility of conflicts of interest there is authorization of functional separation of activities solving the crisis situations from other activities of any public authorities. The plans of solving crisis situations are to secure minimizing the exposure of tax payers to losses from the support of strengthening the solvency while the necessary economic functions are protected. In the plan of solving crisis situations, which will be prepared by the bodies for solution of crisis situations in cooperation with the supervision bodies under the normal circumstances, the possibilities of solving crisis situations with a whole range of scenarios including the systemic crisis will be given. Such plans should contain detailed information about excercising the tools for solution of crisis situations and about the ways of securing the continuity of critical functions. The plans of solving crisis situations at the group level will contain the plan for the group as well as the plans for each institution within the group.

5.1 Implementation of „Crisis Legislation" in the Slovak Republic

Under the conditions of the Slovak Republic the Directive of the European Parliament and the Council 2014/59/EU of 15 May 2014, which establishes framework for remediation and solution of crisis situations of credit institutions and investment societies is transposed to the national legislation in the form of Law 371/2014 of 26 November 2014 on Crisis Management in the Financial Market and on Amendments to Certain Laws.

The above law regulates the basic procedures of selected institutions, elaboration and approval of the plans of solving crisis situations in the financial market in the Slovak Republic. The law also regulates establishment, scope, operation and measures of the Resolution Council and last but not least also establishment and operation of the National Fund for Solution of Crisis Situations including the adaptation of creation, administration and use of the means of this fund.

The basic concepts of this law to be mentioned are defining the crisis situation of a commercial bank, its solution, then the definition of the resolution body at national and multinational levels together with its competence.

Resolution planning represents a process, which serves the authorities for solving crisis situations as a base for fast and adequate decision about the way of solving the crisis situation in a specific bank at the moment of its occurance. An actual output of the planning process is a choice of the preferred strategy as well as identification of obstacles in solving the crisis situation.

Table 1 Example of choice of resolution strategy
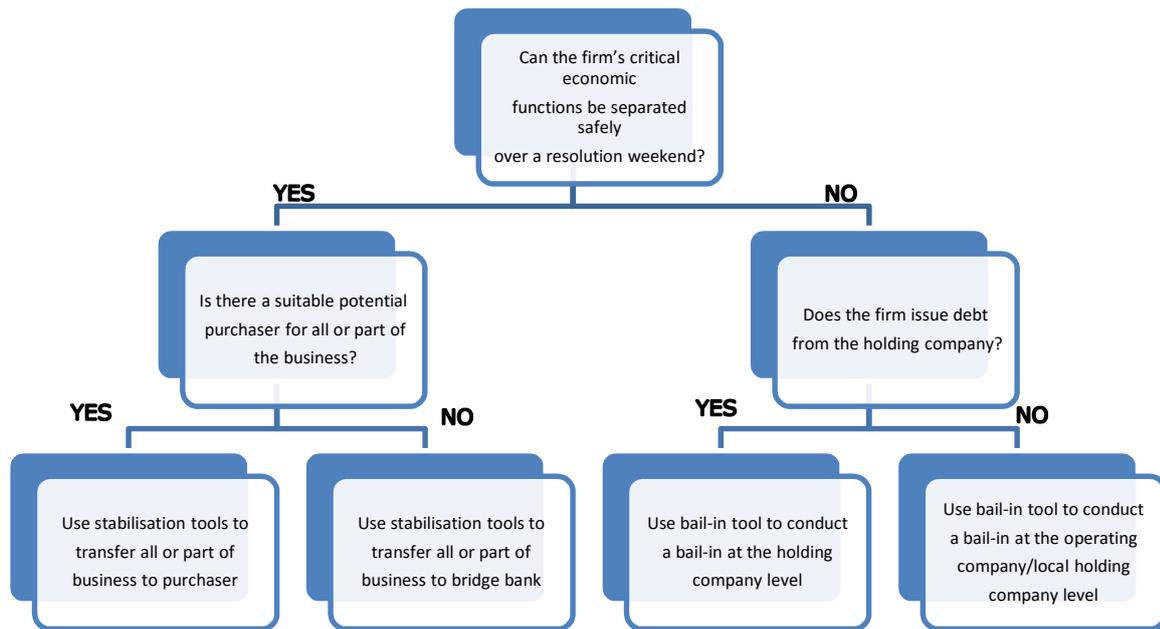
Another very important indicator of prudent undertaking, which as far as its philosophy is concerned, in some way exceptional, is being introduced for commercial banks due to its being created regardless the risk profile of commercial bank, respectively risk profile of assets of commercial bank. But when having a close look at this indicator we can identify an indirect connection with the risk profile of assets. It represents an indicator of minimum requirement of own resources and justified commitments – MREL (Minimum Requirements on Own Funds and Eligible Liabilities).

$$MREL = \frac{Own\ Funds + Eligible\ Liabilities}{Total\ Assets} \tag{1}$$

The minimum requirement is calculated as the ratio (of the amount of own funds and eligible liabilities) and (amount of total liabilities and own resources). Within the indicator a practical application of the definition of eligible liabilities coming from the approved directive is permanently beeing the subject matter of discusions. On one hand there are clearly defined rules which must meet individual eligible liabilities such as:

- total settlement of emitted financial instrument,
- there is no commitment to the institution itself,
- purchase of which is not financed by the institution,
- it has the minimum maturity of 1 year,
- commitment is not resulting from the derivative,
- commitment is not resulting from the deposit of the prioritised order within tender.

On the other hand it is difficult to be able to transform some requirements to the real banking life to document the fulfilled condition for these financial instruments and the indicator itself within the whole European Union. In other words every country has its own specifics of the banking sector and thus in every country there are different financial instruments and so it is difficult to „satisfy" all banking sectors within the European Union.

6 Conclusions and Discussion

At present there is still going on finalisation of the implementation rules, which will adapt the last uncertainties in calculation of indicator, i.e. in determining the minimum amount of own resources and permissible liabilities at the time of resolution. At the moment the system is set to double value of the minimum capital requirement including all applied capital buffers and additional requirement due to the Pillar II.

It must be taken into consideration what impact on the banking sector in the Slovak Republic the realisation of suggested measures within the proposed wording BRRD will have. In the case of an approach on the basis of which besides the resources of shareholders the long term means acquired from investors in the form of unsecured bonds convertible to equity can be used, the economy can face problems thanks to the domino effect in the case of problems of one of the institutions. The banks in Slovakia will have to emit additional amount of bonds which will be very difficult to be located in the domestic market at present interest rates, not speaking about international markets. Even if they are succesful with the emission they will gain large amounts of free financial means which will have to be placed somewhere. Theoretically government bonds come into consideration which it may not be possible to purchase due to the present already high concentration of risk towards the state. Not speaking about the interest rates in case of government bonds being too low to cover the interest costs connected with additional issue of bonds. Thus the banks will have to place free resources either out of the SR and thus there will be an outflow of yields and taxes which will follow to foreign countries or they will have to place free sources to more risky assets thus being exposed to the risk of problems in the future.

In the case a bank will get into initial problems and will not be able to refinance in the interbank market it will lose some of primary resources which will be transferred to other banks and these banks will have to increase the amount of admittable liabilities and thus to emit more bonds which will be difficult to place and than to invest the gained financial means.

In our opinion it is necessary to harmonize individual rights and responsibilities within the European Union. The rise of more new bodies and potential intransparency in definition of their competence can lead to complicated solution of crisis situations.

Acknowledgements

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Acqusition Activity in Financial Sector

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Abstract: Acquisition activity is a complex notion which includes all activities leading to the increase in the market share, overall yields from banking operation targeted on clientele segments in form of business activities with one or several specific (existing or potential) clients. The epicentre of financial institution's attention is a client and his needs. A modern financial institution – a financial supermarket adapts its strategy to him, it offers a wide range of products and services to keep a credit of the best bank in the client's eyes. It tries to come closer to a client with products and spaces. The aim of this article was to create a model of acquisition banking and insurance activity in financial sector in Czech and Slovak Republics. The research was carried out in form of dialogues with the representatives of top and middle management of the selected banks and insurance companies during the period 2009-2014 as well as with representatives of banking and insurance associations. The research was carried out in financial subjects as follows: Slovenská sporiteľňa Bratislava, Česká spořitelna Praha, Československá obchodní banka Praha, Všeobecná úverová banka Bratislava, Allianz Slovenská poisťovňa Bratislava, Kooperativa Praha. The objective of this research is to establish a model of acquisition activities in financial sector. By means of this model it will be possible to optimise the approach of financial institution's in maintaining the existent and gaining the new clients.

Keywords: acquisition, acquisition activity, financial institution, commercial banks, insurance company, satisfaction of financial institution clients, existent or potential clients, behaviour of clients

JEL codes: G34

1 Introduction

Acquisition activity is a complex notion which includes all activities leading to the increase in the market share, overall yields from banking operation targeted on clientele segments in form of business activities with one or several specific (existent or potential) clients.

The goal of acquisition activities is:

- Acquiring new clients – extensive acquisition,
- Keeping existing clients – intensive acquisition (in implementation of long-term growth of premium from product and service sales).

The banks and insurance companies operating in the financial market do not have an identical organisational structure and terminology for their work positions. In order to achieve a better understanding of the system of acquisition activities in insurance companies and banks, a model of a simplified organisational structure has been used in our research. The main part of acquisition activities are those addressing specific clients.

This is carried out by acquisition employees, as e.g. insurance agents employed by insurance companies to be responsible for cooperation with clients.

From the standpoint of an acquisition employee it is possible to divide the process of acquisition into:

- Internal acquisition carried out via own distribution network and managers for special insurance and banking,
- External acquisition carried out via external banking insurance agents, and broker companies.

A demanding character of intensive acquisition, i.e. administration of the portfolio of clients increases with gradual successful development of extensive acquisition.

The focus of acquisition will gradually transgress from the stage of extensive acquisition to that of intensive acquisition. Intensive acquisition is an important part of financial company and as such it cannot be neglected.

The role of acquisition plan is:

- To define and describe methods of acquisition of clients,
- To implement a unified system of acquisition work.

The goal of acquisition methodology is as follows:

- To ensure a unified method in planning, operation, and acquisition activities,
- To coordinate the cooperation of headquarters with regional organisational entities,
- To avoid duplication of acquisition visits,
- To gain the maximum possible amount of information about the client and keep a record,
- To set a system of information flow including its feedback and to ensure that the information on carried out acquisition visit has been entered into the latter system,
- To make use of the financial potential of particular clients.

The accomplishment of efficient acquisition requires general principles as follows:

- Global strategic interests of an insurance company are preferred to particular interests and they are crucial for the behaviour of all employees.
- Insurance company employees are helpful to each other in accordance with the principle of being in the same boat and having a common goal.
- All company levels maintain acquisition workers who are set with measurable tasks and given relevant authority, responsibilities, and pattern of remuneration. The insurance company supports them systemically (directly or via managing department).
- All employees, i.e. not solely the TOP managers, are committed to the goals and strategy of the insurance company.
- The set of acquisition rules is followed by all organisational levels of insurance company and is observed by all employees (acquisition employees as well as top managers).

Belás et al. (2013a) states that just as any other business subject the commercial bank achieves its basic goals through selling banking products and services to its clients. Customers in business relationships require high level of acceptance of their needs from staff and accurately provided services (Lages & Piercy, 2012).

2 Theoretical Background

Under tough competition, it is extremely important for banks to choose the manner of how to manifest their interest in the client and what importance they assign to it. The Bank for International Settlements (2006) confirms this by their statement that bank efficiency and performance have improved, apparently in response to a more competitive

climate. However, also Karlan, Dean S. and Valdivia Martin (2006) suggest that the number of microfinancial organisations who are trying hard to build their human capital is growing. Brokešová (2014) adds that the private insurance industry represents an integral part of all advanced economies. Čejková (2013) notes that insurance is an important form of financial coverage of risks.

Bhardwaj, Neha and Vohra, Anupama (2015) argue that customer-orientation of salespeople has a significant influence on sales performance, behavioural intentions of customers and their satisfaction levels. Yet, there have been studies which point towards the fact, that although the SOCO (Saxe & Weitz, 1982) scale has been used by a number of researchers as a measure of customer-orientation, its efficacy in measuring individual sales performance based on salesperson skills or traits is still incomplete (Singh, A. & Koshy, A., 2011, p. 70), reinforced by the fact that customer orientation is more of an individual level construct being supported by organizational orientation. Salespersons have a tremendous impact on loyalty exhibited by customers, to the extent that customers may cease to be loyal to a firm when a particular salesperson is transferred or leaves the firm (Bhardwaj, Neha and Vohra, Anupama, 2015).

Weber (2010) confirms the importance of clients when stating that the banks are mainly driven by financial returns and clients' needs. R Singh, G Das investigate the moderating effects of selling experience on the relationship between job satisfaction and sales performance, customer orientation and sales performance, and adaptive selling behaviours and sales performance.

Both practical and theoretical aspects of examining the level of satisfaction, decision making and behaviour of bank customers are very important for the banking business.

Belás (2014) points out that several authors examine the issue of satisfaction of banks' clients in the context of bank management. Munari et al. (2013) indicate that customer satisfaction is becoming a stable goal of banking marketing policies, an important element for strengthening corporate reputation. Chavan, Ahmad (2013) state that the bank business increasingly depends on the quality of the customer service provided and overall satisfaction of each single customer. Relationship marketing has become the most critical aspect of corporate banking success. According to Grigoroudis et al. (2013, p.21), the long-term success of banking organizations is related to their ability to adapt to changing customer preferences and needs. For this reason customer orientation and a continuous improvement in philosophy is adopted in order to design and provide products and services that meet customer requirements. This justifies the importance of internal and external service quality assessment and incorporation of quality measures in the performance evaluation of business organizations. Belás at al. (2014) argues that furthermore, the ability of banking institutions to respond to changing market conditions may provide a significant competitive advantage against competition.

Clients generally demand quality form their banks as well as want them to understand their needs in order to be able to respond appropriately. Lages and Piercy (2012) suggest that clients in business relationships require a high level of acceptance of their own needs from staff and accurate services. Agrawal, Sakshi and Vohra, Shubhra (2012) assert that as opposed to the traditional type of banking services, the customers of today require products and services that are more personalized.

3 Materials and Methods

The production of acquisition model needs to engage proportionally the general and specific methods of scientific work. Their engagement emerges from the logic of the research framework. At the same time, the methods of systemic analysis, and theory of complex systemic approach are applied in the production of models. The general methods used in this research include the methods of analysis and synthesis, induction and deduction, comparison, analogy and generalisation. The specific methods include questionnaire inquiry, semi-structured interviews, and some others. Considering that the gaining of information from top and middle management did not result in acquiring

statistically significant cohorts, it was not possible to apply statistical methods when processing the results.

The processed acquisition model produces complex processing of current knowledge, its classification, analysis and generalisation, as well as information on banks´ behaviour from the aspect of the client. The main emphasis is put on the production of a framework systemic model for commercial banks.

4 Results

4.1 Methodology of Acquisition Activities

Based on the current research it can be stated that the basic segments of a bank are as follows:

Corporate banking which includes:

- National creditworthy companies with the need of structured financing and high level of know-how,
- TOP 100 companies,
- Creditworthy companies of above regional significance and operation,
- Creditworthy companies with the need of structured financing,
- Creditworthy financial institutions.

Commercial banking:

- Small and medium company clients,
- Insurance companies,
- Investment companies,
- Participation and pension funds,
- Small companies.

Retail banking:

- Micro companies,
- Private clientele,
- Ordinary clientele,
- Students.

4.1.1 The System of Clients Identification of the Subsegment of Private Clientele for Acquisition

The choice as to which clients should be acquired can contain several related partial stages which are implemented in time. The goal of the attitude is to identify private clients suitable to be included into the acquisition plan on various levels of client departments in the region of their operation. The method and realisation of this process can be as follows:

- Identification of all private clients belonging to the given target segment in its regional operation within its given distribution place. It is advantageous to process a database of potential clients from statistic resources, which should be structured as per region and field of economic activity.
- The clients are then classified as to their suitability for acquisition in the monitored period, and included into long-term plan bearing in mind the product offer.

4.1.2 The System of Clients Identification for Acquisition Actions

The method of operation can be as follows:

- To identify all and potential clients belonging to the given target segment, namely in the regional operation of the given distribution place,
- In relation to the system of monitoring economic data of a financial institution to count a year potential income yield of all companies. In case of non-sufficient or

not verified information the client's manager has an opportunity to create his own qualified estimation of the missing parameter. The achieved data have to be recorded in distinctive way when compared to the rest of other verified data.

4.1.3 Collection of Information on Clients

The process which was described in the previous section contains a preparatory stage which is demanding in gaining up-dated and reliable data on existing and potential clients of the private subsegment. Regarding the high diffusiveness of individual data on clients it is inevitable to keep information in form of an acquisition card of a client (in its written or electronic form).

Financial institution employees are considered to be an important secondary source of information and it is their duty to provide information on existing or potential clients of a financial institution to a relevant manager as long as it is not in contradiction with legal regulations.

4.1.4 Collection of Information on Corporate Clients

The extent of information has to be in compliance with the structure of the existing acquisition model which in turn enables to prepare a qualified action of acquisition.

4.1.5 Processing and the Content of Acquisition Plans for Private Clientele

On the basis of information from the client acquisition card, individual client employees process the acquisition plan.

4.1.6 Segmentation of Company Clientele and Methodology of Steps Leading to Identification of Potential Clients on the Level of Bank and Insurance Headquarters

Companies with the potential of being included into the acquisition plan of banks or insurance companies can be found in a database bought from companies dealing with the business of collecting and selling information. The database usually contains basic data of companies operating in the territory of an insurance company or bank (listed in Company Register):

- Organisation's name,
- Organisation's address,
- Telephone number,
- Fax number,
- E-mail address,
- Company's identification number,
- Tax identification number,
- Bank account number,
- Legal form,
- Ownership form,
- Date of origin,
- Organisation type,
- District,
- County,
- Number of employees,
- Basic property,
- Turnover,
- Date of latest database update,
- Prevailing Classification of Economic Activity (CEA),
- Other CEA,
- Contacts,
- Organisational entities,
- Information on debtors and creditors,
- Information from the Company Register.

It is necessary to note that the information on any organisation within the database does not necessarily have to be as detailed as mentioned above. Nevertheless, the software enables to divide the database into needed segments; i.e. enables to divide the database as per segmentation criteria as follows:

- Main segmentation criterion – classification of economic activities,
- Adjacent segmentation criterion – overall number of employees,
- Auxiliary segmentation criterion – annual turnover.

Although these three criteria do not necessarily display the explicit financial potential of a company, they represent the only available and relevant information of economic character.

Main segments and parameters of companies:

- TOP companies - over 500 employees
- Medium A companies - 250–499 employees
- Medium B companies - 100–249 employees
- Medium C companies - 25–99 employees
- Small companies and traders - less than 25 employees

Čejková (2014) notes that criteria of segmentation can be generalized, however each business entity prefers and considers different criteria on the grounds of which they decide.

The segmentation of companies as to their size and identification of potential clients have several stages:

The first stage is based on the division of companies according to the main segmentation criterion i.e. the field of economic activities of a company. This classification is the main criterion defining the rating of a client.

The second stage divides the companies based on the adjacent segmentation criterion, i.e. on overall number of employees. This criterion indirectly indicates the physical size of a company as for example the extent of their tangible property and thus also their insurable potential. The overall number of employees is a criterion on the basis of which the companies are divided into size categories mentioned above.

The division is necessary in order to be able to define distinct levels of competencies of acquisition first-contact employees depending on the size of the company that is to be acquired. This division cannot be achieved absolutely as the information on the overall number of employees is provided only by about 30% of companies. Nevertheless, it is important to state that the majority of companies which do not disclose the number of their employees are tradesmen and thus are ranked among small companies and tradesmen. Annual turnover is only an auxiliary criterion helpful in dividing companies according to their size.

The first two stages of division are made by the marketing department and its manager is responsible for it.

The third stage is carried out by the sales department in cooperation with the administration department. The sales manager is responsible for this stage. The stage includes a comparison of a company database with the database of their existent clients. As a result the database is divided as per field of economic activity and size category:

- Existent clients who are subjected to intensive acquisition i.e. those who are to be looked after.
- Potential clients who are subjected to extensive acquisition,

In the fourth stage, the sales department manager matches the particular size segments of potential clients with the corresponding levels of responsible employees according to the key of authority of the first acquisition contact.

The key of authority of the first acquisition contact is not a dogma; its application can be adapted after consulting and considering various conditions (personal contacts). It is important that an employee who believes in the success of his acquisition activities consults his decision with his/her business manager.

4.1.7 A Final Classification of Potential Clients and Methodology of Acquisition Implementation by Regional Agencies

The final classification of potential clients after gaining the database is made by the sales manager. His/her role in cooperation with the regional manager is to divide the database of potential clients as follows:

a) Non-prospective potential clients. The inclusion of company into this segment is a matter of educated estimation of the sales manager in cooperation with regional manager on the basis of information available from previous acquisition attempts or other sources. The reason for such classification can be based upon information on shareholders´ interconnection with the competing financial company. This classification is to be considered temporary.

The non-acquisition of such a company cannot be declined definitively. In case of changes in the interconnection of shareholders it can be included in the acquisition plan.

b) Prospective potential clients are addressed in compliance with the acquisition plan.

The role of the sales manager in charge of acquisition is as follows:

- To collect information on the potential client, and fill in the acquisition card,
- To decide on the form of addressing the client and subsequent acquisition activities,
- On the basis of information which the sales manager in charge of acquisition has collected during the first acquisition contact, to elaborate a general product offer for potential clients,
- To continue in acquisition,
- On the basis of performed acquisition activities, to complete the acquisition card of the client,
- To pass the acquisition card to the sales manager.

4.2 Model of Acquisition Activities in Financial Institution

4.2.1 Planning of Acquisition Activity

The starting point of the whole economic management is planning. Because of this, the planning of acquisition activity within a financial institution can be characterised as an inevitable part of marketing policy and as such it is an inseparable part of marketing and business plan. The marketing plan is a starting point of the economic management of acquisition activities in retail and corporate segments. Based upon detailed marketing development analyses, extrapolations, and assessed strategic tasks its role is derived from a set of quantified indicators that should be achieved after completing all preconditions predetermining the business plan.

These indicators are used in the process of permanent evaluation of economic results of particular current and future marketing activities as well as acquisition activities of financial institution.

The particular procedure of defining a particular plan has to be published in form of an internal regulation in which exact deadlines for assessed tasks as well as personal responsibilities for their completion must be entered.

Every client within acquisition has to be clearly assigned to a particular client employee who will be responsible for the result of the planned acquisition negotiation. The plans are controlled, coordinated, and approved by the manager of client's department or deputy manager.

4.2.2 Product Range and its Division for Retail Segment

When offering products to particular retail clients the financial institution should derive its action from retail strategy. According to individual client segments, the products are usually divided into existent and new products. Apart from product and distribution strategies a bank should define a systemic support.

4.2.3 Realisation of Acquisition Activities

A realisation stage of acquisition activities directly follows the planning stage while bearing in mind that in some moments both stages mutually overlap. The retail acquisition has two forms, namely individual and complex.

Individual acquisition is performed in sub-segments of private clientele. It is subjected to detailed reporting and is regularly carried out in form of personal meetings with clients. Complex acquisition is performed in all other retail subsegments. It is not reported in detail and its content is composed of a set of area-wide media campaigns, PR and Direct Mail.

4.2.4 Evaluation of Acquisition Activities

Acquisition activities of a financial institution are considered to be one of the tools for implementing the strategic goals and mainly a tool representing a feedback. Because of this, the evaluation of acquisition activities is an important part of economic management in which the controlling department should participate. Apart from planning, this includes the comparison of plans with achieved results. The primary goal of monitoring the acquisition activities in segment retail is to evaluate the fulfilment of planned tasks and running activities in regular intervals. The control is divided into two fields:

- Control of economic and business results;
- Control of promotion efficiency and sale support

A company manager is permanently in charge of controlling acquisition activities. This responsibility associated with a duty to be economically efficient.

5 Discussion

Satisfied customer is of major importance for current and future financial performance of commercial banks. Korauš (2011) states that a satisfied customer stays loyal to his bank while costs incurred by keeping an existent customer satisfied are five times lower than those incurred in the process of gaining a brand new customer. A loyal customer is willing to pay a higher price whereas for luring a satisfied customer away from the competitor means to reduce the price of bank's product by 30 %. A satisfied client represents a free form of advertising. He is more inclined to purchase more products from the bank. A satisfied customer gives positive feedback to banks' employees, which in turn becomes a source of their satisfaction and pride in their work and business.

The level of customers' satisfaction in banking business differs considerably from country to country. The most important reasons for switching to another bank includes an increase in fees, poor service and operational personnel errors (Titko & Lace, 2010), lack of interest in solving clients' problems and high price policy (Belás et al., 2013b).

Our research has not confirmed the fact that the overall customers' satisfaction with provided services depends on age, gender, or education level of banks' clients. Our research has shown some differences between perceptions of selected social groups. For example when comparing young clients with old ones, the former surprisingly considered the poor availability of the branch as an important reason for their dissatisfaction and are less sensitive to the price of products and services. Compared to men, women are more sensitive to the price and mode of operation in the branch. University graduates were more critical of banks and stated that the possibility to e-banking usage is the most important reason for their satisfaction.

These results indicate that attitudes of retail consumers differ from country to country. They determine the current situation on banking market and may have different objective preferences on traditional, historical, cultural, moral and political grounds. In this context, it is appropriate to conduct such studies on regional markets.

6 Conclusions

The model of acquisition activity in financial sector is an alternative for financial institutions and at the same time a suggestion for the procedure as to how to adopt an active approach to gaining and maintaining their clients. Clients are the basis for the existence of financial institution and their acquisition and maintenance are immensely important. This process is influenced not only by the activity and ability of financial institutions, but also by attitudes, requirements and needs of the clients. The success of financial institution in relation to their clients can be achieved merely by means of long-term strong-minded and efficient work especially in the field of direct contact of their representatives with clients. The research and the model give space for open discussion of experts on the problem of acquisition in financial sector.

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Net Working Capital across Sectors in the Czech Republic

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Abstract: *This paper calculates the net working capital of enterprises included in various sectors of the national economy in the years 2004 to 2012. The goal of the paper is to highlight the development and structure of net working capital in the analysed period and the represented sectors, to assess the differences between the indicators in the represented sectors and to highlight the factors influencing the level of net working capital. In absolute terms, the highest level of net working capital throughout the analysed period is reached by the Agriculture, Forestry and Fishing sector. The ratio of net working capital to current assets in this sector exceeded the threshold of sixty percent, pointing to a very moderate way of its management. On the contrary, the minimum values are achieved by the sector of Accommodation and Food Service Activities, where since 2007 the net working capital is increasingly negative. With a few exceptions, we can state, that the most involved on the structure of the net working capital from the current assets are the short-term receivables; inventories are involved the least. Contradictory effect of short-term bank loans is recorded minimally. This implies that short-term payables exclusively have a lowering effect on the level of net working capital.*

Keywords: liquidity, net working capital, current assets, liabilities, analysis

JEL codes: G3

1 Introduction

Short-term financial decisions, which are to ensure the liquidity and solvency of the enterprise, are an important part of financial management. Solvency is generally understood as the ability of the enterprise to pay its debts at the time they are due. For the business to be considered solvent, it must have a certain part of its assets in a highly liquid form, i.e., the immediate availability of money to satisfy a liability is the prerequisite for this matter. Liquidity refers to „the enterprise´s ability to convert its assets into money and to use them to cover due debts - in time, in the required form and in the desired location" (Scholleová, 2012).

One of the basic conditions of existence of the enterprise is then the ability to pay its debts. This ability is measured by the traditional short-term liquidity ratios, in particular, the current ratio between current assets (working capital) and short-term liabilities. Besides of the financial ratios of liquidity, differential indicators are also used for the analysis and management of financial situation with a strong focus on liquidity. The most known is the net working capital (NWC), which is calculated as the difference between short-term assets and short-term liabilities (Brealey et al., 2014). Therefore, net working capital is closely connected with the management of current assets and their financing, which is referred to as the working capital management. Working capital management involves the determination of the optimal value of each item of current assets (inventory, receivables, short-term financial assets) and the determination of their total (the necessary, reasonable) sums and then the choice of an appropriate method of their financing (short-term payables and short-term bank loans).

In the context of the financial and economic crisis, which caused a decline in sales for a number of enterprises, it was necessary to pay increased attention to the management of current assets and their financing, or to change the style of management of working capital altogether. Adjustment of the value of current assets to the decline in sales assumed a restructuring of assets, in the direction to reduce not only current assets, but

also long-term assets. The aim of restructuring of assets should be to maintain the optimal level of assets utilization, even of the current assets. The reduction in current assets can be reflected in the decline of stock; by contrast, in the context of the worsening payment discipline, there may be an increase in receivables. It can be expected that the universally existing failures of money movement in a time of crisis emphasise the necessity of an increase of money share in the structure of current assets.

The aim of this paper is to build upon the analysis of liquidity (Kozáková, 2014), to highlight the evolution and structure of net working capital in the reviewed period (with a focus on the financial crisis period) in the represented sectors of national economy of the Czech Republic and to evaluate the differences between the indicators in the represented sectors and to identify the factors affecting the level of net working capital.

2 Methodology and Data

For the analysis and management of the financial situation of enterprises, with a strong focus on liquidity, the differential indicators are used, among which the previously mentioned, net working capital is included, which is defined as the difference between current assets and short-term liabilities (current liabilities), see formula (1).

$$\text{NWC} = \text{Current assets} - \text{Short-term liabilities}$$
$$(1)$$

If the net working capital is of negative value, i.e. the NWC < 0, "unsecured debt" is formed (Režňáková et al., 2010). A positive value of net working capital represents the portion of current assets which is financed by long-term capital. It represents a relatively free capital (net working capital), which is used to ensure the economic activity of the enterprise. For the enterprise to be considered liquid, it must have the necessary amount of relatively free capital, i.e. the excess of short-term liquid assets over short-term resources (Knápková et al., 2013).

For the analysis of liquidity with the use of the net working capital, the transactions, which resulted in its change (Δ NWC), i.e. reduction or increase over a certain period of time, are relevant, see formula (2). Increases of NWC are caused by the increase of current assets and the reduction of short-term liabilities, while decreases are caused by the reduction of current assets and the increase in short-term liabilities.

$$\Delta NWC = NWC_{end\ of\ period} - NWC_{beginnig\ of\ perio} \qquad (2)$$

In the context of an inter-enterprise and inter-sector comparison, the ratio of net working capital to current assets or the ratio of net working capital in relation to total assets is calculated. The three basic strategies of the management of net working capital in relation to total assets are indicated in the table no. 1.

Table 1 Management Strategy

Strategy	NWC / Assets
Conservative	Over 0,3
Average	Between 0,1 a 0,3
Aggressive	Below 0,1

Source: Marek, 2009

The source data file for the analysis of NWC is based on the Albertina business data database. In total, the basic data file includes 19,075 business corporations with more than 20 employees each, which are analyzed in the period from 2004 to 2012. Table 2 represents the number of business corporations, which in a given have year had relevant results. On average, the basic set is represented by 77%, however, the structure of the representation of individual sectors has not changed. Table 2 also depicts a representation of individual sectors from the core data set in comparison with the representation of the number of registered units according to the Ministry of Industry and Trade (MIT). Manufacturing sector is represented more (C), Professional, Scientific and

Technical Activities less (M). Due to insufficient number of represented companies in the sector O (Public Administration and Defence) by only 3 or 4 companies, they are not analyzed.

When calculating NWC indicator, but also during additional calculations, the values for each company were always found separately and subsequently, the indicator for the representation of the sector as a whole was established. Descriptive characteristics in the form of arithmetic mean has proved to be unsuitable because in all the sectors there are extreme values, and the data sets are not symmetrically distributed, as indicated by the high value of standard deviations. In this case, the median value has a higher explanatory power. Each represented sector is thus characterized by the median of the total number of results in the given sector and in the given year.

Table 2 Number of monitored companies by NACE classification in the period 2004 - 2012

NACE	Sector	Average number of companies	Repre-sentation of data file	Repre-sentation by MIT
A	**Agriculture, forestry and fishing**	781	5%	4%
B	**Mining and quarrying**	58	0%	0%
C	**Manufacturing**	5202	35%	12%
D	**Electricity, gas, steam and air conditioning supply**	155	1%	0%
E	**Water supply; sewerage, waste management and remediation activities**	283	2%	0%
F	**Construction**	1495	10%	13%
G	**Wholesale and retail trade; repair of motor vehicle and motorcycles**	2653	18%	26%
H	**Transportation and storage**	738	5%	3%
I	**Accommodation and food service activities**	422	3%	5%
J	**Information and communication**	481	3%	2%
K	**Financial and insurance activities**	102	1%	1%
L	**Real estate activities**	272	2%	6%
M	**Professional, scientific and technical activities**	824	6%	13%
N	**Administrative and support service activities**	566	4%	2%
P	**Education**	173	1%	2%
Q	**Human health and social work activities**	305	2%	1%
R	**Arts, entertainment and recreation**	138	1%	2%
S	**Other services activities**	76	1%	7%
In total		14 724	100%	100%

Source: Own processing, www.mpo.cz

Quantifying of the impact of determinants on the absolute level of NWC, as well as on its change, is based on deviance analysis. It states, that the deviation of the top indicator can be expressed as the sum of the deviations of the selected sub-indicators. The same principle can also be logically applied when analysing the absolute values of the NWC indicator. Additive ties exist among the components of NWC at all levels of the eventual pyramid decomposition. Quantifying of the impact is therefore based on the ratio of the sub indicator on the overall indicator, or respectively on the ratio of the determining factor change on the overall NWC synthetic indicator change. Mathematically it can be expressed as follows (Dluhošová, 2010):

$$\Delta x_{a_i} = \frac{\Delta a_i}{\sum_i \Delta a_i} . \Delta y_x \qquad\qquad (3)$$

Δx_{a_i} = The influence of the sub indicator a_i on the analyzed top indicator x

Δa_i = The change of the sub indicator a_i (= $a_{i,1} - a_{i,0}$)

$\sum_i \Delta a_i$ = The sum of the change of all sub indicators (for example ($a_{1,1} - a_{1,0}$) + ($a_{2,1} - a_{2,0}$) + ($a_{3,1} - a_{3,0}$) + ...)

Δy_x = Change of the influence of the analysed top indicator

3 Results and Discussion

As expected, the initial results of the NWC analysis have already confirmed the results of the previously conducted current ratio analysis (Kozáková, 2014) and they are extending it further with another perspective on the management of current assets. Throughout the reference period of 2004 to 2012 a rising trend of NWC values in companies representing the individual sectors of national economy is mainly recorded. The most frequent NWC decline occurred across all the sectors in the year of 2012, approximately in a half of the represented sectors. Mainly the development of current assets is responsible for the development of these trends. Similar trends are also shown by the ratio of NWC to total assets, as well as the ratio of NWC to current assets. However, the ratio of NWC to total assets is accompanied by numerous fluctuations for the entire period of time. Even then, we can still consider the trend as rising, with a ratio increase by approximately 5-10%. As far as the NWC to current assets ratio is concerned, only a slight increase of this ratio can be stated, also with more frequent fluctuations.

Based on the median of absolute values of NWC (see Figure 1), it can be noted, that the indicator reaches the highest levels in businesses representing the Agriculture, Forestry and Fishing (A) sector, with an average of almost 20 mil. CZK. Thus, the analyzed companies, after the payment of all short-term debts have an average amount of 20 mil. CZK remaining - in the form of short-term current assets. This part of the current assets is then financed from the long-term capital. It may also be noted that in this represented sector, a cautious approach to the management of current assets is reflected. In the last two years of the reference period high values of NWC are also reached by enterprises in the sector of Mining and quarrying (B), mainly due to growth in receivables and short-term financial assets, and in the Electricity, Gas, Steam and Air Conditioning Supply (D), which exhibits the fastest growth rate due to the high rate of growth of short-term financial assets.

The lowest, but still positive, values of NWC are reached by the examined enterprises in the sectors of Other Services Activities (S) and also Education (P). In this case the NWC values are positive and we can speak of a moderate approach to working capital management. Since 2007 there is a completely different situation in the sector of Accommodation and Food Service Activities (I), which is characterized by negative NWC values. These values are steadily getting lower and lower over time, with the exception of the most recently evaluated year of 2012. It is all due to the higher growth rate of short-term liabilities compared to almost no change in current assets. As a direct result of the negative value of NWC, we can talk about an aggressive approach to working capital management, where companies are unable to pay short-term debts from current assets; on the contrary, they are forced to pay for these debts by selling long-term assets.

Development of NWC in represented sectors does not confirm the negative impact of the global crisis on the level of NWC, except the mentioned sectors of Accommodation and Food Service Activities (I), Agriculture, Forestry and Fishing (A) and Mining and quarrying (B), where in the year of 2009, a decline of NWC occurred (but not in 2011 during the second wave of the crisis). Likewise, in those years in represented sectors, not even the ratios between NWC and assets or current assets are decreasing. Mainly because of growth in receivables the increase of NWC level is more frequent in these sectors.

Figure 1 Development of the absolute values of NWC according to NACE classification in the years 2004 - 2012
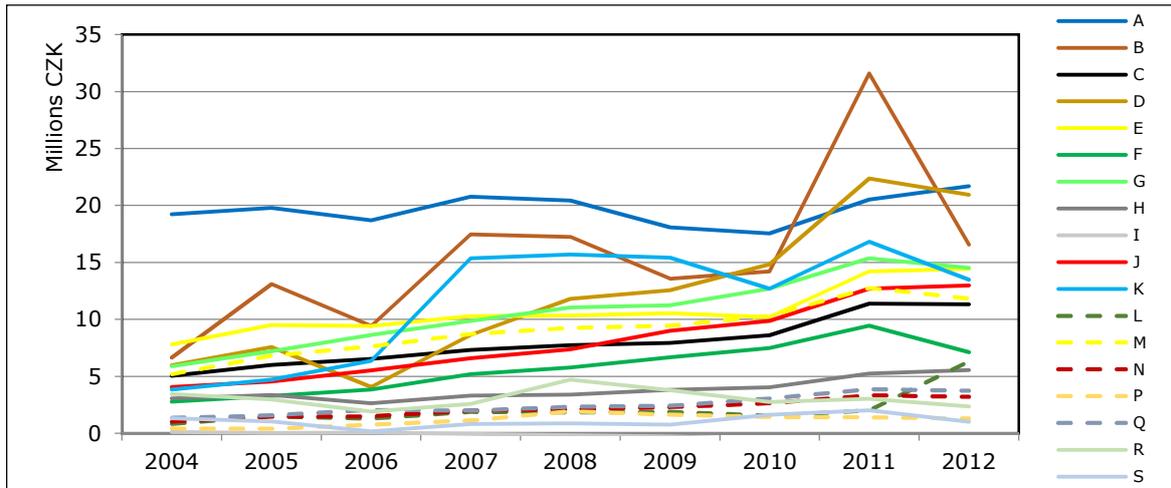
Source: Own processing

It is obvious, that current assets are highly involved on the level of NWC, since NWC, with one exception, acquires positive values in the represented sectors. A better idea about the amount of NWC and the simultaneous effect of influencing factors i.e. current assets and short-term debts, is shown by the bubble chart in Figure 2. The size of the bubble indicates the amount of NWC. So once again, the already mentioned sectors A, B and D are at the forefront of NWC levels. The industries of Financial and Insurance Activities (K), Professional, Scientific and Technical Activities (M), Water Supply (E) and Wholesale and Retail Trade (G) are more clearly illustrated below. At the same time, the graph suggests, that a specific, and often very similar, NWC levels were achieved by using different levels of current assets and short-term debts. The highest current assets and short-term debt levels are represented by the Financial and Insurance Activities industry (K). The already mentioned industry (A) is far below the levels of assets and debts of the industries above, however the NWC values are greater. Other represented sectors are grouped within current assets levels of 40 mil. CZK and short-term debt levels of 20 mil. CZK. With the decreasing size of the bubble, the approach of the level of current assets and short-term debts can simultaneously be perceived.

Figure 2 The average influence of part components on the value of NWC according to NACE classification
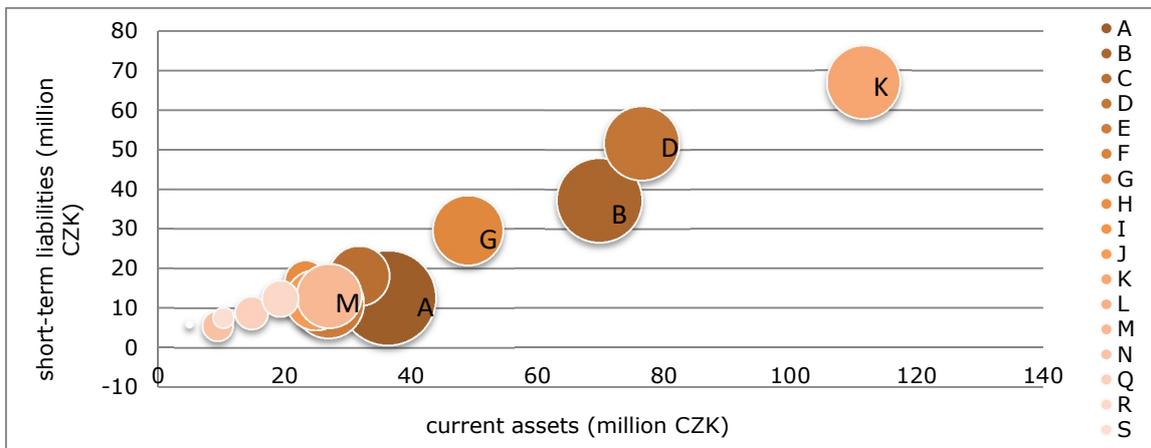
Source: Own processing

The prevailing influence of current assets on the level of NWC, and thus on its development, can be analyzed in the next stage from the perspective of the structure of

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current assets, see Figure 3. The structure of current assets is determined by the focus of the given industry. Figure 3 reveals the dominant influence of current receivables on the total amount of current assets across sectors. Logically, inventory levels are represented significantly in the sectors of Agriculture, Forestry and Fishing (A), Wholesale and Retail Trade (G) and eventually also in the Manufacturing sector (C). In terms of short-term financial assets, especially the industry of Education (P) is worth considering, where this form of property forms the industry average of 64%. Short-term payables are almost exclusively involved on the structure of short-term debts, with a minimal involvement of short-term bank loans and financial assistance. However, this is the result of median indicator, because there are a large number of enterprises with zero bank loans and financial assistance. In terms of mean indicator, where it is necessary to take the extreme values into account, short-term liabilities are involved in short-term payables with about 90%; therefore, a greater significance of short-term debt indicator still remains.

Figure 3 The average structure of current assets according to NACE classification
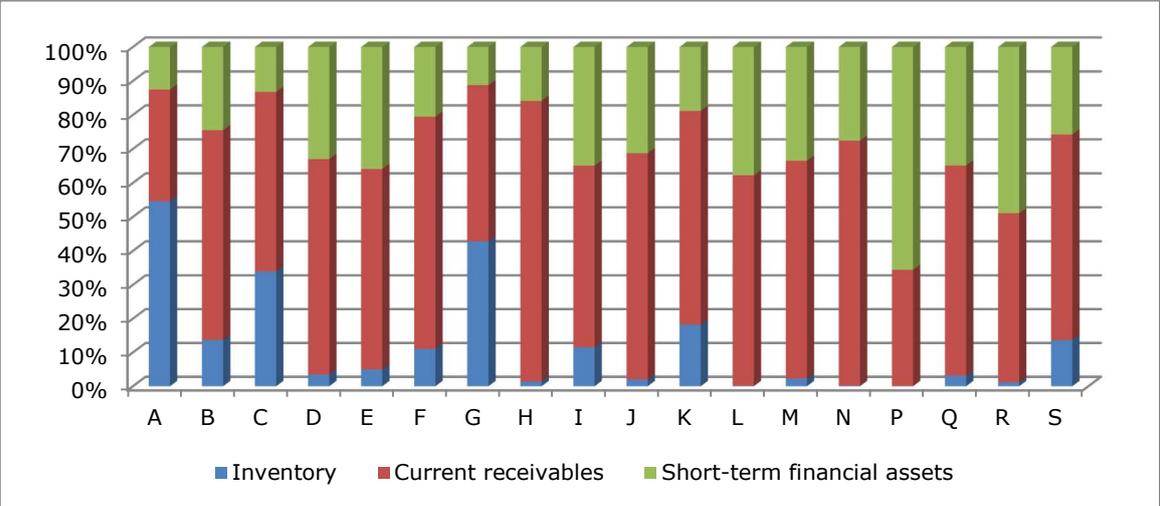
Source: Own processing

In the context of the sector comparison it is appropriate to calculate the ratio of NWC to current assets, or the ratio of net working capital to total assets. From both points of view, the represented industry of Agriculture, Forestry and Fishing (A) still retains a high level of NWC; it is characterized by an average 25% share of NWC on assets and also by 62% share of NWC on current assets. Furthermore, we can also highlight the sectors of Information and Communication (J), Scientific and Technical Activities (M) and Education (P), which can be distinguished by nearly a 30% share of NWC on the assets and 40-50% share of NWC on current assets.

According to the share of NWC on total assets (see Table 3), the approach to the management of NWC can be more accurately determined. The threshold for marking the approach as conservative is 0.3, or 30% respectively. Table 3 shows only a few represented branches, which are characterized by this approach (only in certain years). In particular the Information and Communication (J) and possibly the Scientific and Technical Activities (M) sectors are worth mentioning. On the contrary, the aggressive approach, wherein the values of the NWC/Assets ratio are smaller than 0.1, or 10% respectively, is apparent (as expected) in the Accommodation and Food Service Activities (I) sector. As a rather more aggressive approach to working capital management we can also label the approach represented in the Electricity, Gas, Steam and Air Conditioning Supply (D) and Arts, Entertainment and Recreation (R) sectors; with both averaging the NWC to total assets ratio of 8%.

Table 3 The share of NWC on total assets according to NACE classification in the years 2004-2012

NACE	2004	2005	2006	2007	2008	2009	2010	2011	2012
A	25%	25%	25%	27%	25%	24%	24%	26%	24%
B	8%	12%	15%	14%	15%	15%	16%	15%	15%
C	16%	18%	18%	18%	18%	20%	20%	22%	21%
D	6%	7%	6%	8%	8%	8%	9%	9%	8%
E	17%	20%	20%	23%	18%	21%	21%	24%	24%
F	14%	14%	16%	19%	20%	23%	23%	26%	22%
G	18%	19%	20%	20%	21%	22%	22%	25%	22%
H	12%	12%	11%	13%	12%	11%	12%	13%	12%
I	1%	1%	1%	0%	-1%	-1%	-3%	-3%	-2%
J	25%	27%	28%	29%	**30%**	**31%**	**31%**	**34%**	**30%**
K	11%	7%	9%	14%	13%	17%	16%	16%	19%
L	5%	7%	6%	9%	9%	13%	10%	12%	9%
M	22%	25%	27%	29%	28%	**30%**	**32%**	**36%**	**32%**
N	20%	21%	22%	23%	23%	26%	28%	**30%**	29%
P	22%	18%	25%	28%	**30%**	**32%**	28%	29%	26%
Q	8%	11%	11%	13%	11%	12%	12%	10%	10%
R	5%	9%	7%	9%	9%	9%	6%	9%	7%
S	12%	9%	5%	13%	9%	9%	13%	22%	13%

Source: Own processing

4 Conclusions

This paper calculates the net working capital of enterprises included in the various sectors of the national economy in years 2004 - 2012. Each of the represented sectors is characterized by the median value of NWC of enterprises representing a particular sector.

In absolute terms, the highest level of NWC throughout the analyzed period is reached by the Agriculture, Forestry and Fishing sector. Also during the analyzed period, the sector of Electricity, Gas, Steam and Air Conditioning Supply achieved the fastest growth of net working capital. The lowest values, but still positive, were reached by the analyzed enterprises in the Other Services Activities and also Education sectors. Accommodation and Food Service Activities sector is since 2007 characterized by negative NWC values. Development of the NWC value in the represented sectors does not confirm the negative impact of the global financial crisis on the level of NWC.

With a few exceptions we can say, that from the current assets the short-term receivables are the most involved on the structure of the net working capital, whereas inventories are involved the least. Contradictory effect of short-term bank loans and financial assistance is recorded minimally only in some years in the represented sectors of Agriculture, Forestry and Fishing and Mining and Quarrying. This implies that especially short-term payables have a lowering effect on the level of net working capital.

Based on the share of NWC to assets, or to current assets, the represented sector of Agriculture, Forestry and Fishing ranks itself with 25% on the forefront again. According to the NWC share to total assets it can be stated, that only certain sectors can be characterized by a conservative approach to the current assets management. In this case, the Information and Communication sector (J) and eventually the Scientific and Technical Activities sector (M), can be noted. On the other hand, an aggressive approach is evident in the Accommodation and Food Service Activities sector (I). As a more aggressive approach to working capital management we can classify the approach in the Electricity, Gas, Steam and Air Conditioning Supply (D) and Arts, Entertainment and Recreation (R) sectors.

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Profit versus Cash Flow in Sectors of the Czech Republic

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Abstract: The paper deals with the comparison of profits and cash flows in companies representing various sectors of the national economy in the Czech Republic. The paper compares the parallel development of these financial indicators and reflects upon the eventual cause of a different indicator development. Results confirm that the profit exceeds the annual cash flow, in many cases even several times. Positively may be evaluated, that in the most represented sectors, the situation where profit and cash flow are positive dominates - in ¾ of the cases in the given sectors and period. Significant changes of indicators are characteristic in the development of cash flow. Situations of either parallel increase or decrease of both indicators, or a decrease in cash flow when the profit grows, can be considered to appear with an equal proportion.

Keywords: profit, cash flow, sector of the national economy

JEL codes: G39, M21

1 Introduction

Financial situation of a company can be assessed from the indicators of profit, as referred in the profit/loss account, and from cash-flow, as referred in the cash flow statement. The profit/loss account shows the different categories of revenues, costs and profit in the period of their origin, regardless of whether it actually incurred a real cash income or expenses. That can mean the content and timing mismatch between costs and expenses, revenues and incomes, profit and state of cash funds (Růčková, 2007). The purpose of this report is to capture the relationship between costs and revenues and to report on results and success achieved by the company in a certain period (Kislingerová, 2010). Cash flow, unlike profits, gives a real picture of the cash funds, their increase or decrease in a certain period due to the economic situation of the company. It is also an important tool for detecting erroneous conclusions that may result when assessing the company's financial situation only by profit. (Valach, 1999) Shown profit does not in fact mean sufficient amount of cash funds, as well as the loss their want. Therefore, the company should pay sufficient attention to the cash flows. Cash flow statement shows if the company has sufficient amount of cash funds to ensure its economic activity, allows to determine the cause of insolvency as it provides information on initial and final state of cash funds, their increases and decreases in economic activity, their production and use for a certain period.

The relationship between a profit/loss and cash flow can take on four forms. Profit and negative cash flow indicates problems with enough prompt collection of revenue and the danger of ensuring of the adequate levels of cash. The opposite situation of loss and positive cash flow contrary points to problems with the economy, namely the inability to capitalize on invested capital. Optimal situation occurs when both indicators are positive. Conversely an adverse and in the long term unsustainable state seems loss and negative cash flow.

Company that is profitable but hasn't got the cash for the payment of its obligations cannot be managed in that way for a long time. It is important to try to find the reason for this state; therefore is necessary to monitor, analyse and plan revenues and expenditures and cash flow.

The goal of the paper is to compare profit/loss and cash flow in the companies representing individual sectors of the national economy of the Czech Republic in years 2005-2012. The result of the comparison is a presentation of eventual differences

between profit/loss and cash flow in the monitored period and in the represented sectors, presentation of the development of these financial indicators and presentation of eventual causes thereof. The mentioned comparison of represented sectors in a given period represents one of the possible financial characteristics of sectors and represents a sub-part of the research, which is subject of author´s interest. The results of the comparison can point out the sectors in which greater importance should be given to cash flow monitoring to ensure the eventual insufficient conclusions following from indicators using the profit.

2 Methodology and Data

The source data file is based on the database of the business data – Albertina. In total, the basic data file includes 19 075 companies analyzed in the period 2005 – 2012, each of them employing more than 20 employees. The table 1 shows the average number of companies reporting results in a given year and the representation of individual sectors in the basic sample in comparison with the representation of the number of registered units according to MIT (Ministry of Industry and Trade). On average the basic data file is represented approximately by 78 %. The structure of the representation of the sectors, however, has not changed. The number of companies reporting results in the monitored period gradually increased and reached the highest representation in 2009. Since the following year the number of companies reporting data has substantially decreased. From the comparison of basic data file structure and the structure of the number of registered units according to Ministry of Industry and Trade (MIT) is obvious, that the Manufacturing sector is represented more frequently, on the contrary, the sector of Professional, Scientific and Technical Activities less. Due to the insufficient number of companies represented in the sector O (Public Administration and Defence) by only 4 companies, the further analysis of this sector is not included. (Kozáková, 2014)

Table 1 Number of monitored companies by NACE classification
in the period 2005 - 2012

NACE	Sector	Average number of companies	Repre- sentation of data file	Repre- sentation by MIT
A	Agriculture, forestry and fishing	797	5%	4%
B	Mining and quarrying	60	0%	0%
C	Manufacturing	5 301	35%	12%
D	Electricity, gas, steam and air conditioning supply	159	1%	0%
E	Water supply; sewerage, waste management and remediation activities	290	2%	0%
F	Construction	1 525	10%	13%
G	Wholesale and retail trade; repair of motor vehicle and motorcycles	2 689	18%	26%
H	Transportation and storage	757	5%	3%
I	Accommodation and food service activities	437	3%	5%
J	Information and communication	492	3%	2%
K	Financial and insurance activities	102	1%	1%
L	Real estate activities	283	2%	6%
M	Professional, scientific and technical activities	845	6%	13%
N	Administrative and support service activities	585	4%	2%
P	Education	177	1%	2%
Q	Human health and social work activities	315	2%	1%
R	Arts, entertainment and recreation	142	1%	2%

NACE	Sector	Average number of companies	Representation of data file	Representation by MIT
S	**Other services activities**	77	1%	7%
In total		15 032	100%	100%

Source: Own processing, www.mpo.cz

Profit/loss and cash flow are assessed on the basis of statistical characteristics of the median. Median of profit/loss and median of cash flow of all companies characterize specific sector and a specific year. Descriptive characteristics, like the arithmetic mean proved to be unsuitable, because in all sectors and years there are extreme values and the files are not distributed symmetrically – it is referred by the high value of standard deviations. Thus in this case the median value has greater explanatory power.

Individual sectors and years are assessed by net profit and total cash flow. A more accurate analysis appears to be only the operating profit and operating cash flow comparison. However, these are indicators that are not available in the Albertina database, also the analytical materials of MIT don´t present them. In fact, many companies don´t analyse their cash flow. Therefore, for the purposes of comparison of profit and cash flow is the cash flow determined as the difference between the initial and final state of short-term financial assets.

3 Results and Discussion

Even from the first view it is possible to note the definitely exceeding level of profit above annual cash flow in almost all represented sectors (see Figure 1 and 2). The exception is the sector Arts, Entertainment and Recreation (R) and mentioned may also be sector P - Education. On the contrary, cash flow exceeds income in these represented sectors. The cause is possible to see in the subject of these sectors, the associated minimum inventory and notably in factually the lowest levels of receivables across represented sectors. In the monitored period values of profit in represented sectors achieve positive values unlike cash flow.

Figure 1 and 2 show the development of profit and cash flow in the period 2005-2012 in absolute values (in thousand CZK). For the comparison of represented sectors in terms of the relationship between profit and cash flow absolute value of these indicators does not entirely have the correct explanatory power. It's also important to say that the figures do not include the values of the Financial and Insurance Activities (K) sector; because these values far exceeded the indicators levels in other sectors (profit averaged 9.3 mil. and cash flow less than 2 mil. CZK); consequently, the figures were difficult to read. On the basis of Figure 1 is possible to say that other sectors with the highest profit are the sectors of Mining and quarrying (B) and since 2009 also the sector of Electricity, Gas, Steam and Air Conditioning Supply (D). Other represented sectors are quite evenly distributed within the range from 0 to 3.5 mil. CZK.

In the figure 1 a more frequent decline of profit in 2008 and 2009 can also be noted, suggesting the impact of the economic crisis. Medians of profits in the individual sectors, however, do not show the influence of the second wave of the crisis in 2011, rather we can talk about the influence showing in 2012. The lowest profit in the monitored period was achieved in the Accommodation and Food Service Activities (I) (profit of 53 thousand CZK in average and in 2008 and 2009 even a loss) and Education (P) (profit of 67 thousand CZK in average).

Figure 1 Profit by NACE classification in the period 2005 - 2012
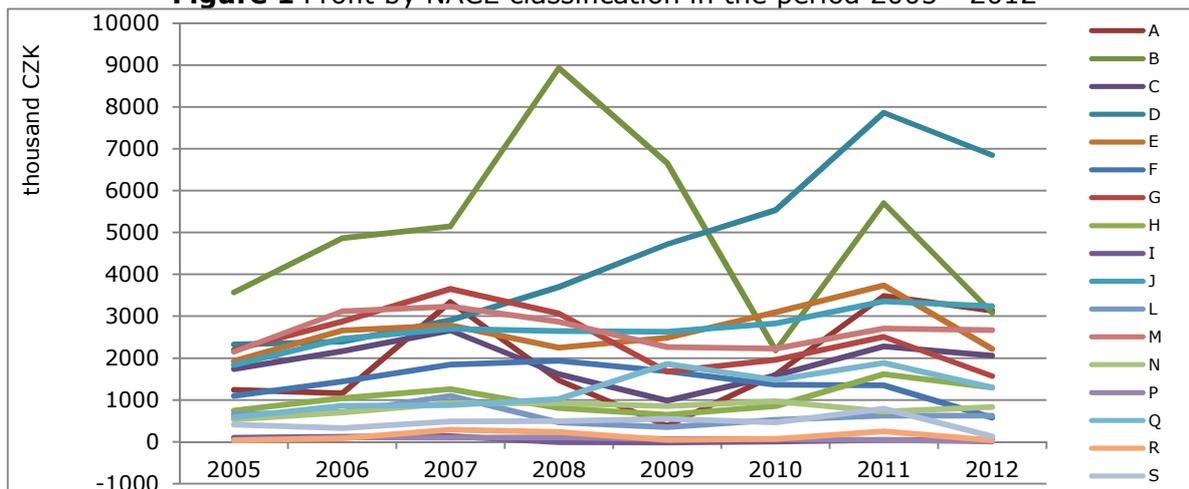
Source: Own processing

Cash flow development (see Figure 2) is marked by more frequent fluctuations than profit in the reporting period, and of course, by the numerous negative values of annual cash flow. As well as for the profit development it is not possible to set specific trend. Cash flow development cannot be fully associated with the course of the economic crisis, because in 2009 there was a negative cash flow (really minimal) only in two sectors (1 thousand CZK in the sector H – Transportation and Storage and 5 thousand CZK in the sector I – Accommodation and Food Service Activities). On the contrary, a more frequent occurrence of negative cash flow can be seen in 2008 and then in 2012. Especially years 2008 and 2011 are connected with the greatest investment activity and the year 2011 with inventory growth. After the above mentioned sector of Financial and Insurance Activities (K), the sector of Electricity, Gas, Steam and Supply Air Conditioning (D) (like in the case of profit) can be mentioned as the one with the highest average cash flow, as can be the Real Estate Activities (L) sector. Average lowest cash flow, negative, can be seen in the sector of Mining and quarrying (B) - average cash flow is -138 thousand CZK; situation in that sector has deteriorated especially in the last two years. Problems with the collection of revenues are likely to occur also in the sector Human Health and Social Work Activities (Q), where cash flow in the last three years became negative with an increasingly deepening trend. This sector can also be characterized by a 60% share of receivables on the current assets.

Figure 2 Cash flow by NACE classification in the period 2005 - 2012
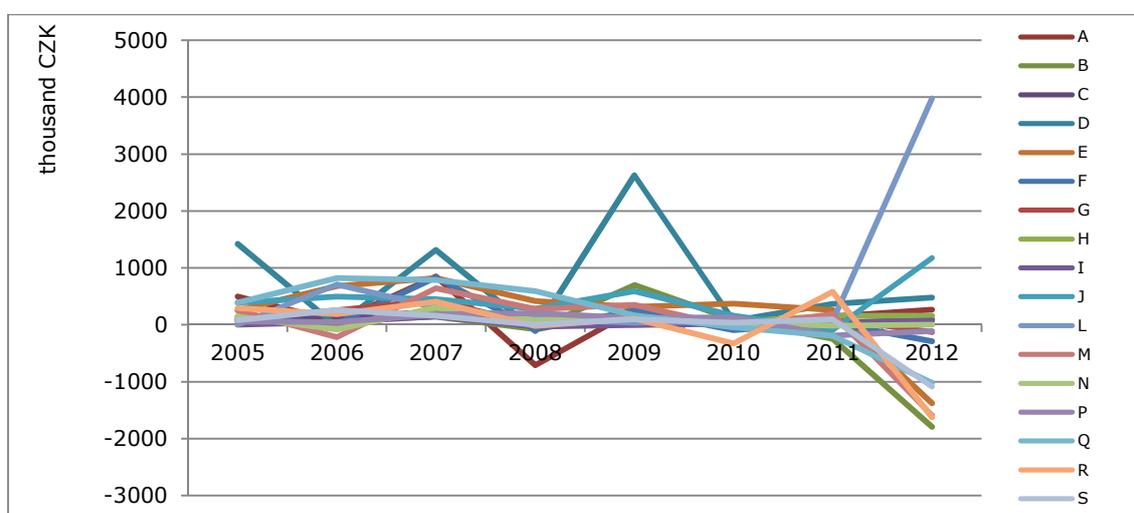
Source: Own processing

Interrelationship between profit and cash flow in the represented sectors and in the monitored period is already apparent; profit exceeds cash flow and while profit is almost exclusively positive cash flow values take on both positive and negative values. The greatest differences between profit and cash in absolute values are detectable in the sector of Financial and Insurance Activities (K) and we can also mention the Mining and quarrying (B) sector. On the contrary, minimal differences are shown in the sectors of Education (P) and Accommodation and Food Service Activities (I). More informative comparison of profit and cash flow in the represented sectors is offered by the ratio of profit to cash flow, which reflects also the negative value of cash flow. Figure 3 shows, how many times in average the profit exceeds cash flow in the sector. The greatest difference between these financial measures is quite clear in the Manufacturing sector (C), where the profit exceeds cash flow even as much as by 220 times in an average. This sector is characterized by a relatively low share of short-term financial assets on current assets (12%), to the contrary the receivables account for less than 50 % of current assets. Comparable change in receivables and fixed assets has the greatest impact in reducing the cash flow. The larger difference between profit and cash flow is also apparent e.g. in the Transportation and Storage (H) sector, where receivables make up for 80 % of current assets and short-term financial assets only for 15 %. They are the sectors where changes of receivables prevail, their growth event twice prevail investment in fixed assets. The minimal difference between profit and cash flow is in the sectors of Education (P) and Arts, Entertainment and Recreation (R). However, the difference in this case is that in the sector P the both indicators are positive, whereas in the sector R the average profit is positive but the average cash flow is negative.

Figure 3 Average ratio of profit and cash flow of the period 2005 – 2012 by NACE classification
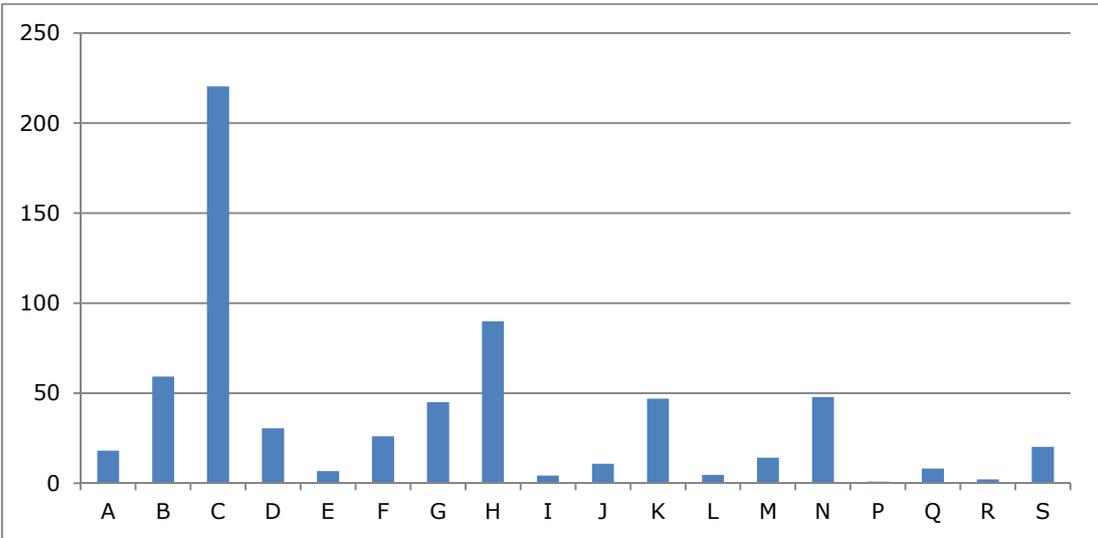
Source: Own processing

As already indicated, in the represented sectors there are various cases of profit and positive or negative annual cash flow. Table 2 presents precisely these relations in all sectors through the analysed years. The blue field with a value of 1 represents the situation of profit and positive cash flow; it is obvious that this situation prevails across the sectors and periods - it represents 75 % of all cases. Conversely, there is no situation of loss and positive cash flow. In the whole monitored period across all of the sectors there were only two years, where in the represented sector of Accommodation and Food Service Activities (I) loss and also negative annual cash flow was present. Red field with a value of 3 indicates a situation of profit and negative cash flow. It is the second most frequent situation in the comparison of profit/loss and cash flow, in 23 % of all cases. The white fields represent a situation where the value of the cash flow was zero. Probably the best in this matter can be considered the evaluated sector of Real Estate Activities

(L), because throughout the period it was profitable with positive values of cash flow. It is also possible to mention other sectors, which have recorded a negative cash flow with a positive profit value, but only once. We can also highlight the sector of Manufacturing(C), where the annual cash flow in 2008 was only -1 000 CZK.

Table 3 Parallel relationship of profit and cash flow by NACE classification in the period 2005 - 2012

NACE	2005	2006	2007	2008	2009	2010	2011	2012
A	1	1	1	3	1	1	1	1
B	1	1	1	3	1	1	3	3
C	1	1	1	3	1		1	1
D	1	3	1	3	1	1	1	1
E	1	1	1	1	1	1	1	3
F	1	1	1	3	1	3	1	3
G	1	1	1	3	1	1	1	3
H	1	3	1	1	3	1	1	1
I	1	1	1	2	2	1	1	1
J	1	1	1	1	1	1	3	1
K	1	1	1	3	1	3	1	3
L		1	1	1	1	1	1	1
M	1	3	1	1	1	3	1	3
N	1	3	1	1	1	1	3	1
P	1	1	1	1	1	1	3	3
Q	1	1	1	1	1	3	3	3
R	1	1	1	3	1	3	1	3
S	1	1	1	1	1	1	1	3

Source: Own processing

Already the opening figures 1 and 2 indicated more or less similar development of profit and cash flow. The average change in these indicators is shown in the Figure 4 which thus confirms the fact of large fluctuations in cash flow compared to almost zero changes of profit.

Figure 4 Average change of profit and cash flow of the period 2005-2012 by NACE classification
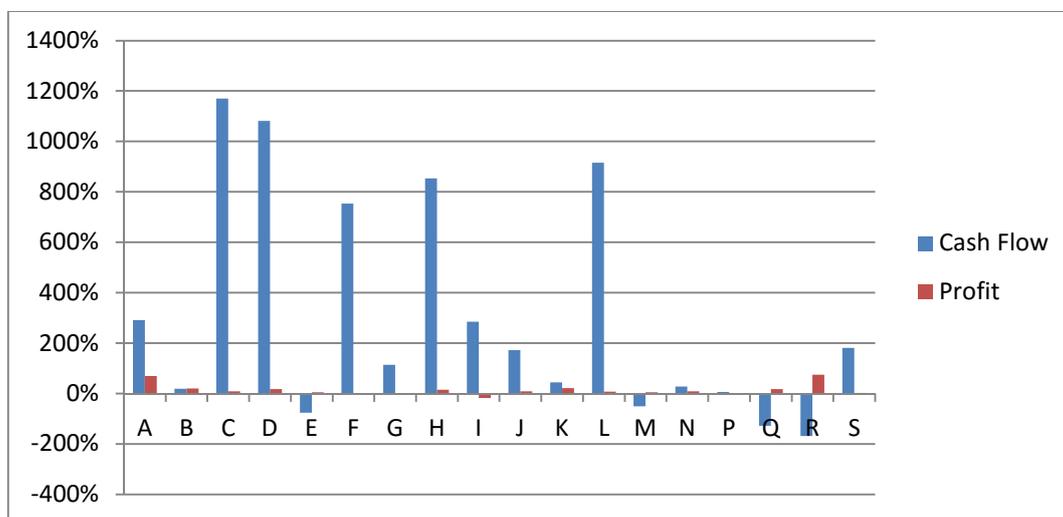
Source: Own processing

The Figure especially shows sectors in which cash flow really significantly fluctuated and in which it has been minimal; or the sectors in which the decrease of cash flow (ie. negative changes) predominates. From the analysis of these changes across the represented sectors and monitored years we can again state four possible situations that had occurred. Most often a situation of growing profit as well as cash flow has occurred, in 31 % of cases to be exact. 26 % of cases represent a decrease of cash flow as well as of profit. Also 26 % of cases include situations of decrease of cash flow and increase of profit. A situation of a decrease of both indicators in the given year occurred the least – in 17% of cases.

Indirect method of cash flow determining consists in deriving from profit by especially receivables, liabilities, inventory, fixed assets and bank loans adjustment. These items have also the greatest impact on cash flow. In the monitored period there is typical a growing trend of mentioned items. The exception is the sector R – Arts, Entertainment and Recreation (decreasing trend of receivables and liabilities) and S – Other services activities (decreasing trend in liabilities and fixed assets). Minimal changes of items are typical for the sector of Education (P). Although receivables in absolute terms are lower than obligations, their fluctuation in relative and absolute terms exceeds. In the monitored period and across sectors there increase especially receivables; only the years 2009 and 2012 are marked by their decline due to the financial crisis. On the contrary, the trend of obligations is not fundamentally influenced. Generally, across sectors and years, we can say that receivables are connected with the greatest absolute change (and thus a significant influence on the development of operating cash flow); especially in the sectors F (Construction), K (Financial and insurance activities) and M (Professional, scientific and technical activities), mention may be G (Wholesale and retail trade) and H (Transportation and storage). The influence of changes in obligations follows; the influence of inventory is the least. The influence of changes in bank loans is negligible. The influence of fixed assets changes on investment cash flow approximate to the level of receivables changes; prevailing influence of fixed assets changes on the cash flow trend is detectable in the sectors R (Arts, Entertainment and Recreation) and L (Real estate activities). Sectors D (Electricity, gas, steam and air conditioning supply) and Q (Human health and social work activities) are characterized by comparable influence of development of receivables, obligations and fixed assets on cash flow.

The results of the cash flow and profit comparison confirm the assumption of preponderance of profit over cash flow. Undoubtedly, it is a positive finding that sectors are characterized by profit, not loss. The fact, that cash flow has both positive and negative values, points to the suitability (if not even necessity) to apply also indicators based on the using of cash flow (not only profit/loss) in evaluation of the financial situation. This applies especially in cases where the differences between profit and cash flow are significant. The highest profits and also cash flow was reached by the sectors of Financial and Insurance Activities (K) and Electricity, Gas, Steam and Air Conditioning Supply (D). The lowest average cash flow, a negative value, concerns the Mining and Quarrying (B) sector. The biggest difference between profit and cash flow has occurred in the Manufacturing (C) sector, where profit exceeded cash flow even by 220 times on an average; mentioned in this case can also be the Transportation and Storage (H) sector. Just in these sectors (B, C, H) can using of cash flow indicator prevent erroneous conclusions that may result when assessing the company's financial situation only by profit. On the contrary the minimal differences between profit and cash flow are in the sectors of Education (P) and Arts, Entertainment and Recreation (R). The situation of profit and negative cash flow represent approximately a quarters of all cases. Especially in these cases it is expedient to supplement the common indicators of profitability, liquidity etc. by indicators based on the using of cash flow and by the search for the causes of negative cash flow. E.g. in the sectors Mining and Quarrying (B) and Arts, Entertainment and Recreation (R) there the investment activity has the greatest negative impact on negative cash flow; while in the sector Professional, scientific and technical activities (M) there are the growing receivables.

4 Conclusions

The paper compares the state and development of profit/loss and cash flows in the companies representing sectors of the national economy in the years 2005-2012. From comparison across all represented sectors a superiority of the profit level over cash flow values is immediately obvious as well as almost exclusively positive profit values and positive or negative cash flow values, with more frequent fluctuations in cash flow and completely ambiguous trend of both indicators in the period. More frequent decrease of profit in the years 2008 and 2009 highlights the influence of the economic crisis. This cannot be said for cash flow which is rather positive in 2009; a higher number of sectors with negative cash flow tend to appear in 2008.

The parallel relationship of the level of profit and cash flow indicates that positive values both indicators represent 75 % of all cases. There is no situation of loss and positive cash flow. Less than a quarter of cases represent situation of profit and negative cash flow. Probably the best can be rated the Real Estate Activities (L) sector, because it reaches profits and positive cash flow throughout the period. The Manufacturing (C) sector may be also highlighted. From the profit and cash flow minimal difference point of view, the sectors Education (P) and Arts, Entertainment and Recreation (R) are possible to mention.

The research of the financial situation of the represented sector in years 2005 – 2012 in terms of profit/loss and cash flow comparison confirms the importance of distinguishing of these indicators and the importance of their applications in financial indicators evaluating financial situation. This applies especially to the sectors characterized by an average negative cash flow. Company that is profitable but hasn't got the cash for the payment of its obligations cannot be managed in that way for a long time.

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Fields: Investigating the Visibility of the Flows in Digital Business

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Abstract: *Traditional investment and management tools fail to capture the complexities of a networked, digital business economy: SWOT analysis are static, accounting ratios are unidimensional. More importantly, those artifacts are unfit to deal with intangibles- by definition, the "material" information-based economies transact on. Here we present a Weak Signals technique -Vector Fields Flows- to dynamically profile strengths and opportunities in digital businesses, specially those heavily reliant on web search as source of revenue.*

Keywords: brand valuation, valuation of intangibles, complex systems, predictive analytics, digital economy

JEL codes: M21, C61, D82

1 Introduction

Recent research (Ibbotson and Idzorek, 2014) has identified the central role of popularity in asset pricing, arguing for the consideration of popularity outside of a standard risk framework, and differentiating low-popularity equity strategies from low-volatility and low-beta strategies. Particularly, it has been found that besides premiums that are considered permanent (for example, for risk, liquidity, taxability, and so on) and are expected to provide excess returns even after their discovery, as a stock's popularity increases, its price rises, and the investor not only gets the premium but also the return from the increase in popularity. The more transitory popularity characteristics, for example, the stocks that are highly traded, in the news, or there is much excitement about, may be associated with mispricing. As Ibbotson and Idzorek found, in all cases, the movement from the unpopular dimension to the popular dimension corresponds to relative price increases. However, this sort of mispricing seems to impact shorter term returns but not necessarily long-term returns.

We have seen that this conception can be extended as well to private companies operating mainly in the digital economy, given that the right popularity signals are measured. The character of these signals might be weak in nature (for instance a small-medium size private business doesn't usually get much coverage in the news), but nevertheless possible to acquire, condition and process, to present in a visual context that can facilitate decision making. These weak popularity signals change fast, with a degree of randomness, and are buried in noise (so, they are more similar to what one will see in complex physical systems), which calls for a non traditional approach for their study. In other words, before we could even begin to assess impact on asset prices changes, we need a device that can allow us to identify general patterns, a phase portrait on revenues or anticipated liquidity changes linked to popularity -computational models of Vector Fields and Flows (Weisstein, 2015), have shown particularly fit to the task. We foresee that a refining of these techniques may provide proxies to anticipate changes in revenue streams and the value of intangible assets, therefore enhancing the digital business reach of commercial valuation models such as the VIM Model for Appraising the Trademark of an Unlisted Company (Čižinská, Krabec, 2013).

The study of search volume for finance keywords in Google Trends has suggested that there are patterns of early warning signs in stock market moves, and this is consistent with Herbert Simon's model of rational choice (Preis, Tobias and Moat, 2013). Online businesses revenues are exposed to the effects (risks) of unpopularity: When Yelp Inc. (YELP) presented its SEC filings, it clearly stated that "we rely on traffic to our website from search engines like Google, Yahoo! and Bing. If our website fails to rank prominently in unpaid search results, traffic to our website could decline and our business would be adversely affected"; this kind of organic ranking is correlated with the human factors (trust, popularity, and so on) that the search engines algorithms ascribe to websites. After all, most elements contributing to increase of (prospect customer) traffic in the web have a parallel with the real world (website : property-real state, organic search : yellow pages, social : word of mouth, backlinks : referring partners, display advertisement : billboards, universal search : media and news, and so on), and therefore is a factor in increasing visibility. Smaller, unlisted companies may be even more exposed to popularity risks: they usually rely on less diversified revenue streams, with incoming traffic concentrated in a few countries and product catalogs focused on a single type of offering usually reliant on a constant stream of new leads (one time sales, software as a service with large churn rates, subscriptions based in freemium upgrades, and so on).

Emerging properties of complex human-machine systems appear to have an effect in the movement of security prices: A fact well known by search engine optimisation industry practitioners is that, for listed company operating online businesses with websites that are highly reliant on search, a change on search algorithm can positively or negatively impact stock price. When Panda 4.0 -the codename for a Google algorithm change that penalised a number of e-commerce sites by reducing their search ranking, therefore decreasing the probability for visitors to find them, was rolled out on May 22nd 2014, RetailMeNot Inc (SALE:NASDAQ GS) stock dropped 10% or in other words, "Google's change helped to wipe $170 million from their market cap in a single day. Since a high in April their stock had dropped 29% by October" (Allsopp, 2014). For some time it was observed that the impact of search algorithm updates consistently followed that sort of "tsunami" pattern: a first shock wave could erase value just after the change, in anticipation to the penalisation, and the second shock (the big wave) would come around 2 months after, when the impact of the change was evident and earnings had to be reported. However, recently Google has been deploying its algorithm changes in more unpredictable ways, with progressive deployments that start at different dates in different countries and, thus, calling for novel non-linear and multidimensional mapping techniques.

Since signals may come from a variety of direct sources (search, social networks, display advertisement, etc) thus relating to intrinsic strength, and indirect sources (such as the transfer of risk from linking partners exposed to their own search, social network, visibility changes) therefore affected by extrinsic factors, and they represent a continual information stream, we believe that a suitable technique to visualise the topology of the flow can take as a model moving fluids and electromagnetic fields, where each point in space has a velocity vector, making all the points into what is called a vector field. Validation about the importance of visibility comes from the study of complex networks - we know that mechanisms such as grow and preferential attachment in fact operate in business networks and the world wide web, showing self-organization due to the local decisions made at each individual node, based on information that is biased towards the more visible nodes (see already in Barabási, Albert, Jeong, 1999).

2 Methodology and Data

In our study we have used aggregated metrics (indexes, scores, statistics) from billions data points logged by specialised data mining vendors operating sensors and data collection facilities across the world. We have also used anonymised financial information (ratios) from some of the companies under study. The vendors for the curated datasets are providers to some of the most data intensive online businesses (e.g eBay Inc.), and according to multiple independent reviews, are best in class: Israels' SimilarWeb LTD and Germany's SearchMetrics GmbH; below we cite the vendor's disclaimer on the source, treatment and reliability of their data.

SearchMetrics' SEO Visibility presents the current trend and historical development of a domain's visibility in search engines. The index reflects how often a website shows up in the search results. SimilarWeb's Traffic sources data comes from 4 main sources: [1] Panel of Web Surfers - the largest panel in the industry (tens of millions). Panel data is collected from tens of thousands of browser plugins, desktop software, and mobile apps. [2] Global Internet Service Provider - data from local Internet Service Providers (ISPs) in many countries. [3] Direct Measurement - web traffic from tens of thousands of websites that share their data with SimilarWeb. [4] Web Crawlers - scan every public website to create a highly accurate map of the digital world. All Vector fields and Network graphs are computed and plotted by using the Wolfram Language (Mathematica).

3 Results and Discussion

COMPANY A: MONEY FLOW TRIGGERS

Company A is a (private) online business that holds customer's balances, and it is highly reliant on web search as a channel to gain new customers. Let us start by defining an arbitrary "liquidity ratio" (only for the purpose of this case) as the percentage *liquidity = deposits/withdrawals*, e.g when deposits are 2 times withdrawals then it means high liquidity, if withdrawals are 2 times deposits it means low liquidity (and at lower levels, possibly a sign of alarm). In this case, the liquidity ratio encodes transactional data from thousands of customer transactions each day. Beyond this basic (intrinsic) relation, (extrinsic) popularity related forces acting in feedback loops may also effect upward and downward pressure on liquidity. Figure 1 uses the "stock and flow" concept from the System Dynamics methodology (Forrester, 1971) to depict those relationships.

Figure 1 Liquidity ratio (instantaneous rate) as representation of the flow level, and possible feedback loops correlated with increases and decreases in popularity
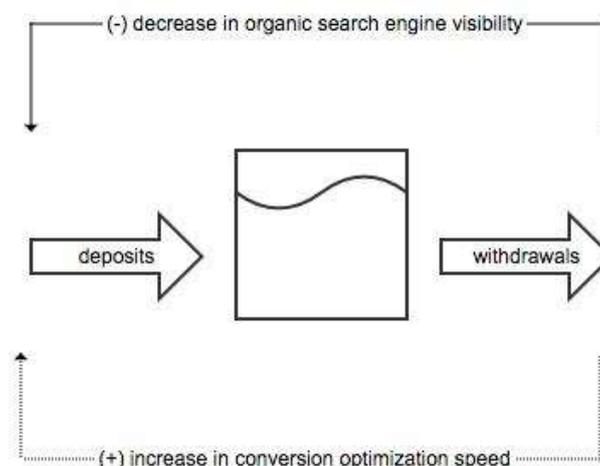
Source: SearchMetrics and private cashflow statements

Then we can define a study period of 6 months, and draw gauges for 2 moments at the beginning and end of the period (Figure 2), as typically represented in financial dashboards and other commercial products.

Figure 2 Liquidity, the static measurement
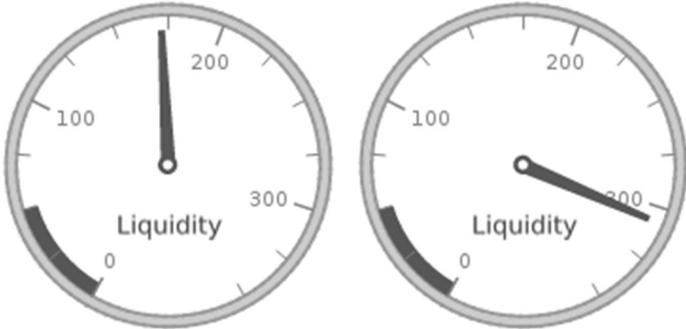
Source: Company A financials – an example

Note that Company A works as a business unit. A brand that is beyond its asset function acts as its own profit center as well. The static representation is convenient for some purposes - it is a quick pulse for the health of the operation, and it offers some information security (no actual deposits or withdrawals figures are shown). The problem with this approach alone is that an observer has to be *in* the organization (have complete internal information) to notice disturbances within the flow, and furthermore, he would be unable to perceive external variables that may affect or compensate for sudden changes in flow (such as search engine visibility changes due to traffic and ranking corrections, etc). Viewed from above (top view perspective), and at a distance (as it is usually the case, because we always have incomplete information about our competitors, other market players, and even ourselves), we might get a clearer visual of where the stream is constant and where it is disturbed. This also allows us to add extra dimensions to our data, beyond the simplistic "money level". This sort of hidden flow will look as in Figure 3 from above, when representing the data as a stream (or money on the surface),

Figure 3 Streamplot for the **vector field (liquidity, visibility)**. The time-like surface covers a period of six months (x-axis) over 4 weeks (y-axis)
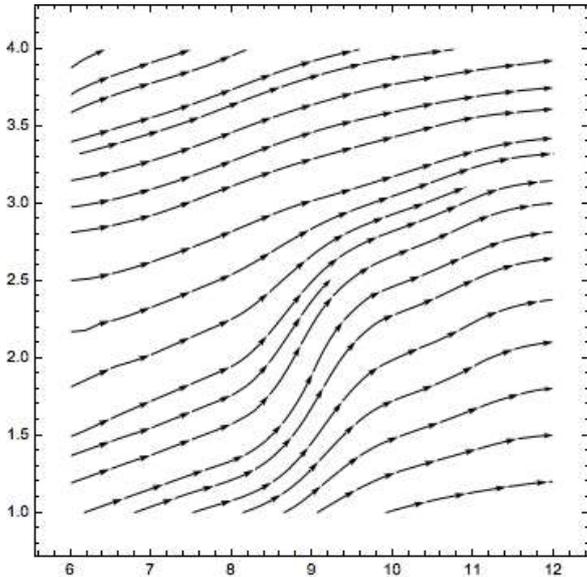
Source: SearchMetrics and Company A financials

The streamlines here show the direction of the velocity of the liquidity ratio and visibility index, and have been used by multiple authors to study fluid characterictics in physical systems such as flow patterns (Yang, 2012) and critical points (Levine, 2005); the visual arrangement combines the benefits of a long exposure photograph, that captures several different instants of time on a single print (similar to a fireworks or fire show picture, where a number of frames for the instantaneous fluid appearance of flames are presented together into a single photo) and a light field image (that conveys all the information available about intensity of luminosity, direction of movement, and aestetics characteristics), where different focus points can be studied *a posteriori*. In a way, we are applying a transformation of vast amounts of data points from the digital economy realm to a more tangible expression: converting digital-to-analog signals, for the convenience of the decision maker that has to quickly understand and act upon the data at hand. Furthermore, the field visualisation is generated programatically, so it can be updated with the most recent data in real time, in a cloud computing environment.

From the slope of the curves we can see what appears to be a flow pattern with tendency for incremental changes in velocity; however the most intriguing criticality occurs during the first 2 weeks of the third month, where an accelerating stream driven by the visibility component of the vector catches the eye. As expected from emerging behaviour in complex networks, a simple regression fails to capture the relationship in the data (visibility shows no statistically significant effect on liquidity). Nevertheless, it is clear that there is some sort of "impulse response" present here, where a spike in visibility in week 12 gives momentum to liquidity (week 13 peak, and the overall raising trend after that, in Figure 4),

Figure 4 Visibility and liquidity trends (weekly). Ratios and indexes are shown in the y-axis and weeks in the x-axis
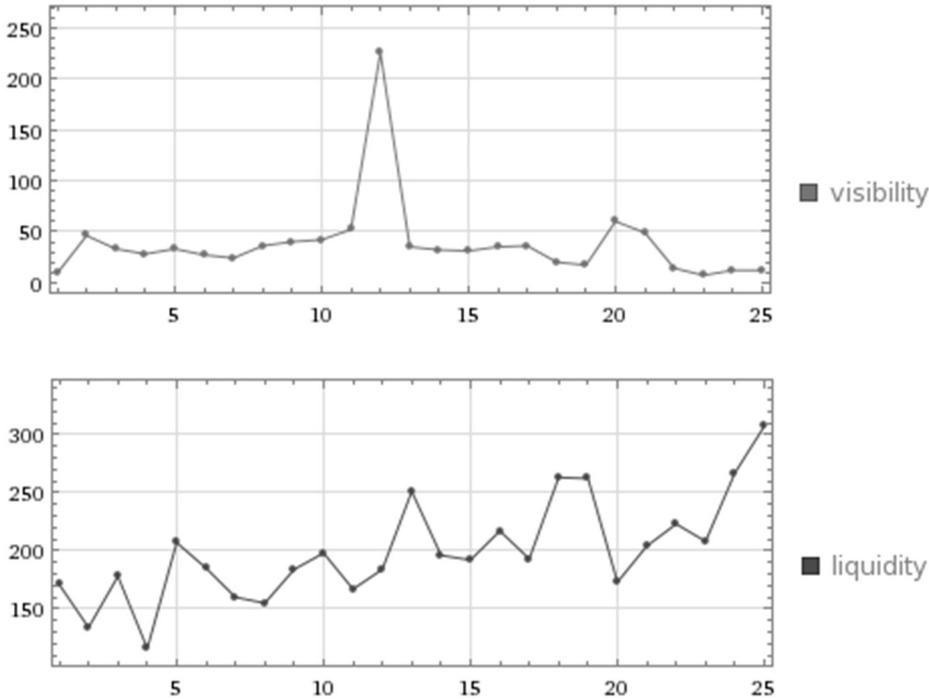
Source: SearchMetrics and Company A financials

The discovery of this kind of "bursty" behaviour is one of the key insights from the modern study of complex systems. The dynamics of a wide range of real systems, from email patterns to earthquakes, display a bursty, intermittent nature, characterized by

short timeframes of intense activity followed by long times of no or reduced activity (Goh and Barabási, 2008).

What we are seeing is similar to turning on an extremely bright light in a dark room for a short moment: suddenly one obtains a wealth of information to navigate the environment, at least for some time (as memory and interest allows). But how can bursts act as triggers to changes on the flow?, what are the key signals to control their occurrence, and for how long might their effect have material impact? This is an important point, because any chance of replicability may have immediate positive effect on revenues.

The mechanics of bursting are the subject of a separate study. For now, let us focus on the visualization of the flow, and its utility to inform management and investment desicions. We know that a vector field arises in a situation where, for some reason, there is a direction and magnitude assigned to each point of space (Asimov, 1993). Particularly, we are interested in the critical points (singularities) in the field, therefore we may find convenient plotting a Line Integral Convolution Plot (Cabral and Leedom, 1993, Laidlaw et al, 2001).

Figure 5 Simplified representation of the dynamic flow, using Line Integral Convolution
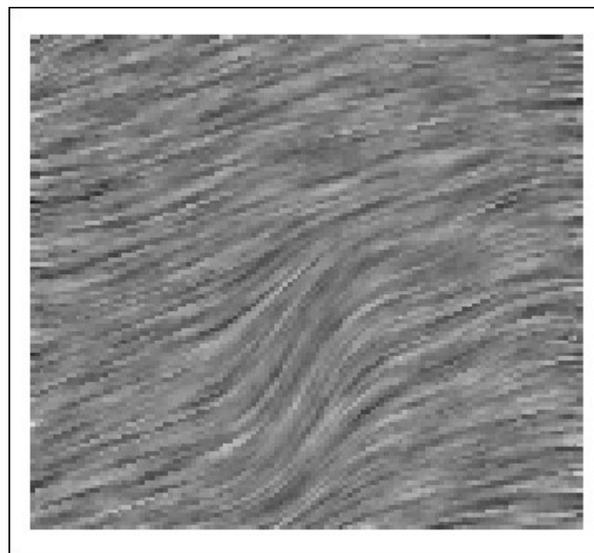
Source: SearchMetrics and Company A financials

At this point we can tangibly perceive that liquidity follows visibility. Our new visualization as shown in Figure 5 works like "painting with light", only that in this case we have a (liquidity,visibility) field rather than a light field. A quick look into this kind of phase portrait will immediately give a feeling of the opportunity, and provide direction into which questions to ask next. There is also an enhanced information security aspect to this representation, due to the possibilities that it offers to encode information using colours, or even plain sight hiding of secret messages (for instance by using steganography techniques).

COMPANY B: ANTICIPATED LIQUIDITY CHANGES

Company B is a medium-large size information portal (receiving over 5Million visits a month from desktop computers), that is specialised in technology tutorials. This kind of firm operates mainly a business model of content production & advertisement sales and, therefore, relies on a continual stream of fresh traffic to generate revenue. Not having the benefit of internal information on the operations of this private business, how can we anticipate downside pressure on revenue? First, in Figure 6 we notice that most of the traffic (around 94%) comes from organic web search, meaning that listings are appearing in search engines due to relevance to the query, not paid results; the rest of

the traffic is divided among direct visits (visitors who already know the site address), universal (multimedia and news listings), social network traffic, paid advertisement, and second level traffic (routed though referring/partner sites).

Figure 6 Traffic sources for Company B website, links are coloured by strength of traffic received
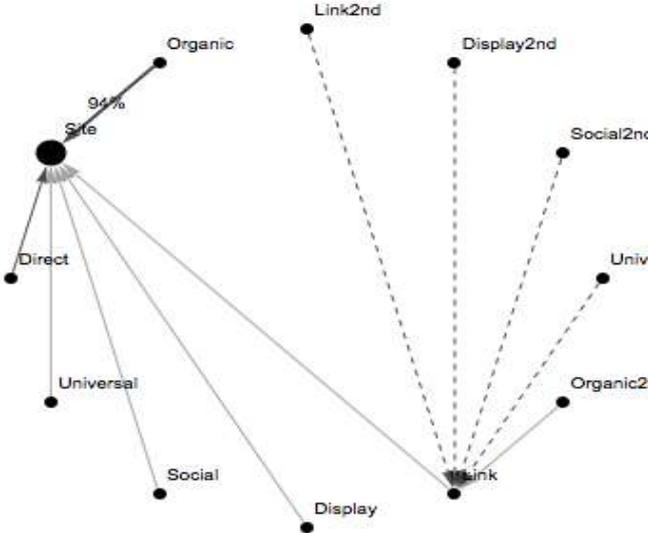
Source: SimilarWeb

Now that we identified what is important (the main acquisition channel for new visitors), we can obtain the visibility spread by country, to further narrow our focus. By looking at the top 5 contributor countries, we find that United States and Canada account for over 50% of both visibility and traffic, so we now plot the visibility vector field for a period of at least 2 years (in order to capture the possible effect of business cycle). Vector fields have been used extensively in physical and biological applications to encode data sets as an equivalent alternative to differential equations (Asimov, 1993) and more recently in evolutionary game theory and economics (Sandholm, 2010),

Figure 7 Visibility vector field **(United States, Canada)** during 27 months. The time-like surface covers a period of six months (x-axis) over 4 weeks (y-axis)

Source: Searchmetrics

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In Figure 7 we plot the vectors themselves (not just the streamplot). Therefore we can appreciate both magnitude and direction of the visibility field; we notice that visibility seems to be stronger during the second year, and it seems to have the same direction with a general tendency to increase. In general terms, the importance of mapping visibility country pairs is that it allows to capture the moments when the value of the indexes reinforce each other, when a weekly drop in one geography is cancelled by the surge in another, and so forth; in this specific case the impact is limited, though, since there is a difference of one order of magnitude between the two geographies mapped, the website receives its largest share of traffic from the US. Now that we have a general understanding of the shape of the data we can focus in the area that seems more intriguing, the last ten weeks of the period. We are interested in large movements, apparent changes, and critical points in the flow pattern; in this view we get some hints on differences of density.

Figure 8 Detail of the vector field and vector density plot for the area of interest (weeks 17-27) and **Visibility vector field (United States, Canada)**
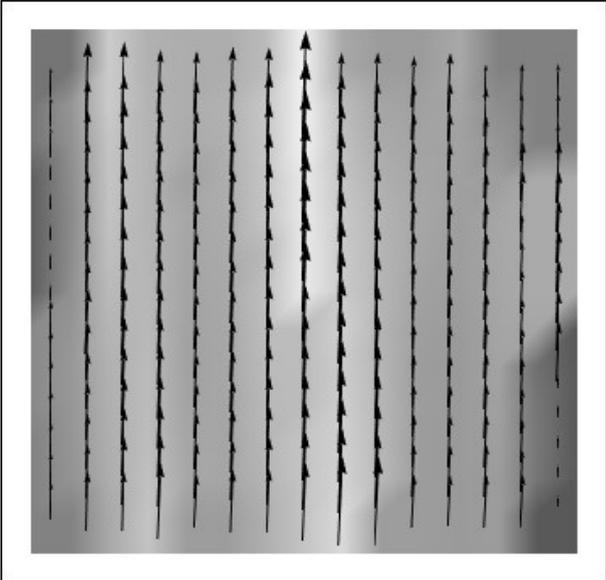
Source: Searchmetrics

In Figure 8 we have plotted both the vectors and their density, which serves to facilitate interpretation - the eye is immediately directed to the top side in the middle of the period, which is the region with stronger field/visibility, as denoted by the lighter background. Conversely, the darker spots around the first weeks of the last month become a focus of attention for further investigation (why was the visibility so low then?, perhaps a technology operations issue, loss of search engine rankings competitiveness, other?).

This is in effect a map of anticipated visitor liquidity and therefore, revenue; this is akin to "turning on" a light at different spots of space (in this plane, time) - search engines will show online presence clearer at some points (and moments) and not so clearly at others, therefore limiting the ability of the online business to attract new visitors, and advertisement partners. An useful analogy from the physical world is that of a dark room where only when light is turned on at certain moments an object is visible and therefore potentially reachable, or that of one retail shop that looses its listing on the yellow pages - it will retain some walk-in traffic for a while as an effect of previous visibility, but eventually its traffic will fade as new customers can not see a clear path to it and have no way to find it.

4 Conclusions

In Mergers & Acquisitions and other investment activities there are at least four distinct phases: Target identification, Due diligence, Negotiation, and Valuation; in the context of digital businesses, the use of advanced analytics is essential in at least the first two of those. Topological data analysis deals with the study of the shape of data to extract encoded meaning from large, complex datasets; system dynamics shows how structure determines behaviour - shape matters. Literature on the valuation of intangibles and the role of popularity to boost short term asset performance, supports the case for developing new methods to extract valuable business meaning from the hidden and weak signals present in the digital economy - specially, but not constrained to, private companies where the availability of information for investment and competitive decision making is limited. We have seen how vector field topology is useful for flow analysis and visualisation, and to provide an intuitive way to quickly identify critical points in circumstances where data is massive, continually changing, and assymetrical, in terms of geographical reach. We have demonstrated how to approach the construction of a elemental liquidity portrait, both for the case of availability of partial internal information, and availability of external information only. This type of exercise may help online businesses to anticipate liquidity issues or track competitor's position changes, and investors to assess the quality of prospect leads and portfolio companies. A future paper will analyse in detail different types of flow patterns observed in online businesses, their meaning and utility for decision making.

Acknowledgments

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The Impact of Interbank Interest Rates to Banks' Profit

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Abstract: *This paper aims to clarify on the basis of historical data analysis, development PRIBOR impact on the development of profitability of commercial banks. Attention is also paid to their impact on risk. In parallel with the decline in the growth of PRIBOR and liabilities of the banking sector, there are changes in their profits and attitudes to risk.*

Keywords: liabilities, profit, rates, risk, management

JEL codes: C15, E43, G21

1 Introduction in Problematic of Profit and Assets and Liabilities Management

Management of assets and liabilities form the crux of bank management and is an essential part of the financial management of the bank. It's a way to control the structure of bank balance sheets, which is an overview of the Bank's assets and the sources of its funding.

Management of assets and liabilities refers to the bank as a whole. The bank always acts in the space defined by the central bank, and must respect its actions in terms of prudent banking and monetary policy.

The results of the management of assets and liabilities are reflected in the overall results of banks. It plays a significant role and expected developments in key interest rates. The paper mainly deals with the impact of interbank PRIBOR 3M, which is considered crucial interest rate. Banks derive mainly from the interest rate of loans provided to clients.

It is also possible an objection that the rate is not important. Theoretically, it is possible to consider a rate announced by the central bank (the discount rate and the repo rate), which have a decisive impact mainly on bond prices. Rate announced by the central bank are reflected in the rates of the interbank market. Therefore, in these calculations considered with interest rate 3M PRIBOR.

For stable development of the Bank's profitability is essential and skilled management of assets and liabilities that form the focus of bank management and is an essential part of the financial management of the bank. It's a way to control the structure of bank balance sheets, which is an overview of the bank's assets and sources of its funding, with the aim of maximizing profits.

The crucial impact of the developments especially liability and the possibility of their use in risk management. For relevant risks are considered for analysis:
- Credit risk.
- Interest rate risk.

Management of assets and liabilities refers to the bank as a whole. Bank always operates in the space defined the central bank, and must respect the measures in terms of prudential banking and monetary policy.

To bank management also reflect the macroeconomic impact of regulation of the banking sector in particular, as currently applied BASEL II and the upcoming BASEL III which banks are implanted Slovik and Cournede (2011).

2 Using Methodology and Data

In this research we draw mainly of the following methods.

The basic method for following studying and analysis of the data, followed are the Positivist research methodology and Pragmatism. Basis is on date analysis methodology. Following methods are the methodology of critical rationalism, followed by economic and statistical methods to evaluate lessons learned using CNB data.

In this paper is used primarily analyzing data that are available in the ARAD system CNB. The analysis is focused exclusively on the Czech Republic for which data are available in a sufficiently long time series, which allows the adoption of conclusions. Use literature search is limited primarily to basic literature dedicated to banks and their ratings. It is considered relevant for the analysis of profits especially in relation to the development of particular interest rates, balance sheet and risks in the banking sector. For purposes of evaluating risk development are utilized.

Data are not available for the entire period from 1993 to 2014. Available are mainly basic development indicators of the banking sector. Some data are available since 2008. Nevertheless it can be said that the CNB data provides sufficient overview of developments in the banking sector and enable an analysis of its development.

3 Results and Discussion for Profit and Assets and Liabilities Management

Asset and Liability Management forms the center of gravity of bank management and is an essential part of the financial management of the bank. It's a way to control the structure of bank balance sheets, which is an overview of the Bank's assets and sources of funding.

Management of assets and liabilities refers to the bank as a whole. Bank to manage bank risk diversification, risk-border specifying the volume of the lower and upper boundaries, while respecting the criteria of profitability and bank profitability. In Management of assets and liabilities of the bank always operates within the boundaries of the central bank, and must respect its actions in terms of prudent banking and monetary policy.

Although it is necessary to understand the management of assets and liabilities as a whole, liability management has its own rules and peculiarities, by analogy asset management.

Quality management assets and liabilities are reflected in the Bank's profit. Development of interest rates is crucial for the development profit. If the expected rise in interest rates on granted loans are rising as banks' profit. In the event that the banks expect a significant drop in interest rates depositary, which only belatedly reflected in interest rates on the loans, then their growing significantly.

For those reasons, the bank devoted significant attention to the expected development of interest rates and together with it and devote greater attention to the management of liabilities and assets.

The Management of Banking Liabilities

Its aim is to raise resources from the principle that the cost of obtaining funds should be as low as possible and principles at least partial alignment with the requirements of the asset side of the liabilities side in terms of their maturity deadline overs, interest rates and their sensitivity. Extraction of resources, the Bank actively supported the process of marketing measures.

Every bank has its own specific sources. The Bank shall have an overall resource for your business in a structure with respect to the assets side, the current market situation, resources, assessment in terms of risk and the costs, or from other aspects.

Management of bank liabilities is important not only from the position of the profit motive sourcing the lowest cost and with the longest possible their use, but also with regard to the problem of bank liquidity.

The Management of Bank Assets

Its aim is to use the acquired financial resources so that adequate revenues were at the highest risk reduction, and it is necessary to take into account the liabilities in terms of maturity, deadline-overs, etc.

When creating the structure of bank assets is necessary to comply with two basic goals - profitability of banks on the basis profitably used resources and the stability of banks on the basis of risk management.

In comparison to other firms, the proportion of equity to total liabilities is relatively low, the banks in their activities is widely used by foreign capital. Bank's balance sheet has considerable explanatory power, based on its analysis, we can estimate the orientation of the bank, its strength and "health".

In the mouth the balance sheet business plan and strategy of the bank. Recently seen growth of bank vulnerability. Banks are due to increasing competition trying to carefully allocate resources obtained - between different clients, products, markets. Growing competition forces the creation of new products and capabilities, while significantly increasing the number of participants in the market. The result is better decision-making and management of banks, to which the latest theoretical knowledge and experience.

The following analysis is devoted attention to the effects of PRIBOR 3M, which is considered the base reference rate on the interbank market to banks' profit development. Its steady decline is associated with a decline in reference rates CNB. A decline in interest rates coupled with a decline in interest rates on deposit (at their present growth) has its other positive and negative impacts.

Positive impacts:

- Reducing the cost of financing public debt.
- Relatively easier access to finance for individuals and legal entities.
- Pressure on bank clients to realize their savings in the capital market.

Negative impacts:

- The pressure on management in the banking sector for investment funds.
- Reduced sensitivity to risk in lending and capital market investments.
- Lower revenues from deposits for individuals and legal entities.

For banks it is therefore imperative to focus mainly on the management of liabilities, assets and bank balance sheets.

While it is necessary to understand the management of assets and liabilities as a whole, management liability has its rules and peculiarities, mutatis mutandis asset management.

Simulation of the Impact of the Relationship between the Balance Sheet, Profit and 3M PRIBOR

Figure 1 Development Balance Sum and PRIBOR 3M
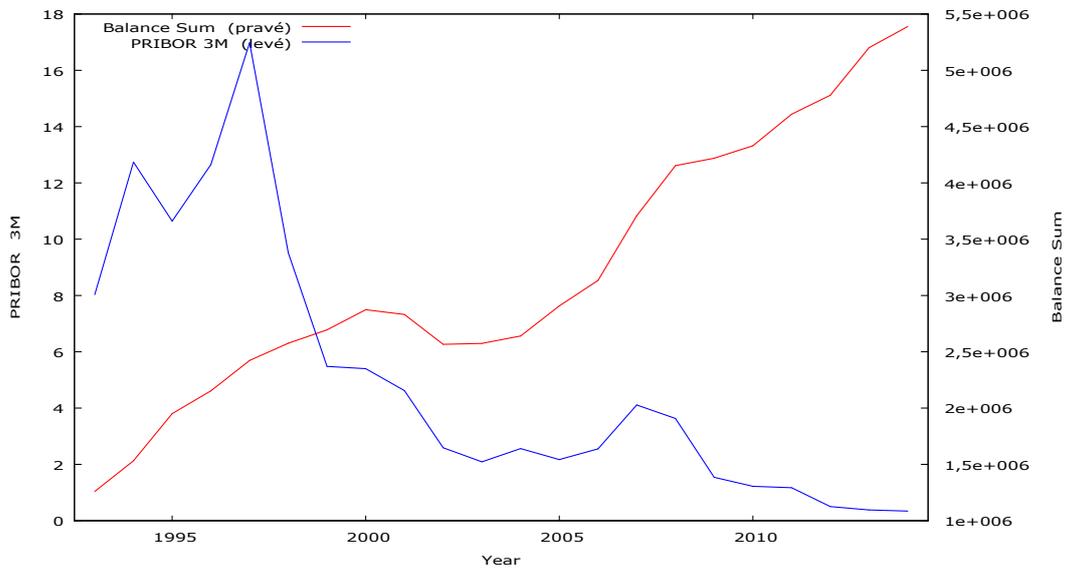
Source: Own processing from data CNB (2015)

Graphic representation clearly shows an addiction in the Czech Republic had interest rates PRIBOR 3M to profit growth in the banking sector. Of course, is that profit growth of banks have an effect except changes PRIBOR 3M and other factors, particularly the growth in total assets of banks and related loans. Nevertheless, it is superfluous to take account of the fall in interest rates into account. Banks' balance sheet grew from 1993 to 2014 by almost fivefold.

Similar results are obtained when analyzing the correlation between the share of profit to Balance Sum and the development of PRIBOR 3M.

Figure 2 Development Profit/Balance Sum and PRIBOR 3M

Source: Own processing from data CNB (2015)

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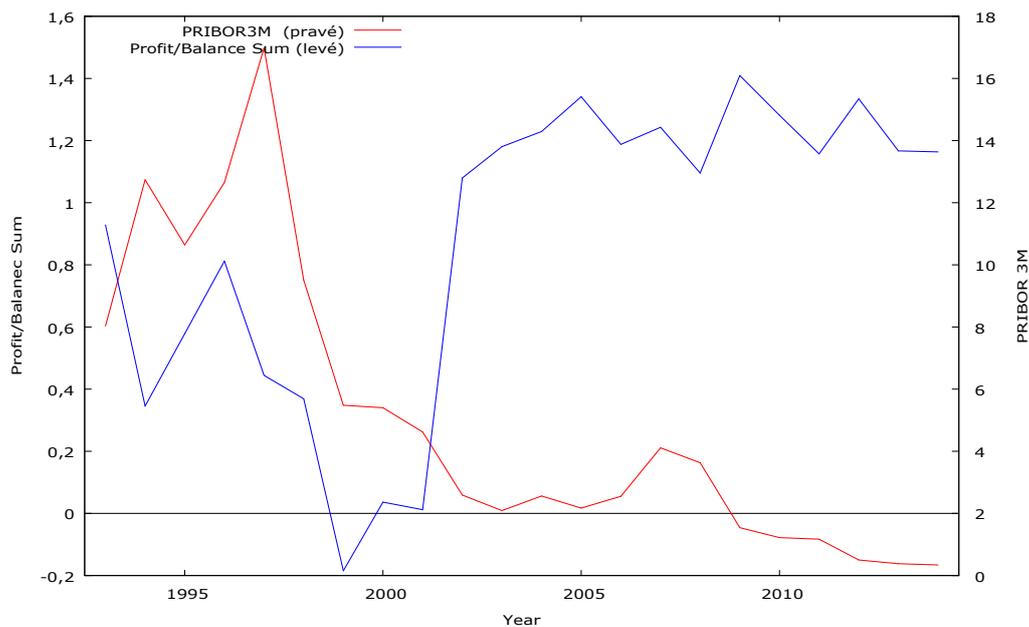
The relationship between the growth of profits/total assets, expressed the following simulations model that in all decisive criteria confirms the previous assumption "development profits is linked to the evolution of interest rates".

Simulation 1 Dependent variable; Profit/Balance Sum

OLS Model, Observation 1993-2014 (T = 22)

	Coefficient	Decisive error	t-quotient	p-value	
constant	1,17935	0,129353	9,1173	<0,00001	***
PRIBOR 3M	-0,0607301	0,0189603	-3,2030	0,00447	***

Medium value dependent variable	0,873214	Decisive divergence dependent variable	0,490748
Sum quadrate residue	3,342785	Decisive divergence regression	0,408827
Ratio determination	0,339045	Sight ratio determination	0,305997
F(1,20)	10,25924	P-value(F)	0,004465
Logarithm believability	-10,49003	Akaiko criterion	24,98005
Schwarz criterion	27,16214	Hannan-Quinn criterion	25,49409
rho (ratio autocorrelation)	0,646248	Durbin-Watson statistics	0,690752

Source: Own processing from data CNB (2015)

OLS model results show a high degree of dependence of profits (here simulated a share of profits to total assets, so as to reduce the effect of simply increasing the balance, or simply gain

Previous graphic display and simulation can be expressed as follows.

$$P = const + coeficient \times P3M = 1,17935 - 0,0607301 \times P3M \qquad (1)$$

Legend:

P – Profit/Blance Sum

P3M – PRIBOR 3M

Critical for management decision making banks and development banks' profit/total assets depending on developments in interest rates (3M PRIBOR) and loss receivables. This relationship shows the following simulation OLS model.

From the model is obvious dependence of profits of banks as on the development of PRIBOR 3M, and in particular the loss of receivables.

Simulation of the impact of the relationship between the Loss Receivables, PRIBOR 3M and Profit

Simulation 2 Dependent variable Profit/Balance Sum

OLS, Observation 1993-2014 (T = 7)

	Coefficient	Decisive error	t-quotient	p-value	
constant	2,14307	0,188858	11,3475	0,00034	***
Loss Receivables	-8,96851e-06	1,90533e-06	-4,7071	0,00926	***
PRIBOR 3M	-0,199953	0,0408331	-4,8968	0,00806	***
Medium value dependent variable	1,229766	Decisive divergence dependent variable		0,113664	
Sum quadrate residue	0,010860	Decisive divergence regression		0,052105	
Ratio determination	0,859907	Sight ratio determination		0,789860	
F(1,20)	12,27619	P-value(F)		0,019626	
Logarithm believability	12,70756	Akaiko criterion		-19,41511	
Schwarz criterion	-19,57738	Hannan-Quinn criterion		-21,42073	
rho (ratio autocorrelation)	-0,707035	Durbin-Watson statistics		3,313310	

Source: Own processing from data CNB (2015)

Previous simulation can be expressed as follows.

$P = const + coeficient1 \times LR + coeficient1 \times P3M = 1,17935 - 0,0607301 \times P3M = 2,14307 - (8,96851e - 06) \times LR - 0,199953 \times P3M$ (2)

Legend:

P – Profit/Blance Sum

LR – Loss Receivables

P3M – PRIBOR 3m

Assets and Liabilities Management form the crux of bank management and is an essential part of the financial management of the bank. It's a way to control the structure of bank balance sheets, with the aim of maximizing liabilities. Decisive is their management so as to achieve the maximum possible profit. Previous analysis and simulation aims to clarify the relationship between interest rates on the interbank market - PRIBOR 3M and generated profit of the banking sector.

It is a question of further examination and discussion of the impact on the profit the bank have other balance sheet items of banks. It can be assumed also a significant impact on generating revenue from the fee. But crucial for profit generation is the use of customer deposits and the proper management of assets and liabilities.

4 Conclusions

The paper is based on literature only marginal. The basis for his treatment was primarily own analysis using data CNB data.

The aim of this paper is primarily a discussion of the possibilities of the influence of interest rates on bank profits

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Resource Accounting and Budgeting for Managing Personnel Costs and the Amount of Capital Expenditures in the UK Armed Forces

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Abstract: *The paper "Resource Accounting and Budgeting for Managing Personnel Costs and the Amount of Capital Expenditures in the UK Armed Forces" analyses the use of accrual accounting and the resulting consequences of the introduction of Resource Accounting and Budgeting in the UK Armed Forces. This paper examines statistically, whether growing costs of manpower causes that the amount of investment spending changes, or not. In the case of personnel expenses, this new approach to resource management using RAB system has led to improvement of utilization of the resources. The research is based on data for total staff numbers and unit personnel costs (in 2005 constant prices) that were spent on maintaining army manpower from 1980 to 2011. The following periods are analysed: First is the period preceding RAB (from 1980 to 2001); the second period comprises the introduction of RAB during 2001 to 2011. Software STAT1 was used to analyse the collected data. The statistical solution of the given problem has a two-tailed nature; it means that the mean and variance of data was compared in both analysed periods. In the period after the implementation of RAB there was a slowdown in manpower reduction. In the period before the introduction of RAB the staff level was reduced by an average of 5,650 people a year that represents an annual decrease of 2.1%. After the introduction of RAB the average annual decline slowed down to 1920 people (respectively by 0.97%). After the introduction of RAB, in terms of raising the cost of manpower, the extent of investment spending remains unchanged.*

Keywords: Resource accounting and budgeting, effective allocation, RAB, accrual accounting

JEL codes: H50; H56; H60

1 Introduction

UK resource management has undergone gradually through many conceptual changes and transformations. One of the reform objectives that the British Government acceded after the year 1990 was to achieve a more rational use of resources allocated to a gradual reduction in production inefficiencies (Olejníček, 2006).

The path to this goal was based on the existence of a certain analogy between private enterprise and the Army. Due to this reason, the reforms rely on the use of enterprise criteria and experience from the private sector (economical and efficient use of resources, methods and tools of economic management). As mentioned in *Cash versus accrual accounting in the public sector,* public sector accounting system uses two main trends (as well as the private sector): traditional accounting model based on monetary basis and modern one that uses the accrual principles. These days the focus is put on accrual accounting in the public sector and the formerly widely supported model is receding. For this reason, a set of financial statements that use the accrual principles is recommended for a public sector. A change in the form of accounting was a part of large-scale reforms (known also as the New Public Management) and the new integrated system of Resource Accounting and Budgeting – RAB was introduced (Heald, 2005).

2 Importance and Role of Accrual Accounting in the Defense Sector

Unlike the previous accounting system, which aimed at recording incomes and expenditures, RAB enables classification of expenditures and meeting the purpose for which they have incurred. It provides a better overview of the current situation in the

entity. Thus it creates a wide scope for application of economic and transparent management of the organization and generates potential conditions for management decisions.

The path to this goal was not easy, despite the ostensible advantages of this form of accounting records, there is still considerable scepticism, whether this type of reform has benefits compared to the costs incurred for its implementation and the risks associated with the implementation.

It is known that a permanent increase of the armed forces efficiency and improving the allocative efficiency depends primarily on the level of economic management of individual cost centres. According to Olejníček and Kunc, this level is influenced in the military, inter alia:

- The nature of accounting used in the public sector and the Ministry of Defence (external factor),
- The nature of the financial system, public sector and defence sector (external factor),
- Degree of economic and managerial training of commanders and officers of professional service (internal factor),
- A set of financial management (internal factor). (Olejníček and Kunc, 2012)

Introduced economic instruments affect significantly resource management in the army. For example, *Private Finance Initiative/PFI* applied between 1995 and 1996) and the *Smart Procurement Policy /SPP* are included among the important economic tools applied in an environment of UK Defence. Private Finance Initiative provides support for various programs by supplying stable resources, facilities and equipment on the principle of tenure paid annually by the Ministry of Defence. These include the provision of accommodation, the provision and operation of information systems, management training and equipment. SPP policy aimed to simplify approval processes, reduce inflation in the defence sector and improve commercial practices, including greater incentives for suppliers (contracts fixed for a certain period).

When talking about the nature of accounting in the public sector and the Ministry of Defence of Great Britain, we distinguish between two basic accounting methods used for accounting and for obtaining overviews of incomes and expenditures. These are accounting prepared on cash basis (in the international literature, it is a system referred to as cash accounting, or cash-basis accounting) and accrual (source) accounting. RAB tool, as the representative of accrual basis, can be defined as a comprehensive set of financial statements that are specific in many ways and different from the accounting system which uses cash basis. The difference can be found, for example, in the way the periods for deriving profit are separated, i.e. the period when the transactions are recorded in the accounts (Corner, 2006).

Traditionally used cash accounting system is currently being increasingly replaced by the accrual accounting system, or any other way of financial accounting organization (Vodáková, 2014).

3 Rising Labor Costs and RAB

RAB has been officially in place since 2001. It has been long and sufficient-enough time for statistical verification of hypothesis: *when rising labour costs, the quantity of investment spending remains constant.* The aim of the following statistical analysis is to answer the question whether the new approach in resource management has led to improvement of resource utilization (specifically there will be a focus on the overall staff costs). The analysed data comprise total staff numbers and unit labour costs which were necessary to maintain the Army manpower (in period from 1980 to 2011).

The data file is separated into two periods. The period before introduction of RAB was analysed from 1980 to 2001, the period after introduction of RAB was analysed from 2001 to 2011 (the first-mentioned period is characterized by the resources management

on a cash basis, during the second period the system was gradually replaced by accrual accounts until the complete RAB was finally implemented). Input data are given in the 2005 prices; the input level of both groups is therefore identical.

Now there is statistical verification if the total cost of ensuring the staff was the same prior to the introduction of RAB as the cost of hiring personnel after the introduction of this system, respectively we will see if the increase in the cost of labour force causes the constant investment spending. The software STAT1 will be used for statistical calculation. This application can be used to analyse datasets by using exploratory methods, in particular inductive statistics. It is intended mainly for basic data processing in the form of descriptive statistics, and there are implemented univariate inductive statistics, two-sample tests and a square test of independence in the pivot table. The application is designed so that with absolutely minimal inputs it provides a number of useful outputs (Neubauer, Odehnal, Sedlačík, Holcner, Foltin and Michálek, 2013).

The starting point for solving this problem will be exploratory analysis of data, which is made on two selected files (Table 1 and Table 2). These are two independent samples from normal distribution.

Table 1 Selected indicators from the period before introduction of RAB

t (year)	1980	1981	1982	1983	1984	1985
y_t (£ staff costs in the given year)	119 120	110 965	120 849	113 350	114 483	118 639
y_t (labor force in the given year)	320 600	333 800	327 600	320 600	325 900	326 200
Staff costs x labor force (in mil.)	38 190	37 040	39 590	36 340	37 310	38 700

t (year)	1986	1987	1988	1989	1990	1991
y_t (£ staff costs in the given year)	122 109	118 637	115 399	112 484	115 304	116 337
y_t (labor force in the given year)	322 500	319 800	316 900	311 600	305 800	298 100
Staff costs x labor force (in mil.)	39 380	37 940	36 570	35 050	35 260	34 680

t (year)	1992	1993	1994	1995	1996	1997
y_t (£ staff costs in the given year)	121 404	127 584	133 713	139 649	136 999	142 742
y_t (labor force in the given year)	293 400	274 800	254 500	233 300	221 900	210 800
Staff costs x labor force (in mil.)	35 620	35 060	34 030	32 580	30 400	30 090

t (year)	1998	1999	2000
y_t (£ staff costs in the given year)	136 078	147 220	151 204
y_t (labor force in the given year)	210 100	208 600	207 600
Staff costs x labor force (in mil.)	28 590	30 710	31 390

Source: Rogers and Sedghi, 2013

Table 2 Selected indicators from the period after introduction of RAB

t (year)	2001	2002	2003	2004	2005	2006
y_t (£ staff costs in the given year)	160 992	148 608	150 991	158 937	165 440	173 609
y_t (labor force in the given year)	205 600	204 700	206 900	207 000	201 100	195 900
Staff costs x labor force (in mil.)	33 100	30 420	31 240	32 900	33 270	34 010

t (year)	2007	2008	2009	2010	2011	
y_t (£ staff costs in the given year)	180 252	187 333	200 106	209 338	219 528	
y_t (labor force in the given year)	190 400	187 100	188 400	191 700	186 400	
Staff costs x labor force (in mil.)	34 320	35 050	37 700	40 130	40 920	

Source: Rogers and Sedghi, 2013

4 Statistical Investigation of RAB Efficiency in the Personnel area

Statistical solution has two-tailed nature of the problem, under which it is necessary to compare the mean and variance of the data in both analysed periods (Litschmannová, 2010). In the period after the introduction of RAB the value of the sample mean cost of providing human resources increased (model of staff development) and the average absolute increment in the volume of human resources decreased.

Now the compliance variances σ1 = σ2 against the alternative hypothesis σ1 < σ2 will be tested by these two independent samples from normal distribution (The hypothesis test of compliance variances), and mean values μ1 = μ2 against the alternative hypothesis μ1 < μ2 (The hypotheses test of mean compliance provided homoscedasticity/heteroscedasticity). Both variables are normally distributed, the level of significance of the test is α = 0.05. At the 5% significance level we will verify whether, after the introduction of RAB, the rising costs of workforce remains on the same level of investment spending. There are the following statistical values:

Table 3 Selected statistical values

	n_1	$\bar{x}$	$s_1(x)$	$s_1^2(x)$	α
Before introduction of RAB	21	34977,143	3253,149	10582981,4	0,05

	n_2	$\bar{x}$	$s_2(x)$	$s_2^2(x)$	α
After introduction of RAB	11	34823,636	3404,160	11588305,4	0,05

Source: Own research

First, it is necessary to test compliance variances. Depending on the outcome, we continue with the test of median conformity.

$$\text{H}: \sigma_1^2 = \sigma_2^2 \rightarrow \text{A}: \text{H}: \sigma_1^2 \neq \sigma_2^2 \tag{1}$$

Testing criterion

$$\text{F} = \frac{s_1^2}{s_2^2} = \frac{10582981}{11588305} = 0,913 \tag{2}$$

Critical field

$$\text{W}_{0,05}: \text{F} \leq \text{F}_{0,025}(20; 10) \vee \text{F} \geq \text{F}_{0,975}(20; 10) \tag{3}$$

$0,913 \leq 0,361 \; \square \; 0,913 \geq 3,419$

Since the value of 0,913 (the value of testing criterion) does not belong to critical field, we can accept the hypothesis of conformity at the significance level of 0.05. In further calculations we assume that the variances of the two choices are identical. Now we proceed to the conformity mean values test (assuming homoscedasticity or the same variances, because the test did not reject such compliance).

$$H: \mu_1 = \mu_2 \rightarrow A: \mu_1 \neq \mathbf{\mu_2} \tag{4}$$

Testing criterion

$$t = \frac{\bar{x} - \bar{y}}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = \frac{34977 - 34823}{\sqrt{\frac{10582009}{21} + \frac{11587216}{11}}} = 0,125 \tag{5}$$

Critical field

$$W_{0,05}: |t| \geq t_{0,975}(v^*), \text{where} v^* = [k^*] \text{ and} \tag{6}$$

$$k^* \approx \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\frac{1}{n_1-1}\left(\frac{s_1^2}{n_1}\right) + \frac{1}{n_2-1}\left(\frac{s_2^2}{n_2}\right)} = \frac{\left(\frac{10582009}{21} + \frac{11587216}{11}\right)^2}{\frac{1}{20}\left(\frac{10582009}{21}\right) + \frac{1}{10}\left(\frac{11587216}{11}\right)} = 1,697 \tag{7}$$

If $v^* = [1,697]$, then:

$$W_{0,05}: |t| \geq t_{0,975(1,697)}$$

$$|0,125| \geq 1,697$$

Because this inequality does not apply, this means that the value of the test criterion does not belong to the critical field and we can accept the hypothesis at the significance level of 0.05. Changing the levels before and after the introduction of RAB has not been demonstrated. The result is the finding that the 5% significance level hypothesis cannot be rejected. Practically, this means that with 95% confidence we can confirm the hypothesis:

"With rising costs of living force, the scope of investment spending remains constant."

Therefore, we can say that the reduction in manpower after the introduction of RAB was lowered (in the period before the introduction of RAB the staffing level was reduced by an average of 5650 people annually, that is a percentage decrease of 2.1%. After the introduction of RAB the average annual decline lowered to 1920 people, respectively by 0.97%).

Personnel costs show an increasing trend (average cost of staff in the period before the introduction of RAB grew annually by an average of £1,604, i. e. 1.19%, in the period after the introduction of RAB personnel, this level rose to an average of £5,853, or 3.14%). The total extent of investment spending has not changed since the means and variances of total personnel costs in both periods remained unchanged (95% confidence). Thus we can say that RAB helps maintain proportional expenditure on manpower.

"RAB has a significant impact on the effective allocation of resources."

5 Conclusions

The paper has analysed and evaluated advantages of managing resources by using RAB in the Armed Forces of Great Britain. When management is becoming increasingly more complex and complicated, it is necessary to look for such management tools that enable to unite fragmented parts of the system in an effectively functioning whole, also in the armed forces. RAB is an effective tool that can improve the management of scarce resources. The UK with the implementation of RAB ranked among the advanced countries that apply standards of business practice in the public sector and lead public finances in accordance with generally accepted accounting standards (GAAP).

If the army has to find savings through more efficient management of resources, RAB is one of the paths that can be used. However, RAB is not a solution for the shortcomings of accounting on a cash basis and we also should not to look at it this way. In the paper there is this conclusion: In the case of staff costs the new approach to resource management has led to the improvement of resources utilization.

In the period before the introduction of RAB the staff level was reduced by an average of 5,650 people a year that represents an annual decrease of 2.1%. After the introduction of RAB the average annual decline slowed down to 1920 people (respectively by 0.97%). After the introduction of RAB, in terms of raising the cost of manpower, the extent of investment spending remains unchanged.

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Definition of Electronic Banking Crisis Management in Financial Markets Cyberspace

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Abstract: *The aim of this paper is to systemically express the classical management capabilities with regard to the dynamics of electronic banking based on specific research. From this perspective, to define modern approach to limit states of the system and also the definition of the management of electronic banking by classical (traditional) methods. At gained status variables, using data from real bank, an appropriate model of system-defined environment was created as possible and also expected crisis management in this area. In terms of management the attention was focused on the modeling of crisis management and on the dynamically developing area of information and communication technologies. Especially focusing on the newly conceived cybernetic principles of the modeling itself (i.e. the traditional "area involving the management and communication in the living and non-living organisms"). System integration (i.e. "Linking") and crisis management processes created in the modern electronic banking can only be addressed successfully in systemically integrated environment defined as cyberspace at the level of detail of the European financial market. The contribution of the doctoral dissertation is the creation of a suitable model and modeling in the specific area as defined by the title of this paper.*

Keywords: electronic banking, system integration, crisis management, cyberspace, European financial markets.

JEL codes: 032, F15

1 Introduction

The aim of this paper is to systemically express the classical management capabilities with regard to the dynamics of electronic banking based on specific research. From this perspective, to define modern approach to limit states of the system and also the definition of the management of electronic banking by classical (traditional) methods.

The concept of a *new economy* emerged in the late 90s. The new economy in words of the Statistical Office of the European Union EUROSTAT is characterized by the emergence of new sectors with high added value and use of information technologies, leading to the growth of competitiveness in the global economy due to the removal of barriers of geographical distance through the use of cyberspace, replacing various intermediaries with internet trading system.

According to EUROSTAT four typical features are essentially assigned to the new economy which are high value added, bringing goods and services closely related to knowledge and education; information and communication technologies as a tool to take quick and effective changes; restrictions on geographic distances through virtual communities and a significant limitation to the exclusion of intermediaries and their services.

Literature Review

Nečadová, Soukup and Břeňová in this respect define the difference between the categories of the *new economy* and *knowledge economy*, which, according to them, in fact investigate similar processes occurring in the global economy at the level of individual national economies, but from a different perspective. The main common feature is the emphasis on the position of education, knowledge and ICT in the globalized economy. (Nečadová, Soukup, Břeňová, 2008) Matula compares the concepts of the new

economy, the knowledge economy and information economy, as a means of creating added value, according to him, shifted from information (information economy) through product knowledge (knowledge economy) to knowledge as a tool (new economy). (Matula, 2011)

Banking, as part of the economy has in recent decades undergone dramatic development as well. It experienced particularly strong growth in importance of electronic banking activities of the banking sector. Development of information technology has brought to the business new platforms:

e-business features electronic business. Primarily uses web technology and various automated information systems. (Jurášková, Horňák, 2012)

e-commerce means selling goods and services via the Internet. It affects the area of distribution, purchasing, sales, marketing and servicing of products over electronic systems. (Jurášková, Horňák, 2012), e-commerce is thus a subset of e-business. It is the foundation of the new economy. (Dvorak, Dvorak Jr., 2005)

e-banking is a subset of e-commerce. We can put it hierarchically below the e-business model, as a model of the highest level of activity using information and communication technology (Dvorak, 2002).

Banking is thus typical socio-technical system, within which there are interactions between social and technical system (Fig. 1).

In the banking business is a key issue setting the parameters of growth performance with regard to liquidity and risk. The use of IT technology has brought a new dimension to banking, which enables fundamentally changed approach to the client and its revenue potential. Electronic banking becomes to dominate the main menu of banking products. (Faltejsková, 2011)

The current development of these business activities, however, requires skilled professionals understanding the problems of systems theory, cybernetics theoretical background, crisis management in the context of emerging information and communication technologies in e-business environment understood as part of cyberspace (Janková, Dvorak, 2013).

In the dynamics of the electronic banking we face a very complicated hierarchical cybernetic system in which the major component is adaptation to new environment demands systems as such, and to increase the speed environment with consideration of changes in the new time scales, in ever changing structural changes in the world and that the behavior of the newly conceived cyberspace of all other modern means, especially applied cybernetics. (Dvorak, 2015)

The concept of *cyberspace* is constantly evolving. It is defined e.g. as a global domain within the information environment consisting of networked information infrastructures, including the Internet, telecommunications networks, computer systems and incorporated processors and control units. (TRADOC, 2010) J. Dvorak highlights the need for creation of a functioning and reacting flexibly adaptable cyberspace of electronic banking. (Dvorak, 2015)

Electronic banking environment is a system composed of elements and bonds, open system that works (has interactions) with the surrounding environment, dynamic system whose behavior depends on the time, a hierarchical cybernetic system functioning in an increasingly accelerating and changing environment.

2 Data and Methods

In this paper, generally theoretical methods were used: content analysis, literature review (see bibliography), as well as description and analysis of classic and modern management approach and a comparison of their use in electronic banking, also using the methods of deduction. For the formulation of the results synthesis was used.

3 Results and Discussion

Risk assessment of electronic banking and its management has become with respect to its development a priority. Electronic business is now in a completely different space compared to its beginnings, when it was seen only as a specific support action (e.g. a reservation system) of the original business model (Frendlovská, Janková, 2014).

In an environment of rapidly accelerating, electronic banking, moreover functioning in virtual cyberspace gains in importance the crisis management. Armstrong defines *crisis management* as a process of dealing with a tense situation in a way that plans, organizes, directs and controls the amount of interrelated transactions and leads the decision-making processes of those responsible for a rapid but unhurried decision of the current challenge that enterprises face. (Armstrong, 1990)

This field within the European financial market and its regulation is given a special attention. E.g. payments made over the Internet show a greater incidence of fraud than traditional payment methods. The European Central Bank has therefore issued recommendations on key aspects and best practices applicable to all payment service providers. Recommendation defines common minimum standards on the Internet payment service. The main principles of this recommendation are:

1. specific evaluation and regular updating of the risks associated with the provision of payment services,

2. entering online payments and access to sensitive payment data should be protected with so called strong client authentication,

3. Payment service providers should have effective procedures for the verification of transactions, tracking transactions and systems in order to detect abnormal course of customer payments and preventing fraud,

4. payment service providers should be involved in programs aimed at informing and educating clients on security issues related to the use of Internet payment services to enable clients to use these services in a safe and efficient manner. (ECB, 2013)

The example represents only a tiny fraction of threats and dangers. While crisis situations in the electronic banking system are understandably associated with undergone risks. According to a report by the Basel Committee on Banking Supervision, e-banking compared to the classical banking brings no more risk, but it increases and modifies the already-imposed risks: liquidity risk, credit risk, market risk, operational risk, strategic, legal and reputational. (BASEL COMMITEE ON BANKING SUPERVISION, 2000) Specific definitions of these risks will be used to set the limit states of crisis management system.

Solutions of outlined (otherwise very wide) problems of crisis management can be viewed through the lens of on one hand the classical management and on the other hand the modern cyber capabilities disposing methods.

Classical management is usually characterized by four primary schools:

1. The Scientific Management, founded by FW Taylor,
2. behavioral approach focused mainly on human resources, the behavior of people in the organization, for example. G.E. Mayo.
3. bureaucratic approach, represented by Max Weber, characterized by rigid rules,
4. administrative approach, represented by H. Fayol.

Namely Henri Fayol described in the early 20th century, the fourteen basic management principles: (Fayol, 1930)

1. DIVISION OF WORK.
2. AUTHORITY.
3. DISCIPLINE.
4. UNITY OF COMMAND.
5. UNITY OF DIRECTION.
6. SUBORDINATION OF INDIVIDUAL INTERESTS TO THE GENERAL INTERESTS.

7.   REMUNERATION.
8.   CENTRALIZATION.
9.   SCALAR CHAIN.
10.   ORDER.
11.   EQUITY.
12.   STABILITY OF TENURE OF PERSONNEL.
13.   INITIATIVE.
14.   ESPIRIT DE CORPS.

Henri Fayol also came up with a definition of six managerial functions, which have been further modified over the years, to the currently most widely used concept of Koontz and Weihrich (1990), which contains the sequence functions (planning, organizing, selection and placement of employees, leadership, control) and continuous (parallel) functions (analysis, decision making, implementation).

Crisis management carried out by means of classical management thus includes sequential functions of crisis management and crisis management functions in parallel. It begins at the level of emergency planning with the aim of creating an effective system of prevention of crisis situations, possibly returning to a normal state. Followed by the organization with the intention of having an environment corresponding to plan implementation plan and other management functions, culminating in control and comparison with plan. Each sequential function is undergoing phases of analysis, decision making and implementation of the selected alternatives.

Classic management can therefore be understood with somewhat more modern look in accordance with the definition (Koontz, Weihrich, 1990) as a systematic conceived process to achieve the business objectives of the company. From the perspective of system analysis in terms of cybernetic system (open system with feedback and adaptation to changes around) with the potential presence of chaotic phenomena. While the decision-making model the manager is based more on heuristic principle, shifting over time closer to exact methods.

In the scale of contemporary knowledge optics the classical management is based on the idea of business as a cybernetic control loop and the regulatory options available to him historically; the role of regulatory element here is the social environment, respectively the management that plans, manages and controls in order to maintain the balance of this system. The concept of managerial functions, wher each sequential function is undergoing continuous phases and represents a process of system control based on social environment, respectively the human factor. Also the management principles of Fayol are aimed at the social environment and its specifics.

In the 20th century, therefore, also because of new technologies, the emergence of new approaches, eg. The process, a system based on the perception of objects as isomorphic, respectively. homomorphic, or quantitative. Also created a new branch of management, like knowledge, process, environmental and loan management.

Therefore in the 20th century, also because of new technologies, the emergence of new approaches, e.g. the process, system based on the perception of objects as isomorphic, respectively homomorphic, or quantitative, can be seen. Also new branches of management are created, such as knowledge, process, environmental and loan management.

Orientation of banks changes from product to client. Management of banks is adapting to new conditions, applying the principle of lean management. Trying to get closer to clients leads to changes in the organizational structure of the banks, flattening the organizational hierarchy. Changes require a dynamic management methods, responsive to competition and frequent changes in the market. (Faltejsková, 2011) Constantly changing environment is reflected particularly in the rapid changes of innovation, which

leads to shorter product lifecycles and time required for their development and market introduction.

The risks for crisis management in the information and communication systems must be understood systemically, modeling the real system. For basic model design of systemically designated environment of possible and the supposed crisis management in electronic banking it is necessary to identify the area of the marginal status values of the system (boundary defining critical values of the state of the system under consideration, Fig. 2), when the state variables are detected in a real bank. New management options in terms of cybernetics allow the use of real-time information for crisis management in the designated area of the relevant risks. The role is to define the limit state, preventing its crossing and in case of reaching crisis conditions (exceeding the limit states), then return to the desired values.

J. Dvorak highlights the need for creating a functioning and flexibly reacting adaptable cyberspace of electronic banking. He outlines the vision of a new methodology for e-banking in the modern conception of the trained and learning intelligent robotic system environment of electronic banking. (Dvorak, 2015)

Control and regulation of processes in electronic banking, based on the principles allowed by the current technical and technological capabilities, means the involvement of technical and technological processes in the relevant communication, qualitative change in this environment represents a shift in the role of management. Namely for electronic banking it means the move towards defining systemic problems within cyberspace at the level of the financial market, where the solution will be ascertained through modeling, the shift to the concept of learning, intelligent, adaptable environment. In the accelerating environment there is a new area of economic cybernetics being created.

Development of e-business is closely linked with the development of *system integration*, so e-business can be considered as the next development phase of system integration. (Šlapák, Voříšek, 1999)

For the area of electronic banking it involves problems solving, among others the system integration of crisis management and processes in the modern electronic banking

Figure 1 Integration of electronic banking system with its steering subsystem into cybernetic systém of commercial bank in parallel with traditional banking system with traditionally conceived management as its steering subsystem

Commercial banking entrepreneur

Management use objective function, e.g. max profit, market

Tradicional banking

Management

Processing

E-banking

E-banking management:
Human and artifical intelligence uses objective function:
e.g. max. safety, availibility

Orders processing

RESOURCES
- human
- material
- capital

- ICT hardware
- software
- ICT specialists
- cybernetician

- money transfers
- information about transfers

BANKING SERVICES

Source: Own production

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Figure 2 State of the system, limit state of the system and crisis state of the system
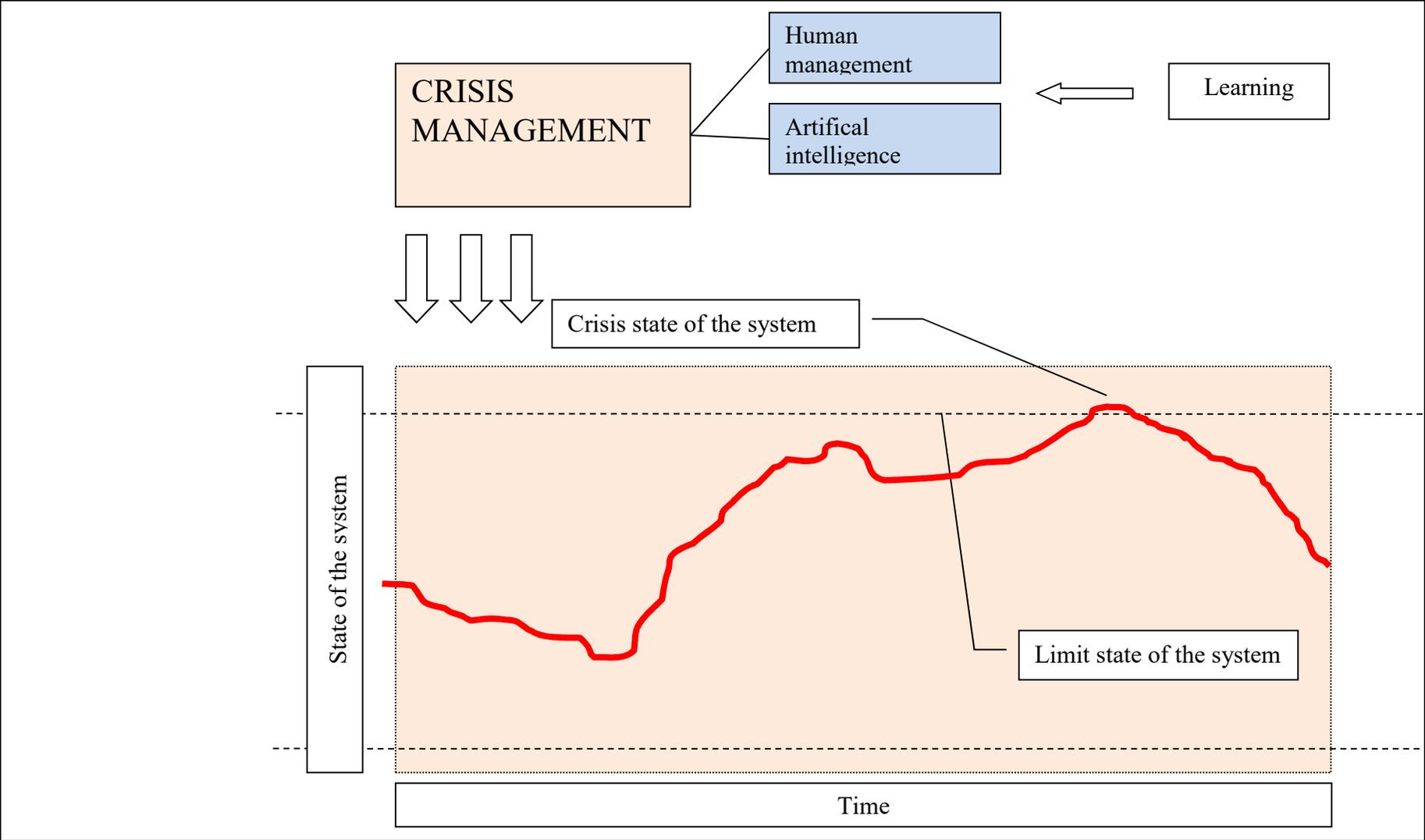
(according to ISO 9000 a process is a set of interrelated or interacting activities which transforms inputs into outputs) (Fig. 1). New economy, globalization, information and knowledge society create the framework for improving the quality of life, including business booming, it is necessary to treat the risks and create adaptable electronic banking cyberspace, when effective and successful solution to the crisis management of electronic banking can only be achieved in systemically integrated environment of new cyberspace at the level of resolution of the European financial market with the necessary interconnection between the state space and the experience of the social environment.

Table 1 Comparison of classical and modern management methods

Management methods	classical	modern
Control unit	Human	computer
Decision environment	Social	ICT
Approach to decision making	heuristic	exact
Access to the procedure	intuitive	cybernetic
Orientation	product	customer
Competitive environment	local	global
The predominance of capital	financial	knowledge

Source: Own production

Yet unrealized vision can be a cybernetic electronic banking system, which itself evaluates the risks and adapts the availability of its services in the evaluated states. A system that assumes the assessment of its risk conditions and their management based on its own decision making without the intervention of management of commercial bank.

In the process of managing electronic banking systems, this means the use of artificial intelligence and algorithm-based decision making. Steps in this direction are the works calling for the introduction of aggregate indicators of electronic banking systems risks, eg. by means of methods to solve problems with multiple attributes (AHP methods), whose goal is to eliminate the subjective element in decision-making in crisis situations in real time (Wang, 2014).

Solution to problems of risk management and crisis situations of electronic banking systems can thus be seen in algorithm-based development of decision-making processes in their management, use of decision-making algorithms adapting to changing conditions and their incorporation into electronic banking systems.

4 Conclusion

To define the crisis management systems in processes of electronic banking we must first identify the environment. Using systems analysis then execute exploration and system identification and basic design of the model of systematically designated environment of possible and the supposed crisis management in electronic banking (state variables, the main elements of the model, subsystems and the relationships between them) by using mathematical modeling techniques (modeling approach choice), this further develop and optimize (bring to simulability) verify by concrete realization and validate by a real system. Programs such as Simulink with MATLAB systém may be used. An essential part must be system integration and modeling of simulation of processes on the environment of information and communications technologies, followed by analysis, summarization and evaluation of results. The modeling is an iterative process, so you need to continuously evaluate the process and possibly iteratively return to previous phases. Finding a workable model will contribute to strengthening of the current perception and shaping the global cyber environment in relation to cyber security in e-business in crisis situations and its solutions.

Constantly increasing scope and importance of electronic banking systems in terms of commercial banking put increasing pressure on the safety of these systems to treat the risk of crisis situations. Algorithmisation of evaluating these states of electronic banking

systems, automation of the measures adopted and the use of artificial intelligence in these processes, represent one of possible answers to these challenges.

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Determination and Analysis of Actual IN05 Accuracy in Prediction of Creditworthiness

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Abstract: The IN05 is considered as the most accurate financial model that predicts the creditworthiness of the company in a measurable way. IN05 was based on the financial data from 2004. It is an updated version of the model IN01 that showed different predictive ability in verifying in 2005, only 4 years after its creation. The situation in the manufacturing industry evolves, and with following 8 years the risk-free rates, interest rates, risk rates and sector averages have changed. The question is how much the ability of IN05 to predict economic value added (EVA) has changed in consequence of it.

The paper aims to determine the current predictive power and the rate of return of the model IN05. The verification sample was made of financial data off 1,224 companies in the manufacturing sector. These companies showed no symptoms of financial instability in the form of execution, insolvency, liquidation or negative equity in 2013. The paper also presents solutions how to improve the predictive ability of IN05 and what areas and factors should be considered or eliminated in further improvement of this model.

Keywords: creditworthiness, index IN05, economic value added, ROE

JEL codes: G24, G33

1 Introduction

Bankruptcy financial models serve for evaluation of accounting data and for determination whether the company corresponds to the bankrupting company profile or to the financially sound company profile. The creditworthiness financial models should classify companies as the prosperous ones and the failing ones. The accuracy of bankruptcy models is standardly stated by their authors. Subsequently the accuracy of some models was verified in time, as well as its relation to chosen branches and regions (application on economies of various states) that are often different from branches and regions for which the model was created.

Kuběnka and Slavíček (2014) state that even creditworthiness as well as bankruptcy models were created differently, the structure of most of them is similar, as the combination of ratios and assigned weights of importance is concerned.

Newest knowledge confirms that the time as well as branches are key for some specific ratios, as it is confirmed by one of newest researches by Karas and Režňáková (2015) performed with the sample of 34533 companies from manufacturing and construction branch "*we found that only 8 of 17 analysed predictors were significant in all of the analysed five year prior bankruptcy, 8 of them in the branch of manufacturing (i.e. EBITDA/TA, S/TA, S/St., EBIT/Int., EBITDA/Int., FA/TA, S/OR and S/CL.), same set (with exception of S/TA) is also significant in the construction branch. As same predictors are time specific, or even not significant at all, this lead us to conclusion, that only some predictors could be used as early warning indicators or used to predict bankruptcy more years ahead.*"

Note: where:

> EBITDA/TA - EBITDA/total assets,
> S/TA – Sales/total assets,
> S/St. – Sales/stock,
> EBIT/Int. - EBIT/interest,

EBITDA/Int. - EBITDA/Interest,
FA/TA - EBITDA/total assets,
S/OR - Sales/operating revenue,
S/CL - Sales/current liabilities.

The presented accuracy is often debatable, mainly due to the fact, that:

- authors created the model for a small sample and thus the presented accuracy is not statistically based,
- authors presented the total accuracy based on the average of achieved accuracy in the sphere of bankruptcy prediction as well as creditworthiness prediction,
- authors confuse the accuracy and the rate of return,
- when comparing the accuracy of models the researchers do not regard the fact that the creditworthiness IN99 and IN05 (or IN01) is derived from EVA.
- authors take into account or make average of achieved accuracy in the sphere of bankruptcy or creditworthiness prediction,
- results of authors are not comparable, as they work with various ratios of bankrupting and financially sound companies.

In addition, for example Růčková (2011) points out the area limitation of prediction models and states that ratios of ensemble work with researches of specific economic conditions that are not identical. Kuběnka (2015) and Vochozka (2011) point out the different definition of the term "failure" or "bankruptcy" and the issue of definition of the bankruptcy moment that is related to the legislation of specific country.

The evaluation of prediction capability of bankruptcy models is standardly performed based on the comparison of current situation with the situation one year before. Thus the creditworthiness or bankruptcy predicted by the model (in the year X) versus the current situation of the following year (X + 1).

Then the accuracy of bankruptcy model prediction is (in relation to the table 1) defined in various ways:

a) as the conditioned probability $\pi_j = TP_j / (TP_j + FP_j)$, applied by Neumaierová and Neumaier (2005), Altman (2006),
b) as the probability (rate of return) $p_j = TP_j / (TP_j + FN_j)$ applied by Delina and Pacáková (2013),
c) as the weighted average $pjnj = (TP_j + TN_j) / (TP_j + FP_j + TN_j + FN_j)$ applied by Karas and Režňáková (2014),
d) as the weighted average with subjectively defined weights for the purpose of creation of models chart, based on their accuracy, applied by Sušický (2011) or Maňasová 2008,
e) as the arithmetic average $pjnj = (TP_j / (TP_j + FN_j) + TN_j / (TN_j + FN_j))/2$ applied by Neumaierová and Neumaier (2005)

Table 1 Contingency table of possible results

	θ(di, cj) = true	θ(di, cj) = false
θ̂ (di, cj) = true	TPj	FPj
θ̂ (di, cj) = false	TNj	FNj

Source: Lee (2009)

where:

TPj – number of companies that went bankrupt and their bankruptcy was predicted by the model

FPj – number of companies that went bankrupt, but their financial health was predicted

TNj – number of companies that went not bankrupt and their financial health was also predicted

FNj – number of financially sound companies for which the bankruptcy was predicted

The creditworthiness model accuracy is not shown in measurement of creditworthiness, except for one exception. Results of few several researches are shown in the table 2. The following validation was focused on measurement of capability to predict the bankruptcy using the creditworthiness model (Index of creditworthiness) and to predict the creditworthiness using the model (IN99) and the creditworthiness – bankruptcy model (IN01 and IN05). Kuběnka (2015) emphasizes that IN99, IN01 and IN05 are specified by the fact that only those for which there is a presumption of economic value added creation are classified into the category of creditworthy companies, and thus the only presumption of positive return of equity is not sufficient for the positive rate of return of shareholders' capital.

Table 2 Verification of accuracy of creditworthiness and creditworthiness-bankruptcy models

	Model	Incorrect bankruptcy prediction in %	Accuracy of bankruptcy prediction in % p_j	Rate of return of the bankruptcy prediction in % π_j	Year
a)	Index of creditworthiness	78,02	21,98	58,25	97-07 SK
b)	IN05	85,41	14,59	73,79	97-07 SK
c)	IN01	x	60	x	04-08 CZ
d)	IN05	x	70	x	04-08 CZ
e)	IN05		62		04-08 CZ

	Model	**Incorrect creditworthiness prediction**	**Accuracy of creditworthiness prediction based on EVA** p_j	**Rate of return of creditworthiness prediction based on EVA** π_j	
f)	IN99	x	85* / 47**	x	98/04
g)	IN01	x	77	x	2000
h)	IN05	x	83	x	2004

a), b) source Delina and Pacáková (2013); c) to e) Sušický (2011) unclear methodology of measurement; f) to h) Neumaierová and Neumaier (2002); Neumaierová and Neumaier (2005); * at the index compilation; ** at the verification in the year 2005

The authors of IN05 states that it "was created and tested on data from mainly medium and large industrial firms, so for these firms it will have the best explanatory power." That is why the current prediction capability of this model will be tested on middle-sized companies. According to Neumaierová and Neumaier (2010) the index has following form:

$$IN05 = 0.13\ X_1 + 0.04\ X_2 + 3.97\ X_3 + 0.21\ X_4 + 0.09\ X_5$$
(1)

where:

X1 = total assets / liabilities
X2 = earnings before interest and taxes / interest paid
X3 = earnings before interest and taxes / total assets
X4 = revenues / total assets
X5 = current assets / current liabilities

When IN05 is greater than 1.60 the firm produces a positive EVA value with a probability of 83%. When IN05 is smaller than 0.90, the firm gets in financial distress ("bankruptcy zone") within a year with a probability of 77% (for middle-sized companies 78%). Firms with the value between these two extremes fall into a "gray zone" and they cannot be clearly determined.

Table 3 Sample of middle-sized companies for IN05			
Middle-sized companies	Bankruptcy menace		Total
	No	Yes	
EVA ≥ 0	471		471
EVA < 0	84	264	348
Total	555	264	819

Source: Neumaierová and Neumaier (2005)

Figure 1 Accuracy of IN05 when EVA predicting
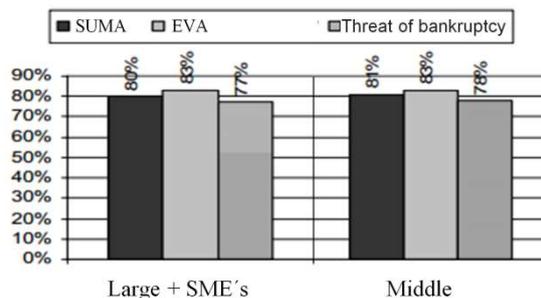
2 Data and Methodology

2.1 Data a calculation of IN05

The sample for testing of the creditworthiness prediction using the model IN05 was compound of 1224 companies from the Czech Republic, from the manufacturing industry, with turnover above 300 million that showed no negative symptoms (failure, execution, insolvency, extinction, negative shareholders´ capital) in the year 2012. Data were drawn from the database of economic entities MagnusWeb of the company Bisnode.

The financial data from the balance sheet and profit and loss statement of chosen companies were applied in the formula (1). Input values were defined as follows:

- *earnings before interest and taxes* (EBIT) is the sum of lines „*" no. 30 + „*" no. 48 + „XIII." no. 53 – „R." no. 54,
- *revenues* are the sum of all revenue categories I. up to XIII., i.e. no. 1 + no. 4 + no. 19 + no. 26 + no. 28 + no. 31 + no. 33 + no. 37 + no. 39 + no. 42 + no. 44 + no. 46 + no. 53,
- *current liabilities* including short-term liabilities and short-term loans, i.e. line „B.III." no. 103 + „B.IV.2." no. 117 + „B.IV.3" no. 118.

Resulting values of intermediate calculations were adapted as follows:

- Within the calculation of interest coverage, i.e. components X2 the problems of zero division were found in about one quarter of cases. Resulting values X2 were limited at -9 in case of the negative EBIT value and +9 in case of positive EBIT value.
- There were also extremes with resulting values X2 directed towards +/- ∞ due to low values of cost interests approaching the zero. These extremes were reduced up to the interval <-9; +9>. Such reduction was performed in about one third of cases.

2.2 Procedure of calculation of economic value added EVA

If the model IN05 in the year X (in this research the year 2012) achieves for the specific company the value higher than 1,6, the company should reach the positive EVA value in the following year X+1 (in this research the year 2013).

There are numerous ways of EVA calculations. In order to verify the prediction capability of IN05 the EVA calculation, as applied by authors of the model IN05, will be used.

$$r_e = \frac{WACC * \frac{UZ}{A} - (1-d) * \frac{U}{BU+O} * \left(\frac{UZ}{A} - \frac{VK}{A}\right)}{\frac{VK}{A}} \tag{2}$$

where:

re – implicit costs of shareholders´ capital
UZ -are paid sources (bank loads, obligations, shareholders´ capital),
WACC - weighted average of costs on capital,
A - are assets,

D - tax rate,
U - cost interests,
BU + O - bank loans and obligations,
VK - shareholders´ capital.

For the calculation by rating methodology, it is necessary first to define the value of WACC using the modular methodology. According to Neumaierová and Neumaier (2002) this method is applied under following simplifying presumptions:

- The current or estimated interest rate is the value of loan capital.
- The market value of loan capital equals to the account value.
- Resulting value of WACC index is independent from the level of shareholders´ or load capital, in case of the indebtedness change, the total capital costs are only re-distributed among owners and creditors.
- Operational economical results equals to the EBIT value, i.e. to the sum of gross profit and cost interests.

$$WACC = rate\ of\ the\ risk\text{-}free\ assets + r_{company} + r_{finstab} + r_{LA} \tag{3}$$

where:

$r_{company}$ - extra charge for the volume of business risk,
r_{finstr} - extra charge for the risk resulting from capital structure,
$r_{finstab}$ - extra charge for the risk that the company is not able to pay back its liabilities,
r_{LA}- is the risk extra charge for the size of company.

EVA shall be defined based on the positive value (ROE – re), which is according to Lízalová (2010) and Máče (2005) sufficient conditions if we are based on the relation used also by the Ministry of industry and trade for creation of statistics for particular branches:

$$EVA = (ROE - re) * E \tag{4}$$

where: ROE return of equity
        E   equity

3 Results and Discussion

Results of the application stated in the table 4 show different accuracy when compared with values given by authors in the year 2005. The accuracy of IN05, based on data from the year 2004, was 83% for the sphere of creditworthiness prediction for middle-sized companies. The accuracy based on data from the year 2012/2013 corresponds to the column f.) tab. 4, i.e. to the accuracy of 89,37%. The reliability interval π can be, according to Pacáková (2003), determined as follows.

$$P\left(p - z_{1-\frac{\propto}{2}} * \sqrt{\frac{p(1-p)}{n}} < \pi < \left(p + z_{1-\frac{\propto}{2}} * \sqrt{\frac{p(1-p)}{n}}\right)\right) = 1 - \alpha \tag{5}$$

where:

p - the original accuracy of IN05 amounting to 83%,
n - the size of the base π, i.e. TPj + FPj, i.e. 254,
α - determined at the level of 5%,

The resulting reliability interval for the original accuracy of 83% is within <78,38; 87,62> per cent. Thus it can be stated that the resulting accuracy of IN05 within the creditworthiness measurement, based on the methodology f.) tab. 4, has increased by 6,37% after the period of 9 years.

In the opinion of the author of this text the most objective accuracy index of IN05, for the sphere of creditworthiness measurement, is the calculation based on the column h.) tab. 4. This one takes into account the whole correct predictions and compares it with the whole tested ensemble of companies, including those that are within the grey zone.

Based on this index the capability of model IN05 to predict the positive EVA achieves 49,26%. If we take into account the uncertainty area (grey zone), the prediction capability grows up to 75,38%.

Table 4 Result of application IN05 at the original grey zone <0,90;1,60>

Column: a.	b.	c.	d.	e.	f.	g.	h.
IN05$_{2012}$ vs. EVA$_{2013}$		Results of application	In relative expression	Rate of return p$_j$ = TP$_j$ / (TP$_j$ + FN$_j$)	Conditioned probability π_j = TP$_j$ / (TP$_j$ + FP$_j$)	Weighted average pjnj = (TP$_j$ + TN$_j$) / (TP$_j$ + FP$_j$ + TN$_j$ + FN$_j$)	Weighted average pjnj = (TP$_j$ + TN$_j$) / (TP$_j$ + FP$_j$ + TN$_j$ + FN$_j$ + GZ)
Good prediction + EVA	TPj	227	18,55				
Defect prediction + EVA	FPj	27	2,21				
Good prediction - EVA	TNj	376	30,72	57,18%	**89,37%**	75,38%	**49,26%**
Defect prediction - EVA	FNj	170	13,89				
Grey zone	GZ	424	34,64				
Suma		1224	100%				

Source: Author

In order to increase the accuracy, the tests were performed when original evaluation scale limits <0,90;1,60> were shifted. According to the methodology g.) tab. 5 the accuracy was growing with lowered upper limit. The highest accuracy of 75,50% was achieved when the upper limit was lowered at the value 1,4. At the same time the model was not able to include 26,63% of companies into the category +EVA or –EVA and incorrectly included 44,61% of companies from the tested sample of 1224 companies.

Table 5 Results of IN05 application with moved limits, without grey zone

Upper limit	1,6	1,5	1,4	1,3	1,2	1,1	1,0	0,9	0,8	0,7	0,6	0,5
Lower limit	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,8	0,7	0,6	0,5
Good prediction + EVA	227	252	302	341	396	453	492	524	565	592	608	632
Defect prediction + EVA	27	36	50	65	90	105	136	154	186	212	247	290
Good prediction - EVA	376	376	376	376	376	376	376	376	344	318	283	240
Defect prediction - EVA	170	170	170	170	170	170	170	170	129	102	86	62
e. p$_j$ = TP$_j$ / (TP$_j$ + FN$_j$)	57,18	59,72	63,98	66,73	69,96	72,71	74,32	75,50	81,41	85,30	87,61	91,07
f. π_j = TP$_j$ / (TP$_j$ + FP$_j$)	89,37	87,50	85,80	83,99	81,48	81,18	78,34	77,29	75,23	73,63	71,11	68,55
g. pjnj = (TP$_j$ + TN$_j$) / (TP$_j$ + FP$_j$ + TN$_j$ + FN$_j$)	75,38	75,30	**75,50**	75,32	74,81	75,09	73,94	73,53	74,26	74,35	72,79	71,24
h. "good" summation pjnj = (TP$_j$ + TN$_j$) / (TP$_j$ + FP$_j$ + TN$_j$ + FN$_j$ + GZ)	49,26	51,31	55,39	58,58	63,07	67,73	70,92	73,53	74,26	**74,35**	72,79	71,24
"wrong" summation	50,74	48,69	44,61	41,42	36,93	32,27	29,08	26,47	25,74	25,65	27,21	28,76
Grey zone	34,64	31,86	26,63	22,22	15,69	9,80	4,08	0,00	0,00	0,00	0,00	0,00

Source: Author

In the author´s opinion, it is the most suitable to move limits at the value 0,7 and to eliminate the grey zone at the same time. The model accuracy, in predicting the creditworthiness according to the methodology h.), achieves the maximum accuracy amounting to 74,35% with zero grey zone and 25,65% of error rate from the complete tested sample.

4 Conclusions

The aim of this research was to define the accuracy of model IN05 after the period of 9 years from its creation. This creditworthiness-bankruptcy model was, as one of the few, created based on real data using the multiple discrimination analysis. The accuracy was derived from the capability of model to predict the economic value added in the following year. This enable to verify its up-to-date condition. Results of calculations of tested sample showed, with statistical importance, that the accuracy of creditworthiness prediction has increased from 83 to 89,37%, when the accuracy is calculated based on $TPj / (TP_j + FP_j)$ (as well as authors of the model). At the same time, 50,74% of companies (from the whole sample 1224) were incorrectly classified.

The testing of crucial limit shift <0,90;1,6> up to the unified critical limit at 0,7 resulted in the best result of the prediction capability of this model, based on $(TP_j + TN_j) / (TP_j + FP_j + TN_j + FN_j + GZ)$. The achieved accuracy 74,35% is the ratio of all well classified companies related to the size of the whole sample (1224). The conditioned probability of correct classification +EVA (based on $TP_j / (TP_j + FP_j)$ is 73,63%. In order to reach a quick classification of the company, using the model IN05, aiming to define its creditworthiness, the author recommends using of the newly defined limit 0,7.

In conclusion it shall be pointed out that performed research confirmed that the accuracy of models can change with time, especially if their accuracy evaluation is based on the variable value re. In addition, the performed research confirmed that declared accuracy of models can be considerably different depending up the methodology of accuracy quantification (tab. 4 columns from e.) to h.)).

Acknowledgement

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Compulsory Insurance of Liability for Environmental Damage: Arguments and Consequences

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Abstract: Solution liability for environmental damage is one of the important components of enterprise-wide risk. Currently, it is necessary for the undertaking thorough knowledge of legislation, full use of the instruments in the system, from prevention to insurance. The legal doctrine is often supported by compulsory insurance as a means to protect innocent victims. Polluter's obligation to negotiate liability insurance is a good way to protect victims from insolvency polluters. It is therefore necessary now to the question of under what circumstances it should be conceived as a compulsory insurance. The main objective is to define the main arguments and reasons for the introduction of compulsory liability insurance. In the context of understanding the theoretical foundations will be used researches domestic and foreign specialized literature, including journal articles, monographs analysis, EU legislation and the Czech Republic.

Keywords: ecological damage and detriment, environment, environmental insurance, liability for environmental damage, polluter pays principle

JEL codes: G22, G23, G38, Q5

1 Introduction

Development of industrial activity during the last century markedly signed on the quality of the environment. In the course of expanding industrial areas of the formation of the accident fundamentally changed the environment in which we live. The development of European and world community is connected with the process of globalization and the industrial economics are guided to not only legal, but also moral responsibility. Czech environmental law is in the context of global and is influenced by international law through international conventions and laws of the European Union (EU). The main reason for the necessary regulation of liability for environmental damage EU is the frequency and severity of damages (due to one-off or long-term releases of various pollutants into the environment). In connection with the Czech Republic joining the EU in 2004 adopted a Directive 2004/35/EC on environmental liability with regard to prevention and remedying of environmental damage (ELD). Directive ELD establishes a framework of responsibility in imminent threat of or the emergence environmental detriment. Principle of the directive is based on the principle of "polluter pays principle" and ability to prevent and remedy environmental damage. The basis is a logical idea that operator who causes damage to the environment, it must pay and removed. This means decontaminate soil, clean river and so on.

A shift from personal accountability to the public or corporate liability risks are predominant phenomenon today. This is for the whole insurance sector poses a major challenge because it must develop transfer of risk, which would cover the cost of repairing damage to the environment on the basis of a revised system of accountability. It is important to evaluate the exposure of the insurance market new demands. We can imagine more than one way to solve this problematic situations, insurance market should address the existing, traditional insurance products as a foundation on which to build new forms of coverage.

The main aim of the contribution will be an overall evaluation of the possibility of solving the problem of environmental pollution liability insurance through a mandatory assessment of the appropriateness of using forms of insurance. From the arguments

reveals whether to be introduced to provide compulsory financial security and whether it is an appropriate form of environmental insurance compulsory liability insurance.

2 Environmental Insurance as Internalization Instrument of Environmental Policy

Financial collateral environmental damage is a key tool of directive ELD. We can imagine it under different names insurance products as insurance of environmental damage, insurance of environmental liability to clean up the environment etc. Various insurance companies now offer a type of insurance is related to environmental damage. This kind of financial security has a long tradition and very well thought out concept. European legislation has in terms of environmental damage forerunner in the legal regulation in the US, during the legislative preparations for the European Union could not ignore. Because of the unique nature of each risk to the environment, the insurance contract for liability insurance for environmental damage in many cases written for each insured person separately on an individual basis. Insurance rather carefully review each application and determine the insured's insurance case (Jílková, 1999).

The nature of the environmental risks implies the utmost importance to prevent losses. This aspect must be the basis for cooperation between the insurer and businessman, loss prevention is the goal of the concept of environmental insurance for industrial and commercial enterprises. The concept is based on the fundamental idea that insurance, insurers and reinsurers are closely and openly cooperate to achieve mutual goals loss prevention. Entities, insurers and reinsurers, thereby shift the traditional approach rather passive "wait-and-see". Separately from the financial coverage provides for additional service in the form of technical expertise gained from risk-management and other experiences. In this regard, insurers and reinsurers are becoming known as "Managers of risk."

From this perspective, an important conclusion can be drawn: a sincere and lasting relationship between businesses and insurers is the cornerstone for the transfer of environmental risks. A key prerequisite for the successful implementation of the concept is the willingness of entrepreneurs to enter into a long term relationship; environmental risk cannot be managed without very close, open, credible and long-lasting cooperation between the insurer and reinsurer on one side and entrepreneur on the other. Before concluding the insurance contract must be an entrepreneur willing to disclose all necessary information relating to this end and inform the insurer of all processes and changes that occur during operations. Long-term commitment on part of the insured, which is the core of this concept, will focus on two key objectives:

- Insurance coverage is secured for a relatively long period achieves greater stability and less sensitivity to economic cycles;
- Requested mutual trust and common interests can be developed to manage specific environmental risks.

The practical implementation of this concept lies precisely on the risk analysis. Using questionnaires and interviews insurer determines whether the basic requirements were met: a competent and professional approach to maintenance of the activity and its willingness to provide all necessary information. Risk analysis involves monitoring business location and its surroundings, as well as populated area, transportation systems and many others. Other important points that need clarification are geological, hydrological and atmospheric conditions, as well as technical information concerning storage, processing and waste management. The policyholder must also provide information of the nature, quality and redundancy of the existing management control and supervision of environmental protection. A detailed risk analysis is performed, depending on the specific situation in a specific case. Assessment may be needed experts in the environmental field. Emphasis is placed on the deficiencies identified through the

survey and preliminary talks. An entrepreneur looking for insurance protection must bear the cost of any required evaluation.

Another phase involves the elaboration of a specific premium concept which takes into account all the information about the risks. Direct insurer with help reinsurer remains in close contact with the policyholder (entrepreneur). The entrepreneur must regularly report any significant respect and insurer monitors risk in terms of risk management. If there are any issues, both sides need to work closely together to arrive at technical, organizational and business solutions. The following Figure 1 shows the evolutionary process described above.

Figure 1 The development process environmental risk management
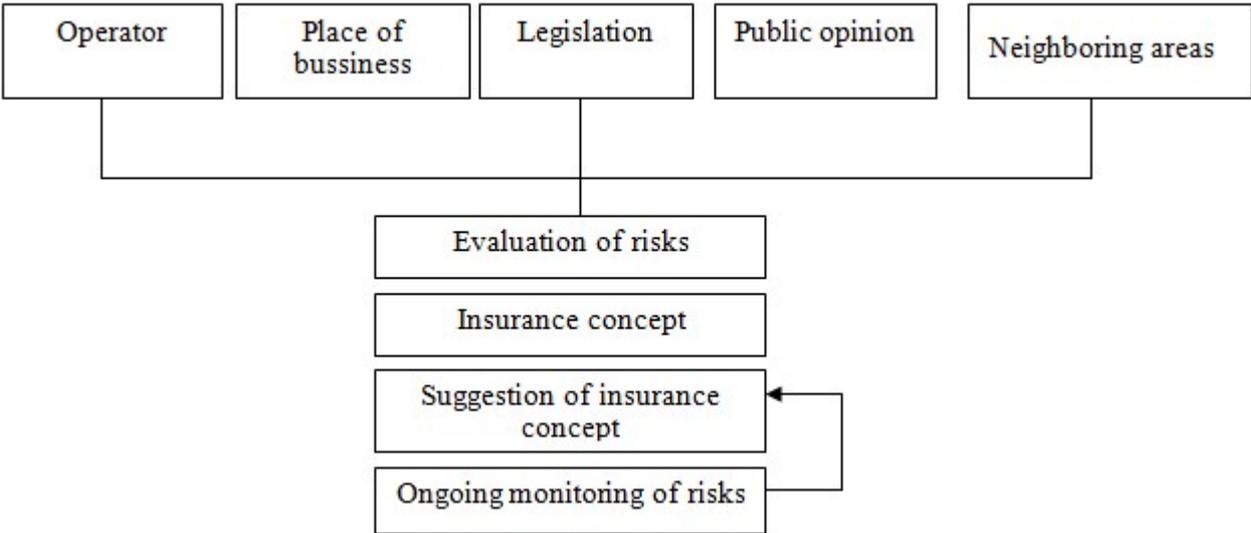
Source: Own processing

To address the needs of protection of entrepreneurs was created a number of insurance products that address the financial implications of environmental damage. They can be divided into two groups:

- Liability for environmental degradation, which includes responsibility for damage to third parties and
- Insurance business owners who need to remediate their own property or place of business.

Although these two groups are fundamentally different, the insurance market offers combined products provide coverage for liability risk and risk remediation. We can find various arguments in favor of these two separate products. The following considerations are based on this distribution.

3 Arguments for the Introduction of Compulsory Insurance of Liability for Environmental Damage

The legal doctrine is often promoted compulsory insurance as a means to protect innocent victims. Polluter's obligation to negotiate liability insurance is a good way to protect victims from insolvency polluters. It must now address the question of under what circumstances it should be conceived as a compulsory insurance. Paper will discuss problems related to inaccurate risk assessments, insolvency operators, increasing the anticipated benefits and potential problems related to the mandatory liability insurance.

3.1 Information Problems

Information problems may arise in the event that the potential polluter cannot make an accurate assessment of the risks to which it is exposed. Underestimation of risk in this case could lead to unjustified decision does not arrange liability insurance. The legislator could recover the information problem by introducing a general obligation to insure, as is the case for owners of motor vehicles. It would be a mere paternalism, where the information problems occurred, however, the legislature would introduce this obligation because it would be in the "best interest" of the insured.

If there were empirical studies and evidence that most polluters significantly underestimates the costs of environmental damage, which may cause, and the likelihood that they will be held responsible for that damage, polluters would then lead to production of too few reserves to cover their potential responsibility. If these conditions are met (it can be assumed that polluters underestimate the costs of environmental damage), this deficiency can be seen as an argument in favor of compulsory insurance. Another argument is the issue of insolvency.

3.2. The Insolvency of Operators

Another reason for the introduction of compulsory insurance is an argument often used by lawyers (OECD, 2003). Insolvency argument implies that the extent of the damage can often exceed the wealth of individual polluters, thereby creating problems with financial compensation. Lawyers should therefore enforce compulsory insurance as an argument for ensuring effective reparation to the victim. In the case of "orphan" objects contaminated by the operator (without the introduction of compulsory insurance) redevelopment would be funded from the public purse.

In the event that the anticipated loss largely exceeds the assets of the operator, polluter will have a tendency to buy insurance only to the extent of their own assets, as it is truly exposed to a risk of losing their own property, leading to the risk of underinsurance. Jost correctly pointed out that under these circumstances insolvency would introduce compulsory insurance would provide optimal results (Jost, 1996). Introducing the obligation to take out insurance in the amount of losses expected better results. When introducing the obligation to insure the full responsibility of the insurer will probably have to provide all the means to control the behavior of the insured. Such internalization can be achieved only if the insurer is able to control the behavior of the insured. Through traditional tools to control moral hazard the insurer may ensure that the operator is required under control (and to avoid an accident). This argument is valid only if the moral hazard can be controlled adequately, and insurance companies also have the right incentives to do so.

Compulsory insurance can eliminate both problems because it can provide adequate compensation to victims and – if certain conditions are met – to eliminate the risk of discouraging insurance. It must be asked whether the mandatory insurance is the best tool to fix the problem of insolvency. Although reference is made to liability insurance, in this context, there are several alternatives. The possibilities are first-party insurance or self insurance damages, whether mandatory or optional.

3.3. Increase Expected Utility

Businesses maximize benefits under the terms of certainty and perfect knowledge of economic environment, because they know perfectly all the circumstances of each market shifts and perform their choice without risk. In fact, the decision taking place under conditions of uncertainty is with multiple effects, and what effects occurs is not known in advance.

If the insurance actually beneficial because it eliminates the risk of the risk-averse individuals, thus increasing their usefulness, they are not these advantages justification introduction of compulsory insurance? This statement, which expressed Faure in his special publication Environmental Damage Insurance in Theory and Practice, however, can be argued several critical arguments (Faure, 2001).

Firstly, the degree of risk aversion is varying. Billionaire probably not averse to risk losing CZK 10.000, but low-income families probably will, therefore, likely to have a requirement for insurance against loss of CZK 10.000, while billionaire apparently not. This simple example clearly shows that the introduction of the obligation to insure may be ineffective in terms of forcing some businesses to arrange liability insurance, which would normally not demand for insurance (in this case, does not increase the expected benefits). Generalized obligation to insure may create a social loss. This could actually be outweighed by others will benefit from the insurance. Whether this is the case or not depends on the number affected by introducing an obligation to insure. There is no reason for regulatory intervention, only based on the fact that insurance may increase the expected benefit. It is believed that those responsible have knowledge about their risk exposure, availability of insurance and make good decisions accordingly. If this is lacking, it could be again raised the question of whether insurance should be mandatory.

4 Potential Dangers of Compulsory Liability Insurance

It should be emphasized that the insurance will always be linked to the **moral hazard** problem (Ducháčková, Daňhel, 2010). This means that even if the legislature decides to introduce compulsory insurance, they should not restrict the ability of insurers to solve problems of moral hazard. Otherwise, the introduction of compulsory insurance of liability for environmental damage creates more problems than it solves. The risk is transferred to the insurer, which means that the only tool available to the insurer to remove the moral hazard problem is monitoring the insured. If it was difficult or very costly, the introduction of compulsory liability insurance might cause problems on the supply side of insurance market. Shavell even goes as far as saying that the problem of moral hazard cannot be controlled with a single control, compulsory insurance would not even exist (Shavell, 1986). In any case, the introduction of compulsory insurance seems problematic if it cannot control the moral hazard problem. If it is possible to adjust the monopoly premiums, the insurer will have less incentive to align premiums of the insured individual behavior, resulting in less control of the problem of moral hazard. From political perspective, it also seems very questionable as to liability insurance in concentrated insurance markets required. In this case, the ineffectiveness of the insurance market strengthened through the introduction of compulsory insurance. Insurance company does not share the enthusiasm of the mandatory forms of insurance, at least not for the risk to the environment. For this reason, there are few insurers who have compulsory insurance mediate.

Dependence on the insurance market is another problematic part in this matter. Legislator should be aware that once you introduce mandatory insurance, becomes dependent on insurers and insurance markets that will be used for that purpose. Practical possibilities of effective enforcement will probably depend largely on the willingness of insurers (insurance market is the one who decides whether insurers are willing to cover a certain risk). This can eventually lead to an undesirable situation where a legislator has introduced a compulsory insurance obligation, but insurers would refuse such coverage (Jordan, 2005). It should be emphasized that if the availability of insurance a prerequisite for the functioning of the company, the insurance company will in fact become the licensor in the industry, which may be questionable from a political perspective. In fact, the insurer becomes a "cop on the environment."

Another problem arises from the fact that it is imperative that policymakers recognize that insurance for damage to the environment is still **relatively new insurance product**, and insurers with him have too much experience. If differentiated offer limited insurance contracts, then another question arises whether it makes sense to introduce compulsory insurance, when it can be found only cover a limited (or no sufficient competition in the insurance market). Limited availability of insurance risks to the environment is largely due to adverse selection: because too few operators have demand for this type of liability insurance, optimal allocation of risk (through the law of large numbers) is not possible. In this context, it pointed out that the risk differentiation in insurance environment in Europe still stands at the beginning of their options.

Of course, one might naively respond with a suggestion that if the insurance markets by refusing to provide adequate coverage, lawmakers should not only introduce compulsory insurance for operators but also the obligation for insurance companies to accept into its portfolio this insurance product, which appears to be a very dangerous path, because one of the important tools for controlling insurance moral hazard is being able to follow ex ante risk that may pose an insurance contract. To lay down cover certain risks seem to be contrary to the fundamental principles that must be followed to ensure the efficient functioning of insurance markets. All these considerations are arguments to legislators.

5 Conclusions

From this discussion follows a very important conclusion. The author believes that in this area there is a need for partial introduction of compulsory insurance for environmental damage, but policymakers must be very careful when introducing regulatory obligations. Flexible system that would in each case assessed whether it should be introduced to provide financial security seems to be a suitable alternative to compulsory insurance (despite the fact that the system requires costly individual assessment). Such a system, under which decisions on the form and amount of the financial liability is left to the administrative authorities, seems to be more flexible and involves fewer risks and dangers of the institute compulsory liability insurance.

One of the main tasks of each insurer is to assume certain business risks from its clients (operators) and evaluate these risks through appropriate underwriting tools. The aim is to enable the implementation of a profitable insurance business in the long term; insurers must meet the expectations of their various stakeholders.

In connection with the lack of statistical data on the occurrence and extent of environmental damage, the insurance company cannot be obtained despite the high-quality data to determine the exact level of risk and insurance. For this reason, insurers are creating a series of restrictions on the elimination of moral hazard: the time constraints, limitations of insurability damages, indemnity limits, participation, bonus and extra premium, and last but not least geographical constraints.

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Application of Gravity Framework to Bilateral Mutual Fund Flows in the Asia Pacific Region

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Abstract: *Already for more than century investigation of allocation of international investment funds is a topic of considerable interest for both practitioners and academicians. To the former such investigation provides a useful aid for efficient diversification of their investment portfolios. To the latter identification of significance of impact of certain factors on international investment flows may provide a proof for violation of efficient market hypothesis, which, if found, will have far-reaching implications for the theory of finance. Despite being an innovative modern scheme for international investment allocation mutual funds still are puzzling from the viewpoint of factors, which determine the status of a particular fund or national fund industry to be or not to be attractive for international investment flows. Most of existing studies focus on effect which individual fund characteristics have on inducing of foreign and domestic capital to flow in or out of a particular mutual fund and there is an evident gap in knowledge about factors which determine the attractiveness of an individual economy and its mutual fund industry for international portfolio flows. In the light of the stated above the paper aims to study the determinants of mutual fund flows in advanced and emerging economies of the Asia Pacific region by means of portfolio flows gravity framework. Application of such framework gives a threefold result: (1) it allows to model simple gravity-type relations between country mutual fund industry characteristics and international portfolio flows in the Asian Pacific region; (2) it allows to analyze the changing structure of the regional mutual fund flows along two – intensive and extensive – margins; and (3) by decomposing the sample into advanced and emerging economies, it allows to track differences across development stages and document important country and regional characteristics.*

Key words: fund flows, gravity model, extensive and intensive margin, the AP5

JEL codes: G23, F37

1 Introduction

Being an innovative vehicle for international portfolio investments, for already half a century mutual funds allocate wealth of nations around the globe. Although literature on mutual fund industry and cross-border capital flows is vast, contributions on the links between them are scarce. Most of studies explore the role of microeconomic variables as fund fees and expenses, past performance, fund family size and age, for inducing of foreign and domestic capital to flow in or out of a particular mutual fund. Although the effect of such variables is significant for a case of some particular funds or a group of them, nevertheless they do not hold for the whole national fund industry. Contemporary with such tries to identify determinants of fund flows, recently in the modern studies investigating the nature and determinants of cross-border capital flows there has emerged a trend toward application of gravity frameworks. Although gravity frameworks were initially designed for modeling of international trade in goods, however, recently they confirmed their ability to explain international transactions in financial assets as well as in goods.

As it has been stated application of gravity models in international finance is a quite new area of research and to our knowledge yet there are no studies exploring the application of such approaches for modeling international bilateral mutual fund flows. Under gravity models, along with major micro- and macroeconomic variables, the volume of international capital flows depends also upon transaction and information costs, caused by information asymmetries and cultural differences. The latter group of variables is known as "distance proxies", which, if found in case of mutual fund flows, as one thing, may substantially influence the benefits from international portfolio diversification and, thus influence the volume of country's international investment inflows; and, as another thing, they may provide an evidence against efficient market hypothesis (EMH). Thus the paper aims to study the determinants of mutual fund flows in advanced and emerging economies of the Asia Pacific (AP) region by means of portfolio flows gravity framework. Application of such framework gives a threefold result: (1) it allows to model simple gravity-type relations between country mutual fund industry characteristics and international portfolio flows in the AP region; (2) it allows to analyze the changing structure of the regional mutual fund flows along two – intensive and extensive – margins; and (3) by decomposing the sample into advanced and emerging AP economies, it allows to track differences across development stages and document important country and regional characteristics. This paper proceeds as follows: Section 2 reports data and methodology used; Section 3 presents obtained results and provides discussion; and Section 4 concludes.

2 Data and Methodology

The goal of the paper is to identify and verify the determinants of mutual fund flows in the sample of five advanced and emerging economies of the Asia Pacific region (AP5) – Indonesia, Japan, Hong-Kong, India and South Korea – by means of portfolio flow gravity framework for the time span of Q1/2000 to Q4/2014. For this reason a dataset of 3 321 open-end equity mutual funds domiciled outside of AP5, but with geographical focus on these countries has been made. The compiled dataset has been divided into subsamples of inflows from mutual funds domiciled in the countries of the Middle East and North Africa (MENA), in countries of the Central Asia and Asia Pacific (CA&AP, excluding AP5), in countries of the Western and Eastern Europe (W&EE), in countries of the North America (NA) and Central and South America (C&SA). Thus there were made five regional subsamples and one global sample. It turned out that the major host countries for AP5 fund inflows are from the CA&AP and NA regions, while the least volume of inflows comes from the MENA-domiciled mutual funds (Table 1).

Table 1 Structure of average annual MF inflows in AP5

		Fund flow host regions				
		MENA	Central Asia & Asia-Pacific	West. & East. Europe	North America	Cent. & South America
Fund flow target countries	Indonesia	0%	100%	0%	0%	0%
	Japan	0%	28%	0%	72%	0%
	Hong-Kong	0%	0%	0%	87%	13%
	India	6%	85%	6%	3%	0%
	South Korea	0%	100%	0%	0%	0%

Source: Bloomberg

As for structure of target countries, so the most geographically diversified inflows go into Japan, Hong-Kong and India, while the least diversified ones go into Indonesia and South

Korea. This can be explained by high correlation between level of economic development and quality of governance and mutual fund industry development (Lemeshko and Rejnus, 2014). This relationship holds clearly for Japan, Hong-Kong, Indonesia and South Korea, but it is less clear for the case of India. Possible explanation may be high growth rates of Indian economy and huge local fund industry. Thus in case of Japan and Hong-Kong we can to talk about extensive margin of fund flows, that is, larger number of foreign funds investing into local capital markets and asset management due to lower transaction costs and higher protection of investors rights; while in case of Hong-Kong there is a trend toward intensive margin given by lower number of foreign funds, thus higher concentration in the industry, higher fees and higher home-bias faced by mutual fund managers outside from CA&AP. As for Indian asset management, so it follows a mixture of extensive and intensive margins.

The study of factors determining the attractiveness of an individual economy and its mutual fund industry for international portfolio inflows comprises a wide range of variables, mainly of micro- and macroeconomic nature. The most frequently studied microeconomic determinants of mutual fund flows are past fund performance and fund fees and expenses. Existing evidence suggest that: (1) past winners are rewarded with inflows while the past losers are punished with outflows, however at not symmetrical level (O'Neal, 2004; Ivković and Weisbenner, 2009; Cashman et al., 2012); (2) mutual fund investors are increasingly averse to mutual fund costs and their purchase decisions are more strongly influenced by fund's front-end loads and commissions rather than its operating expenses (Barber et al, 2005; Houge and Wellman, 2006; Greene et al., 2007). As for macroeconomic determinants of mutual fund flows, so there is a vast body of evidence confirming a co-movement in mutual fund flows and stock market returns (Shrider, 2009; Jank, 2012; Ferreira et al., 2012). However in light of gravity framework, which has been applied successfully in field of international investment flows in the recent years, it is possible to assume that along with effect of basic micro- and macroeconomic variables the effect of some "distance proxies", given by information and cultural differences, might also be significant in determining the volume of international mutual fund flows. A number of studies have used gravity models to analyze the determinants of international investment flows – both in form of FDI and portfolio investment. The major findings indicate that bilateral trade in assets increases with country size and declines with transaction costs and information asymmetries (Portes and Rey, 2005; Okawa and van Wincoop, 2012). In light of the stated above the combination of micro- and macroeconomic factors with cultural differences results in a gravity framework, which is widely applicable in international trade of goods and securities and which can be used for modeling international fund flows. Following such approach the assumed relationship between international fund flows and groups of chosen explanatory variables can be captured by means of a gravity model for international portfolio investments, given by:

$$MFF_{n.t} = \alpha_0 + \beta_{1,t}R_{i,t} + \beta_{2,t}MKT_{j,t} + \beta_{3,t}V_{j,t} + \beta_{4,t}L_{j,t} + \beta_{5,t}D/P_{j,t} + \beta_{5,t}\Delta PD_n$$
$$+ \beta_{6,t}\Delta Ind_n + \beta_{7,t}\Delta Masc_n + \beta_{8,t}\Delta UnA_n + \beta_{9,t}\Delta LTO_n + \beta_{10,t}\Delta Ing_n + \beta_{11,t}\Delta TH_n \qquad (1)$$

where: $MFF_{n,t}$ – dependent variable, mutual fund inflow in country n at time t; $R_{i,t}$ – excess return of fund i at time t; $MKT_{j,t}$ – excess return of equity index j at time t; $V_{j,t}$ - volatility of equity index return j at time t in capital market m; $L_{j,t}$ – liquidity of equity market m at time t; $D/P_{j,t}$ – dividend/price ratio of equity index j at time t; ΔPD_n – difference in value of Power distance index in host and target countries n; ΔInd_n – difference in value of Individualism index in host and target countries n; $\Delta Masc_n$ – difference in value of Masculinity index in host and target countries n; ΔUnA_n – difference in value of Uncertainty avoidance index in host and target countries n; ΔLTO_n – difference in value of Long-term orientation index in host and target countries n; ΔIng_n – difference in value of Indulgence index in host and target countries n; ΔTH_n – difference in trading hours of stock exchanges in host and target countries n; $\beta_{i,t}$ – estimates referring to direction and strength of

examined relationship (for better description of used variables see Table 2 and summary statistics in Table 3).

As it has been mentioned earlier we run a couple versions of the estimated gravity model.

Table 2 Chosen actors of mutual fund flows in the AP5 countries

Variable	Description	Reference	Source
Panel A. Dependent variable – mutual fund flows			
Mutual fund inflow ($MFF_{n,t}$)	Change in total net assets of mutual fund i from country n over period t with only investment focus on AP5 as a unit or on its particular member country l. For estimation of inflow from host country n at time t it is necessary to take sum of changes for all funds domiciled in such host country.	Chevalier and Ellison (1997), Sirri and Tufano (1998)	Bloomberg
Panel B. Explanatory variables – microeconomic and macroeconomic factors			
Excess mutual fund return ($R_{i,t}$)	Excess of mutual fund i at time t over return of T-Bill in capital market m at time t.	Ferreira et al. (2012)	Bloomberg
Excess market return ($MKT_{j,t}$)	Excess of equity index return j at time t over return of T-Bill in capital market m at time t.	Ferreira et al. (2012)	Bloomberg
Volatility ($V_{j,t}$)	Volatility of equity index return j at time t in capital market m.	Ferreira et al. (2012)	Bloomberg
Liquidity ($L_{m,t}$)	Liquidity of equity market m at time t. It is estimated by means of market efficiency coefficient (MEC). Higher value of MEC corresponds to higher degree of liquidity in equity market.	Ferreira et al. (2012), Sarr and Lybek (2002)	IMF, Bloomberg
Dividend yield ($D/P_{j,t}$)	Dividend/price ratio of equity index j at time t. It stands for equity premium.	Ferreira et al. (2012)	Bloomberg
Panel C. Explanatory variables – cultural and information factors			
Power distance index (PD_n)	Expresses the degree to which the less powerful members of a society from country n expect that power is distributed unequally.	Portes and Rey, (2005)	HCCD database
Individualism index (Ind_n)	Reflects the degree of preference of members of a society from country n for a loosely-knit social framework.	Portes and Rey, (2005)	HCCD database
Masculinity index ($Masc_n$)	Represents a preference in society from country n for achievement, heroism, and material rewards for success.	Portes and Rey, (2005)	HCCD database
Uncertainty avoidance index (UnA_n)	Expresses the degree to which the members of a society from country n feel uncomfortable with uncertainty.	Portes and Rey, (2005)	HCCD database
Long-term orientation index (LTO_n)	Reflects the degree of preference of members of a society from country n to maintain time-honoured traditions and norms while viewing societal change with suspicion.	Portes and Rey, (2005)	HCCD database
Indulgence index (Ing_n)	Stands for a society from country n that allows relatively free gratification of basic and natural human drives related to enjoying life and having fun.	Portes and Rey, (2005)	HCCD database
Trading hours (TH_n)	Trading hours of stock exchange in country n.		Bloomberg

First of all, we run six regressions for global analysis – five regressions for five regions of the world – MENA, CA&AP, W&EE, NA, C&SA – plus one for global sample (Table 4). Then we run another ten regressions – two per each target country - to estimate the significance of chosen factors for intragroup bilateral mutual fund flows (Table 5). The longitudinal data for regressions used was of both raw and ready-made character and it was collected from various sources: (1) data for mutual fund flows was totally derived from Bloomberg, then filtered and computed manually; (2) data for variables referring to past fund and equity market performance, including volatility and liquidity, was derived from Bloomberg, then filtered and computed manually; (3) data for distance proxies, that is, cultural and information indices was derived from Hofstede's country cultural dimensions (HCCD) database, data on stock exchanges trading hours was derived from Bloomberg.

3 Results and Discussion

On the basis of obtained results, presented in Table 5 and Table 6, we find a strong positive relationship between AP5 mutual fund inflows and domestic funds and equity market past performance. This relation holds for both global and intraregional inflows into AP5. Also we find significant negative impact of domestic equity index volatility and significant positive impact of domestic equity market liquidity on cross-border global and intragroup inflows. Likewise we confirm positive significant role of dividend yield as measure of equity premium on increase of country's attractiveness for international individual and institutional investors. These trends are common for all AP5 economies regardless of their income level –advanced or emerging - and it is consistent with earlier findings by Shrider (2009), Ferreira et al., (2012) and others. Interesting is that these relationships holds as for whole sample of AP5 (Table 4), so for subsamples for individual AP5 economies (Table 5).

Table 3 Summary statistics on AP5 inflows and their factors

	Mean	Median	St.dev	Min	Max
Indonesia inflows, bln USD	8.44	5.38	26.54	-93.87	72.77
Japan inflows, bln USD	155.32	64.85	1150.4	-2258.7	10317
Hong-Kong inflows, bln USD	0.55	0.17	5.15	-13.77	59.5
India inflows, bln USD	4.16	1.37	13.62	-45.36	43.68
South Korea inflows, bln USD	0.8	0.74	3.93	-12.08	23.07
$R_{i,t}$	0.16%	0.49%	8.42%	-31.49%	32.88%
$MKT_{j,t}$	0.06%	0.39%	8.16%	-30.22%	31.61%
$V_{j,t}$	1.31%	1.14%	0.73%	0.07%	6.93%
$L_{m,t}$	27.29%	25.21%	8.32%	11.98%	110.82%
$D/P_{j,t}$	1.9354	1.76	1.5003	0	12.256
PD_n	17.24	18	7.0548	7.2	26.6
Ind_n	32.72	35	11.259	18.4	46.2
$Masc_n$	20.56	18.8	14.308	3.6	42.8
UnA_n	27.32	26.8	19.215	4.2	52.8
LTO_n	36.4	29.2	17.354	15.2	61.8
Ing_n	28.56	29.4	8.872	16.6	41.6
TH_n	7.16	7.6	1.4521	4.8	8.6

Source: Own computation on the basis of raw data from Bloomberg and HCCD database

Table 4 Factors determining global fund flows into AP5 economies (by group analysis), pooled OLS

	Global inflows		MENA inflows	CA&AP inflows	WE&EE inflows	NA inflows	C&SA inflows
const	-26.01	-1256 *	3448.1 **	32.357	-3172	-993.2	-665.3
$R_{i,t}$	216.33	236.55	236.55	236.55	236.55	236.55	236.55
$MKT_{j,t}$	262.95	231.14	231.14	231.14	231.14	231.14	231.14
$V_{j,t}$	-966.3	-194.6	-194.6	-194.6	-194.6	-194.6	-194.6
$L_{m,t}$	289.19	328.51	328.51	328.51	328.51	328.51	328.51
$D/P_{j,t}$	-3.544	0.7889	0.7889	0.7889	0.7889	0.7889	0.7889
ΔPD_n		-33.75 ***	-198.46 *	-145.1	541.65	20.66	19.338
ΔInd_n			-75.71 *	78.085	415.5	4.4995	8.0568
$\Delta Masc_n$			-10.53	-68.57	-1464	7.8101 ***	2.9243 *
ΔUnA_n			-20.03 **	-52.75	1291	16.125	7.6316
ΔLTO_n			-52.27 *	228.22	-744.1	-9.176 ***	1.967
ΔIng_n							
ΔTH_n							
N of obs.	179	179	179	179	179	179	179
R sqr	0.00815	0.0235	0.0235	0.0235	0.0235	0.0235	0.0235

Table shows results for pooled OLS regressions with White's standard errors.

*, **, and *** show significance at 10%, 5% and 1%.

Table 5 Factors determining global and intragroup fund flows within AP5 economies (by country analysis), pooled OLS

	Indonesia global inflows		Indonesia AP4 inflows	
const	4.47642 ***	-46.116 ***	0.55344 ***	-1.7373 ***
$R_{i,t}$	232.679 ***	242.127 ***	-11.385 ***	-9.0743 ***
$MKT_{j,t}$	-104.71 ***	-116.42 ***	4.34624 ***	1.48223 ***
$V_{j,t}$	319.39 ***	337.743 ***	23.0679 ***	27.5559 ***
$L_{m,t}$	0.27981 ***	0.82342 ***	2.27236 ***	2.4053 ***
$D/P_{j,t}$	-0.1521 ***	-0.2916 ***	-0.0568 ***	-0.091 ***
ΔPD_n		10.3321 ***		2.52662 ***
N. obs.	179	179	179	179
R sqr	0.216	0.257	0.119	0.152
	Japan global inflows		Japan AP4 inflows	
const	-324.3 ***	-3849.5 ***	0.01009 ***	0.18454 ***
$R_{i,t}$	3144.37 ***	1554.98 ***	0.1219 ***	0.0585 ***
$MKT_{j,t}$	291.33 ***	1762.75 ***	0.1308 ***	0.07207 ***
$V_{j,t}$	-2954.8 ***	-2452.4 ***	-0.0707 ***	-0.0907 ***
$L_{m,t}$	1701.23 ***	1841.12 ***	-0.0356 ***	-0.0412 ***
$D/P_{j,t}$	36.8826 ***	-27.96 ***	-0.0008 ***	0.00176 ***
ΔPD_n		211.526 ***		-0.0084 ***
N. obs.	179	179	179	179
R sqr	0.251	0.257	0.141	0.161
	Hong-Kong global inflows		Hong-Kong AP4 inflows	
const	0.56679 ***	-2.9169 ***	-0.257 ***	-7.4842 ***
$R_{i,t}$	1.3268 ***	2.0358 ***	1.4448 ***	2.0581 ***
$MKT_{j,t}$	17.3407 ***	17.7346 ***	7.7823 ***	7.4416 ***
$V_{j,t}$	-16.793 ***	-13.751 ***	45.1308 ***	47.7622 ***
$L_{m,t}$	-1.2072 ***	0.59432 ***	-1.6546 ***	-0.0964 ***
$D/P_{j,t}$	0.18207 ***	-0.0151 ***	0.22597 ***	0.05546 ***
ΔPD_n		1.21801 ***		1.0535 ***
N. obs.	179	179	179	179
R sqr	0.255	0.265	0.126	0.134
	India global inflows		India AP4 inflows	
const	4.28089 ***	-45.362 ***	3608.25 ***	-15958 ***
$R_{i,t}$	4.70262 ***	1.46496 ***	29822 ***	32400 ***
$MKT_{j,t}$	49.0322 ***	51.3653 ***	3833.26 ***	5691.29 ***
$V_{j,t}$	34.6148 ***	84.3244 ***	-37341 ***	2247.5 ***
$L_{m,t}$	-4.3542 ***	-4.0683 ***	-818.1 ***	-590.38 ***
$D/P_{j,t}$	0.2278 ***	-0.1428 ***	-105.72 ***	-400.84 ***
ΔPD_n		6.26881 ***		4992.44 ***
N. obs.	179	179	179	179
R sqr	0.296	0.235	0.101	0.117

	South Korea global inflows		South Korea AP4 inflows	
const	0.17912 ***	-13.516 ***	-0.0166 ***	-21.748 ***
$R_{i,t}$	14.1642 ***	14.3009 ***	5.44748 ***	5.60706 ***
$MKT_{j,t}$	3.17825 ***	2.83887 ***	7.60747 ***	7.21153 ***
$V_{j,t}$	42.5757 ***	58.8688 ***	46.1974 ***	65.2059 ***
$L_{m,t}$	0.55915 ***	1.09504 ***	-0.0586 ***	0.56663 ***
$D/P_{j,t}$	-0.028 ***	-0.0935 ***	-0.0265 ***	-0.1029 ***
ΔPD_n		1.23289 ***		1.43836 ***
N. obs.	179	179	179	179
R sqr	0.243	0.217	0.136	0.181

Table shows results for pooled OLS regressions with White's standard errors.

*, **, and *** show significance at 10%, 5% and 1%.

As for cultural and informational differences, so obtained results confirm controversial significance of difference in power distance index, that is, the difference in perceptions by members of two societies – one of which is AP5 in total or by member state – of unequal distribution of power in such societies. This factor is equally significant in global sample and country sample, but its sign changes from negative for AP5 in total to positive for by-country analysis. If we take a look at the value of this index inside of AP5 and in the rest of the world, we will notice that AP5 citizens feel themselves suffering with inequality of power distribution to much higher extent than their counterparts from the rest of the world – 65 points inside of AP5 against average 17 points outside of it. It means that increase in difference in perception of inequality of distributed power in the society by foreign individual and institutional investors outside of AP5 and AP5 citizens, on average, becomes a barrier for cross-border fund investments and, thus, reduces benefits of foreign investors from international portfolio diversification. Also it provides an evidence against EMH. But, as it has been mentioned earlier, this relationship holds not for the whole global sample. For instance, for investors from the MENA region a growth in such difference in perceptions serves as additional significant incentive for increase of their investments into AP5. Also it plays positive significant role for intragroup investors. Such tendency can be explained by common cultural and moral values which prevail in Islamic and Asian societies for centuries and are captured by power distance index.

Besides difference in power distance index important are differences in individualism, uncertainty avoidance and long-term orientation indices. Growth of difference in these factors has significantly negative impact on mutual fund flows from the MENA region. Also investment flows from the NA region are significantly negatively affected by long-term orientation of AP5 societies and their conservatism, and adverse attitude toward new things and modern values. On the contrary, growth in difference of masculinity index has a significant positive impact on growth of international fund flows into AP5 from the NA investors. If we take a look at values of this index in AP5 and NA regions we will notice that societies from NA regions place higher emphasis on assertiveness and material rewards for success (high value of this index), while societies from AP5 region much more appreciate modesty and cooperation (lower value of this index). Thus it is not surprising that investors from NA faced with such cultural environment of AP5 would be satisfied with such difference in their cultural determinants since for them it may turn into decrease of fund fees and personnel costs.

Analysis of all the rest cultural and informational factors did not give any significant results neither in terms of global analysis not in terms by country analysis. Thus the effects of all cultural and informational variables, except power distance, masculinity and long-term orientation, can be neglected. By-country study confirmed the significant positive affect of past domestic funds and local equity markets performance on increase in national attractiveness as target for international fund flows among all AP5 member

states, except Indonesia. Also the obtained results allowed to identify significant positive impact of growth in difference in power distance, which holds for both county-world and county-AP5 relationship and provides an evidence against EMH.

Conclusion

Being an innovative vehicle for international portfolio investments, for already half a century mutual funds allocate the wealth of nations around the globe. On general, obtained results on bilateral mutual fund flows in the AP region confirmed the importance of fund and equity market past performance, including volatility and liquidity. Also the obtained results enhance the debate about validity of EMH in context of international capital flows by suggesting a strong evidence of importance of cultural and information asymmetries, which exist between host and target countries. Also such evidence emphasizes the necessity to take these asymmetries into account while shaping and rebalancing of investment portfolio.

Acknowledgement

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Timing Abilities of Mutual Funds in Countries of the Central and Eastern Europe

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Abstract: *Being a part of developing economies with high growth rates and increasing wealth and financial literacy of local population in the recent decade mutual funds from the Central and Eastern Europe have increasingly started to draw investors' attention. However the amount of academic research on performance of local funds is small in comparison to their recent economic importance. Rare existing studies suffer one major drawback - they are structured mainly upon country evidence, thus limiting the possibility to derive some generalized conclusions about overall mutual funds performance on the regional or country group level. This is caused apparently by lack of all necessary and unified data required for conducting of such a research. Notwithstanding such drawback there is a positive evidence of abnormal returns generated by local funds. In this context the paper aims to test the performance of domestic equity mutual funds from advanced and frontier emerging economies of the Central and Easter Europe for market timing ability. Following established practice mutual funds market timing ability will be tested from three perspectives – market return, market volatility and market liquidity – using data on domestic active and inactive equity mutual funds daily and monthly returns collected from Bloomberg and classified into three groups according to Wiesenberger objective code. Application of such approach gives a threefold result: (1) it allows to reveal and to define the type of timing performed by local funds (return-, volatility- or liquidity-induced); (2) to perform their international comparison with mutual funds from other regions or groups of advanced and emerging economies; and (3) by decomposing the sample into advanced and frontier emerging economies, it allows to track differences across development stages and document important country and regional characteristics.*

Keywords: timing abilities, volatility, liquidity, mutual fund managers, the CEE

JEL codes: G23

1 Introduction

Although for more than a century investors have been almost exclusively interested in funds from countries with mature economies and developed capital markets, nevertheless during the last decade funds from emerging economies have been increasingly drawing investors' attention and in this context funds from the advanced and frontier emerging economies of the Central and Eastern Europe (CEE) are not an exception. Being a part of developing economies with high growth rates and increasing wealth and financial literacy of local population in the recent decade the CEE asset management has approved its status as the one with relatively high competition inside and its significant positive correlations with degree of CEE economies' openness to trade and capital flows, with level of development and stability of local financial and capital markets as well as with level of quality of local governance and regulatory basis (Lemeshko and Renuš, 2014). All these factors determined the leading position of the CEE asset management together with its Latin American counterpart among the emerging mutual fund industries in the world. However, fragmented and quite heterogeneous raw data on emerging CEE capital markets and CEE funds performance in combination with absence of adjusted for specificity of local emerging economies approaches to fund performance evaluation makes study of local fund managers' timing ability to be quite a problematic area of research. Available corresponding studies which are based on evidence from Hungary, Poland, Slovenia and Russia confirm short-term

market timing ability of local fund managers, which likewise in case of other emerging economies can be explained by industry size and level of development, and informational advantages of locals over foreign investors (Delcoure and French, 2007; Białkowski and Otten, 2011).

In light of the stated above the paper aims to test the performance of domestic equity mutual funds from advanced and frontier emerging CEE economies for market timing ability. Following established practice mutual funds market timing ability is tested by means of two-step multivariate dynamic approach proposed by Bodson et al. (2013) from three perspectives – market return, market volatility and market liquidity – using data on equity mutual funds daily and monthly returns which is collected from Bloomberg and classified into three groups according to Wiesenberger investment objective code, active/inactive status and country group. Application of such approach gives a threefold result: (1) it allows to reveal and to define the type of timing performed by local funds; (2) to perform their international comparison with mutual funds from other regions or groups of advanced and emerging economies; and (3) by decomposing the sample into advanced and frontier emerging economies, it allows to track differences across development stages and document important country and regional characteristics. This paper proceeds as follows: Section 2 reports data and methodology used; Section 3 presents obtained results and provides discussion; and Section 4 concludes.

2 Data and Methodology

The paper aims to examine the performance of equity mutual funds for timing ability using cross-section data on two advanced emerging – Hungary and Poland – and five frontier emerging – Bulgaria, Estonia, Lithuania, Romania and Slovenia – CEE economies for the time span from Q1/2000 to Q4/2014. For this purpose there is compiled a dataset of 251 open-end active and inactive equity mutual funds which are domiciled in the chosen countries, are actively managed (i.e. non-index funds) and invest domestically. Further this sample is filtered applying criterion of investment strategies: we apply Wiesenberger objective codes to select and classify funds into three categories – Income, Blend and Growth. Further this sample is filtered for minimum required number of available observations: initial requirement was 180 observations (monthly data) but then this requirement was tolerated to 120 observations. As a result our initial

Table 1 Summary statistics on CEE mutual fund excess returns and their factors

	N of funds	Mean	Median	St.dev	Min	Max
R total	51	0.62%	0.94%	5.13%	-23.28%	20.98%
R active	46	0.65%	0.82%	5.15%	-23.30%	20.98%
R inactive	5	-0.31%	0.83%	10.71%	-98.95%	17.16%
R income	2	-0.09%	0.45%	5.58%	-22.13%	15.68%
R blend	41	0.70%	0.99%	5.29%	-22.85%	25.07%
R growth	8	0.06%	0.74%	5.52%	-26.97%	19.58%
R advanced CEE	35	0.49%	0.76%	5.03%	-22.83%	15.85%
R frontier CEE	16	0.85%	0.75%	12.73%	-40.23%	140.29%
MKT total		3.96%	0.93%	19.22%	-37.21%	97.63%
SMB total		-3.00%	-0.02%	16.45%	-105.16%	28.11%
HML total		0.70%	-0.06%	7.66%	-19.69%	67.89%
MoM total		36.89%	2.67%	107.06%	-18.10%	567.51%
V total		1.10%	0.95%	0.77%	0.35%	8.90%
L total		27.72%	27.23%	4.21%	21.07%	50.41%

Source: Own computation on the basis of raw data from Bloomberg

Figure 1 Time-series of CEE mutual fund excess returns and their factors
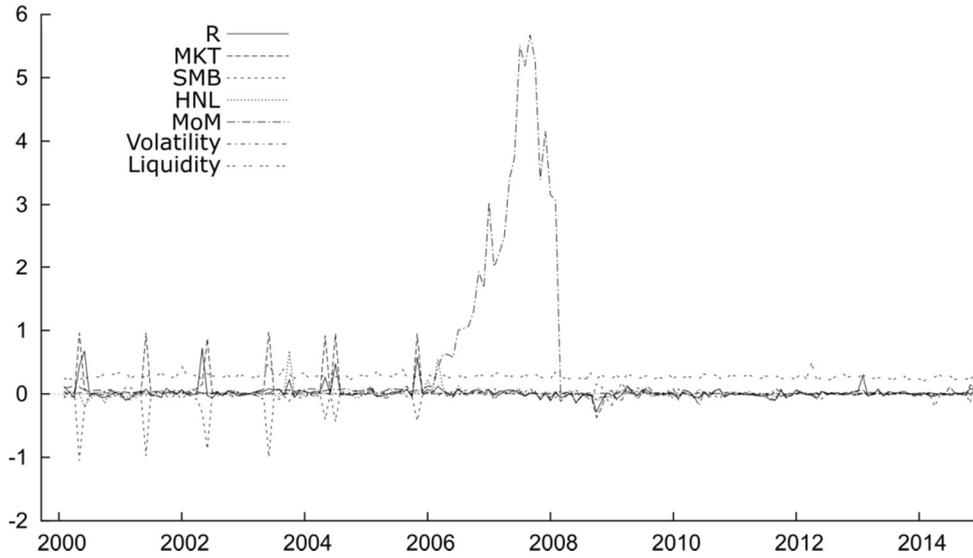
Source: Own computation on the basis of raw data from Bloomberg

database of 251 mutual funds shrinks to 51 funds (all chosen funds are presented in Appendix 1). Using this dataset we create equally weighted portfolio for all funds in the sample – for global analysis – then two portfolios for subsamples for active and inactive funds – for fund status analysis – then two portfolios for mutual funds from advanced and frontier emerging CEE economies – for country group analysis – and, finally, three portfolios for investment strategy analysis. At the very end we perform by-fund analysis using data on every fund individually. Summary statistics on global sample is reported in Table 1 (we do not report here summary statistics on factors for all subsample portfolios due to space constraints, but we can provide it on request).

Following classical approach for identification and evaluation of timing abilities of CEE fund managers we use the asset pricing model of Fama and French (1996) extended by momentum factor of Carhart (1997). Such approach allows us to reveal presence of timing ability, however, if any, it does not allow do identify individual components of it. Here it is necessary to state that recent studies differentiate three types of market timing – market return, market volatility and market liquidity timing (Bollen and Busse, 2001; Benos et al., 2010; Cao et al., 2013). Thus to decompose total timing, if any, into its primary components we apply the same approach as in study by Bodson et al. (2013), where market exposure - $\beta_{1,i,t}$ – is modeled as a linear function of changes in market return, market volatility and market liquidity. Market exposures change dynamically and in absence of timing ability they follow a random walk. Thus the employed in our analysis approach is two-step and it is given by the following models:

$$R_{i,t} = \alpha_i + \beta_{1,i} MKT_{j,t} + \beta_{2,i} HML_{j,t} + \beta_{3,i} SMB_{j,t} + \beta_{4,i} MoM_{j,t} + \varepsilon_{i,t} \tag{1}$$

where: $R_{i,t}$ - dependent variable, excess return of fund i at time t; $MKT_{j,t}$ – excess return of equity index j at time t; $HML_{j,t}$ – excess return of fund i with high B/M ratio investment focus at time t; $SMB_{j,t}$ – excess return of fund i with small cap investment focus at time t; $MoM_{j,t}$ – momentum factor for fund i at time t. Decomposition of timing ability, if any, brings us to the second step:

$$\beta_{1,i} = \beta_{1,i,t-1} + \theta_{1,i} \Delta MKT_{j,t} + \theta_{2,i} \Delta V_{j,t} + \theta_{3,i} \Delta L_{j,t} + \vartheta_{i,t} \tag{2}$$

where: $\beta_{1,i,t-1}$ – change in market exposure at time t from time $t-1$; $\Delta MKT_{j,t}$ – change in excess return of equity index j at time t from time $t-1$; $\Delta V_{j,t}$ – change in volatility of equity index return j at time t from time $t-1$; $\Delta L_{j,t}$ – change in aggregate market liquidity

Table 2 ADF test for stationarity of time-series of of CEE mutual fund excess returns and their factors

	Without first differencing		With first differencing	
	Without trend	**With trend**	**Without trend**	**With trend**
R_{total}	-12.3039	-12.6387	-6.89643	-6.8669
	(4.79E-20)	(5.31E-20)	(6.28E-10)	(5.98E+10)
MKT_{total}	-3.30013	-13.8151	-9.2795	-9.25124
	(0.01491)	(9.11E-22)	(6.42E-17)	(7.08E-17)
SMB_{total}	-3.52461	-12.6904	-10.7805	-10.7311
	(0.007408)	(4.36E-20)	(9.95E-22)	(8.10E-23)
HML_{total}	-11.8319	-11.8022	-8.59821	-8.59586
	(2.34E-19)	(1.61E-18)	(8.17E-15)	(1.77E-14)
MoM_{total}	-3.3956	-3.39074	-5.10724	-5.09986
	(0.01114)	(0.05255)	(1.23E-05)	(0.000115)
V_{total}	-11.3386	-11.3064	-7.8699	-7.85004
	(1.85E-18)	(1.44E-17)	(1.20E-12)	(6.05E-12)
L_{total}	-13.0488	-5.32703	-7.09169	-7.05964
	(2.55E-21)	(3.93E-05)	(1.87E-10)	(1.67E-09)

Source: Own computation on the basis of raw data from Bloomberg. P-values are given in parenthesis.

of equity market j at time t from time $t-1$. The first equation is known as measurement equation, aimed to capture presence of timing ability, and the second one is known as transition equation, aimed to decompose captured timing into its primary components. If there is no change in market excess return, market volatility and aggregate liquidity we do not expect a mutual fund manager to change its market exposure, thus, do not employ market timing skills. However, such market exposure may change due to some other reasons. This will be absorbed by error term.

As it was stated earlier we have constructed a number of equally weighted portfolios for global, by-status, by-strategy, by-country-group and by-fund analysis and we apply the above presented models to this portfolios, results on which are presented in Table 3, Table 4 and Table 5. All data on time-series for presented models was collected from Bloomberg and estimated by means of ARIMA (1,1,1) models using Kalman filter (lag 1 was chosen as the most appropriate on the basis of AIC and BIC information criteria). If CEE fund managers posses market timing abilities from all three perspectives we would expect $\Delta MKT_{j,t}$ and $\Delta L_{j,t}$ to be significant positive and $\Delta V_{j,t}$ to be significant negative.

Here it is necessary to mention that from technical viewpoint we worked with time-series data. For analysis of multivariate time-series data all variables are required to be stationary. The easiest way how to check them is time-series plot. From Figure 1 it is evident that our time-series are mean reverting, although with several outliers, mainly during crisis (we do not plot here time-series on factors for all subsample portfolios due to space constraints, but we can provide it on request). Due to presence of outliers our time-series have a weak form of stationary, which can be confirmed by ADF test (Table 2): for all variables, except MKT_{total} and $MoM_{total},$ we cannot accept null hypothesis of presence of a unit root. First differencing ensures us against presence of non-stationarity in any of chosen factors.

3 Results and Discussion

On the basis of obtained global regression estimates it is possible to conclude about presence of timing ability among fund managers from advanced and frontier emerging CEE economies – there are significant positive $MKT_{j,t}$ estimates for the whole sample of

Table 3 Global regression estimates

	Total	Active	Advanced CEE	Frontier CEE
const	-0.0002	-0.0002	0.0019	-0.0009
	(0.1295)	(0.1427)	(0.9332)	(0.6543)
$MKT_{j,t}$	0.4362 ***	0.4114 ***	1.0976 ***	2.9099 ***
	(0.00001)	(0.00001)	(0.00001)	(0.00001)
$SMB_{j,t}$	0.1094	0.0781	0.2121	-1.3592 ***
	(0.1994)	(0.3637)	(0.2870)	(0.0008)
$HML_{j,t}$	0.2167 **	0.2246 ***	-0.1583	0.9770 ***
	(0.0115)	(0.0096)	(0.4921)	(0.00001)
$MoM_{j,t}$	-0.0005	-0.0006	0.0322	-0.0354 ***
	(0.9297)	(0.9061)	(0.8828)	(0.0003)
$\Delta MKT_{j,t}$	0.0956 ***	0.0947 ***	0.0248	0.0067 ***
	(0.0068)	(0.0081)	(0.6310)	(0.00001)
$\Delta V_{j,t}$	-0.6400	-0.6485	-0.6121	-1.1322
	(0.4558)	(0.4546)	(0.3939)	(0.2574)
$\Delta L_{j,t}$	0.2132 **	0.2171 **	0.0134	0.2718 **
	(0.0134)	(0.0147)	(0.8676)	(0.0147)

Source: Own computation on the basis of raw data from Bloomberg. P-values are given in parenthesis and *, **, and *** show significance at 10%, 5% and 1%.

funds and its functional subsamples, that is, active funds, funds from advanced and funds from frontier emerging CEE economies (Table 3). Unfortunately, due to the lack of observations it was impossible to run ARIMA (1,1,1) for the whole subsample of inactive funds, however, there are results for individual inactive funds, which, leaping ahead, also confirm overall fund managers' ability to time the market. As for primary component analysis, so, on general, local fund managers are successful in timing market excess returns and aggregate market liquidity – there are significant positive estimates in global sample and its functional subsamples for $\Delta MKT_{j,t}$ and $\Delta L_{j,t.}$ Volatility timing, if present, is insignificant across the whole sample and its functional subsamples.

The obtained by-strategy regressions estimates indicate at presence of timing skills among managers from funds with all three target investment strategies. Decomposition of funds managers timing abilities suggested about the best skills among blend funds managers – they manage to time successfully both market return and liquidity. Growth funds managers also have ability to time market return and liquidity, but it is not significant enough – the change in excess market return and liquidities are significant only at 10% level, while for its blend strategy counterparts such estimates are significant at 5% and 1% levels. As for timing ability of managers from income funds, so it seems, that they are able to time only market return. Overall, all strategies display at least one kind of timing.

By-fund analysis suggests about possession of market return timing skills by 47 fund managers (or management teams) out of 51 chosen in the CEE. The most rare ability among CEE fund managers is timing of market liquidity – only 12% of local fund managers display this skill. Probably due to the short time-series available (but not less than 120 observations) it turns out that fund managers from inactive funds have timing ability, which is superior to that of their counterparts from active funds – 100% of return timing against 82%. As for investment strategies, so the most successful from all three timing perspectives are blend and growth strategies, while under income strategy only market return timing is performed successfully. With respect to country-domicile the most successful from all three timing perspectives are fund managers in Hungary and Poland, that is, in advanced emerging CEE economies – here four fund managers posses

Table 4 By-strategy regressions estimates

	Income	Blend	Growth
const	0.0006	-0.0002	-0.0002
	(0.8547)	(0.1406)	(0.4566)
$MKT_{j,t}$	0.5277 ***	0.2054 ***	1.3602 ***
	(0.00001)	(0.0043)	(0.00001)
$SMB_{j,t}$	0.4752 ***	-0.1092	1.0605 ***
	(0.00001)	(0.1976)	(0.00001)
$HML_{j,t}$	0.1301	0.2927 ***	-0.1424
	(0.1634)	(0.0006)	(0.3979)
$MoM_{j,t}$	0.0081	-0.0004	-0.0049
	(0.3385)	(0.9492)	(0.6215)
$\Delta MKT_{j,t}$	0.0982 ***	0.0918 ***	0.1321 *
	(0.0078)	(0.0084)	(0.0642)
$\Delta V_{j,t}$	-0.3336	-0.7414	-0.1115
	(0.7151)	(0.3807)	(0.5498)
$\Delta L_{j,t}$	-0.1522	0.2350 **	0.1419 *
	(0.3902)	(0.0282)	(0.0553)

Source: Own computation on the basis of raw data from Bloomberg. P-values are given in parenthesis *, **, and *** show significance at 10%, 5% and 1%.

all three timing skills at once, while in frontier emerging CEE economies only one manager posses all three skills at once, she is from Lithuania and follows blend strategy.

On general, the obtained results confirm presence of timing skills among domestic fund managers from advanced and frontier emerging CEE. The performed primary component analysis indicates that the most widespread kind of timing performed by majority of fund managers is market return timing and the most successful timing is achieved under blend investment strategy. The obtained results are consistent with earlier finding by timing Bollen and Busse (2001), Benos et al. (2010), Cao et al. (2013) and Bodson et al. (2013), which are structured upon evidence from advanced and emerging economies of the world. They also correspond to findings by Delcoure and French (2007), and Białkowski and Otten (2011) about presence of timing ability among small group of domestic CEE funds managers.

Table 5 By-fund regressions results

	% of funds with ΔMKT significantly positive	% of funds with ΔV significantly positive	% of funds with ΔL significantly positive
Total	92.16%	17.65%	11.76%
Active (surviving)	82.35%	15.69%	7.84%
Inactive (non-surviving)	100.00%	20.00%	40.00%
Income	100.00%	0.00%	0.00%
Blend	92.68%	19.51%	12.20%
Growth	87.50%	25.00%	12.50%
Advanced CEE	97.14%	20.00%	8.57%
Frontier CEE	81.25%	12.50%	18.75%

Source: Own computation on the basis of raw data from Bloomberg. Significance is assumed at the 5% level.

4 Conclusion

Being a part of developing economies with high growth rates and increasing wealth and financial literacy of local population in the recent decade CEE mutual funds have increasingly started to draw investors' attention. Apparently, in the recent times local fund managers timing ability is among the most discussible and controversial issue among practitioners and theoreticians of international finance in general and asset management in particular. However, fragmented and quite heterogeneous raw data on emerging CEE capital markets and mutual fund industry in combination with absence of adopted for specificity of local emerging economies approaches to fund performance evaluation makes study of local fund managers' timing ability to be quite problematic area of research. However, despite all such complications the obtained results confirm, on general, the presence of timing skills among local fund managers from advanced and frontier emerging CEE. The performed primary component analysis indicated that the most widespread kind of timing performed by majority of fund managers is market return timing, the most successful timing is achieved under blend investment strategy and the best timing abilities are among fund managers from advanced emerging CEE economies.

Acknowledgement

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Appendix 1. List of funds

Name of the fund	Ticker of the fund	Country of domicile	Status	Strategy
FUTURA BUX INDEX FUND	FUTINXR HB	Hungary	Active	Growth
RAIFFEISEN EQUITY FUND-A	RAIFAR2 HB	Hungary	Active	Blend
OTP QUALITY OPEN ENDED EQTY	OTPQOEE HB	Hungary	Active	Blend
CONCORDE EQUITY FUND	CONCRESZ HB	Hungary	Active	Blend
ING INDEX LINKED EQUITY FUND	INGILEQ HB	Hungary	Inactive	Blend
KBC AKCJI MALYCH SPOLEK	KBCMYSP PW	Poland	Inactive	Blend
KBC PORTFEL AKC SRED SPOLEK	KBCPASS PW	Poland	Active	Blend

ARKA PRESTIZ SFIO AKCJI POLS	ARKPAKP PW	Poland	Active	Blend
PZU FIO AKCJI MALYCH I S S-A	PZUAMSA PW	Poland	Active	Blend
METLIFE-AKCJI NOWA EUROPA	AMPANOE PW	Poland	Active	Blend
KBC FIO-AKC MAL I SRED SPOL	KBCMYSS PW	Poland	Active	Blend
METLIFE-AKCJI MALYCH SPOLEK	AMPAMSP PW	Poland	Active	Growth
PKO AKCJI MALYCH SRED SP-A	PKOMSAA PW	Poland	Active	Blend
SKARBIEC FIO-SF AKCJI SK-AKC	SKSASAK PW	Poland	Active	Blend
PIONEER EUROPEAN EQUITY	PEEOEIF PW	Poland	Active	Blend
BPH FIO-EQUITY SMALL CAP	BFWEQSC PW	Poland	Active	Growth
PZU FIO AKCJI KRAKOWIAK-A	PZUAKRA PW	Poland	Active	Blend
CA FIO-EQUITY	LUKAKCY PW	Poland	Active	Blend
NOBLE FUND AKCJI MISS	NFAKCMI PW	Poland	Active	Blend
METLIFE-AKCJI SREDNICH	AMPMISS PW	Poland	Active	Growth
IPOPEMA SFIO AGGRESSIVE-A	IPOAGRA PW	Poland	Active	Growth
BPH FIO-EQUITY	BFWEQSC PW	Poland	Active	Blend
PIONEER SMALL MED CO PL	PISMPOL PW	Poland	Active	Blend
MILLENNIUM FIO-SF AKCJI	MFAKCJI PW	Poland	Active	Blend
ARKA BZ WBK PLSH EQUITY FND	ARKBWEF PW	Poland	Active	Blend
PZU FIO AKCJI NOWA EUROPA-A	PZUANEA PW	Poland	Active	Blend
PKO AKCJI FIO-A	PKOAKCA PW	Poland	Active	Blend
UNIKORONA AKCJE FIO	UNIAKCF PW	Poland	Active	Blend
PKO AKCJI NOWA EUROPA-A	PKONWAA PW	Poland	Active	Blend
METLIFE-AKCJI	AMPMISS PW	Poland	Active	Blend
LEGG MASON AKCJI FIO-A	LMAKCJA PW	Poland	Active	Blend
METLIFE-AKCJI POLSKICH	AMPAKPL PW	Poland	Active	Blend
AVIVA INV FIO SUB POLSK AKCJ	CUDOMEQ PW	Poland	Active	Blend
CA FIO - NEW EUROPE EQUITY	LUKAKNE PW	Poland	Active	Blend
COPERNICUS FIO-SUBFUND	COPAKCJ PW	Poland	Active	Growth
KD EQUITY BULGARIA	KDEQTBG BU	Bulgaria	Active	Income
DSK GROWTH	DSKGROW BU	Bulgaria	Active	Income
STANDARD INV-HIGH YIELD	STIINHY BU	Bulgaria	Inactive	Blend
RAIFFEISEN BG EQUITY FUND	RAMEQTY BU	Bulgaria	Inactive	Blend
TRIGON BALTIC FUND-A	TRINESC ET	Estonia	Active	Blend
FINASTA BALTIC FUND	PRUBALT LH	Lithuania	Active	Blend
JT BANK FUND	JTBAFDF LH	Lithuania	Inactive	Blend
ACTIVE DINAMIC FUND	SAISADF RO	Romania	Active	Blend
FDI RAIFFEISEN ROMAN ACTIUNI	RAIFFAC RO	Romania	Active	Growth
FDI RAIFFEISEN CONFORT	RAIFFCO RO	Romania	Active	Blend
ERSTE EQUITY ROMANIA	BCREXPT RO	Romania	Active	Blend
BT MAXIM	BTMAXIM RO	Romania	Active	Blend
ERSTE BALANCED RON	BCRDINA RO	Romania	Active	Growth
YOU INVEST ACTIVE RON	BCREAVA RO	Romania	Active	Blend
TRIGLAV HITRO RASTOCA	TRIHITO SV	Slovenia	Active	Blend
NLB SKLADI-SLOVENIJA DELNISK	NLBSLOV SV	Slovenia	Active	Blend

Source: Own computation on the basis of raw data from Bloomberg

Cross-sectional Analysis of Short Sale Determinants in the U.S. Market Sectors

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Abstract: The aim of this paper is to analyze short sale determinants along particular sectors in the U.S. market. The analysis is carried out for firm-specific and market characteristics of blue chips traded in the NYSE in the period 2000 – 2014. The motivation of investors for short sale is explained by four short sale hypotheses. The results for particular sectors are compared with those for the full sample and findings about attractively of particular stocks for short sale are suggested. The analysis is based on application of panel regression with fixed effect.

Keywords: short sale, panel regression with fixed effect, blue chips, Standard & Poor's index

JEL codes: G10, G14

1 Introduction

The short sale is a market mechanism that allows to capitalize overpricing of securities or to participate in a decreasing market. A short sale is a sale of a stock that a subject does not own in the time of a transaction, but has borrowed it from a lender that may be represented by a large institutional investor, brokerage house or a broker-dealer. A short seller opens his position by selling of borrowed securities and closes his position by purchasing securities back and returning them to a lender.

The maximum gain of short seller is the sale price (S0) of the stock at the time t = 0 if the stock price falls at zero at the time t = 1. The loss is unlimited if the stock price rises. In U.S. the short sale was making more difficult because of the adoption of so called uptick rule that went into effect in 1938 and was removed in 2007. In 2009, the reintroduction of the uptick rule was widely debated, and proposals for a form of its reintroduction by the SEC. A modified form of the rule was adopted in 2010.

The aim of this paper is to analyze short sale determinants along market sectors and compare the results with those for the market as a whole.

2 Methodology and Data

The motivations of investor for short selling are summarized in four hypotheses. Trend Hypothesis (1) (also known as Following the Trend Hypothesis) according that short sellers close their positions if the stock prices have been increasing in the past short term. Jagadeesh & Titman (1993) demonstrate that the stocks with high (low) rate of returns at the horizon from 3 to 12 months are repeating this high (low) rate of return at the horizon of next 3 to 12 months. Overpricing hypothesis (2) that expects that investors have inside information and if they expect that the stock is overprice the short selling is a way how to capitalize it. Diamond and Verreichia (1987) point out that short sale is an expensive transaction and short sellers trade only if they expect that the price will significantly decrease as a compensation for this costs and risks. Dechow et al. (2001) emphasize the relation between low level of fundamentals factors and a level of short selling. Arbitrage Hypothesis (3) argues that short sellers participate in overpricing between a stock and convertible security. High correlation between an instrument and instrument that is going short is demanded. And (4) Taxation Hypothesis that has only limited impact on short interest nowadays because of Tax Act amendments. (Arnold et al., 2005)

Brent et al. (1990) analyze short selling motivation based on three above mentioned hypotheses. They find that short interest follows a seasonal pattern that is weakly consistent with tax hypothesis. Dechow et al. (2001) document that short sellers open positions in stock of firms with low ratios of fundamentals (like earnings or book value) to market value and close their positions at the ratios mean-revert. They also point out the importance of transactions costs in decision making process of short sellers. Angel et al. (2003) examine the frequency of short selling in stocks listed in NASDAQ and analyzed stock characteristics. They get that short sale is more common among stocks with high returns than stocks with weaker performance and further actively traded stocks are more shorted. Desai et al. (2002) examines the relationship between the level of short interest and stock return on the NASDAQ. They find out that heavily shorted stocks experience significant negative abnormal returns with the respect to the market, size, book-to-market and momentum factors. Kot (2007) finds that short-selling activity is positively related to arbitrage opportunities and hedging demand, and negatively related to previous short-term returns.

The paper analyses short sale determinants in the period 2000 – 2014 in U.S. market represented by S&P 500 and along particular sectors. Based on previous literature reviews the determinants of short sale are represented by two categories – market specific and fundamentals-to-price, their definitions and expected impact on short sale level is stated in Table 1. Data was gathered from Bloomberg and full sample consists of 64.761 observations.

Table 1 Analyzed variables

Variable	Abbreviation	Definition	Expected effect	Motivation
Short interest ratio	SIR	Average number of days for closing all open short sale positions	-	-
Market Capitalization (logarithm)	LOGCAP	Proxy for company size. Dollar market value of all shares outstanding.	Positive/ Negative	Transactions costs/ Overpricing hypothesis
Volume of trade (logarithm)	LOGVOLUME	The total quantity of shares bought and sold during a particular period.	Positive/ Negative	Transactions costs/ Overpricing hypothesis
Volatility	VOL	A measure of the risk of price moves for security calculated from the standard deviation	Positive	Overpricing hypothesis
Beta coefficient	BETA	The systematic risk	Positive	Arbitrage and Hedging Hypothesis
Price-to-Book-Value	PBV	A ratio used to compare a stock's market value to its book value. Low value might indicate undervaluation of a stock.	Negative	Overpricing hypothesis
Price-to-Earnings	PE	A valuation ratio of a company's current share price compared to its per-share earnings.	Negative	Overpricing hypothesis
Price-to-Sales	PS	A valuation ratio that compares a company's stock price to its revenues.	Negative	Overpricing hypothesis
Price-to-Free-	PFCF	A valuation metric that	Negative	Overpricing

Variable	Abbreviation	Definition	Expected effect	Motivation
Cash-Flow		compares a company's market price to its level of annual free cash flow.		hypothesis
Rate of Return	RATE	The gain or loss on an investment over a specified period, on the monthly basis.	Positive	Trend hypothesis

Source: Authors

The structure of Standard Poor's index is demonstrated in Figure 1.

Figure 1 S&P's Index structure among sectors
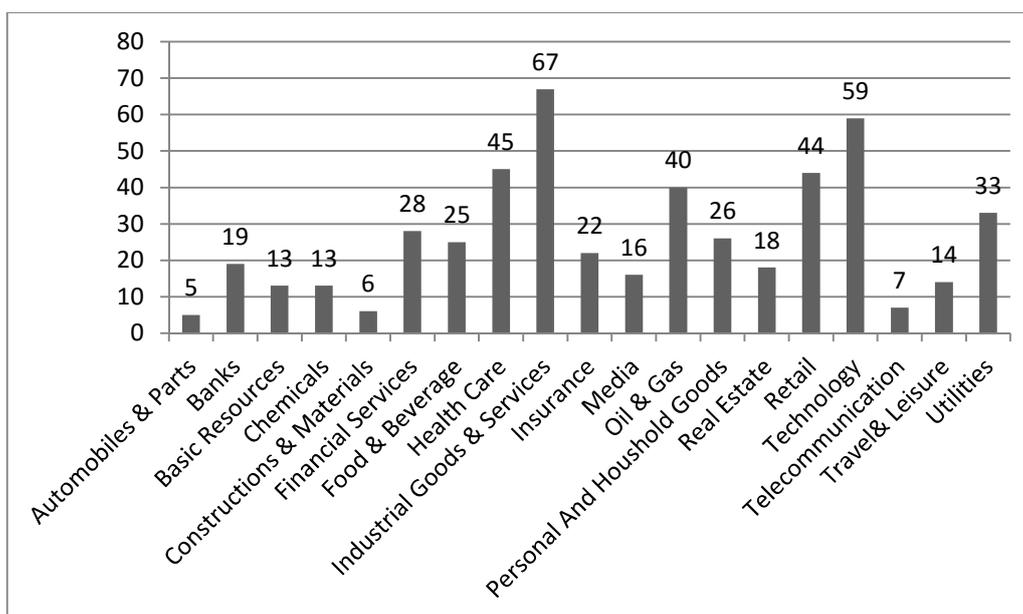
Source: Authors

In the paper the cross-sectional panel regression is applied. Consider the multiple linear regression model for individual i = 1,…, *N* that is observed at several time period t =1, …., *T*.

$$y_{it} = \alpha_i + x'_{it}\beta + z'_i\gamma + c_i + u_{it} \tag{1}$$

Where *y_{it} is the dependent variable, x'_{it} is a K*- dimensional row vector of time-varying explanatory variables and $z'_i\gamma$ is a *M*-dimensional row vector of time-invariant explanatory variables excluding the constant, α is the intercept, β is a *K*-dimensional column vector of parameters, γ is a *M*-dimensional columns of vector of parameters, c_i is a individual-specific effect and u_{it} is an idiosyncratic error term. We assume the balanced panel that each individual *i* is observed in all time periods *t*.

To decide between fixed or random effect the Hausman test was run where null hypothesis is that the preferred model is random vs. alternative the fixed effects. The Hausman test statistic is computed as

$$\xi_H = (\hat{\beta}_{FE} - \hat{\beta}_{RE})'[\hat{V}\{\hat{\beta}_{FE}\} - \hat{V}\{\hat{\beta}_{RE}\}]^{-1}(\hat{\beta}_{FE} - \hat{\beta}_{RE}) \tag{2}$$

Where the $\widehat{Vs}$ denote estimates of the true covariance matrices. Based on Hausman test result the fixed effect model was chosen for further analysis. As a dependent variable in

fixed effect model is chosen short interest ratio and the explanatory variables are represented by a market specific and fundamentals to price variables.

Figure 2 Determinants performance in the period 2000 - 2014
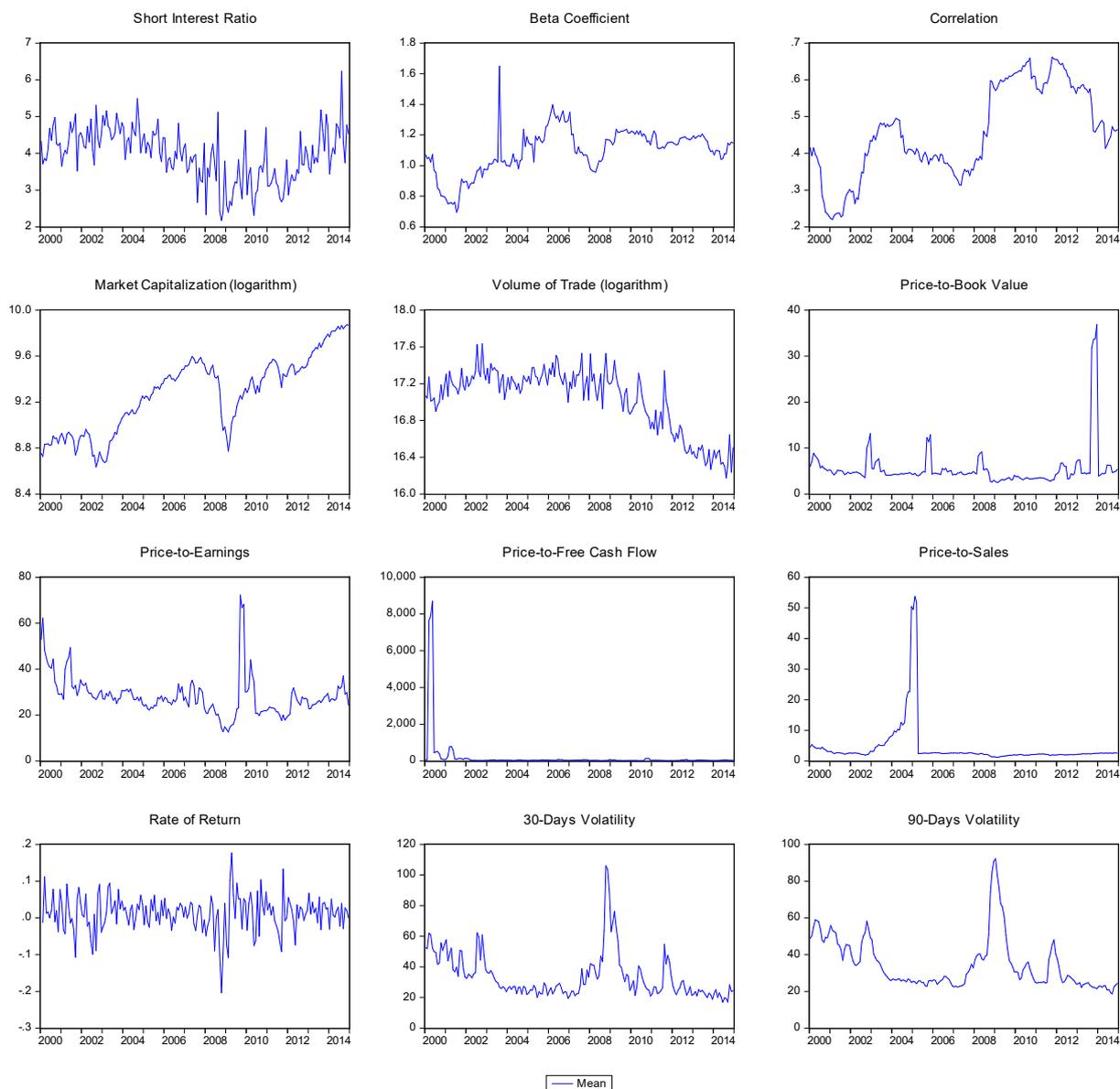
Source: Authors in Eviews

3 Results and Discussion

The results of the cross sectional analysis for the U.S. market in the period 2000 – 2014 are demonstrated in Table 2. Market specific determinants, such as beta coefficient, correlation, market capitalization, volume of trade and volatility and rate of return, are statistically significant in this period. Only Price-to-Sales ratio is statistically significant determinant of price-to-fundamentals ratios. Volatility, market capitalization, correlation coefficient and volume of trade have negative impact on short interest level. These findings support Overpricing hypothesis (statistical significance of volume of trade and market capitalization) and that risk factor is taken into consideration by investors in short sale transactions (statistical significance of volatility). Positive impact of rate of return on short interest level support Trend hypothesis.

Table 2 Cross-sectional analysis results for period 2000 - 2014

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	30.3311	0.44	69.37	0.0000
Beta	**0.4173***	0.02	19.26	0.0000
Correlation	**-1.3913***	0.06	-21.48	0.0000
Market Capitalization (logarithm)	**-0.9763***	0.02	-45.31	0.0000
Volume of Trade (logarithm)	**-0.9794***	0.02	-45.95	0.0000
Price-to-Book-Value	0.0001	0.00	1.30	0.1943
Price-to-Earnings	0.0000	0.00	0.82	0.4100
Price-to-Free-Cash-Flow	0.0000	0.00	-0.15	0.8788
Price-to-Sales	**0.0355***	0.00	9.25	0.0000
Rate of Return	**0.7916***	0.10	7.55	0.0000
Volatility 30D	**-0.0130***	0.10	-12.12	0.0000
Volatility 90D	**-0.0048***	0.00	-4.11	0.0000

Coefficient of determination R^2: 0.3661
Number of observations: 64,761
*, ** and *** indicate significance at the 10%, 5% and 1% level, respectively

Source: Authors in Eviews

The results of analysis along particular sectors are demonstrated in Table 3 a,b,c. Market capitalization, volume of trade and volatility are statistically significant factors with negative impact on short sale level. These findings correspond with the results for the whole analyzed period illustrated in table 2 and can explain investor motivation for short sale sum up in Overpricing Hypothesis and risk. The impact of market capitalization is strongest for Insurance sector (-3,5855) and weakest for sector of Health Care (-0,5401), volume of trade is the strongest negative determinant of short sale in Insurance sector (-2,0820) and the weakest for Oil & Gas (-0,2956). Volatility has also negative impact on short sale level but this effect is decreasing during time (compare results for 30D Volatility and 90D Volatility). The volatility strongly negative influences sector of Automobiles & Parts (-0,0461) and weakly Retail sector (-0,0022).

Table 3a Cross-section analysis among sectors results

Variable	Automobiles & Parts	Banks	Basic Resources	Chemicals	Constructions & Materials	Financial Services
Constant	13.3652	28.6791	27,7926	8.6854	37.5418	30,0703
Beta	**0.4986**	0.0694	-0.3469	-0.1635	**0.9586 ***	**0,3886 ***
Correlation	-0.5702	**-1.0351 ***	0.1764	**0.7575 **	**-5.5871 ***	**-1,2955 ***
Market Capitalization (logarithm)	**-0.9254 ***	0.0326	1.1401	**-0.6150 ***	**-0,6563 ***	**-0,6878 ***
Volume of Trade (logarithm)	0.0000	**-1.470 ***	**-1.7470 **	-	**-1,5097 ***	**-1,1347 ***
Price-to-Book-Value	**0.0632 ***	**04368 ***	**0.0292 ***	0.0751	**-0,2254 ***	**-0,0014 **
Price-to-Earnings	-0.0006	**0.0087 **	**-0.0040 **	**0.0063 **	-0,0018	**0,0231 ***
Price-to-Free-Cash-Flow	-	0.0000	0.0002	**-0.0010 **	**0,0022 **	0,0000

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Variable	Automobiles & Parts	Banks	Basic Resources	Chemicals	Constructions & Materials	Financial Services
Price-to-Sales	0.4420**	-0.0133	0.4842	0.5455***	0,0263	-0,1908***
Rate of return	0.1325	0,1334	-0.6477	-0.8172	2,1795**	1,1780**
Volatility 30D	-0.0461***	0.0067**	-0.0240	-0.0205***	0,0046	-0,0106**
Volatility 90D	0.0227	-0.0011***	-0.0621***	-0.0176***	-0,0034	-0,0031
Coefficient of determination	0.3459	0.3191	0.7871	0.1476	0,3984	0,2967
Number of Observations	726	2.291	86	3.257	871	3.376

*, ** and *** indicate significance at the 10%, 5% and 1% level, respectively

Table 3b Cross-section analysis among sectors results

Variable	Food & Beverage	Health Care	Industrial Goods & Services	Insurance	Media	Oil & Gas
Constant	-6,0665	27,1964	50,1919	67,8586	46,3623	15.8540
Beta	0,0035	0,0585	0,9274***	-0,1163	0,6816***	-0.0644
Correlation	0,1368	-0,3770**	-2,8574***	-0,5330	-0,9888*	0.4220
Market Capitalization (logarithm)	3,4572	-0,5401***	-1,5631***	-3,5855**	-1,9408***	-0.7917***
Volume of Trade (logarithm)	-1,0729*	-1,0546***	-1,9011***	-2,0820***	-1,3732***	-0.2956***
Price-to-Book-Value	-0,0068	-0,0044	0,0011	0,5051	-0,0015	0.0701**
Price-to-Earnings	0,0822	0,0050**	0,0040***	0,0117	0,0153***	0.0011
Price-to-Free-Cash-Flow	-0,0007	0,0004	0,0000	-0,0225**	-0,0003	0.0000
Price-to-Sales	-0,7442	0,0690***	0,4411***	1,5299**	0,2084	0.1941***
Rate of return-0.0131	-0,7114	0,2971	0,5589*	3,3341***	-0,9913	0.3734
Volatility 30D	-0,0166	-0,0131***	-0,0113***	0,0181	-0,0052	-0.0131***
Volatility 90D	-0,0277	-0,0148***	0,0057	0,0106	-0,0116	-0.0131***
Coefficient of determination	0,8663	0,3362	0,4065	0,7898	0,2470	0.2856
Number of Observations	187	6.909	10.563	110	1.644	3724

*, ** and *** indicate significance at the 10%, 5% and 1% level, respectively

Table 3c Cross-section analysis among sectors results

Variable	Personal & Household Goods	Real Estate	Retail	Technology	Telecommunication	Travel & Leisure	Utilities
Constant	22,6123	20.0850	29.9601	24.7323	43.0680	35.5603	31.6617
Beta	0.8954***	-0.0247	-0.3982**	0.2878***	1.3060***	0.0084	1.6029***
Correlation	-2.7701***	1.3265**	-	-0.5313***	-4.3370***	-0.1625	-3.092***

Variable	Personal & Household Goods	Real Estate	Retail	Technology	Telecommunication	Travel& Leisure	Utilities
Market Capitalization (logarithm)	-1.1209 ***	-1.1886 ***	-1.7679 ***	-0.6112 ***	0.0669	-2.0564 ***	-2.4429 ***
Volume of Trade (logarithm)	-0.3996 ***	-0.3712 **	-0.4665 ***	-0.8829 ***	-2.0670 ***	-0.7179 ***	-0.3035 **
Price-to-Book-Value	0.0013**	0.1686 ***	0.0006	0.0246 ***	-0.1425 **	0.0001 **	0.3178 ***
Price-to-Earnings	0.0000	0.0005	0.0007	0.0000	0.0213 ***	0.0094 ***	-0.0035
Price-to-Free-Cash-Flow	0.0010	-0.0003	-	0.0000	0.0000	0.0000	0.0000
Price-to-Sales	-0.0354	0.2998 ***	-0.0008	0.0055	-0.7036 ***	0.2519 ***	0.4444 ***
Rate of return-0.0131	1.5859 **	1.4426 **	1.1396 ***	0.4667 **	0.9417	1.1936 ***	1.3103
Volatility 30D	-0.0262 ***	-0.0409 ***	-0.0022 ***	-0.0077 ***	-0.0056	-0.0201 ***	-0.0231 ***
Volatility 90D	-0.0038	0.0220 **	-0.0078	-0.0106 **	-0.0305 ***	-0.0163	-0.0095
Coefficient of determination	0.2689	0.4205	0.9734	0.4432	0.4034	0.4168 ***	0.3337
Number of Observations	3.531	1.376	7.317	7.922	799	1.818	2.932

*, ** and *** indicate significance at the 10%, 5% and 1% level, respectively

Source: Authors in Eviews

Beta Coefficient and Rate of returns are positive determinants of short sale level along sectors. These findings are in accordance with results for the full sample. Beta coefficient is strongest in sector of Utilities and weakest in the Technology sector. Rate of return is strongest determinant for the sector Insurance (3,3341) and weakest for Technology sector (0,4667). Mixed results were achieved for correlation coefficient, the strongest positive power of this determinant is for the sector of Real Estate (1,3265), for the constructions & Materials is this determinant strongly negative (-5,5871).

Results for price-to-fundamentals ratios are miscellaneous. Price-to-Sales and Price-to-Earnings are predominantly positive determinants of short sale level. Price-to-Sales is the strongest for Chemicals (0,5455) and weakest for Telecommunication sector (-0,7036). Price-to-Earning is strongest for Telecommunication and weakest for Utilities (-0,0035). The findings for Price-to-Book Value are mixture with positive and negative effect on short sale level from -0,2254 to 0,4368.

4 Conclusion

The aim of this paper was to analyze short sale determinants for particular market sectors. The analysis was carried out on U.S. market blue chips traded in NYSE. Short sale determinants were divided into two categories market specifics and price-to-fundamentals. Results suggest that short sale determinants from the market specific category are long-term stable. Variables, such as volume of trade, market capitalization or volatility, were confirmed on the full sample and sectors level. These variables effected short sale interest along sectors. For price-to-fundamentals ratio are results mixed. These variables affected only particular sectors and the impact on short sale level could be positive and negative as well. We can conclude that investors prefer small capitalization stocks with low volume of trade for short sale. They also limited short sale with more volatile stocks and take into account the stock performance. Further, firm-

fundamentals ratios are not significantly important for making decision about going short. These ratios are more important for sectors not for the market as whole.

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Application of the Nonlinear Oscillations Theory to the Study of Non-equilibrium Financial Market

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Abstract: The research deals with the construction, implementation and analysis of the model of non-equilibrium financial market using econophysical approach and the theory of nonlinear oscillations. We used scaled variation of supply and demand prices and elasticity of these two variables as dynamic variables in the simulation of the non-equilibrium financial market. View of the dynamical variables data was determined on the strength of econophysical prerequisites using the model of hydrodynamic type. As a result, we found that non-equilibrium market can be described with a good degree of accuracy with oscillator models with nonlinear rigidity and self-oscillating system with inertial self-excitation. The most important states of model of oscillation non-equilibrium model of the market were found, including the appearance of chaos and its mechanisms.

Keywords: financial market, non-equilibrium model, nonlinear oscillations, Lorenz system, dynamical chaos, ask price, bid price, financial time series

JEL codes: C610, C620, C690, G100

1 Introduction

In our opinion, the most comprehensive review of mathematical models of financial markets is presented in the book of R.J. Elliott and P.E. Kopp (Elliot and Kopp, 2005). Despite the many pithy models presented in the book and various articles (Cai and Huang, 2007; Chen, 2008; Holyst et al., 2001), we could not find a mathematical model of financial market which solutions are changes in ask and bid prices. The importance of building such a model is caused by various reasons, especially - the possibility of obtaining of financial time series and their further analysis and prediction.

We have built a model of the "big" market, that is such a market, which operates many economic agents pursuing their own respective interests and goals. We believe that the market is a system that generates aggregated factors from combined action of individual interests and needs. In this case, economic dynamics are based on some basic dynamic structure. Aggregated factors are manifested in macroscopic scale and act according to the laws of deterministic connections and relationships.

During the constructing of the model we proceeded the assumption that the market in terms of generalized macroscopic flows of capital, goods and services in the phase space of a corresponding economic dynamical system is homeomorphic to the so-called dynamic systems of hydrodynamic type. If there are interaction counter flows in such systems, then they tend to be a phenomenon of generalized turbulence (Mantegna and Stanley, 1996) generating a crisis mode of the states of dynamical systems.

Modern stock markets are armed with powerful computer technology that allow to manage and document real economic processes, that are unfolding in such markets in real time. Changing the conditions of such markets is very fast, and this fact allows you to receive time series, representing them in a small scale of time, which is a prerequisite for the detection of deterministic component of dynamic processes.

Thus, the aim of study is building of a model of non-equilibrium financial market that can generate deterministic component of empirical time series using the econophysical assumptions and the nonlinear oscillation theory.

2 Construction of the Non-equilibrium Financial Market Model

Let's define the functions and state variables of the mathematical model:

- $Y_1(t)$ states the localized variable of the demand function,
- $Y_2(t)$ states the localized variable of the supply function,
- $X_1(t)$ states locally varying demand price,
- $X_2(t)$ states locally varying supply price,
- $Y_1^{(0)} = Y_2^{(0)} = Q_0$ states the equilibrium values of the functions of supply and demand in a market equilibrium condition,
- $X_1^{(0)} = X_2^{(0)} = P_0$ states the equilibrium values of the price of supply and demand in the equilibrium state of the market $R = (P_0, Q_0)$,
- $Y_i(t) - Q_0 \equiv \delta Y_i(t) \equiv y_i, (i = 1, 2)$ states variations of the volume of demand and supply near $R = (P_0, Q_0)$,
- $X_j(t) - P_0 \equiv \delta X_j(t) \equiv x_j, (j = 1, 2)$ states variations of prices of supply and demand near $R = (P_0, Q_0)$,
- $F_1(x_1, x_2)$ states function of aggregated demand in cumulative product of the market as a function of various kinds of price,
- $F_2(x_1, x_2)$ states function of aggregated supply in cumulative product of the market as a function of various kinds of price.

Let's consider that $F_1(x_1, x_2)$ и $F_2(x_1, x_2)$ are continuous and differentiable in the variables x_1 and x_2 in the vicinity of the equilibrium point $R = (P_0, Q_0)$.

Let's construct a matrix of first partial derivatives of functions $F_1(x_1, x_2)$ and $F_2(x_1, x_2)$ near the point $R = (P_0, Q_0)$:

$$L = \begin{pmatrix} \dfrac{\partial F_1}{\partial x_1} & \dfrac{\partial F_1}{\partial x_2} \\ \dfrac{\partial F_2}{\partial x_1} & \dfrac{\partial F_2}{\partial x_2} \end{pmatrix} \tag{1}$$

Given that the price variation x_1 and x_2 are small, use the L. Onsager's relations (Onsager, 1931) of reciprocity in matrix form:

$$\begin{pmatrix} y_1 \\ y_2 \end{pmatrix} = \begin{pmatrix} L_{11} & L_{12} \\ L_{21} & L_{22} \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} \tag{2}$$

where $\{L_{ij}\}$ states phenomenological matrix coefficients (1). The matrix equation (2) connects the extensive (y_1, y_2) and intensive (x_1, x_2) variables of the model; in terms of the thermodynamics of irreversible processes – flows and driving forces associated with data flows.

Economic dynamics of non-equilibrium market due to deviations of demand $Y_1(t)$ and supply $Y_2(t)$ from their equilibrium state $Y_1^{(0)} = Y_2^{(0)} = Q_0$ should induce a temporary change in the variation of prices (x_1, x_2). In the first approximation, these dynamics can be represented as a system of ordinary differential equations:

$$\begin{pmatrix} \dot{x}_1 \\ \dot{x}_2 \end{pmatrix} = \begin{pmatrix} K_{11} & K_{12} \\ K_{21} & K_{22} \end{pmatrix} \begin{pmatrix} y_1 \\ y_2 \end{pmatrix} \tag{3}$$

where $\dot{x}_i$ states first order derivative with respect to time, $\{K_{ij}\}$ states the entries of dynamic market conditions.

The joint solving of equations (2) and (3) gives the equation describing the dynamics of economic and non-equilibrium dynamic system:

$$\begin{pmatrix} \dot{x}_1 \\ \dot{x}_2 \end{pmatrix} = \begin{pmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} \tag{4}$$

where $\begin{pmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{pmatrix} = \begin{pmatrix} K_{11} & K_{12} \\ K_{21} & K_{22} \end{pmatrix} \begin{pmatrix} L_{11} & L_{12} \\ L_{21} & L_{22} \end{pmatrix}$ states matrix, which determines the dynamics of such a non-equilibrium system.

Bid Price Dynamics

Let's proceed to the non-linear dynamic analysis of economic-system (4). If $x_1 = 0$, then $\dot{x}_2 = A_{22}x_2$. Locally varying supply price $X_2(t)$ come near P_0, therefore $A_{22} < 0$. In this case time of relaxation $X_2 \rightarrow P_0$ is $\tau_2 = 1/|A_{22}|$. Also there should appear states $\dot{x}_2 = 0$ around the state of dynamic equilibrium $|x_1| = |x_2|$. This is possible if $|A_{22}| = A_{21} = 1/\tau_2$. Consequently, up to the first order values (x_1 and x_2) the second equation of the system (4) takes the following form:

$$\dot{x}_2 = -\frac{1}{\tau_2}(x_2 - x_1) \tag{5}$$

Similar arguments about the coefficients of the first equation of (4) lead to the fact that $A_{11} = 1/\tau_1$, where τ_1 states characteristic time of relaxation $X_1 \rightarrow P_0$. If $|x_1|$ and $|x_2|$ are small enough, then A_{12} is constant. In this case, the solution of (3) is a noise relaxation oscillations near the equilibrium state $R = (P_0, Q_0)$.

With the growth of the amplitude values of deviations $X_1(t)$ and $X_2(t)$ from $R = (P_0, Q_0)$ variations in prices of supply and demand start to "cling" to each other. There is a simple non-linear interaction between supply and demand in system (4) Consequently, there is a relation between variables x_1 and x_2, describing the elasticity of x_1 due to x_2.

Consider,

$$A_{12}(t) = cE_{12}(t) \tag{6}$$

where $E_{12}(t)$ – the elasticity of x_1 due to x_2, c – parameter, used for dimensions matching. With help of choosing of measure units we can prove, that $|c| = 1$.

Introduce the dimensionless time $T = t/\tau_1$. Multiplying the equation (5) to τ_1, we get the following equation:

$$\frac{dx_2}{dT} = -\sigma(x_2 - x_1) \tag{7}$$

where $\sigma = \frac{\tau_1}{\tau_2} = \left|\frac{A_{22}}{A_{11}}\right|$. Factor σ shows the relation between the relaxation speeds $X_1 \rightarrow P_0$ and $X_2 \rightarrow P_0$, i.e. it represents the relative sensitivity to changes in market prices of supply and demand. If $\tau_2 < \tau_1$, then we can observe an effect of delay of the reaction of demand price to rapid change in the supply price, which leads to a certain dynamic effects.

Ask Price Dynamics

In the view of (6) and (7), the first equation of system (4) takes the following form:

$$\frac{dx_1}{dT} = -x_1 + \tau_1 cE_{12}(t)x_2 \tag{8}$$

Elasticity Dynamics

The value $E_{12}(t)$ is regarded as an independent dynamic variable, provided in the following form:

$$E_{12}(t) = E_{12}^{(0)} + \delta E_{12}(t) \tag{9}$$

where $E_{12}^{(0)}$ states elasticity in the equilibrium state.

The essence of the non-equilibrium dynamics of the market leads to the conclusion that in the first nonlinear approximation, the differential equation for $E_{12}(t)$ takes the following form:

$$\dot{E}_{12} = -eE_{12} + kx_1x_2 \tag{10}$$

where $e, k > 0$ – constants, $e = 1/\tau_E$, τ_E states characteristic time of relaxation $E_{12}(t) \to E_{12}^{(0)}$.

Let's introduce $C = \tau_1 L_{21}$, $K = \tau_1 k$, $\beta = \tau_1/\tau_E$ and multiply (10) to τ_1. Then we get the following equation:

$$\dot{E}_{12} = -\beta E_{12} + K x_1 x_2 \tag{11}$$

Let's also introduce some characteristic elasticity scale λ and new renormalized quantities:

$$\rho = \frac{E_{12}^{(0)}}{\lambda}, z = \rho - \frac{E_{12}}{t}, x = \sqrt{\frac{K}{C}}x_1, y = \sqrt{\frac{K}{C}}x_2, \dot{x} = \frac{dx}{dT}, \dot{y} = \frac{dy}{dT}, \dot{z} = \frac{dz}{dT} \tag{12}$$

Therefore the equations (7), (8) and (11) respectively take the following forms:

$$\dot{x} = -\sigma(y - x) \tag{13}$$

$$\dot{y} = \rho x - y - xz \tag{14}$$

$$\dot{z} = -\beta z + xy \tag{15}$$

System of equations (13), (14) and (15) is well known as Lorenz system (Lorenz, 1963).

Nonlinear Oscillations

Now let's reduce the number of equations describing the non-equilibrium market.

Introduce a new variable:

$$u \equiv 2\sigma z - x^2 \tag{16}$$

Taking into account (16), equation (13) takes the following form:

$$\ddot{x} = -(\sigma + 1)\dot{x} - \frac{1}{2}x^3 + \left[\sigma(\rho - 1) - \frac{1}{2}u\right]x \tag{17}$$

Taking into account (16), equation (15) takes the following form:

$$\dot{u} = -\beta u + (2\sigma - \beta)x^2 \tag{18}$$

The system of equations (17) and (18) corresponds to the dynamic model of an oscillator with inertial nonlinear inflexibility (Hayfeh and Mook, 1995). Equation (17) represents the dynamics of anharmonic oscillations along a coordinate axis Ox in two-humped potential pit, damped with the member $-(\sigma + 1)\dot{x}$ and described by the function

$$V(u, x) = \frac{1}{8}x^4 - \frac{1}{2}\left[\sigma(\rho - 1) - \frac{1}{2}u\right]x^2 \equiv \frac{1}{8}x^4 - \frac{1}{2}\omega x^2 \tag{19}$$

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The value $\omega(u) = \sigma(\rho - 1) - \frac{1}{2}u$ is not a constant. Consequently, the system generates complex auto-oscillatory relations between $u(x)$ and $x(u)$, defined by equations (17) and (18).

The system of equations (17) and (18) generates a complex irregular movement in a plane of the variables (u, x), that under certain relations between the parameters $\langle \sigma, \beta, \rho \rangle$ generate a phenomenon called dynamical chaos (Wiggins, 2003).

3 Results and Discussion

Asymptotically Stable Equilibrium Price

Let's proceed to a qualitative analysis of the systems of differential equations (Wiggins, 2003). Let's find the stationary points and determine their stability.

The system of differential equations (17) and (18) has three stationary points:

$$O(0,0), \quad E_{1,2}\left(\pm\sqrt{\beta(\rho-1)}, (2\sigma - \beta)(\rho - 1)\right) \tag{20}$$

If $\rho < 1$, then the zero point is asymptotically stable. At the same time there are no other real stationary points $E_{1,2}$. Point $\rho = 1$ is a point of supercritical pitchfork bifurcation. If $\rho > 1$, then the zero stationary point is unstable.

Figure 1 Asymptotically stable solution $x(t)$ at $\rho = 0.7$
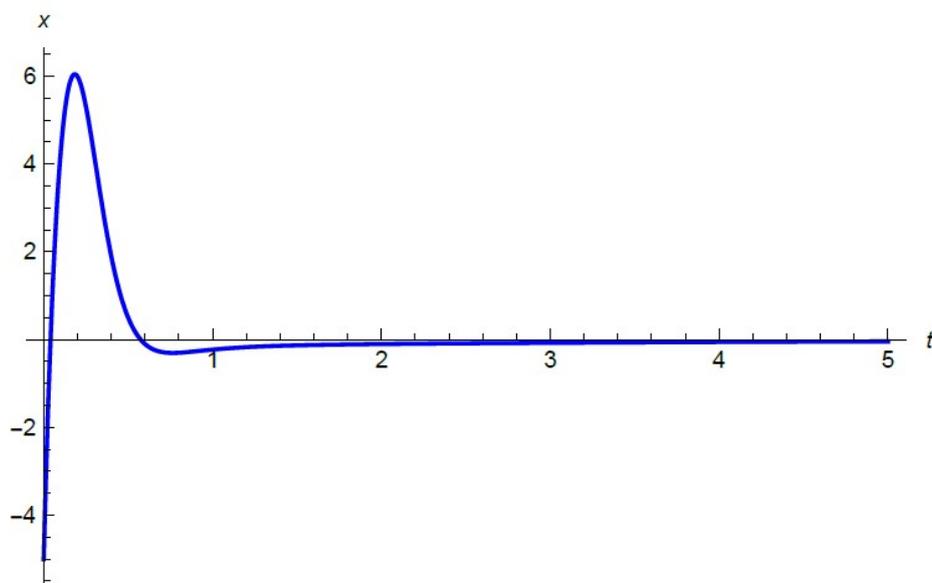
Real stationary points $E_{1,2}$ appear if $\rho > 1$. At the same time, if $1 < \rho < \rho_c$, then the points are stable; if $\rho > \rho_c$, then – unstable. Here $\rho_c = \sigma\frac{\sigma + \beta + 3}{\sigma - \beta - 1}$, where $\sigma > \beta - 1$. In these cases, $\beta(\rho - 1) \neq 0$ and stable equilibrium market price doesn't exist.

The condition for the existence of equilibrium (not necessarily stable) market price is the equality of supply and demand prices $X_1(t) = X_2(t) = P_0$ or achieving a state of equilibrium system $R = (P_0, Q_0)$. In the notation of the Lorenz system for variations in the price of supply and demand, this condition is equivalent to $x = y = 0$.

Consequently, if and only if $\dfrac{E_{12}^{(0)}}{\lambda} < 1$, the market may contain asymptotically stable equilibrium price (fig. 1).

Dynamical Chaos and Financial Time Series

Let's fix σ and β, i.e. ration of times of relaxation $\dfrac{\tau_1}{\tau_2}$ and $\dfrac{\tau_1}{\tau_E}$. Consider $\dfrac{\tau_1}{\tau_2} = 10$ and $\dfrac{\tau_1}{\tau_E} = \dfrac{8}{3}$. At the same time we vary the parameter $\rho = \dfrac{E_{12}^{(0)}}{\lambda}$.

For sufficiently large values ρ ($\rho \geq 28$), i.e. for big elasticity $\dfrac{E_{12}^{(0)}}{\lambda}$, random (irregular) paths $x(t)$ и $u(t)$ appear in the system of equations (17) and (18) (fig. 2). For Lorenz system, when $T \to \infty$ phase path fills an attractive special area near the points E_1 and E_2, which is called a strange attractor. In this case – the Lorenz attractor (Lorenz, 1963). Lorenz attractor is stable, i.e. it is preserved under small changes in the parameters.

Figure 2 Chaotic solution $x(t)$ at $\rho = 28$
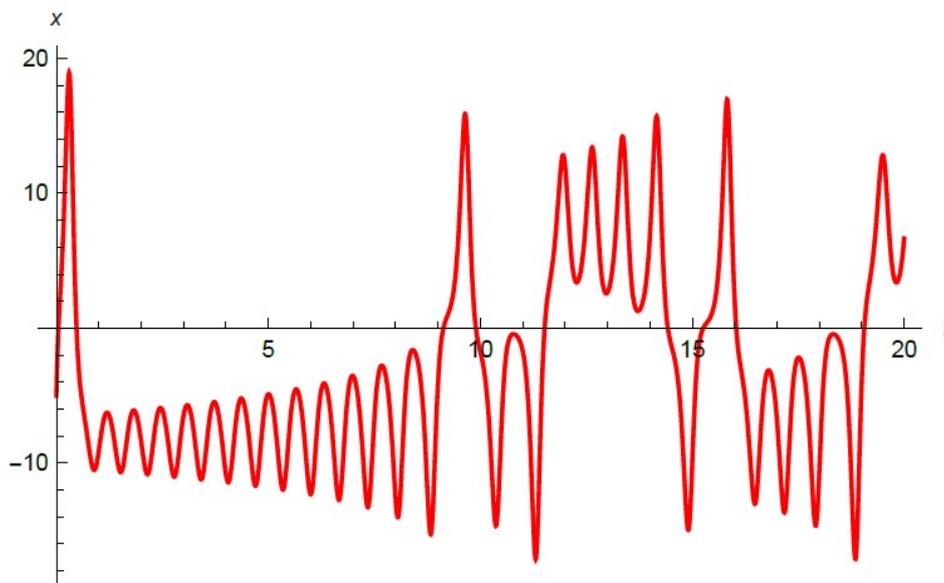
Strange attractors are one example of the appearance and manifestation of such an evolutionary phenomenon, which is called a catastrophe (Arnold, 1992). Accidents in dynamical systems give rise to such a phenomenon as dynamic chaos. One of the most difficult and important task – to learn how to predict occurrence of the phenomenon of dynamical chaos and precede the appearance of this kind of phenomena.

Thus, in complex dynamic systems such as financial markets, there are basic nonlinear dynamics, which generates the observed sequence of their states in its various modes of display, which are called time series. Time series that are obtained from empirical observations and that are "good" organized carry meaningful information about the deterministic component of the dynamics that form these series.

4 Conclusions

We found that the model of a nonlinear oscillator and the Lorenz model describe non-equilibrium financial market. A model in the form of equations (17) and (18) gives the relationship between the demand price time, i.e. dynamic component of financial time

series. Analysis of the model suggests that market has an asymptotically stable equilibrium price at small scaled elasticity ($\frac{E_{12}^{(0)}}{\lambda} < 1$). If the scaled elasticity $\frac{E_{12}^{(0)}}{\lambda} \geq 28$, one of the crisis mode arises in the system - dynamic chaos. Given the dependence (16), these phenomena are characteristic for elasticity $E_{12}(t)$. In addition, following from the properties of the Lorenz system that models financial markets, there is asymptotically stable and chaotic dependence of the supply price from time to time.

The practical significance of the model of the financial market is associated with the solution of the problem of reconstruction of a dynamic system (Sugihara and May, 1990). In some sense, this is the inverse problem – recovering of dynamic system, using empirically observed values of financial time series, generating these financial time series. Some results of the reconstruction of a dynamic system are presented in our papers (Dmitriev et al., 2014; Maltseva et al., 2014).

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Cash Levels and its Role in Full Operating Cycle Enterprises: 2005-2013 Czech, Slovak, Hungarian and Polish Enterprises Case

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Abstract: *The main purpose of the paper is a scientific discussion about the influence of risk and uncertainty on cash levels in enterprises in the context of their innovative economic policy realized in their specific economic environment. The aim of the study is to determine the rules governing the modern cash management in V4 enterprises with a full operating cycle with particular emphasis on economic environmental conditions influencing enterprises. Research hypothesis is the belief that the currently observed in many companies operating in industries using full operating cycle, assessed by investigators as "excessive" cash reserves, are dependent on factors that give to describe the relationship between risk and uncertainty and the expected and realized under conditions of risk and uncertainty in the value added generated by enterprises with a full operating cycle. Paper at first present and discuss theoretical relations between cash levels and risk the enterprises face, and next is shown how such relations are seen in empirical data from firms operated in V4 countries. Research sample contains enterprises operating in V4 countries.*

Keywords: cash management, financial liquidity, risk sensitivity, full operating cycle, European financial systems

JEL codes: Q14, D92, E62, F36, G32

1 Introduction

The main purpose of the paper is a scientific discussion about the influence of full operating cycle risk and uncertainty on cash levels in enterprises in the context of their innovative economic policy realized in their specific economic environment. Full operating cycle enterprises face operating risk in the manner that can moderate motives for cash holdings observed in enterprises as whole. The aim of the study is to determine the rules governing the modern cash management in V4 enterprises with a full operating cycle. Full operating cycle risk influence on firm value creation should be considered in competitiveness and efficiency context (Soltes and Gavurova, 2013). Competition and competitiveness in the economy are among the most commonly used, but poorly defined concepts. Competing brought a big contribution to improving the quality of life and prosperity. Popularity of research on the competition dates back to the seventies of the twentieth century. Then over a period of post-war prosperity and capitalist economies entered a phase of economic turbulence (Daszkiewicz, 2008), (Qineti et al., 2011). Symptoms of increase structural constraints observed in the second half of the sixties. Turning points in the global economy were the events of the first half of the seventies, such as a currency crisis and the crisis of fuel and energy. They have contributed significantly to the emergence of long-unprecedented negative phenomena: unemployment and inflation. However, it is difficult to say whether this was the cause of interest to researchers competition issues. According to other sources, is how American economists were the first to determine the degree of competitiveness of competing economies, the United States of America and Japan. The background for this research was fierce commercial battle between companies of these two countries (Olczyk, 2008).

2 Full Operating Cycle and its Connection with Efficiency and Performance

Competition concepts were developed by such classics of economics as JS Mill, D. Richardo, or A. Smith. There are many items of literature on the research level of competition and its determinants in terms of specific countries or industries. However, the main concern of economists dealing with competition is the lack of a single, universally accepted definition of this phenomenon (Daszkiewicz, 2008). The term "competition" comes from the Latin phrase concurrere, which means "run together". However, the substantive meaning of this concept is different and comes down to contest between the rivals (Roslanowska and Jarosinski, 1996), (Qineti et al., 2011).

Competition can be seen as a process in which market participants carrying out their agreed objectives represent better deals than other entities, due to the factors influencing the decision of the transaction. These factors can include, among others price, quality, delivery terms. Competition is a phenomenon characterized by certain types of relationships between entities that are covered by this phenomenon. These relationships are based on competing. For despite the obstacles created by competitors achieve their goals, the organization must be competitive (Struzycki, 1998), (Svidronova, 2013).

Generally it can be assumed that competitiveness is a trait of participants of competition. In the literature definition of competitiveness it is rare and, when it is most common in regard to the macro-economic entities such as countries or individual sectors of the economy (Stankiewicz, 2005). None of the definition of competitiveness has not received widespread acceptance from economists studying this issue (Olczyk, 2008). Even a subject matter expert as M. Porter (1998) in his book The Competitive Advantage of Nations does not define the phenomenon of competitiveness directly, although this term is used repeatedly (Porter, 1998), (Daszkiewicz, 2008).

Competitiveness is usually characterized as a feature relative, appearing by comparing products or companies. This category is seen on many levels. It is a relationship business entity and its potential, capabilities and skills to the market structure and, acting on its strategic opportunities. Competitiveness can also be understood as the ability to long-term and sustainable growth. It is also referred to as a property of the organization, which consists in maintaining high efficiency and productivity (Stepien, 2004), (Gavurova, 2012). Competitiveness is the ability to efficiently pursue the objectives on market competition arena (Stankiewicz, 2002). Similarly competitiveness is considered in terms of the EU Commission that competitiveness is the ability to cope with international competition (Wysokinska and Witkowska, 2001).

It is also considered that the survival and development of the organization determines the market in which products find or not their customers. There is therefore a definition that competitiveness is a permanent ability to design, manufacture and sell products whose quality, price, and other qualities are more attractive than the corresponding products offered by domestic and foreign competitors (Kisiel, 2005), (Gavurova, 2012). With many existing in the literature definition of competitiveness the most precise is definition proposed by the World Economic Forum in Lausanne in 1994. Competitiveness is defined as "the ability of a country or company to create greater wealth than their competitors on the world market". In a number of approaches to competitiveness does not stand out of the entity to compete and treats the phenomenon described in a relative manner. An example is the one with the OECD definition, which describes the "competitiveness means both the ability of companies, industries, nations, regions or supranational groupings to face international competition and to provide a relatively high rate of return on the used factors of production and relatively high employment on a sustainable basis" (Stankiewicz, 2005).

According to Porter (1998) striving to explain competitiveness on a national level is the search for answers to the wrong question. More important is to understand the determinants of efficiency and its rate of growth (Raisova et al., 2014), (Bartak and Gavurova, 2014). To do this, you should focus attention not on the national economy as

a whole, but to specific sectors and segments. Competitiveness is created at the enterprise level, but there must be some deeper reasons which make the country is a favorable location for companies competing on an international scale. Porter (1998) notes that the success of the competition is influenced by differences in economic structures, national values, culture, institutions and history (Svidronova, 2013).

Austrian perspective and resource advantage theory shows the market as a mechanism that allows firms to employ their unique resources (Hunt and Morgan 1995) and take a series of actions to gain comparative and temporary advantages until competitors fight back (Rindova et al., 2010). Other, but not less important aspect of full operating cycle risk premium influence on firm value creation possibilities are transaction costs, that are grooving in the context of increasing risk context. The transaction is the basic unit of analysis in the theory of economic organization. Transactions enable the economic system works. Transactions entail some costs for the parties to exchange, and often for others. Transaction costs are the costs of reducing uncertainty. That is all related to the exploration and collection of information, its processing, as well as the conclusion and transaction monitoring and enforcement obligations (Vacekova and Svidronova, 2014).

According to the new institutional economics the main object and effect of economic institutions are saving on transaction costs. It is also assumed that every economic problem can be formulated as a problem that the desired effects can be studied in terms of saving transaction costs. Saving these costs is the main issue market research organization. This is achieved by linking transactions with governance structures that differ in adaptability and associated costs. Economists who deal with the concept of transaction costs are also interested in the interior of the company, since it is an appropriate organizational structure and management features allow to better minimize transaction costs. In the discussion on the concept of transaction costs important point was an article R. Coase, in which considered the question of the reasons for the existence of enterprises. He noticed that they are a coordination mechanism other than the market. According to him, the market and the company are two alternative forms of allocation of resources, which are limited. However, his greatest contribution to economic theory was noticing and defining transaction costs as business expenses. In his conception he departs from the neoclassical vision of the perfect competition model and notes that the essential feature of economic entities is to repeal market mechanism of allocation of resources. Within its market mechanism does not work, because it is replaced by the organization - hierarchical structure (Wojtysiak-Kotlarski, 2011). R. Coase has also introduced the concept of cost of the transaction as an instrument, which explains the dynamics of the company. Beyond the statistical theory of general equilibrium he said (Gajecki, 1997): there is always a market for manufactured goods (present and future); for currently produced goods in the future the market may not exist, which is associated with differences in the moment of the future.

In addition, he noted that companies can significantly reduce transaction costs through internal organization of the production process (Wojtysiak-Kotlarski, 2011). Modern trends in institutional economics attribute the role of regulator the size of transaction costs institutions that systematically increase its share in the national product market economies. According to K. Arrow (1969), the transaction costs are the costs of functioning of the economic system. They are delaying the formation of the markets and, in some cases, they can completely block them (Arrow 1969). It indicates the costs for the conclusion and execution of transactions, the cost of creating the system, as well as the opportunity costs that result from the conduct of the parties of the contract. You can divide them traditionally the costs of ex ante and ex post, which are interdependent. This means that you have to refer to them at the same time, not sequentially (Williamson, 1998). Ex ante contract costs are impossible to calculate, as well as to take into account the economic calculus before the transaction, while in the ex post assumed existence of an element of surprise (Czyzewski, 2011), (Bem et al. 2014c). During the study, economists overrule the presumption that zero transaction costs. Only in a perfect world, transaction costs are zero, in the real world, where businesses operate, there are always some of the costs of collecting information and negotiating contracts, determining their

content, or their enforcement. Without a doubt we can say that transaction costs are the actual costs incurred by the company. It should also be noted that there are expenses that you must always bear and their limiting could effect on the effectiveness of the company. The full operation cycle is connected with higher probability of imperfection in the realization business cycle. The type and size of costs of holding cash as liquid asset is partly dependent on the financial strategy conducted by the firm (Michalski, 2014).

The goal of the paper is to find if there is an correspondence between fact of having full operating cycle with cash levels in real economy. Levels of cash from investment point of view are maintained in firms for hedging purposes against the risk of illiquidity connected with risk of breaking production fluency and risk of lack final offer for the clients (Bates et all., 2009), (Faulkender and Wang, 2006). Investments in current assets with higher liquidity have also built in value considered from real option approach. We think about option of American type connected with holding more liquid current assets and value of option of European type from holding less liquid current assets components like inventories and accounts receivables (Michalski, 2015), (Mura et al., 2015), (Soltes and Rusnakova, 2013) (Michalski, 2013). There is believed that, both cash and other current assets levels should be as small as possible (Ferreira and Vilela, 2004), (Kim et al., 1998), (Miller and Orr, 1966). Unfortunately too small cash level is not accurate in higher risk sensitivity context. If financial management decision should be done in context of future free cash flows generated by the firm in the risk and uncertainty context, then truth is that the risk is higher, the working capital levels have higher utility (Uzik and Soltes, 2009). There exists very few firms not suffering from that risk, and they do not suffer in the same way always (Opler et al, 1999). Firms sensitivity on risk is different, and it depend on factors connected with its business environment (Kulhanek and Uherek, 2003), (Ozkan and Ozkan, 2004). In that paper our model explains noted in empirical data phenomenon of sensitivity on risk (Dittmar and Mahrt-Smith, 2007). We also can derive a suggestion, that cash to total assets indicator can serves as forecasting information and forewarning signal about whole manufacturing part of economy as firm environment (Horvatova, 2008), (Kalcheva and Lins, 2007), (Gavurova, 2012).

## 3 Theoretical Expectations and Empirical Data Testimony

Cash levels are a result of use active policy in attract the offer to clients by on time and full answer on the purchasers needs (Michalski, 2014), (Mura et al., 2015), (Michalski, 2009). Scale of investment in cash and near cash assets levels and money tied in capital involved in cash levels is a result of enterprise position in economic environment (Gavurova et al., 2014), (Pinkowitz et al., 2006), (Gavurova, 2011). In effect there are entities that do not hold large levels of cash. That strong in position firms have small vulnerability and lower sensitivity on risk and do not afraid of situation in which risk of too small level of cash occur (Michalski, 2012), (Gavurova and Hyranek 2013). It is because the cost of holding too small levels of cash to total assets for that kind of firms is very small or even they have no such opportunity cost or is not linked with negative value calculated from real option approach (Soltes, 2010). In fact, there are firms with significant financial sensitivity on risk connected to small levels of cash in relation to total assets (Michalski, 2014), (Vacekova and Svidronova, 2014). That entities need to keep larger cash levels to hedge against costly risk of too small cash levels (Michalski, 2014), (Soltes and Gavurova, 2013), (Bem et al. 2014b). Too small cash levels lead that group of firms to negative changes in their sale levels. Destruction of cash revenues creation possibilities is dangerous for them and is hard to rebuild possibilities to create future cash revenues. Free cash flows are generated in context of uncertainty and risk and depend also on cash management policy of the firm.

Figure 1 Comparison of dynamics of return on invested capital (RIC) for full operating cycle processing firms (left) and dynamics of (RIC) for general population of processing firms (right) that operate in V4 countries.
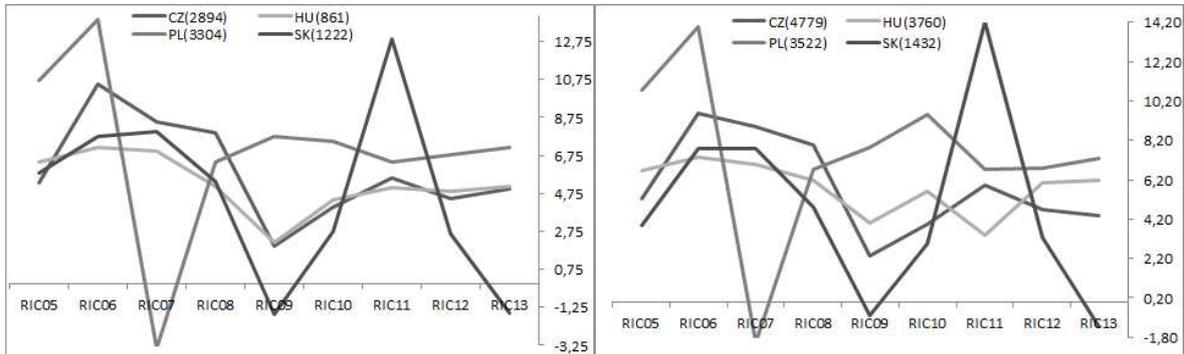
Source: Data from 8281 full operating cycle firms and 13493 general population firms reported in Database Amadeus product of Bureau van Dijk, [date: 2015 JULY 05].

Figure 2 Comparison of dynamics of free cash flow divided by equity (FFE) for full operating cycle processing firms (left) with dynamics of (FFE) for general population of processing firms (right) that operate in V4 countries.
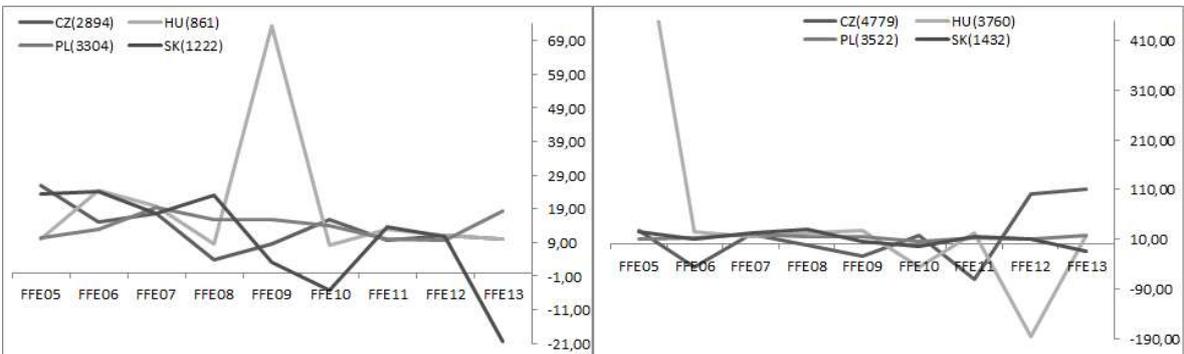
Source: data from 8281 full operating cycle firms and 13493 general population firms reported in Database Amadeus product of Bureau van Dijk, [date: 2015 JULY 05].

Figure 3 Comparison of dynamics of cash to total assets (CTA) for full operating cycle processing firms (left) and dynamics of (CTA) for general population of processing firms (right) that operate in V4 countries.
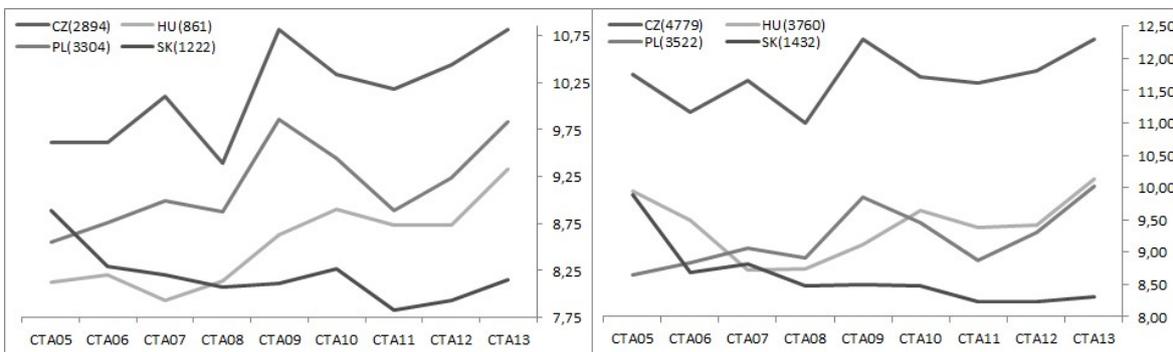

Source: Data from 8281 full operating cycle firms and 13493 general population firms reported in Database Amadeus product of Bureau van Dijk, [date: 2015 JULY 05]

Individual risk sensitivity is a result of firm answer on changes in its internal economic health but also is response on general economic changes. Here is presented: return on invested capital (Fig 1), free cash flow in relation to invested equity (Fig. 2), cash to total

assets ratio (Fig 3) and cash in relation to earnings before interests and taxes (Fig. 4) in V4 producing firms reported in Amadeus database.

Figure 4 Comparison of dynamics of cash to earnings before interests and taxes (CBT) for full operating cycle processing firms (left) and dynamics of (CBT) for general population of processing firms (right) that operate in V4 countries.
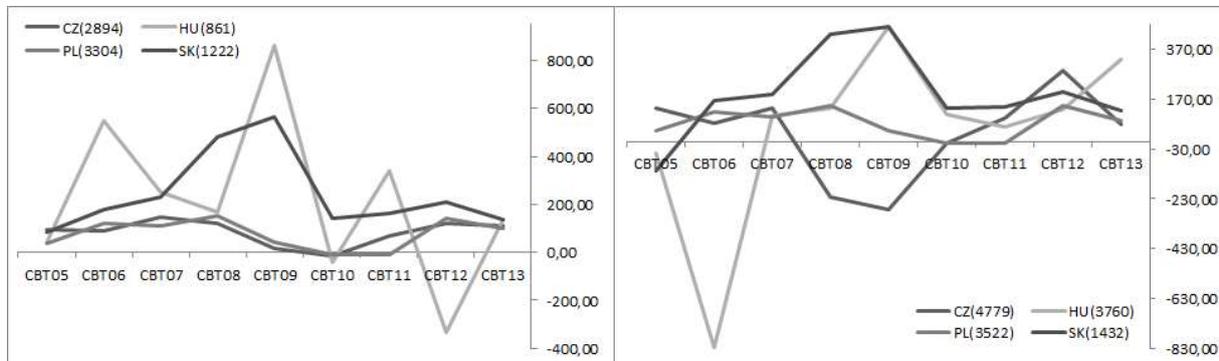

Source: Data from 8281 full operating cycle firms and 13493 general population firms reported in Database Amadeus product of Bureau van Dijk, [date: 2015 JULY 05]

That results are presented in comparison between population of full operating cycle firms (left) and general population of firms (right). Especially we are concern on 2005-2013 period. Empirical data confirms our projections derived from theory based on our model (Michalski, 2014), (Soltes and Gavurova, 2014), (Michalski, 2015), that is useful to describe expected relationship of cash levels and total assets (CTA) and it depends on firm individual risk sensitivity level. In full operational cycle context, according to our predictions, cash to total assets ratio should be higher for full operating cycle processing firms than for general population of such firms. The rest indicators illustrated by figures, informs about the risk sensitivity level. In case of higher volatility cash levels should be higher. The empirical results are near to that expectation.

4 Discussion and Conclusions

Closing or scientific discussion about the influence of full operating cycle risk and uncertainty on cash levels in enterprises in the context of their innovative economic policy realized in their specific economic environment we can point that full operating cycle enterprises face operating risk in the manner that can moderate motives for cash holdings observed in enterprises as whole. Bem et al., clam that liquidity management area, or broadly speaking, working capital management, is still considered secondary and that the concept of the financial situation assessment with financial liquidity is to be a an key area (Bem et al. 2014a). Such paper is one from an attempts in changing such a perspective. Further study should take in mind next configurations of branches, countries and liquidity indicators. Next research should be concentrated on future control of overall fit of the our model and its predictions in conditions with higher operational risk, cross the countries and cross the sectors research, that could answer how the risk sensitivity characterize the firms from various business branches, and various countries. Presented data from firms is with one accord with our model predictions. Forecasting of the our model is useful for make quick judgments about current and future condition of the general population of enterprises, that population risk sensitivity and as global effect of that. There is possible to guess future condition of the whole manufacturing part of economy as well.

Acknowledgments

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Political Uncertainty as an Economic Risk Factor: the Regional Perspective from Russia

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Abstract: The academic circles and media commonly associate political uncertainty with aggravated economic risks, discouraged investments, and stunted economic growth. The goal of this survey is to explore the reaction of domestic businesses to political signaling. It allows addressing a key question regarding the perception of uncertainty in Russia: how sensitive are the economic agents to political trends? How robust is their assessment of the extent to which the rules of the game are changing, and what are the threshold levels of political change at which the uncertainty begins to affect economic decisions? Due to the sensitive nature of questions, a large-N randomized selection was not feasible, and we relied on a small sample of convenience. The study focuses on the case of Nizhny Novgorod region in Russia and is based on a survey of the owners and employees of small- and medium-size businesses. The data, collected in 2014 and 2015, provides tentative insights into the correspondence between political signals and local economic calculus in today's Russia. The study demonstrates that the local businesses are aware of the political costs, especially high levels of corruption and the general arbitrariness of power. They also appear to dismiss the probability of substantive changes in political status quo.*

Keywords: economic risks, political uncertainty, political risks, entrepreneurship, SME

JEL codes: L26, P26, G32, O52, D72

1 Introduction

The Western public and media commonly associate political uncertainty with aggravated economic risks, discouraged investments, and stunted economic recovery (e.g., Davidson, 2013; Novack, 2013). This assessment is broadly shared within the academic circles (Allard et al., 2012; Bell, 2013; Carmignani, 2003; Dutto, 2013; Julio and Yook, 2012; Khattab, 2011; Pastor, 2013). Political uncertainty also discourages foreign direct investments and can prompt trans-border capital flight (Clark, 1997; Julio and Yook, 2013). From the standpoint of investors, a threat of expropriation and other losses appears to be higher in the states where the executive power is poorly constrained by legislative oversight (Jensen et al., 2013). In times of crisis, governance and the quality of political institutions remain key predictors of capital flight (Pepinsky, 2014). It stands to reason that any negative effects attributed to policy change and political bickering in fairly stable societies are likely to be exacerbated by the more profound political transformations, characterizing the regimes in transition or the states experimenting with the recalibration of key institutions. Russia presents an interesting case for studying political stability and the interpretation of political risks by the economic agents in a quasi-democratic setting. The reaction of domestic businesses to political signaling allows

addressing a key question regarding the perception of uncertainty in Russia: how sensitive are the economic agents to political trends, such as increasing expressions of popular dissatisfaction with the government, and the hints of more substantive anti-corruption measures? How robust is their assessment of the extent to which the rules of the game are changing, and what are the threshold levels of political change at which the uncertainty begins to affect economic decisions?

The impact of political uncertainty on SMEs in Russia has been explored in (Volcheck et all., 2013) and (Shurchkov, 2012). Our study focuses on the case of Nizhny Novgorod region in Russia and is based on a survey of the owners and employees of small- and medium-size businesses. It should be noted that SME's in Russia are developing, but its share in the economy compared with other countries is low. The scientists believe that the entrepreneurial competence and skills can be developed through training (Grudzinskiy and Bedny, 2013). But the current system of support of small business is focused mainly on the creation of new small businesses, although small business development is recognized by the Government of the Russian Federation, as one of the priorities in the program of socio-economic development. According to the Ministry of Finance of Nizhny Novgorod region, share of income in the form of taxes on small business in Nizhny Novgorod region in accordance with the plan for the year 2015 will total 4.693 billion roubles (or 82.290 mln. euro according to exchange rate of Bank of Russia), which is just 4.08% of the total income of the regional budget.

2 Methodology and Data

Due to the sensitive nature of questions, a large-N randomized selection was not feasible, and we relied on a small sample of convenience. An earlier survey, conducted by us in Russia right before the escalation of the crisis in Ukraine, demonstrated sensitivity of businesspeople to high levels of corruption and arbitrariness of power. Interestingly, they also discounted the relevance of foreign policy to their routine economic decisions. The original study establishes a baseline for assessing the influence of political uncertainty on economic calculus under 'normal' conditions. The events that transpired later in 2014 (such as the annexation of Crimea, violence in Eastern Ukraine, and economic sanctions imposed on Russia) allow estimating a shift in the sensitivity to corruption, political stability, and foreign developments. We were particularly interested in examining whether the devaluation of the ruble and other economic problems of late 2014 forced the local business people to reassess the salience of foreign policy. To trace changes in the perception of political uncertainty and corresponding economic risks we conducted a follow-up survey of 32 local businesspeople in February 2014 (prior to the introduction of international sanctions) and a series of interviews in May 2014 and February 2015.

To examine the impact of political uncertainty on the assessment of economic risks we formulated the following hypotheses. First of all, to gauge the overall sense of unpredictability associated with the recent recalibrations of Russia's institutional environment (per Busygina, 2011 and Shevtsova, 2012) we hypothesize that, the 2012-2013 political ambiguity should have produced detectable concern over its economic implications for Russia's small- and medium enterprise (SME) executives. To examine whether local political decisions (and hence the risks that they may generate) factor prominently into the calculus of SMEs, we hypothesize that:

1. From the standpoint of local business owners, the municipal and regional political decisions generate greater concern than the national-level initiatives.

2. Foreign policy and routine international events should be less salient than domestic developments. These descriptive expectations have been supplemented with two propositions about economic ramifications of the heightened sense of political ambiguity. The first of these hypotheses directly explores the impact of uncertainty on economic choice.

3. In comparison of individuals, those who recognize a high level of uncertainty are more likely to pursue the strategies of risk minimization, consistent with the behavior in a highly unstructured environment.

A preference towards risk minimization empirically manifests in avoidance of long-term planning, cautious investment portfolio, reluctance to expand the business, planning for an exit strategy (e.g., leaving the country, transferring the funds and savings abroad, etc.).

The final hypothesis dealt with the possible effects of corruption, a pervasive condition in Russia that adds to the weakness of the legal framework, but has also become accepted as a norm, providing informal channels for business transactions (Karhunen, 2011; Kleiner, 2012). Corruption has been demonstrated to discourage some business activities and facilitate other.

In the final phase of our study, since the N-large scale entrepreneur survey was not available to us, we used a representative sample of VCIOM and Levada-Center (the two largest Public Opinion Research Centers in Russia). 1600 Russians of different age and professions were surveyed in 130 communities, 42 regions and republics of Russian Federation. The statistical error did not exceed 3.4%. In the records available, we selected those questions, which were more or less similar to the questions, that we asked entrepreneurs. We supposed, that the answers, which the ordinary Russians would give to the similar questions, that our entrepreneurs were asked, will not be the same.

To generate empirical data, we have surveyed thirty-two private sector businesspeople representing small (less than 100 employees) and medium (up to 250 employees) enterprises. As noted earlier, due to the sensitive nature of inquiry (e.g., questions dealing with corruption, preferred ways of investment, etc.) and a generally high level of mistrust characterizing the Russian society, a randomized large-scale survey was not a feasible option. Instead, we developed a brief, structured survey administered in person and online. While samples of convenience limit the generalizability of the results, a set of participants in this study was fairly representative of this subset of economic actors. The respondents operated businesses in Nizhny Novgorod region. Business experience varied from five through twenty-five years. Twenty-three participants were business owners or co-owners, while nine occupied a top managerial position (a director or managing director). Nine respondents worked in industry, nineteen – in service, and 4 – in retail.

Data collection was conducted in three discreet stages over 2014 and 2015. The first survey was administered in February 2014 right before the collapse of the Yanukovich regime in Ukraine and the ensuing events that had a dramatic impact on Russia's politics and internal debates. We are confident that the results of that study were not skewed by the confrontation over Ukraine and the domestic reaction that it produced. This survey established a baseline for the perception of political and economic risks in a fairly ambiguous, yet stable environment.

The second stage took place in May 2014 following the annexation of Crimea and the ensuing boost in the levels of support for president Putin, but prior to the introduction of significant Western sanctions or escalation of violence in eastern Ukraine.

The third round took place in February 2015, in a much more hostile international environment, characterized by the increasing isolation of Russia, exchange of economic sanctions with the E.U. and U.S., collapse of oil prices, and a major devaluation of the ruble that led to a few days of elevated anxiety in December 2014.

The questionnaire consisted of twenty-five questions. The first cluster examined the perceived security of property rights. It included questions on the probability of a hostile take-over, the levels of governmental regulation, and the frequency of state interference in business affairs. The second set of questions looked at the preferred strategies for investment and the general outlook on the long-term business perspective. The respondents were asked whether they would opt for higher returns over lower risks;

whether they preferred to invest in real estate or other, more liquid assets; whether keeping money in Russia was safe. The participants were also asked about their business expansion plans. To tap into the long-term assessment of stability and opportunities in Russia, we included questions measuring support for education and possible relocation or residence abroad for the participants' kids. The final group of questions examined the perception of different manifestations of political uncertainty. This cluster included questions about the perceived impact of political decisions on business activity; the overall assessment of political stability in Russia; the probability of changes in the political climate; the effects of corruption; and the relative importance of the local, regional, and federal-level decisions.

The third survey was supplemented with questions about the perceived changes in the business climate since early 2014. In a series of open-ended questions, the respondents were asked to (a) elaborate on the impact of foreign sanctions and economic decline on their business; (b) evaluate changes in the domestic political situation and governmental policies, especially as they relate to small- and medium-size enterprises; (c) comment on what the government could do to support their business. The second and third surveys thus allow investigating whether worsening economic conditions and increasing international tensions force SMEs to recalibrate their economic strategy.

3 Results and Discussion

The first survey of Russia's SMEs (February 2014) revealed the following trends. While only four of the respondents described the political situation as unstable, almost 41 percent categorized the political environment as uncertain. Slightly less than half (48 percent) of participants indicated that political decisions influenced their business calculations. These results are consistent with the first hypothesis: the existing political conditions produce a sense of uncertainty amongst SME executives. Interestingly, only three individuals thought that the political climate may be changing in the more liberalizing direction (in light of Mikhail Khodorkovsky's release from prison), while the rest of the group rejected such possibility.

The relevance of proximity of political authorities to business operating environment was the focus of our second hypothesis. The results demonstrate that, while political signaling was not the exclusive prerogative of the federal center (meaning the local and regional politics mattered for some SMEs), the plurality of those affected by political decisions were concerned mostly with the national-level developments.

The observed impact of uncertainty on economic decisions is somewhat ambiguous. Drawing any causal claims here, in the absence of a larger sample, statistical controls, and more refined measurements for the dependent outcomes and independent variables, would be premature. Nevertheless, we are confident in making the following general observations. The perception of political instability and uncertainty, contrary to the original prediction, did not affect the immediate plans to expand business. But it appears to be linked to the overall sense of business insecurity (as measured by a possibility of hostile take-over) and influenced longer term individual strategies. Thus those who indicated a high degree of instability or uncertainty were more likely to support foreign education and potential relocation abroad for their children. Those affected by uncertainty were also less likely to feel safe investing exclusively in Russia. The SME owners seem to be willing to operate in a politically ambiguous environment, but recognize the risks and diversify their options accordingly, even planning for a potential exit from the market.

Approximately 66 percent of the participants indicated that corruption impeded their business, while the rest thought that corruption had no influence or even facilitated economic transactions (four respondents fall into the latter category). The observed effects of perceived corruption are consistent with the fourth hypothesis. Those who were troubled with corruption were less secure about the future of their businesses and were less likely to plan for business expansion. They also exhibited a preference for investing

abroad (or abroad and in Russia, but not exclusively in Russia) and were comfortable with the idea of their children moving abroad for residence or education.

The results of the original survey suggest that the SME executives in Russia were definitely concerned with the general arbitrariness of power and high levels of corruption. Political signaling, however, was somewhat discounted, at least for the short-term business planning. Most of the respondents dismissed the possibility of substantive political change. The 2012-2013 political maneuvering appeared to be interpreted as a cosmetic adjustment, rather than a far-reaching revision in the rules of the game. It is plausible that the ambiguity and opaqueness of power had become accepted as a norm, thus converting into a calculable economic risk. Still political uncertainty engenders a profound pessimism regarding the long-run prospects for business and life in Russia, in general. "Make money here, while you can, but plan for an exit" was an operating principle in the politically ambiguous, yet fairly stable environment.

Follow-up data collection (May 2014 and February 2015) allowed exploring whether international conditions become relevant to SMEs in times of economic crisis and increasing tensions. Per Fraile and Pardos-Prado (2014), we expected local businesses to be alarmed about economic implications of confrontational foreign politics. The results are consistent with that hypothesis (see Figure 1).

Figure 1 The influence of foreign policy on SMEs, according to the respondents
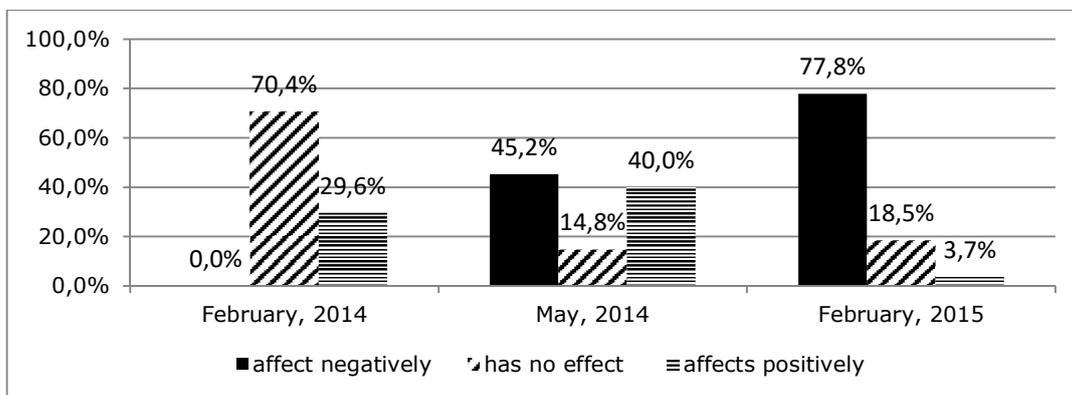
Source: The results of surveys, conducted by the authors

Earlier in 2014, international developments were salient only to those directly dependent on foreign trade and exchange (e.g., tourism, importing, and etc.). Notably, not a single respondent thought that foreign policies had negative economic implications. As the international environment started turning more adverse over the course of 2014, more of the participants exhibited concern over the deleterious effects of foreign developments. In May, 2014 the opinions became polarized with 40% insisting that foreign policy was conducive to business and 45% claiming the opposite. In a reversal of the earlier (February 2014) pattern, only several respondents continued to dismiss the relevance of international politics. A year later – in February 2015 – foreign environment was no longer viewed as benign and close to 78% of participants expressed concern over the negative ramifications of foreign policy. In general, the level of pessimism increased dramatically over 2014. Reaffirming the point of view of Jensen et al. (2013) a threat of expropriation and other losses appears to be higher in the states where the executive power is poorly constrained by legislative oversight 70 percent of our respondents believe that their businesses are not protected or not fully protected from hostile takeover. Additionally, more than 70 percent of the respondents concluded that business climate has significantly worsened, that is consistent with the research of Davidson (2013) and Novak (2013) (see Figure 2). As summarized in Figure 3, the deteriorating conditions were primarily attributed to the decreasing purchasing power of the population (93%), collapse of the ruble (70%), price and interest rates increases (67 and 52%, correspondingly).

Figure 2 Changes in the business climate over 2014
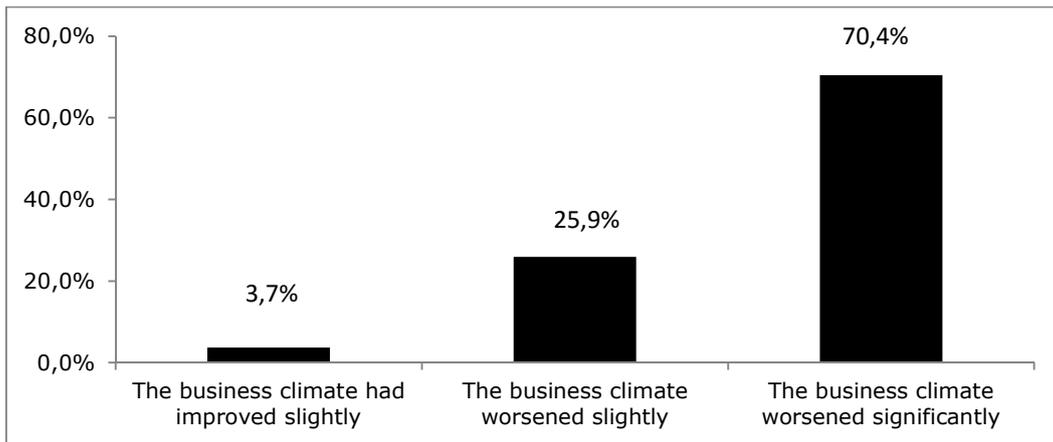
Source: The results of surveys, conducted by the authors

Additionally, 52 percent of the participants stated that their business was negatively affected by the oil prices (compared to 22 percent in February 2014).

Figure 3 Factors negatively impacting SMEs
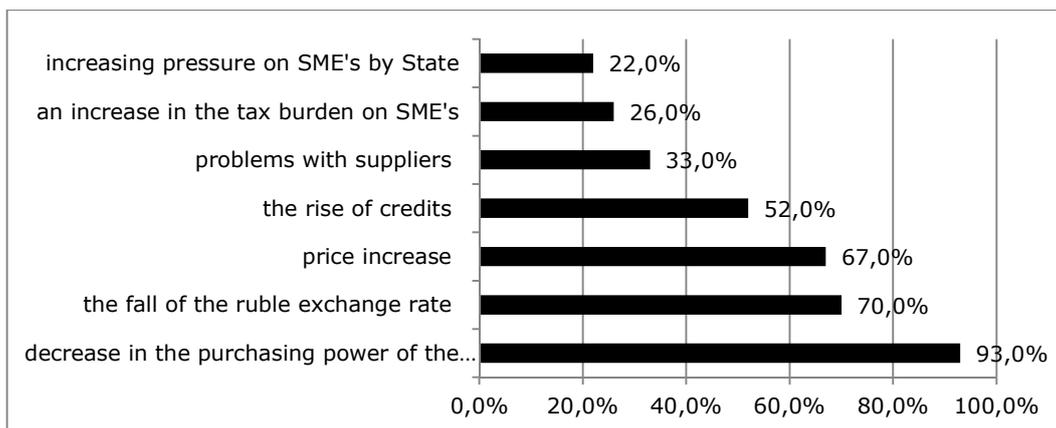
Source: The results of surveys, conducted by the authors

Interestingly, the perceived levels of stability at home also dwindled – from 44.5% in early 2014 to 22.2% in February 2015. Close to 78 percent of the respondents regarded domestic conditions as either uncertain or unstable (see Figure 4). Small firms hold back on investment expenditures until the uncertainty surrounding is resolved, as suggested by Julio and Yook (2012).

The participants repeatedly pointed out that support of SME's did not appear to be a priority for the government, although Government claims to the contrary (see above). On the contrary, many of the recent or proposed policy measures were viewed as barriers to business growth. For instance, the respondents were concerned about an increase in insurance rates for private entrepreneurs (2013), revisions in appraising the property value for taxation purposes (2014), and the introduction of special labor regulations for SMEs.

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Figure 4 Perceived stability of political situation in Russia, 2014 v.2015
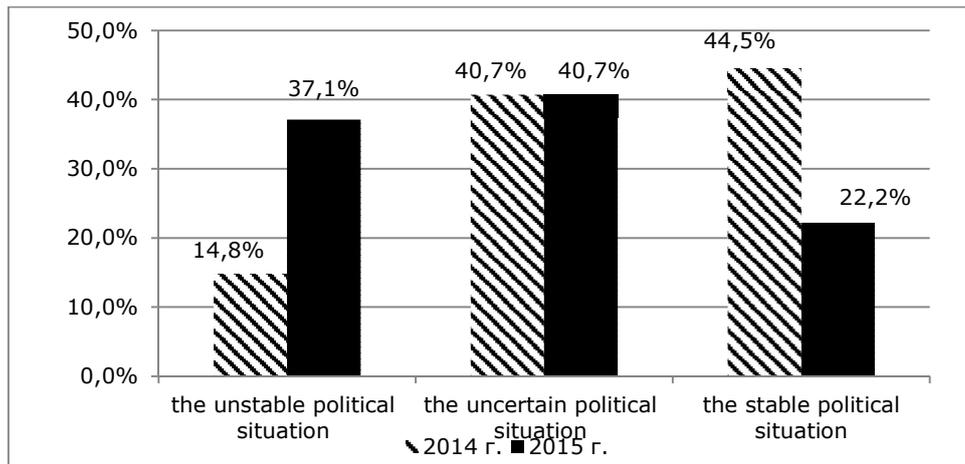
Source: The results of surveys, conducted by the authors

4 Conclusions

Regardless of such pessimistic assessment, 66% percent of February 2015 participants expressed interest in expanding business (compared to 74% a year earlier). Other answers suggest that the business strategy adopted earlier in 2014 remains sticky and does not noticeably change in response to the gloomier outlook. That inconsistency presents an interesting puzzle. Consistent with Fraile and Pardos-Prada (2014), those with a stake in private sector are sensitive to changing economic and political situation. But our results suggest that, in the case of Russia's businesses, such concerns do not necessarily translate into action – the respondents did not appear to be more risk-averse, as predicted by the literature. Since the overall levels of concern remain elevated, this result cannot be attributed to a decrease in the initial alarm over crisis conditions, as observed by Burns et al. (2012). While the design of our study does not permit explaining why a heightened perception of instability has not noticeably affected individual strategy, two tentative propositions may account for that incongruity. First of all, that result may reflect a lower mobility of SMEs. As different from larger investors, relocation options for local entrepreneurs – at least in the near term – are more restricted and incur significant personal costs. Local SMEs may thus constitute a captive audience with a limited choice set. It is also possible that political risks and uncertainty in Russia have already been factored as a normal, routine condition affecting business decisions and strategy. The current escalation, while duly acknowledged, does not alter the strategies already adapted for unstable conditions and short-term decision-making horizon.

The research, based on VCIOM and Levada Center sampling, showed, that the majority of Russians (not only a small group of the surveyed entrepreneurs), do not consider political risks and political uncertainty sufficient enough to take them into account in their economic activities. There is a high level of patriotism and State bodies of power support. A lot of Russian citizens are worried about unstable economic situation and a lot of unsolved economic problems, however, the aggravation of economic situation in the country is not connected in Russian citizens minds with political risks.

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The Threats of the Banking Union for the Polish Banking Sector

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Abstract: The main aim of the article is the assessment of the threats of the European banking union for the Polish banking sector. The problem is difficult and complex due to the large degree of internationalization of the Polish banking sector and the presence EU banking groups. The article shows the most considerable potential risks connected with the Single Supervisory Mechanism and the Single Resolution Mechanism for banks in Poland. There are currently no strong arguments for a quick Poland's accession to the banking union. Polish authorities see important threats related to the establishments of close cooperation. Poland nowadays is in the position of "awaiting and observing" and analyzing the functioning of the banking union. It seems, that the banking union in the proposed form will not bring notable benefits – just the opposite – it can cause important problems. The main threat related to the banking union is the risk that the union is still the "not-finished project". Poland should continue to strengthen its banking sector – to be prepared for whatever the future holds.
In the article as the research method the descriptive and comparative analysis is used.

Keywords: European banking union, banking sector, single supervisory and resolution mechanism, deposit insurance, financial crisis

JEL codes: F36, G28

1 Introduction

Poland nowadays finds itself facing a strategic decision: to enter the European banking union without entering the Eurozone, to adopt the common currency or to maintain the status quo. The choice is influenced not only by the economic, financial but also (which is perhaps more important) political factors.

The aims of the banking union are: fostering the financial stability in Europe, especially in the Eurozone and also dealing with financial fragmentation in Europe. The aims of the new financial framework are ambitious and seem to be crucial for the prospective European integration. The banking union however is also a subject to uncertainties, assumptions and risks, especially for such a country like Poland.

The main aim of the article is the assessment of the threats of the banking union for the Polish banking industry. The article also discusses the situation of the Polish banking sector. The decision of Poland's accession to the banking union is difficult and complex due to the large degree of internationalization of the banks in Poland and the presence of EU banking groups.

I should be underline that because of the complexity of the subject-matter the article addresses only the chosen problems, which can be the topics for further discussion.

In the article as the research method the descriptive and comparative analysis is used.

2 European Banking Union – Outline of the Concept

Looking for the genesis of the concept of banking union it should be underline that the banking sector is the "élan vital" of the European economy. In 2013 the ratio of bank assets to GDP was equal to 334% in the EU, compared to 88% in the US and 196% in Japan (Langfield, Pagano, 2014). The European economy and – what extremely important - public finances - are heavily dependent on the situation of banks. That is why in the light of the financial economic crises, and especially the spreading of the crisis to certain sovereign debt markets in the euro area, it turned out to be critical to introduce

a new system of bank supervision and resolution at European level. The origin of the banking union can be found in the de Larosière Group recommendation. However three years later in June 2012 the Heads of State and Government agreed to create a banking union – the new integrated financial framework which should complete the economic and monetary union.

The banking union should be built of three pillars: 1) single supervisory mechanism, 2) single resolution mechanism and 3) common deposit guarantee system. After all, the realization of the last pillar is problematic. Now, we should rather say about the three main building blocks of the banking union (Table 1).

Table 1 The main building blocks of the European banking union

	Main tasks	Structure
The single rulebook (the legal acts that all banks in the EU must comply with)	1. Laying down capital requirements for banks 2. Ensuring better protection for depositors 3. Regulating the prevention and management of bank failures	The legal acts that are most relevant for the banking union: - capital requirements directive IV (CRD IV) and capital requirements regulation (CRR) - amended directive on deposit guarantee schemes (DGS) - bank recovery and resolution directive (BRRD)
The single supervisory mechanism	1. Supervision of credit institutions' compliance with prudential requirements 2. Detection of the weaknesses at an early stage 3. Ensuring action taken to correct those weaknesses, in order to prevent the situation from developing into a threat to overall financial stability	The European Central Bank (ECB) and the national supervisory authorities of the participating EU member states
The single resolution mechanism	Ensuring an orderly resolution of failing banks with minimal costs to taxpayers and to the real economy	1. An EU-level resolution authority - the single resolution board 2. A common resolution fund, financed by the banking sector

Source: European Council (2015b), European Council (2015c) and European Council (2015d).

The most important aims of the banking union are:

- ensuring banks robustness and ability to withstand any future financial crises,
- preventing situations where taxpayers' money is used to save failing banks,
- reducing market fragmentation by harmonizing the financial sector rules,
- strengthening financial stability in the euro area and the EU as a whole (European Council, 2015a).

The banking union project focuses on improving the functioning of the euro area due to the fact that the financial crisis in the EU was concentrated in the euro-countries. The priority for the new framework is to stabilize the banking system in the Eurozone. However the banking union is also open to non-euro countries, like Poland, which may participate in the project through establishing "close cooperation" (opt-in). Opt-in countries do not need to join the euro area. In case of the close cooperation the national supervisor must accept instructions from the ECB on supervision, but the national central bank retains instruments for liquidity support to the domestic banking system, and independent monetary and exchange rate policies. The ECB will only share responsibilities with national authorities over macro-prudential policy instruments (Lehmann and Nyberg, 2014). Participating in the banking union on the basis of close

cooperation entails, therefore limitations resulting from its construction (Kosior, Rubaszek eds., 2015).

The banking union transfers not only the supervisory responsibilities, but also the burden of rescue or closure costs from the national to the European level (Popławski, 2014). Therefore it could be stated that the implementing of the banking union is the important step towards the new financial safety net in the Eurozone. And even an important stage in the process of European integration: from the banking union to the fiscal union and from the fiscal union to the political union. There are grounds for wondering whether the banking union is the step towards the political integration or is just simply a project implemented ad hoc, without further enquiries or thought concerning its future financial and political consequences in the euro and non-euro countries (Cichocki, 2012).

3 The Situation of the Banking Sector in Poland

The banking sector in Poland has undergone fundamental changes over the past 25 years. The main objective of transformations was a creation of competitive market structure and the development of the modern banking sector. Today's the banking sector is characterized by relatively low level of concentration, which is coherent with a traditional bank business model (Lindblom at al., 2013). The important feature of the sector is the dominance of the foreign capital. Undoubtedly foreign investors contributed to the development of banks in Poland through among others: transfer of knowledge, technology and financing.

As at the end of 2013, the banking sector comprised 67 commercial banks, among which 22 banks with total assets exceeding PLN 10bn. Only 6 banks among the biggest institutions were controlled by the Polish capital (Table 2). The State Treasury holds a majority stake in 4 banks: PKO Bank Polski, Bank Gospodarstwa Krajowego, Bank Pocztowy and Bank Ochrony Środowiska.

Foreign capital accounted for: 55.3% of the issued capital, and 63.2% of total assets of banking sector. The highest share of the foreign capital in the issued capital had the investors from Germany (9.3%) and France (9.0%). It should be mentioned that the high share of foreign capital in banking sector is common also in other post-communist countries. The highest share of foreign capital in banks could be observed in Estonia (98%), Czech Republic (95%), Slovakia (89%), Romania (86%), Bulgaria (79%) and Lithuania (78%).

An important factor which influenced the situation in Polish banking sector was the harmonization of the financial law with the European Union regulation caused by Poland's accession to the European structures. One of the most important changes was the introduction of a single passport law, according to which a credit institution which obtained a banking license in one of the European Union country might undertake and conduct the activity in the territory of another European Union country, without a necessity to undergo another license procedure (only the notification the host country banking supervisor the intention to undertake the activity in its territory) (Pawłowska, 2012). The single passport law has enabled a fierce uncontrolled expansion of banks (especially banking groups) on the whole territory of the European Union. However, in practice European banks did not enter other markets though opening branches but with subsidiaries and thus subjected themselves to host-country supervision (Fonteyne, 2007).

Under this approach the entire responsibility lies with the subsidiary and the host-country supervision authority, and the responsibility of the parent bank was limited almost exclusively to the amount of invested capital. This business model of the banking groups enabled them the maximum benefit at a minimum cost (Ramotowski, 2015). The home-country supervisor authorities remained responsible for the supervision of the whole banking group under consolidated supervision. The host supervisor was the leading authority for the subsidiaries (Fiechter at al., 2011).

Table 2 The largest banks in Poland - dominant/strategic investors, assets, net profit/loss (as of 31/12/2013, EUR m)

	Banks	Dominant/strategic investor	Assets	Net Profit/loss
1.	PKO BP	State Treasury	48 029	770
2.	Bank Pekao	UniCredit	38 215	664
3.	Bank Zachodni WBK	Banco Santander	25 575	473
4.	mBank	Commerzbank	25 140	288
5.	Bank Gospodarstwa Krajowego	State Treasury	10 573	176
6.	ING Bank Ślaski	ING Bank	20 913	229
7.	Getin Noble Bank	Leszek Czarnecki (Polish capital)	15 336	95
8.	Bank Millennium	Banco Comercial Portugues	13 745	128
9.	Raiffeisen Bank Polska	Raiffeisen Bank International	11 581	31
10.	Bank Handlowy w Warszawie	Citigroup	10 944	232

Source: KNF, 2014, Raiffeisen Bank Polska S.A., 2014, Bank Gospodarstwa Krajowego, 2014a, Bank Gospodarstwa Krajowego, 2014b.

The effectiveness of the financial supervision in Poland should be assessed positively. The supervisor of the financial services industry - after the reform in 2006 - is The Polish Financial Supervision Authority (KNF). It supervises: credit institutions, insurance firms, investment companies, exchanges, pension scheme as well as payment institutions and credit unions (KNF, 2015). The supervisory architecture in Poland has proven its strength even in the turbulent times of the global financial crisis. According to the IMF the KNF: has well-developed supervisory methodologies and processes, the staff is highly professional and dedicated and during the crisis has undertaken numerous proactive measures to preserve financial sector stability (IMF, 2012). During the crisis despite the strong deterioration in financial performance, the situation of the banking sector in Poland remained stable. Banks were capable to face extraordinary external threats. No bank has gone bankrupt for 11 years and there was no need of state aid during the period of crisis (Zaleska, 2012). There was an uncertainty regarding the future situation of parent banks. It turned out however that the foreign parent banks not only did not withdraw existing exposures and, but in emergency situations, even provided financial support to their subsidiaries in Poland. The negative observable phenomenon was the reduction of corporate portfolio loans by the banks controlled by the foreign banking groups which has restricted the access of the Polish corporate sector to loans (Gozdek, Kawalec, 2012).

The banking sector in Poland remains in good condition and achieves positive financial results. The capital position of domestic banks remains good, which ensures high resilience to shocks. The sector is characterized by low leverage which confirms good capital position of banks. The results of stress-tests are positive and demonstrate that the banking sector in Poland is capable of absorbing strong macroeconomic, market and liquidity shocks (NBP, 2015 and GUS, 2014).

4 The Banking Union - Main Threats for Poland – the Discussion

Poland has generally welcomed the concept of the European banking union at the beginning. The vision of greater financial stability in Europe through banking union should be certainly assessed positively from the Poland's point of view. However the potential implementation of this union in Poland remains disputable and highly controversial matter.

The government, the National Bank of Poland, The Polish Financial Supervisory Authority and political groups - are generally concerned that the banking union, and especially the common European supervision, will have a negative impact on the stability of the Polish banking sector (ISP, 2012). Poland at the beginning wanted to have the influence on the shape of the union and the decision-making process of future European supervisor. Unfortunately, that has proved impossible since Poland as the non-euro country does not have a voice in the ECB. The banking union could affect Polish banking sector but Poland has no impact on the union. It should be mentioned that Poland's position regarding the banking union is influencing the attitude of other countries such as Hungary (Kisgergely, Szombati, 2014).

Especially relevant from a Polish perspective is work on the Single Resolution Mechanism and the expanding EU backstop for non-euro countries. Poland perceives the need to ensure adequate transnational protective mechanism (backstop), both in the context of the Single Resolution Mechanism as well as of potential capital needs of banks which could emerge as a result of the ECB asset quality review (AQR) or the EBA stress tests (MSZ, 2013).

The main threat related to the banking union is the risk of the "not-finished project". The banking union is still not yet fully implemented and it is very difficult to say when and if at all - will be (the problem with the third pillar). What more – we do not know whether the construction of the banking union is correct and will fulfill its functions. We will not know this until the future potential crisis situation. This risk of incorrect construction can emerge during the implementation of its individual pillars or later, during its functioning. It should also be considered that the new financial framework assumes so far only strict and centralized banking supervision at European level, living the rest of the financial system less under control. This situation could create risk of instability because of adverse selection, when the risky financial activities will "leave" banks and shift towards non-banking sector (Bruni, 2014).

Other risk is related to the possibility of more favorable treatment of the Eurozone banks than the banks outside the euro area. The problem associated with this - the lack of possibility to obtain help from the European Stability Mechanism for the non-Eurozone countries. It raises the question about the liquidity support for the countries outside the euro area. Another important related issue is the risk of potential capital flight - if foreign investors will perceive the Eurozone countries as the safer location for their capital in the non-banking union countries (Majkowska, 2015).

Another significant issue is connected with the "competence problems". There is the risk of the conflicts among the ECB and the Polish supervisory authority, what can lead to the increase in costs of financial safety net. The supervisory competences will be transferred from the country-level to the European-level. The European Central Bank will be responsible for instance for: the authorization of credit institutions and to withdraw authorizations of credit institutions, carrying out supervision on a consolidated basis over credit institutions' parents assessment of notifications of the acquisition and disposal of qualifying holdings in credit institutions, performing supervisory reviews, stress tests and their possible publication, carrying out supervisory tasks in relation to recovery plans (Council of the European Union, 2013 and Liszewska, 2014). That is why so crucial will be the conclusion of the memorandum of understanding describing in general terms how the ECB and the Polish competent authorities will cooperate with one another in the performance of their supervisory tasks. The memorandum should among others clarify the consultation relating to decisions of the ECB having effect on subsidiaries or branches established in Poland whose parent undertaking is established in a participating Member State, and the cooperation in emergency situations, including early warning mechanisms (Council of the European Union, 2013). The transfer of the macroprudential policy to European-level can lead to the risk that European supervisor will not take under consideration the interests of the subsidiaries which are the part of the foreign capital groups. What more, the European supervisor can place the big banking groups at an advantage compared with the local banking sectors in non-euro countries. The banking

union is therefore build on the principle „large can do more". The banking union will be "asymmetric" with not equal division of rights and responsibilities especially in terms of decision-making process. It should be underline that regardless of Poland's close cooperation with banking union or not, due to the significant share of foreign capital in domestic banking, parent banks from the euro area countries will be supervised by the ECB. In this way improving the stability of the parent banks could be beneficiary for the stability of the Polish banking industry (Kosior, Rubaszek eds., 2015). Particular in view of the fact that the parent banks come from - among others - Spain and Portugal – the countries with troubled banking sectors.

The banking union arises also the threat which professor Zaleska calls „the budding" of different responsible organs, which can lead to the problems with definition of their detailed competencies and responsibility for decision or the costs of the functioning of the new structure (Zaleska, 2014). It should be underline that the lack of transparency and distinct delimitation of the responsibilities could be the treat for the whole banking union.

The interesting conclusions about benefits and costs of joining banking union were drawn by Schoenmaker and Siegmann. By comparing the benefits (resulting from the efficiency gains moving from the home rule to a supranational rule) and the costs (based on the ECB capital key - the capital input into the ECB) they got the net benefits for the euro area and non-Euro are countries. Authors simulated the resolution of top 25 European banks, which count for the vast majority of cross-border banking in the European Union with assets of EUR 985bn and capital of EUR 40bn (Schoenmaker and Siegmann, 2013). The results of a cost-benefit analysis of joining the banking union indicated that the biggest looser among non-euro area countries would be Poland (-4.9%). It results from the fact that Poland – the country from which none of 25 large banks which fall under the resolution process are coming - would have to incur costs resulting from payments to the ECB. It should be mentioned that - the other "biggest losers" - net payers - would be Germany (-6.7%), and the "biggest beneficiaries" - the United Kingdom (12.9%) and Sweden (8.6%). Therefore the important problem of the European banking union is the inequality in distribution of net benefits of joining European banking union between the euro area and non-euro area countries (Breuss, 2014).

5 Conclusions

It is difficult at the initial stage of the functioning of European banking union to assess its benefits and possible threats. Its effectiveness could be only verified in practice (of course nobody wants to check it). The answer to the question: is the banking union the right measure for the future crisis in the European financial system - stays unknown until the next financial disaster. Is the banking union the best "medicine" against the crisis? The important issue in the history of financial crisis is – as in the medical science - the disease always appears before the cure. It is hard to foresee the roots of the future crisis in Europe. It is hoped that the European banking union will contribute to the financial stability in the European Union and will create the conditions for the future development of the whole European economy.

Potential implementation of this union in Poland remains disputable and highly controversial matter. Polish authorities see important threats related to the establishments of close cooperation. Poland nowadays is in the position of "awaiting and observing" and analyzing the functioning of the banking union. As from a political point of view this is not the best solution because Poland has no influence on the decisions taken on the European level (threat of the "two-speed Europe").

It seems that the banking union in the proposed shape won't bring notable benefits for Poland. It should be noted that the banking sector in Poland remains sound and the domestic financial safety net (especially financial supervision) is effective. The most important is the further strengthening of the banking sector and the whole financial system for being prepared whatever the future holds. If Poland decides to enter the banking union it will need time for negotiate conditions which will ensure advantageous terms of cooperation.

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Systematization of Modern Structured Products according to the Parameters Common to all these Instruments

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Abstract: Modern structured products are mostly derivative financial instruments aimed at retail clients. These products allow implementing different investment strategies using derivatives by retail investors. Currently it is issued and traded many types of structured products at the markets. The potential investor has a very difficult orientation in order to make effectively decision and choose a product that meets his expectations and risk profile. Systematization of this segment of investment instruments is necessary. Modern structured products can be classified according to several criteria. This paper intends to focus on the qualitative characteristics of structured products, which are common to all structured products. These characteristics will be considered as potential criteria of systematization of modern structured products and according to relevant criteria will be designed systematization.

Keywords: investments, structured products, systematization, derivative financial instruments

JEL codes: G11, G19, G24, O16

1 Introduction

In the past two decades, structured products have established themselves in the financial markets and have gained a place in the portfolios of retail investors. Structured products are "financial assets, which consist of various elemental components; combined to generate a specific risk-return profile adapted to an investor's needs" (Blümke, 2009). Structured product make available investment strategies based on the use of derivatives to retail investors.

Any modern structured product is equipped with certain parameters. Some of these parameters are common to all structured products. In addition to the parameters available to each derivative financial instrument it is of course also possible to find the parameters that are common only to certain derivative financial instruments. If these parameters occur on a sufficiently large number of various types of structured products, then they have the potential to become also a suitable criterion for systematization. This paper aims to identify characteristics common to all structured products and consider it as possible criterion of systematization of structured products. These include in particular the underlying variable, from which is the value of a financial instrument derived, then the duration of the product (maturity), the currency in which the product is denominated, ratio in which the product is emitted, ISIN and issuer of structured product (or rather its creditworthiness).

2 Methodology and Data

This paper is intended as a theoretical work. Thus, the work uses general theoretical scientific methods, such as analysis, deduction or synthesis. Derivative financial instruments have different parameters/characteristics. This paper focuses on qualitative features that are not measurable and which determine either equality or diversity (the instrument contains the characteristic or not). These qualitative features may have different options of your speech, which are called category (quality class). Categories of qualitative characters then represent different variants of qualitative character. Some qualitative features can be set with only two choices of his speech (variant) - these are called alternative. Other quality features can acquire more possibilities of his speech

(variant, e.g. currency: EUR - USD - CHF - GBP ...) - these are called plural (Bedáňová and Večerek, 2007).

The research question of this paper is whether all these parameters (common to all structured products) are useful criteria for the systematization of structured products.

3 Results and Discussion

One of the most important parameters of modern structured products is parameter which is called underlying. From the value of underlying variable is derived the value of structured product. This variable may in principle be any variable that is measurable and that can be measured repeatedly. Development of the value of this variable significantly influences the development of the value of modern structured product.

For this variable is often used term underlying asset. At this point it should be noted, that it may not always be a financial asset (for definition of financial asset see International Accounting Standards IAS 32 or IAS 39) or asset in general (from an accounting perspective seen as property that will bring some economic benefit in the future).

For this reason, the author recommends to classify structured products not according to the underlying asset, but according to the underlying variable.

On the other hand should be added that the value of the structured products is mostly derived from underlying assets in practice, as documented in Table 1 below.

Table 1 Underlying instruments matrix

Underlying/Type of structured product	Bonus	Knock-Out	Index / Tracker	Discount	Express	Warrant	Other	Total
Indices	94,489	72,293	1,818	44,539	916	90,239	32,894	337,188
Shares	189,264	193,436	19	142,774	2,602	294,879	138,555	961,529
Baskets	7	2	5	-	234	-	2,583	2,831
Currencies	-	19,828	1	-	3	17,978	1,672	39,482
Commodities	648	22,003	237	2,281	36	11,907	2,756	39,868
Bonds / Interest rates	-	3,237	-	-	-	-	80	4,116
Other	16	22	194	2	8	1	1,034	1,277
Total	284,424	310,821	2,274	189,596	3,799	415,004	179,574	1.39 m.

Source: Warrants Exchange Frankfurt

The structured product may depend on the development of the value of the underlying variable in different ways (with regard to its structure).

Nevertheless, it is useful to classify structured products according this criterion and for the retail investor is the choice of these underlying variable important investment decisions.

Groups of variables with similar characteristics, from which can be derived the value of structured products, are shown in Figure 1.

Figure 1 Systematization of structured products according to underlying variable
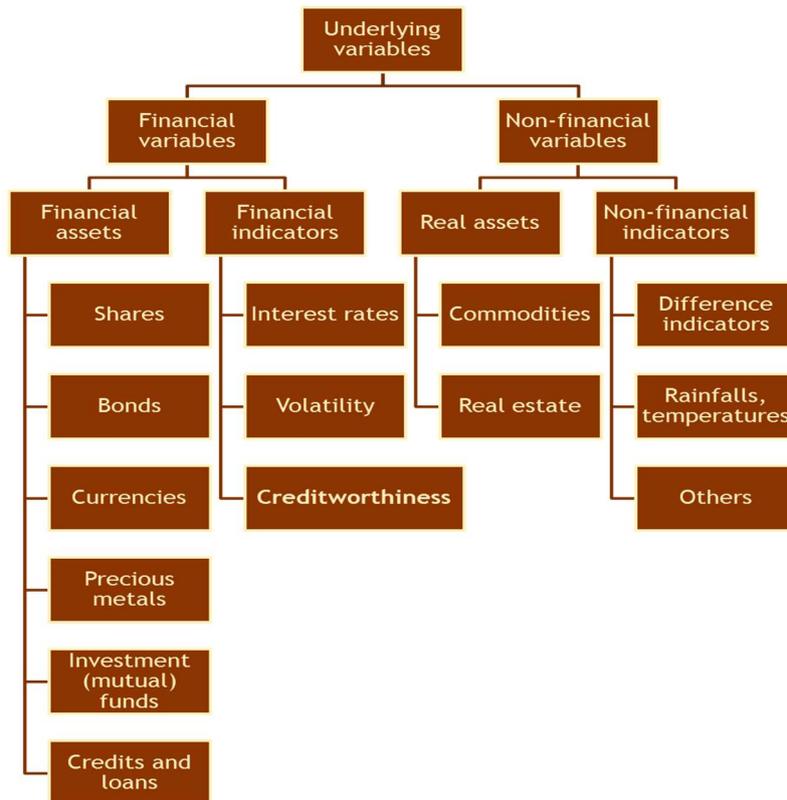
Source: Author's own work

Another parameter of modern structured products which is common to all products is their duration (maturity). This criterion of classification corresponds with another important characteristic of retail investor's investment - an individual investment horizon. The basic premise is that the investor should choose such product, which duration (maturity) corresponds to his individual investment horizon.

The classic systematization of financial instruments according to the duration is segmentation into short-term instruments with duration of up to one year, medium-term instruments with duration between one and five years and long-term instruments with duration longer than 5 years.

For structured products (with respect to the practical usefulness of such a classification) it seems appropriate to shorten the medium-term segment, because only slightly more than 30.000 units of the total number of about 1.4 million of structured products traded on the Frankfurt Stock Exchange has a duration longer than 24 months, if products with unlimited duration are not included (ZertifikateBörse Frankfurt, 2015). Products with unlimited duration are then usually designated like "open-end". The ratio of these products in the total number of traded structured products exceeds 15%.

It is also possible to find specific instruments in the segment of structured products, for which the duration is not fixed and can be conditionally reduced.

Condition of shortening of the duration is usually the development of value of the underlying variables and achieving a predetermined level. In this case, the product is then prematurely repaid and settled. Achieving a defined level could be assessed during the entire duration, at a certain date or only during a defined part of duration. It is known only maximum possible duration for these products.

According to the criteria described above is designed systematization of structured products on Figure 2.

Figure 2 Systematization of structured products according to duration of the product
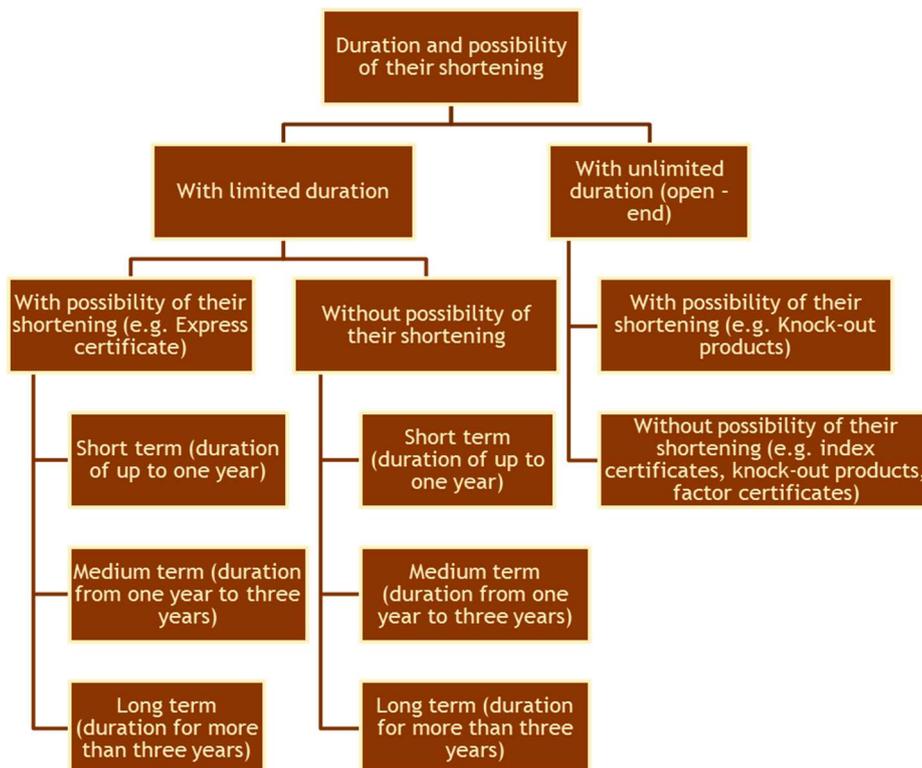
Source: Author's own work

Any structured product is denominated and priced in selected currency. So it is again typical parameter for all structured products. Structured products can thus be classified according to different national currencies. But it may be useful also another criterion. This is a potential currency risk which the investor is exposed.

Certain structured products may in fact be denominated in a currency other than that in which is expressed the value of the underlying variables. In this case, the investor runs the risk of loss of value of his investment as a result of adverse changes in the exchange rate of these currencies. This currency risk, the investor may voluntarily undergo. On the other hand investor can hedge against currency risk or can purchase such product that includes an embedded exotic option and currency risk is eliminated. Such products are called "quanto". In this case, it is necessary to reckon with the fact that such a product will be either more expensive than the equivalent instrument without hedging, or will be priced as well, but will have a less favorable others parameters (e. g. guarantee level, the participation rate, parameter "cap").

Besides these aspects, of course, the investor have to consider the currency risk in the situation where the currency of his state does not correspond to the currency in which is structured product denominated (even when the underlying variable is listed in the same currency as structured product).

Figure 3 below shows the classification according to undergoing currency risk and hedging against him.

Figure 3 Systematization of structured products according to relationship between currency in which is the product denominated and currency of the underlying variable
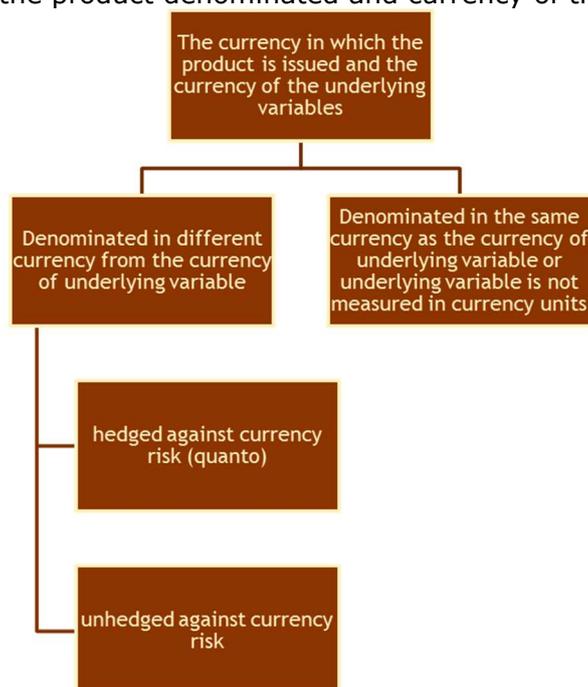
Source: Author's own work

The ratio is a parameter that makes the investment in structured products accessible to retail investors too. It is a ratio of the value of a structured product to the value of the underlying variables. If the value of underlying variable (expressed in monetary units) is too high (with regard to retail investor), the issuer relates the value of structured product to value of underlying variable in ratio. The issuer adjusts the price of structured product for example, when the underlying variable is an index.

Because there are a plethora of underlying variables that have different values, also the parameter ratio can assume various values. The classification of structured products according to this criterion (ratio size) is useless, because this parameter by itself, without relating to the value of the underlying variables, has not meaningful ability for the potential investor.

Another parameter of structured products is ISIN. This International Securities Identification Number is used worldwide.

ISINs were once considered only a secondary form of security identification, used exclusively for clearing and settlement. In recent years, some European countries have adopted ISINs as their primary security identifier (International Securities Identification Number Organization, 2015).

With regard to uniqueness ISIN for each security, it is not possible to form categories of structured products according to ISIN and this criterion is not suitable for systematization of structured products.

Although it would be theoretically possible to classified structured products like by other securities (e.g. bonds) according to issuer, the current practice is that issuers are only commercial banks or financial intermediaries. So it does not make sense to classify structured products similar to the bonds according to the issuer on structured products, which have issued state, municipalities, corporations, banks.

4 Conclusions

Every structured product is equipped with certain parameters. Parameters that are common for all these instruments are derivation of his value from the value of another underlying variable, than the duration, the currency in which is product denominated, the ratio and assigned ISIN. Every structured product has also an issuer.

Parameters ratio and ISIN were assessed as unsuitable criterion for systematization of structured products, because the parameter ratio itself has no meaningful ability. This obtains only in relation to the value of the underlying variable and then ratio has an impact on the value of the structured product. ISIN is unique to each individual structured product and it is not possible categorize structured products according to this criterion.

As appropriate criteria for systematization of structured products were evaluated the underlying variable, the duration and the currency in which the product is issued, because according to these characteristics, it was possible to classify structured products in categories which are useful for investors. According to these criteria was performed systematization.

Structured products have the nature of a debt security and therefore it makes sense to monitor the creditworthiness of the issuer, as an expression of its ability to fulfill obligations from issued structured products.

For underlying variable it is useful to perceive that the value of structured products may be derived not only from the underlying asset, but also from other accidental and repeatedly measurable variable.

Currency risk may arise from the valuation of the underlying variables in a currency other than the currency in which it is priced the structured product.

A specific feature of some structured products is the possibility of shortening their duration.

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Comparing Stock Market Efficiency
with Detrended Fluctuation Analysis

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Abstract: *Efficient market hypothesis is a core assumption of financial economics upon which the majority of asset pricing models are built. Therefore, before employing asset pricing models for the cost of capital calculations and stock performance predictability, we need to test the random walk properties of stock prices. EMH is closely related to random walk hypothesis that implies unpredictability of stock returns behavior on financial markets. The measure of the random walk content of stock returns is computed with detrended fluctuation analysis of Peng et al. (1994). According to the EMH, the returns within time series present uncorrelated values and are not predictable on a historical basis. The detrended fluctuation analysis is implemented to check the possible correlations in price returns within the studied time series.*

We measure scaling exponents (core measurement in DFA methodology) of financial markets for China and Germany, which are considered as emerging and developed economies. Since developing economies are supposed to be less efficient then developed ones, we check if the difference in presumed efficiency levels are reflected in the levels of scaling exponents. The expectation is to understand whether both of the markets could be the "platform" for applying classic asset pricing models, that require financial markets being efficient.

Keywords: efficient market hypothesis, random walk, detrended fluctuation analysis, DAX, SHCOMP

JEL codes: G12, G14

1 Introduction

The aim of the work is to estimate and compare the deviations of German and China stock markets, as reflected by the DAX and SHCOMP index correspondingly, from the random walk hypothesis. Those two markets are chosen in order to compare the levels of their market efficiency as one of them represent developed economy and another one - emerging economy. The more global perspective of the study is to find possible reasons of particular inaccuracies in testing of asset pricing models, which can be caused by inefficiency of the market.

The concept of EMH was brought into financial world by Eugen Fama (1970) while working on his Ph.D. thesis and was subsequently broadened in his review of EMH theory and empirical evidence. EMH is closely related to random walk hypothesis that implies unpredictability of stock returns behavior on financial markets. Critics of EMH started with behavioral finance theory appearance, assuming that market agents do not behave rationally as was assumed by EMH. Recently late-2000s financial crisis evoked a new wave of critics towards EMH, blaming it for substituting real imperfect market functioning by its simplification. Motivated by behavioral study of market agents Lo (2004) presented the alternative theory – adaptive market hypothesis (AMH). That theory reduces the strictness of EMH and assumes that the predictability of stock prices can vary according to the economic cycles, shocks, bubbles, etc. Recent study of Rodriquez et. al (2014) examined level of efficiency of US stock market, presented by Dow Jones Index Average (DJIA), by means of Detrended Fluctuation Analysis (DFA). Results demonstrate that US stock market can be characterized in terms of AMH, where the level of market efficiency measured by scaling (Hurst) exponent is influenced by business cycles. We would like to

imply the methodology on German stock market and check in what way the changes of business cycles' phases influence market's efficiency through time.

2 Methodology and Data

The time series for the DAX was obtained with a daily frequency from Bloomberg database for the period 1960-2015. The German Stock Index is a total return index of 30 selected German blue chip stocks traded on the Frankfurt Stock Exchange (bloomberg.com). The DAX index that is known as a benchmark of the German financial market was selected in order to examine level of efficiency of the most powerful European financial market. Figure 1 illustrates a historical development of return levels of DAX index.

Figure 1 Historical observations of DAX index for period 1960-2015 (Interday returns – upper left graph, Intraday returns- upper right, overnight returns – lower left, interweekly – lower right)
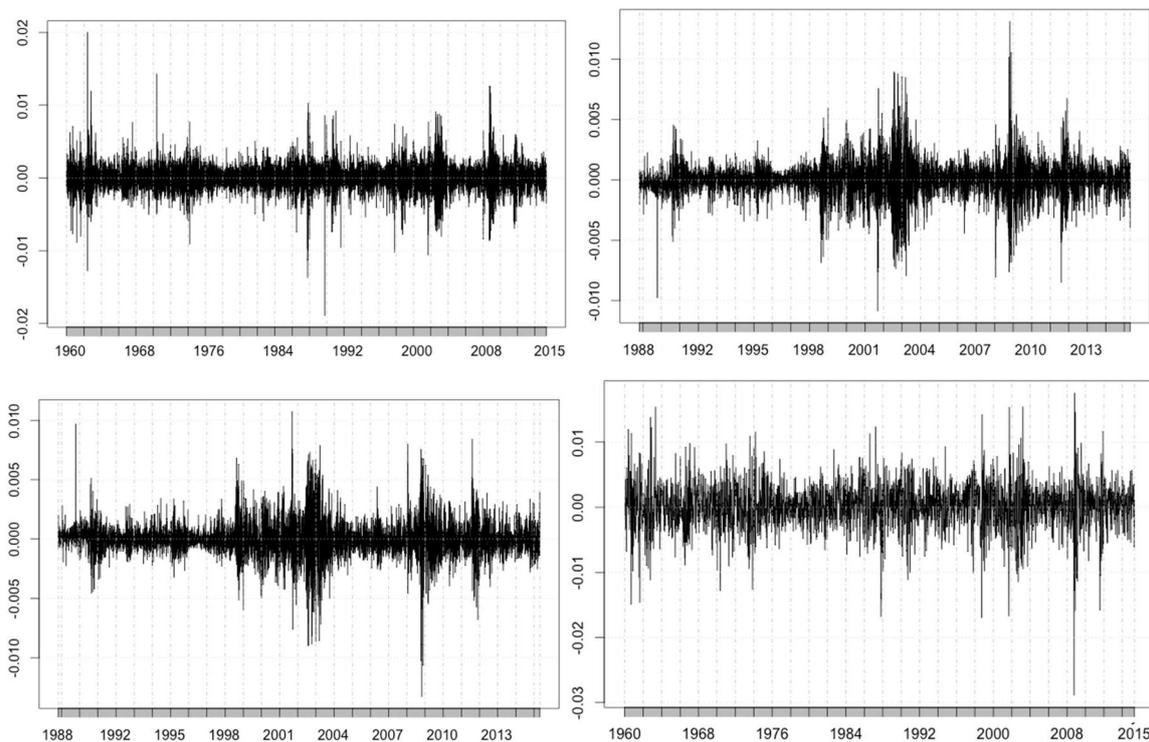
Source: Author's construction

Chinese index SHCOMP is The Shanghai Stock Exchange Composite Index, that tracks the daily price performance of all A-shares and B-shares listed on the Shanghai Stock Exchange (bloomberg.com). We have the shorter history of the Chinese index (Shanghai index exists since 1990), but it still gives a relevant number of observations, that are needed for the applying of DFA methodology. The evolution of the SHCOMP returns is illustrated in Figure 2.

Daily and weekly returns were calculated for testing the market efficiency level. They were classified into

- interday (close-to-close) return;
- intraday (close-to-open) return, that shows the price changes within a stock sessions;
- overnight (open-to-close) return, which is supposed to catch the daily market volatility;
- interweek (close-to-close) return.

Figure 2 Historical observations of SHCOMP index for period 1990-2015 (Interday returns – upper left graph, Intraday returns- upper right, overnight returns – lower left, interweekly – lower right)
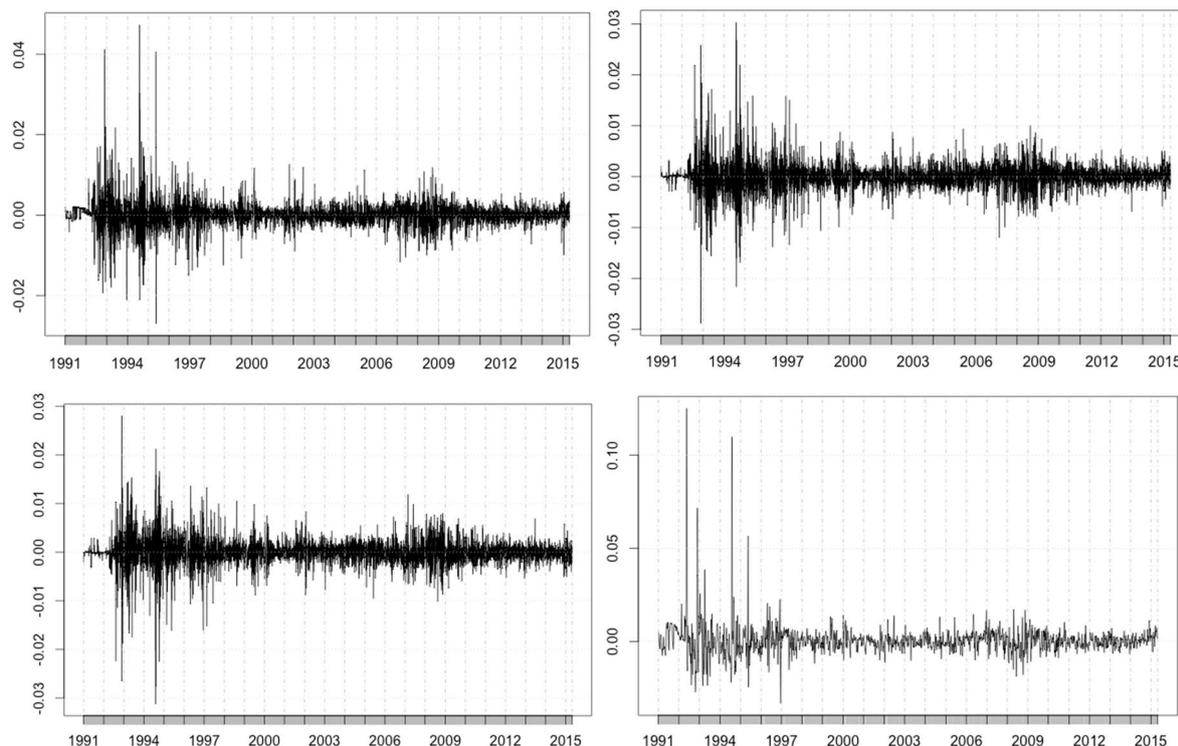
Source: Author's construction

According to the EMH the returns within time series present uncorrelated values and are not predictable on a historical basis. The methodology of Detrended Fluctuation Analysis is implied to check possible correlations in price returns within time series. The scaling (Hurst) exponent is calculated as a measure of returns correlation level.

The economical cycle theory is implied in understanding the results of the study, as the variation of the exponent value within different fractional time-series can be possible explained by changing of cycle phases.

Calculating of the scaling exponent with DFA is in line with below procedure.

Step 1. Calculation of the mean of time-series $x_k = (x_1, \ldots, x_j)$, $k = 1, \ldots, N$

$$\langle x_k \rangle = \frac{1}{N} \sum_{j=1}^{N} x_j \tag{1}$$

Step 2. Building of integrated mean-adjusted time-series.

$$Y_k = \sum_{j=1}^{k} (x_j - \langle x_k \rangle), k = 1, \ldots, N. \tag{2}$$

Step 3. Divide the mean adjusted time-series into non-overlapping fractions of equal length, τ.

$$N_s = \frac{N}{\tau}. \tag{3}$$

Step 4. Estimate trend within each time-segment.

In our study the local trend is defined as a first-degree polynomial function $Y_{\tau,k}$ and estimated as an ordinate of linear least square fit of the data points in every segment. The degree of polynomial should not be necessary equal to one. It can vary in order to

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eliminate linear, quadratic, cubic or higher order trends. But according to Rodriguez et al. (2014) the linear polynomial is sufficient enough for detrending of the integrated time series.

Step 5. Detrend every obtained segment.

Deviation between the profile function and the polynomial fit is calculated as

$$\widetilde{Y}_k = Y_k - Y_{\tau,k}. \tag{4}$$

Stock market time-series are predisposed to appearance of rapidly varying trends and it is necessary to liberate data from them. According to numerous studies, for example Bashan et al. (2008), the detrending technique different from DFA detrending method can also be implied and could result in increasing of the accuracy of the calculations. This point is however is out of scope of the current study and could be considered as one of its possible improvements.

Step 6. Obtain fluctuation function that is determined by scaling coefficient.

The variance of $\widetilde{Y}_k$ presents the fluctuation function on scale τ.

$$F(\tau) = \left(\frac{1}{\tau N_s}\sum_{k=1}^{\tau N_s}\widetilde{Y_k^2}\right)^{\frac{1}{2}} \tag{5}$$

The function is calculated for different scales, that in our case vary from segments with length of 8 observations to segments with 1024 observations. There is a linear relation between sample size and the fluctuation function value ($F(\tau)$ increases while τ increases).

Step 7. Calculate the Hurst exponent

$$F(\tau) = \tau^\alpha \tag{6}$$

If scaling exponent, α, is higher than 0,5, then the result is persistent and long time-segments (large τ) are correlated to long time-segments or vise versa if short time segments are influenced by short time segments.

If $\alpha < 0,5$, then the results are anti-persistent and long ranges of observations are correlated to short ranges and vise versa.

If $\alpha = 0,5$, then the time-series at any steep are completely uncorrelated to any previous values and can be described as a random walk process.

Step 8. Define size of a rolling window and calculate scaling exponent for each rolling interval.

This step contributes to obtaining historical values of scaling exponents and allows to asses the level of market efficiency at some significant time intervals such as periods of crises, political shocks, economic bubbles etc.

3 Results and Discussion

We start with comparing of scaling exponents (measures of market efficiency in our study), that were calculated on the traditionally computed interday returns for both indexes. Figures 3 present a variation of scaling exponent (α) over almost half a century of observations of DAX returns. We notice that there is a certain volatility in a level of market efficiency, that could be explained by specific social and economic events, that took place across one or another time-scale.

But still the value was never higher than 0,6 or lower than 0,4, what shows that market efficiency fluctuates around level 0,5 and market is in general efficient. The scaling coefficient was decreasing across the periods, when economy was unstable, e.g. there is a sharp drop in 2008-2010 crises period. On the graph of year moving average existence of long-term cycles is quite noticeable. We see that the first cycle continues over 18 years (1960-1978), the second – 12 years (1978-1990), the third – 8 years (2002-2010). The third period can be described as a Juglar's investment cycle, that is supposed to be from 7 to 11 years long and have four phases: expansion, crises, recession,

recovery. That's what we observed during the period since 2002, it was continued by recent global financial crises and following recovery from it.

Figure 3 Time-variation of scaling exponent of DAX (upper) and SHCOMP (lower) interday returns (actual series on the left, year moving average on the right)
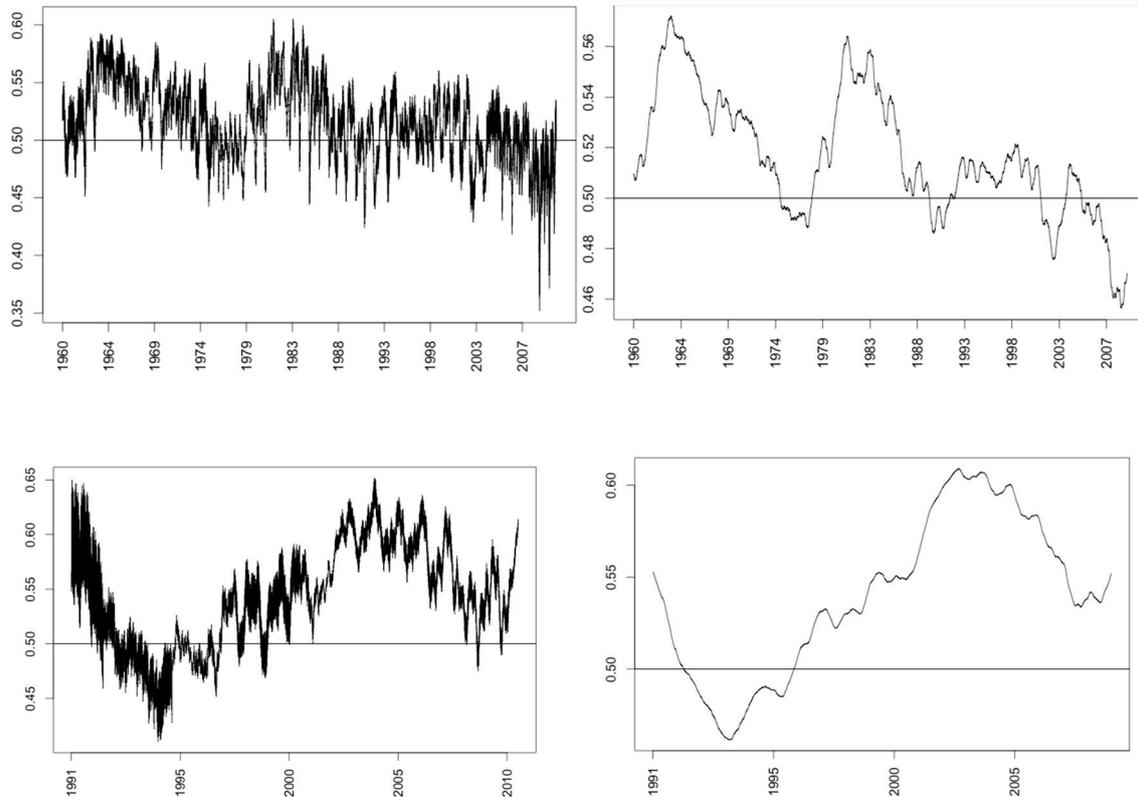
Source: Author's construction

From Figure 3 (lower two graphs) we observe the evolution of the Chinese market efficiency and can see the decrease of the market efficiency in early 1990's and then strong deviations from the random walk hypothesis. Because of the smaller observations' number we cannot spot some long-term business cycles, but we still see some bubble during period 1993-2008, that most likely can be identified with enormous growth of Chinese economy and overheating of the global economy.

The idea of checking intraday returns consists in the interest in possible correlations in high-frequency data and studying the conditions of intraday trading. Figure 4 reveals that the volatility in scaling coefficient of intraday returns is higher than the one for interday returns. Here we see more significant deviations from random walk hypothesis, what is probably caused by the nature of high-frequency data (see Bollerslev et al., 2006 and Curme et al., 2014).

SHCOMP intraday results show much more dramatic volatility of level of market efficiency in China. For intraday returns the scaling coefficient grew from 0,4 in 1993 to 0,65 in 2002 and showed a progress in market's persistence. But still such a huge volatility is a sign of an emerging process in economy.

The next step is to compare results obtained by DFA for weekly returns. Figure 5 illustrates the time-variation of scaling exponent on weekly returns for both stock markets.

Figure 4 Time-variation of scaling exponent of DAX (upper) and SHCOMP (lower) intraday returns (actual series on the left, year moving average on the right)
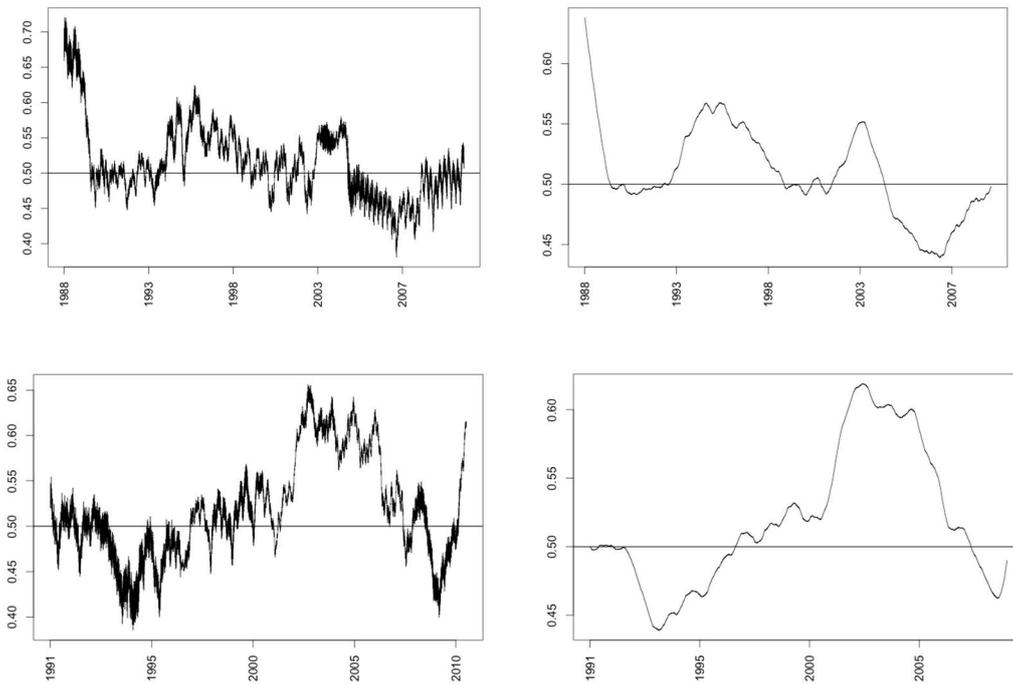
Source: Author's construction

Figure 5 Time-variation of scaling exponent of DAX (upper) and SHCOMP (lower) weekly returns (actual series on the left, year moving average on the right)
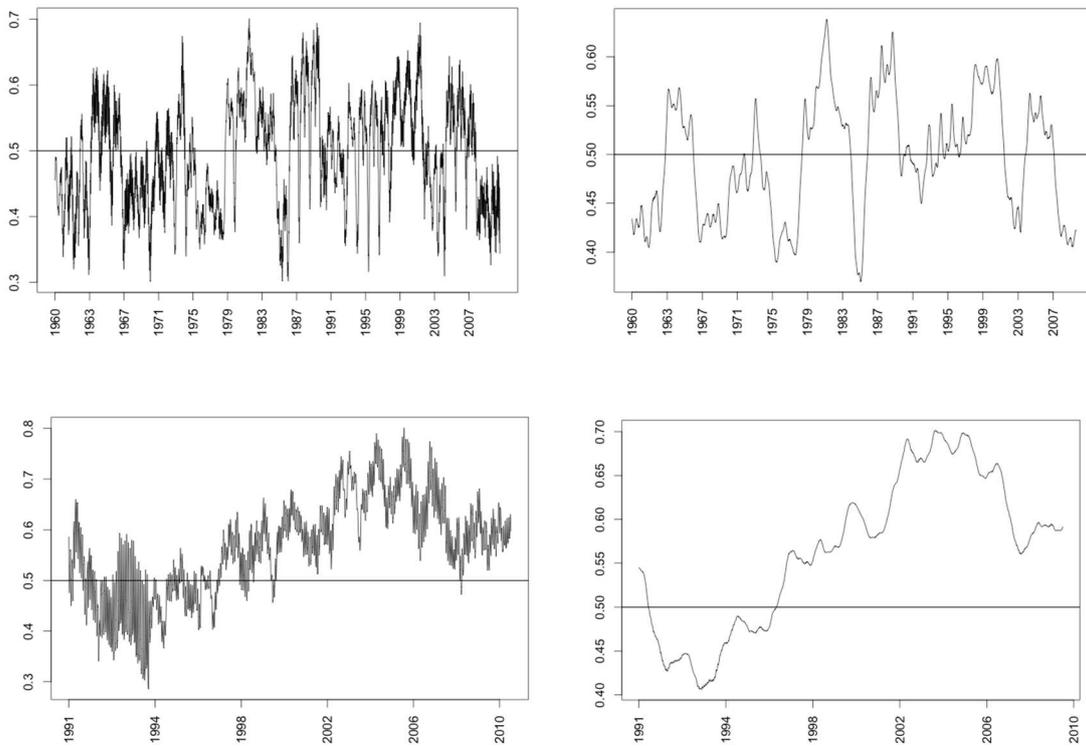

Source: Author's construction

According to Figure 5 scaling exponents computed on the base of weekly returns of both indexes present the most consistent results and allow to make more precise analysis. Following by these results we see that scaling coefficient of DAX tends to it's optimal value 0,5 in long term perspective and does not present long-term trends, while SHCOMP is inclined in a long-term trend of building persistent market.

4 Conclusions

We compared levels of market efficiency for two stock markets, one of which is considered to be developed and another – emergent. Interday analyses of DAX index presents that German stock market is consistent with AMH and that returns observed during long-time periods are correlated to returns of long-time periods and the same logic is applied to short-time observations. However Intraday analyses shows less supportive results because of the volatile structure of high frequency data, which intraday data are considered to be. Results based on weekly returns are the most consistent with AMH. From the above analyses the difference between German and Chinese markets is obvious. Form weekly data analysis we noticed that there is a positive trend in market efficiency of China. In this paper we proved our expectations that developed economy is more efficient than the emerging one and that the problem of non-successful testing of asset pricing models on developing markets can be their volatile level of market efficiency.

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Prediction of Oil Depletion in Ghana Based on Hubbert's Model

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Abstract: *This paper seeks to investigate the potential peak production of oil in Ghana beyond which declining production occurs. Ghana has over the years explored the possibilities of producing oil but major discoveries and subsequent commercial production began in 2010. As important as this resource is to the quest for economic transformation and diversification of the Ghanaian economy, its usage should also take into consideration challenges of depletion. This is so relevant given the fact that, the country needs to make plans that will cover the future generations. The study employed Hubbert's linearization model and curves of oil production and depletion. Two models were set up. The first including few years of the exploratory activities and the second making use of only the years of actual oil production. The chosen results predicted that Ghana had a total recoverable oil reserves of about 1.8 billion barrels. It also predicted that the maximum or peak production will occur in the year 2025 and total oil will be depleted by 2045. The data for the study was obtained from the U.S Energy Information Administration.*

Keywords: hubbert's curve, hubbert's linearization, oil production, oil depletion, Ghana

JEL codes: C5, Q3, Q4, O1, O2

1 Introduction

Oil as a resource was recently discovered in Ghana in 2007 and its commercial production basically started in 2010. Before this period, several exploratory activities were undertaken by several multinational oil drilling companies. These activities yielded very little output and could therefore not be classified as production but exploration.

Major and sustained exploration activities started with the formation of the Ghana National Petroleum Corporation (GNPC) in 1985 and has continued until today. Ghana's first petroleum law, the Ghana National Petroleum Corporation (GNPC) Law was passed in 1983, and in 1987 the enactment of the Petroleum Income Tax Law provided a separate tax regime for the petroleum sector.

GNPC announced a significant discovery of light oil offshore at the Jubilee Field together with partners Tullow Oil and Kosmos Energy in 2007. According to Tullow Oil, it was one of the biggest oil finds in Africa in recent times. The Jubilee field began producing in December 2010, and was estimated to hold 1.5 billion barrels of oil. Tullow Oil Plc, the lead company in Ghana's oil production, estimated production at the Jubilee oil field for 2012 to average between 70,000 and 90,000 barrels per day (bpd).

After producing an average of only 8,880 barrels per day (bpd) in 2010, Ghana's oil production increased to 84,737 bpd by late 2011, with nearly all of that production coming from the Jubilee field. The country anticipated a rise in total output to 120,000 bpd sometime in 2012 but this was not achieved.

The economic impact of an oil boom in any economy cannot be overemphasized as it has a huge potential to turn the economic fortunes of nations. Proceeds are enormous and largely dependent on the international price of crude oil per barrel.

Ghana over the years relied heavily on a narrow range of exports which include; cocoa, gold and timber. The discovery of oil as a resource has therefore added to the export portfolio but as to whether this reduces the ratio of concentration will be answered. It must be admitted that though the proceeds from the oil resource has had a huge impact

in terms of economic growth and development, its impact on economic diversification is negligible.

There are two opposing views with regards to the nature of oil; whether it is renewable or non-renewable. This study assumes the stance that oil is non-renewable and its exploitation must therefore take into consideration the fact that it will be depleted after some years to come. This is often relevant due to planning initiatives to cover the future generations. Currently production is at about 110,000 barrels per day and the maximum is yet to be achieved though the Jubilee Field which is the largest operator in Ghana has predicted 120,000 bpd.

This study seeks to predict Ghana's oil production peak and depletion using Hubbert's model. Hubbert's model of energy production has remained a source of emphasis on dwindling oil reserves. The prediction by Hubbert (1956) that oil production from the 48 contiguous United States would peak between 1965 and 1970 was accurate. Hubbert based his estimate on a mathematical model that assumes that the production of oil resource follows a bell-shaped curve, one that rises rapidly to a peak and declines quickly.

A 1998 article in Science was titled "The next oil crisis looms large and perhaps close" discussed by Kerr (1998); while a 1999 Nature article was subtitled ´Permanent decline in global oil production rate is virtually certain to begin within 20 years" by Hatfield (1997). But contrary studies have adduced that the rate at which oil reserves are being utilized is less, if not equal to, the rate at which it is being replenished as discussed in Demming (2003), and McCabe (1998).

There is also the possibility that structural and technological changes on the demand side could cause the demand for oil to "run out" before the supply (Odell, 1999). Modern researches are focused on "peaking" of oil production e.g., Bentley, 2002; Campbell and Laherrere, 1998). Other studies have considered the timing of the peaking of conventional oil production e.g., Wood et al., 2000.

The next sections discuss the methodology used for the study, the results and discussions as well as the conclusions.

2 Methodology and Data

Ghana produced a total of about 27 million barrels of crude oil in 2011, 28 million in 2012, 35 million in 2013 and 37 million in 2014. A total of about 9.6 million was produced in the first quarter of 2015 of which, 2.9 million was produced by GNPC and 6.7 million was produced by partners.

Using two scenarios to predict oil production and depletion in Ghana, the study used two time periods for separate analysis. The first period covered data from 1992-2015. The second period covered data from 2010-2015. Actual oil productiion began in 2010 and the activities before then were classified as exploratory. The study therefore seeks to capture the two periods.

The model developed by Hubbert in the 1950s offers a symmetric, bell shaped curve that rises rapidly to a peak and declines just as quickly. It fits logistic function to oil production. This model has been very effective at predicting the overall behavior of many different finite resources like oil or coal. The equation is symmetric about the peak point and reaches its maximum when half the oil is produced. The equation for cumulative oil production is given in equation (1).

$$Q_t = \frac{Q_\infty}{1 + e^{w*(\tau - t)}} \tag{1}$$

where Q is cumulative production and Q_∞ is maximum production, t is time to peak, ω is logistic growth rate. The derivative of cumulative production is current production P_t

which is used to capture development in time. Current production is expressed as in equation (2).

$$P_t = Q_\infty \omega \frac{1}{(e^{-(\omega/2)*(\tau-t)} + e^{(\omega/2)*(\tau-t)})^2}$$

(2)

where t is time in years, Q is cumulative production in billion barrels at year t, $Q\infty$ is the ultimate recoverable resource, P_t is annual production in thousands of barrels at year t. Hubbert Linearization will be used as described by Deffeyes (2005) to estimate parameters which govern Hubbert curve (maximum production $Q\infty$, logistic growth rate). We use the non-linear differential equation formula given in equation (3).

$$\frac{dQ}{dt} = P_t = \omega Q(1 - \frac{Q}{Q_\infty})$$

(3)

Equation 3 can be re-written in linear form, by dividing both sides by Q to obtain equation (4).

$$\frac{P_t}{Q} = \omega(1 - \frac{Q}{Q_\infty})$$

(4)

A scatter plot of the P_t/Q versus Q was constructed, where P_t represented the annual production. It gives us a straight regression line with a y-axis. The intercept is equal to ω and an inclination given by b. Equation (5) is thus derived by expanding equation (4).

$$\frac{P_t}{Q} = \omega - bQ$$

(5)

Q_∞ which is an important variable of peak production is given by the intercept on the x-axis, since it corresponds to the point at which the resource is exhausted and $\frac{P_t}{Q} = 0$.

The year of peak production was then inferred or simulated from the forecast of the cumulative production. All of the proposed data analysis steps were performed in software R version 3.1.1 and the data was obtained from the United States Energy Information Administration.

3 Results and Discussion

The results show two models. The first (see Figures 1 and 2) cover the data from 1992-2015 and the second covers the data from 2010-2015. Figure 1 shows a scatter plot of the ratio of yearly oil production to the cummulative yearly production for the years 1992-2015. The intercept is about 0.28. The intercept on the horizontal axis predicts the total recoverable oil reserves to be about 450 million barrels. It was necessary to predict the year in which total crude oil depletion will occur and the year in which peak production will also occur and what quantity will be produced. The study therefore proceeded to estimate the Hubbert's historical bell-shape curve in Figure 2.

Figure 3 Logistic decline plot (1992-2015)
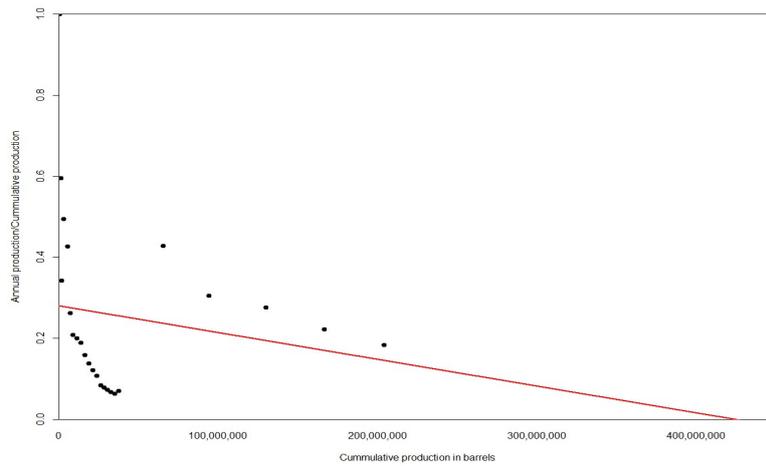
Source: Authors

Figure 2 predicts the pattern of oil production expected over the years and compares that with actual production. It shows that at peak production, Ghana will be producing cummulative total of about 275 million barrels of crude oil and that will occur in the year 2025. The results also show that, total oil will be depleted by the year 2052.

Figure 4 Hubbert curve 1992-2015
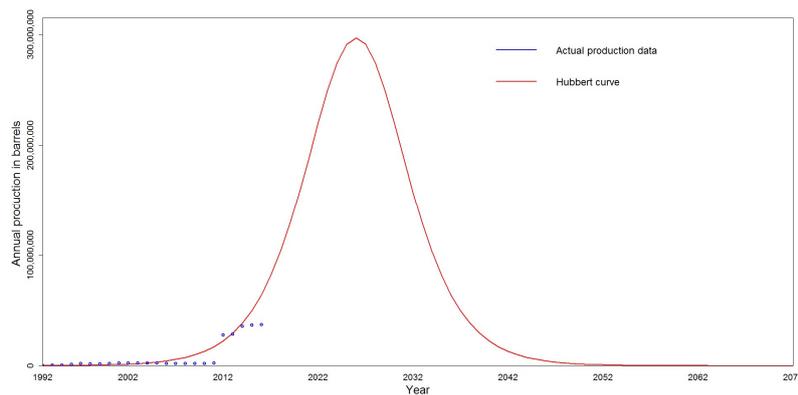
Source: Authors

Figures 3 and 4 show the results of the analysis from 2010-2015. From Figure 1, it is predicted that the total amount of oil reserves of Ghana is about 1.8 billion barrels. This is indicated by the intercept on the horizontal axis.

Figure 5 Logistic decline plot (2010-2015)
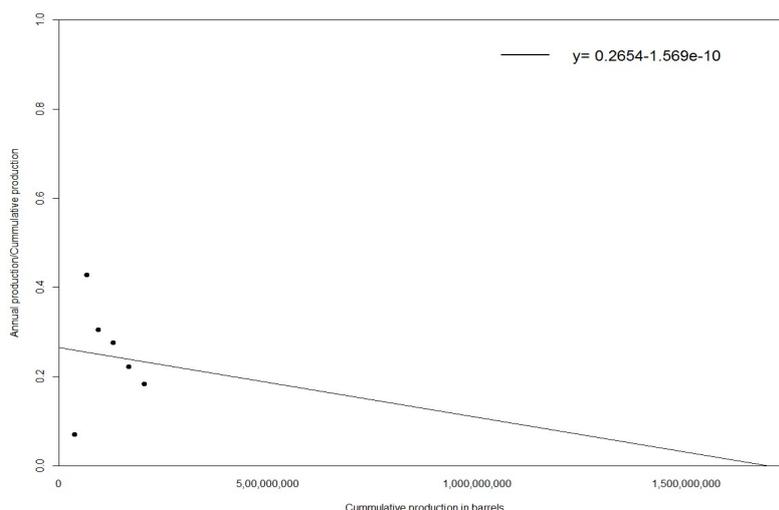
Source: Authors

From Figure 4, it is predicted that peak production will occur in 2025 and a total of about 120 million barrels will be produced at this point. The year of depletion in this scenario is however 2045.

Figure 6 Theoretical Hubbert curve from 2010 - 2015
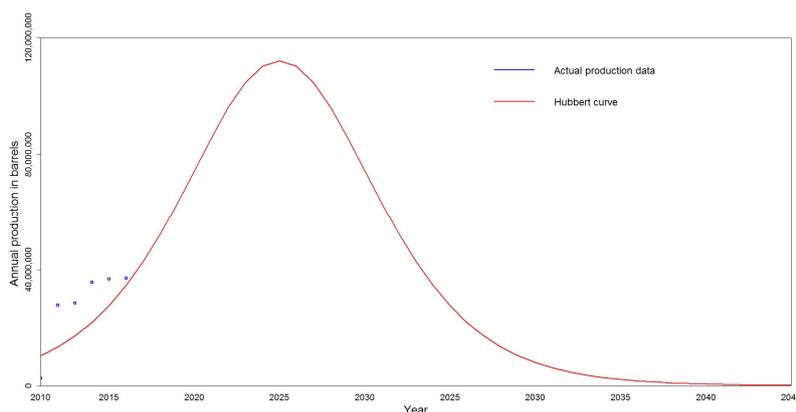
Source: Authors

Table 1 summarizes the results of the two model scenarios. Both models predicted similar period of peak production but the peak cumulative quantity differed. The ultimate recoverable resource also differs. It is smaller in the case of the first model largely due to the low exploratory output added to the analysis. Model two however has a value closer to the estimate by the Ghana National Petroleum Corporation. Oil will be depleted fast in the case of model 2.

Table 6 Summarized model results

	Model 1 (1992-2015)	Model 2 (2010-2015)
Peak year	2025	2025
Peak production	275,000,000	120,000,000
Ultimate recoverable resource	450,000,000	1,800,000,000
Year of depletion	2052	2045

Source: Author generated from models

Given the two models, the results of model 2 are very close to the reality and include only the years when actual oil production began. The estimated total amount of oil is

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about 1.8 billion barrels which coincidentally is the estimate by the Ghana National Petroleum Corporation. Currently Ghana is producing increasingly about 37 million barrels per year and model 2 predicts a total peak production of about 120 million barrels per year in 2025 which is realistic given the current level of production and the rate of growth. It also predicts that by 2045, Ghana's oil reserves will be depleted. This prediction will be affected by new oil field discoveries, new technologies and demand and supply forces.

Hubbert's modeling technique works well when applied to a natural domain, unaffected by political or significant economic interference, to areas having a large number of fields, and to areas of unfettered activity. The disdvantage of Hubbert's Curve is that, it does not consider the price of oil and the law of supply and demand in forecasting the outcome of crude oil production. In the past (energy crisis in 1973 and 1979), imbalances between supply and demand caused variations in the price of oil and temporary short-lived peaks.

Also in real life there is no reason for the decay rate to match the growth rate. It could be faster due to horizontal drilling. It could also be slower because we tax to conserve or invest in new technologies and discoveries.

Comparing the results with that of Hatfield (1997), maximum oil production rate, in turn, is achieved several years after the maximum in proven reserves. He noted in his study that, United States (48 states) oil discovery rate was maximum in 1957 and has since decreased. United States (48 states) proven oil reserve, however, was greatest in 1962 and has diminished since. United States oil production rate reached its peak in 1970 and has since declined. This study predicted the total amount of proven reserves, peak production and the year of peak production as well as the year of total oil depletion.

4 Conclusion

The discovery of oil and gas in Ghana is great news to the economy however the use of the proceeds from this resource will determine whether Ghana joins the list of developing countries benefitting from the resource emensely or those suffering from the resource curse. Rightly, the economy responded strongly to exports from the new sector with a strong and high growth in national output of about 15% in 2011 and currently about 7.1%.

There are fears about the effects of the new oil sector on traditional sectors such as agriculture and manufacturing. These two sectors are often affected by natural resource discoveries in that, resources (capital and labour) relocate to the new and profitable natural resource sector. It also happens that, export products from the new sector cause the real exchange rate of countries to appreciate thus rendering exports from the traditional sectors uncompetitive. Though this has not been clearly observed in the economy, it is a phenomenon that should be given the desired attention so as to keep a balanced growth from all sectors in the economy.

The distribution of the proceeds from the new oil sector will determine whether it will have an impact on poverty, inequality and social inclusion. As much as the resource is being exploited to the benefit of the nation, appropriate plans should be put in place to cater for the future generations in the event that the resource is depleted. The Heritage Fund established to cater for future generations when the resource is depleted should be increased in terms of the percentage of the excess from the annual budget funding amount (ABFA) that is transferred into it.

The study applied Hubbert's linearization which has been used effectively to predict oil trends in several countries. The predictions however will largely depend on the trend in technological advancement, demand and supply forces as well as the discovery of new oil fields. The results represent data used from actual oil production from the Jubilee oil field.

Subsequent studies in this area will focus on a comparison of the impact of global crude oil price volatility on the economy of Ghana. This is relevant given the role that oil as a

commodity plays in the economy. It will be important to observe the responses of economic activities in Ghana to oil price movements before the country began oil production and after the production and export of oil.

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Evaluation Criteria for Public Procurement

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Abstract: *The paper analyzes evaluation criteria in public procurements. It examines a data set of public procurements for construction that were awarded in Czech Republic in 2013. Evaluation criteria for public contracts was applied to a set of 5065 public contracts. Two methods of evaluating bids can be used for the evaluation of public contracts: single-criterion (the lowest bid price) and Multi-criterion (economically advantageous tender). The paper analyzes the use criterion of the lowest tender price and criteria economically advantageous tender with regard to the frequency of their use, their average weight, the price differential (final price of tenders) and the type of procurement procedure used. The predominant evaluation criterion is the lowest price and respective bid price. The criteria of the quality and functionality of public contracts was found to be infrequently used.*

Keywords: public procurement, public contracts for construction, evaluation criteria, the lowest price, the economic advantages of offers

JEL codes: D23, H57

1 Introduction

The public sector faces the problem of how to provide public goods and services. It can secure these by the utilizing the methods of in-house and out-house (Prager, 1994). Each of these methods has its economic advantages and limitations (Nemec, Mikušová Měřičkova and Grega, 2014). If the public sector decides on the provision of public goods and services through public procurement, it must respect a certain legal framework (Jurčík, 2012, 2014). You can choose from a set of options that are set out by the Public Procurement Act. One element of this option is the use of evaluation criteria and the choice of the type of procurement procedures (see Strand, Ramada, Canton et al., 2011).In this paper we focus on the problem of the evaluation criteria in public procurement. The research is focused on public contracts in construction in the Czech Republic in 2013. It is an analysis of the first year of the period after a major amendment to the Public Procurement Act by Act no. 55/2012 Coll. In the paper, we aim to explore what the frequency is of the use of assessment criteria in public contracts by a number of evaluation criteria and the volume of funds, as well as whether the choice of evaluation criteria had an impact on the average price difference of a public contract. We also ask at the same time the question of how the tenders differ according to the type of procurement procedure, as well as what the relationship between the average number of offers and price differentials in relation to the evaluation criteria is. Consideration of those issues has not only theoretical, but also practical importance. It concerns the search for factors that affect the efficiency of public competition as well as possible

savings in public procurements (Půček, Ochrana, 2014). About 500 billion CZK have been allocated via the institute of public contracts, so therefore it is important to look for factors that may increase effectiveness of public procurement, or to reveal the factors that cause waste in public procurement (see Bandiera, Prat, Valletta, 2008). Does the choice of evaluation criteria belong among them?

2 Methodology and Data

The contracting authority may use the lowest bid price for the evaluation of offers, or it can evaluate public contracts on the basis of the criterion of economically advantageous tender (see Law no. 137/2006 on public procurement). In the case of the lowest tender price the bid is evaluated by a single criterion. When applying the economically advantageous tender, a multidimensional assessment of tenders is applied where individual criteria are set by weight. The bid price is (can be) one of the evaluation criteria.

The problem of the role of evaluation criteria does not belong to the predominant research questions public contracts. In theory, we encounter studies that concentrate more on other issues regarding public procurement. Bolton Dewtripont (2005) analyze public awarding in terms of contractual theory. Examining procurement as being a barter between a public authority, (the contracting entity) and the tenderer. This economic view is complemented by a legal analysis of public procurement (Jurčík, 2012). A public tender is a formalized procedure for which the Public Procurement Act has established rules and procedures. These are compared to decisions of individual consumers as being so complex that it can lead to inefficiency and a lack of transparency in public awards as demonstrated, for example, in the empirical study of the OECD (2002). A factor of (in-)efficiency may be the level of competition on the supply side (Kuhlman & Johnson, 1983). This is indicated by the number of offers in the competition. In theory, this problem is referred to by the term "competitive effect" (Domberger & Rimmer, 1994). The effect of competitive and open public competition is dealt with in most studies dealing with public procurement. Among international research we would like to point out, for example, the European Commission study (see Strand, Ramada & Canton, 2011) and the study Iimi (2006). In the Czech Republic, empirical investigations into the effect of competitive and open procurement procedure are dealt with by, for example, Pavel (2010), Nikolovová & al. (2012), Kameník (ed., 2011), Soukopová & Malý (2013), Ochrana and Stehlik (2014).

Other studies have examined the impact of selective factors that influence the outcome of tenders (see eg. Nemec, Mikušová Měřičková and Grega, 2014). These authors conducted a secondary data analysis of eight Central European countries (Slovakia, Poland, the Czech Republic, Austria, Estonia, Latvia and Lithuania) and three Western European countries (Great Britain, France and Germany). They examined, inter alia, the role of the lowest bid price criteria in public awards. They concluded that Central European countries prefer the criterion of the lowest tender price, whereas Western European countries prefer multidimensional assessment of public contracts. In our investigation, we will monitor whether this conclusion is valid for the Czech Republic, even after the amendment to the Public Procurement Act (amended by Act no. 55/2012 Coll.). That conclusion is worth exploring due to the reason that we found out during the implementation of professional training for several hundred contracting authorities (years 2005-2014) that the contracting authorities express the opinion that the use of a single evaluation criterion is more appropriate than the use of multi-criteria evaluation of tenders.

The contracting authorities consider that the single-criteria evaluation of bids leads to a greater price difference between the final price and the estimated price. The contracting authorities argue as follows: based on a rational assumption, the tenderer wants to win the contest. They therefore choose a strategy that is supposed to bring victory in the contest. The source for the creation of such a strategy is the available information about the public contract. With a single-criterion evaluation of bids, the estimated cost of the public contract is one of the key pieces of information. The candidate then tries to

minimize this price. He experiences an increase in hope that he will win the bid. With multi-criteria evaluations, the state authorities create a situation where the bidder no longer intensely feels the pressure of having the lowest bid price. He can indeed calculate other criteria and their weight as well as the implied (expected) relative advantages of his offer over the offers of others.

They often know their potential competitors in a public tender, supply the contracting authorities, and from this the applicant assumes that the bidder should prevail over potential competitors in some of the evaluation criteria. This leads (in the opinion of that group of authorities), to the fact that bidders do not reduce the price as much as when there is a single-criterion evaluation.

It infers that the mentioned group of contracting authorities conclude that the applicant may offer a higher bid price for a multi-criteria evaluation than what they would offer when the single-criterion evaluation is used. This higher price may reportedly compensate other sub-criteria (e.g. quality, technical parameters, etc.). It can also calculate the weights of individual criteria and assess their position when winning the bid. It is true, that the use of a single evaluation criterion leads to a lower final price?

The difference between the final price and the estimated price can be monitored in various ways, for example, as a normalized difference (see Nikolovová et al., 2012), or as FC / EP (final price / estimated price), where the result is a measure of the final price in relation to the estimated cost (%).

The starting point for the empirical analysis was to analyze the public construction contracts that were awarded in 2013. Details on these public contracts were obtained from the website of the Journal of Public Procurement (see www.vestnikverejnychzakazek.cz). A total of 6 273 contracts 2013 were awarded. During data collection and evaluation, however, a relatively high error rate in the database became apparent. Some of the entries lacked some of the following signs of public procurement: contracting authority, contractor (winning bid), type of award procedure, the number of bids, the estimated price of the public contract, the final price of a public contract, evaluation criteria. After adjusting for errors the resulting data set was 5 065 contracts.

3 Results and Discussion

The first analyzed problem was to examine the evaluation criteria. The results of the used evaluation criteria according to the number of evaluation criteria and the financial volume of public contracts is shown in Table 1.

Table 1 Usage of evaluation criteria according to the number (%) and financial volume (%) of public contracts

	The Offer Price	Economically Advantageous tender
Number of Contracts	85	15
Volume of Public Contracts	76	24

Source: Journal of Public Procurement. Own analysis.

As seen by examining the data set, a clear majority of public contracts were evaluated based on one criterion for evaluation, both in terms of Single-criterial ranked procurement, and in terms of financial volume of public contracts. Single-criterial evaluated bids, therefore, dominate. The research of Nikolovová et al. (2012), covering the period 2006-2010, which examines public contracts for supplies, services and constructions, finds approximate equality in the use of single evaluation criteria and multiple criteria. The causes of this difference may be caused by the considerable heterogeneity of the sample, especially when the examination includes all types of public contracts (supplies, services and construction), as well as sub-limit and above the threshold contracts. This may influence the choice of evaluation criteria.

If the contracting authority chooses the criterion of economically advantageous tender, it provides sub-criteria which must be given weight. The findings of this criterion are shown in Table 2.

Table 2 Selection of evaluation criteria (frequency of use and average weight)

Criteria	Frequency of use (%)	Averaged Weight (%)
Offer Price	47.96	80.44
Period of Implementation	34.21	17.15
Length of Guarantee	13.76	14.21
Response Time to Remove Defects	0.98	15.00
Functional Properties	0.98	29.62
Amount of Guarantee	0.75	10.00
Operating Costs	0.61	10.00
Other	0.75	21.20
Total	**100.00**	**47.16**

Source: Journal of public procurement. Own analysis

As is evident from the results of the analysis, when bidding price is used as the evaluation of procurement criteria, it dominates. This finding is not surprising. This corresponds to the fact that public resources are scarce and, therefore, limited. Contracting authorities react to this fact, by using the criterion of bidding price for the tender evaluation, and by clearly giving it the most weight. In second place, in terms of frequency of use, was the time of implementation. This finding can be interpreted to mean that the authorities require that the benefits from realized investments begin to flow as soon as possible. Surprisingly, however, there was a relatively low weight for this criterion. This can be explained by the fact that some contracts regarding the time of implementation of the work were used as two to four criteria and weighted differently (for periods of implementing individual parts of the procurement). In third place was the criterion dealing with the length of warranty which as shown, the dominant criteria that relates to economical and efficient management of resources. On the lower end of the criteria represented were the ones relating to the usability of the public procurement. Here we can see, for example, the criterion of "functional properties". Another surprising finding is that the criterion "quality" was so infrequent that it fell into the "other" category. We believe that this is due to the fact that the contracting authorities are unable to use qualitative criteria when evaluating bids, which include the criterion of "quality". The findings from the training of contracting authorities show that evaluators can not use the procedures to transform qualitative criteria into something that is assessable. Therefore, their use is avoided. This can be explained in that public procurement is dominated by the criteria that are more related to the cost of the public contract. Those criteria, which reflect the effectiveness of public procurement, are seldom used. The question arises whether contracting always act in the spirit of the idea of "rational savings" or whether it is not a "pseudo-savings" (Půček, Ochrana, 2014). This question, however, is not the subject of our investigation.

Another issue that our analysis focused on was to answer the question of what is the average number of tenders using single-criterion and multi-criteria evaluation of tenders and what is the price difference (ie. the price ratio between the final price and the estimated price). The analysis results are shown in Table 3.

Table 3 Average number of bids and the ratio between the final price
and the estimated price

Criteria	Average number of bids	Average price difference
Economically advantageous tender	6.03	0.7928
Lowest Bidding Price	6.60	0.7656
Total	**6.51**	**0.7697**

Source: Journal of public procurement. Own analysis.

As is evident in the case of multi-criteria evaluations of public procurement where price is only one of the evaluation criteria, the average number of tenders is approximately 0.5 offers smaller than in the case single-criterion assessment, while the ratio between the final price and the estimated price indicates that the final price reaches approximately 79% of the level anticipated price, thus saving amounts of about one-fifth of the estimated price. In the case of a single evaluation criterion greater savings are achieved. The final price amounts to approximately 76% of the expected price level. The achieved savings amounts to about one quarter of the estimated price. So it seems that with the lowering of price as the only evaluation criterion, this reduces the number of offers. The causes may be different. On the supply side, it can affect the behaviour of candidates due to the multidimensional assessment because the offer must incur greater transaction costs for the tender preparation as well as having to look for other winning strategies, because it is not so easy to get a contract with a straight (single) strategy such as focusing on the lowest bidding prices. The number of bidders may also influence the kind of competition where non-transparent kinds contracting management may discourage some potential bidders from participating in public tenders. The lower number of competitors leads to lower savings in the final price.

This fact was also noted by Pavel (2008) who examined the influence of the number of suppliers on the price of construction contracts in the field of transport infrastructure (2004-2007). He believes that it is appropriate for construction work to prefer the selection criterion of the lowest tender price. We believe that the problem is more complicated. The criterion of the lowest tender price can be used in buildings that are not structurally challenging. It is inappropriate to use them where they are relevant to the assessment of technical specifications, terms, and guarantees. On the contrary, experience shows that when choosing construction contracts based on the lowest bid price in the evaluation,that according to this criterion there has been a failure to meet the principles of economy as well as the incurring of consequent additional costs. But the fact is that in the multi-criteria evaluation, the bidder with the lowest price may not obtain the public contract. Another offer that is superior in the other criteria could win, due to their ability to meet the specified criteria. Obviously, the problem of choice of evaluation criteria may have different effects on the ultimate effect of public procurement.

In the following table, we attempt to answer the question: what is the representation of different types of tender procedures in connection with the use of evaluation criteria. The research results are shown in Table 4.

The table shows that the criterion of the lowest price tender dominates all kinds of procurement procedures (except negotiated with a call for tenders), while most public contracts are awarded in an open procedure.

Table 4 Type of award procedure and evaluation criteria used
(volume of public procurement)

Type of award procedure	Economically advantageous tender (%)	Lowest bidding price (%)
Open	45.64	56.92
Limited	45.98	24.25
Negotiated without publication	3.07	13.39
Negotiated with a call for tenders	4.22	3.91
Award the contract without prior publication	0.06	1.41
Accelerated restricted	0.03	0.10
Accelerated negotiation	0.00	0.02
Others	0.75	21.20
Total	**100.00**	**100,00**

Source: Journal of public procurement. Own analysis.

Interesting results were seen compared to the kind of procurement procedure and evaluation criteria based on the number of contracts (Table 5).

Table 5 Type of award procedure and evaluation criteria used (number of contracts)

Type of award procedure	Economically advantageous tender (%)	Lowest bidding price (%)
Open	65.83	67.13
Negotiated without publication	13.64	18.43
Negotiated with a call for tenders	10.33	9.02
Restricted	8.74	3.49
Award the contract without prior publication	1.19	1.56
Accelerated Restricted	0.26	0.26
Accelerated Negotiation	0.00	0.12
Total	**100.00**	**100.00**

Source: Source: Journal of public procurement. Own analysis.

Comparing the results in Table 4 and Table 5 shows significant differences. If we examine the representation of individual types of procurement procedures and criteria used by the volume of funds allocated in the individual types of procedures, we see significant differences in the use of the lowest bid price and economically advantageous tender for individual types of procurement procedure. One possible explanation is that the volume of allocated funds is related to the complexity of the public contract. It would therefore be interesting in further research to explore what influences the contracting authority when choosing evaluation criteria and the choice of procurement procedures.

If we follow the given problem from the perspective of public contracts (table 5), the differences are minor. So it seems that the decision of candidates to compete is more related to the type of procurement procedure. The entry of candidates into the public tender (identified by the number of offers) does not significantly affect whether the contracting authority provides as the evaluation criterion the lowest bid price or the economically advantageous tender.

4 Conclusions

An analysis of public contracts for construction awarded in 2013 shows that the predominant evaluation criterion is the lowest bid price. Also, the lowest bid price carries the most weight when utilized in the multi-criteria evaluation. Among the sub-criteria (in terms of frequency of use) then criteria that relate to the principles of prudent and effective resource management are the most predominant. Criteria that express purpose and use of a public contract (criterion of "functional characteristics" and the criterion of "quality") are completely on the sidelines. The causes of this condition should be explored in further research. This may be due to the fact that authorities purposely avoid these criteria (especially the criterion of "quality") because, for example, they do not control the methods of how such criteria are to be evaluated. Not utilizing the criteria (quality, performance, satisfaction) can lead to the fact that the selection of a public contract will be of lesser quality and functionality from the selected tender. A singular focus on the cost criteria (and the underestimation of the criteria of quality and functionality) can lead to pseudo-savings in public procurement. This will make the bidder offer the lowest price (or offer the best service completed by cost considerations), but these are often in a form of exploitation and lead to dysfunction within the system. It would therefore be useful to examine the price differential (the difference between the respective estimated price and the final price) in the context of usability and functionality of public contracts. This economic theory is left out. Another perspective branch examination is post-contract conduct which plays a crucial role here in information asymmetry, assets of specificity and moral hazard, e.g. a situation where the contract is implemented by the private sector, but the ultimate responsibility is borne by the public sector. The public sector has therefore a weaker bargaining position, which can lead to having to sign another contract, amendments, or more competitive work. Ultimately, any savings may be purely virtual. The fact that we achieved savings in public procurement (lower final cost, compared with an expected value) does not necessarily mean that it certainly is an economically rational outcome. The path to finding answers may lead to interdisciplinary (psycho-socio-economic) research that reveals the motives, for instance, for the choice of evaluation criteria in public tenders.

Acknowledgments

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Identification of the Consumer of Insurance Services: Evidence from the Slovak Republic

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Abstract: *Insurance industry is a dynamic part of the economy that must constantly reflect the change in needs of potential clients. Therefore, knowledge who is the potential client is essential requirement of the success of any insurance company which is trying to bring the tailor-made insurance offer. Similarly, because of the predominance of the supply-side in the insurance market, the proposed offer of the insurance should meet the expectations of consumers themselves and their current needs. The main aim of the paper is to identify the typical consumer of life and non-life insurance in Slovakia through personal, demographic and financial characteristics of individuals. We use the method of classification trees, which allows us to identify the key characteristics of insurance consumers. We point to the fact that there are differences in the characteristics that indicate interest of individuals in insurance protection. Sample used in analysis consist of nearly 900 respondents of the questionnaire survey. Our results can be used by insurers not only to select the appropriate strategy for segmentation of customers, but also to the effective utilization of resources for distribution channels and marketing.*

Keywords: consumer, consumption, classification tree, life insurance, non-life insurance

JEL codes: G22, D12

1 Introduction

Insurance industry is a dynamic part of the economy that must constantly reflect the change in needs of potential clients. Therefore, knowledge who is the potential client is essential requirement of the success of any insurance company which is trying to bring the tailor-made insurance offer. The insurance market is characterized by the predominance of the supply-side, and thus the proposed offer of the insurance coverage should meet the expectations of consumers themselves and their current needs.

The identification of potential consumer is closely associated with the insurance demand. Research has empirically examined insurance demand for over 50 years (Liebenberg et al., 2012). Based on earlier findings, Hau (2000) notes conflicting evidence for various determinants of insurance demand (e.g. age, marital status, number of dependents, education, and income). Similarly, Zietz (2003) brings overview of previously published researches that show conflicting results for certain variables that are expected to be determinants of the demand for the insurance (e.g., education, saving motive, head of household). We must also note that the majority of studies are focused on the life insurance. The reason consists in the different character as well as in the motive for buying insurance contract.

The large disparity across countries in the characteristics of potential consumers of the insurance services raises questions about what causes this variation and thus what determines the insurance consumption. The main aim of the paper is to identify the typical consumer of life and non-life insurance in Slovakia through personal, demographic and financial characteristics of individuals. The uniqueness of the research is supported by the concentration on all consumers irrespective of the particular insurance company in which they bought insurance coverage.

The paper is organized as follows. Section 2 presents methodology and data, which we used for the analysis. The results of the research and discussion are given in the section 3. The paper finishes with some concluding remarks and suggestions for the future research that are outlined in section 4.

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2 Methodology and Data

Our data come from the survey that was distributed in electronic and paper form. Target group consist of the population of the Slovak Republic from 18 to 62 years. The survey involved 1044 respondents of which we randomly selected 870 respondents who represent the Slovak population distribution by age and gender according to the Statistical Office of the Slovak Republic. Overall frequencies of respondents by age and gender are summarized in following Table 1 and Table 2.

Table 1 Gender Structure

		Frequency	Percent	Valid Percent	Cumulative Percent
	Man	438	50,3	50,3	50,3
Valid	Woman	432	49,7	49,7	100,0
	Total	870	100,0	100,0	

Source: Authors' own calculations from survey

Table 2 Age Structure

		Frequency	Percent	Valid Percent	Cumulative Percent
	18 - 24	131	15,1	15,1	15,1
Valid	25 - 39	331	38,0	38,0	53,1
	40 - 61	408	46,9	46,9	100,0
	Total	870	100,0	100,0	

Source: Authors' own calculations from survey

For the identification of potential consumers in life and non-life insurance in the Slovak Republic we use classification tree method (sometimes referred to as Decision Trees). Classification tree is predictive model which maps observations about an item to conclusions about the item's target value (Rokach and Maimon, 2008). This method represents an alternative to the discriminatory and regression analysis. The purpose of this method is to create a tree structure through various algorithms, whereas the output is a graphical representation of schemes which elements are nodes and branches. The nodes are organized into different levels, when the single top level is called the root (in our case the ownership of the particular insurance policy). The nodes are then divided into two types. Non-leaf nodes are those that refer to the lower levels and leaf (leaves) nodes, which represent the lowest level. Root node is the dependent variable. Independent variables that have the greatest impact on modeling the dependent variable are selected for further fragmentation. For that purposes is used as default the maximum likelihood method with a significance level of 0.05 (Řezánková, 2010). In next steps other explanatory variables are sequentially selected and the completion of breakdown ends with a certain criteria. These criteria can be a number of objects, respectively the variability in the node. The data are analyzed by using statistical software SAS Enterprise Miner.

The classification tree is useful as an exploratory technique. However as the limitation it does not attempt to replace existing traditional statistical methods and there are many other techniques that can be used classify and predict the membership of instances to a predefined set of classes, such as artificial neural networks or support vector machines (Rokach and Maimon, 2008).

3 Results and Discussion

Lewis's theoretical model (see Lewis (1989) for more details) suggests, that a number of variables may explain international differences in insurance demand and characteristics of the insurance consumer. In general we can divide determinants of the demand for the

insurance into several groups according to their character as a personal, demographic, and economic, respectively financial, political, institutional, and also cultural (Beck and Webb (2003); Browne and Kim (1993); Li et al. (2007)). From our perspective, when we focus on the individual consumer, we considered the most important above all: personal, demographic, as well as economic and financial determinants. From various determinants of the insurance demand, we selected for the purpose of this paper following ones: age (AGE), social or employment status (SOC_S), education (EDU), income (INC), saving (SAV) and head of household (HEAD).

Demand for insurance is positively correlated with income in most of previous studies (e.g. Fortune (1973), Campbell (1980)). As income increases, insurance becomes more affordable. In addition, the need for life insurance increases with income as it protects dependents against the loss of expected future income due to premature death of the wage earner or head of household (Browne and Kim, 1993). Higher income gives an opportunity to save money for individuals. Saving habits also determine an insurance purchase positively (Ferber and Lee, 1980). Miller (1985) reports that retirees have less insurance coverage than active workers of the same age. Lower interest of the insurance coverage is also present in case of students, unemployed people or women during maternity leave. From the perspective of employment status and life cycle, one of the major motives behind the insurance purchase is explained by the uncertainty of future human capital and the possibility of the wage earners non-survival. This means that differences in expected retirement ages should result in different demands on insurance, assuming similar income levels (Lee et al., 2010). Education lengthens the period of dependency but also higher level of education may lead to a greater degree of risk aversion and more awareness of the necessity of insurance in general (Browne and Kim, 1993).

Overview of the determinants of the insurance demand helps us in the identification of the consumer. Classification tree showing the characteristics of the individual with an interest in the life insurance is displayed in Figure 1. If we want to characterize a particular individual who purchased life insurance policy in the Slovak Republic we should pay attention to following criteria: his/her savings, age, social status and education. Typical consumer of the life insurance in the Slovak Republic according to our survey is employed or self-employed individual, aged between 40 and 61 years, who save up and has university education. The probability that individual with all mentioned characteristics would own life insurance policy is more than 90%. The root of our classification tree in Figure 1 represents ownership of life insurance policy when 681 individuals out of total amount of 870 respondents own life insurance. For the splitting of nodes to the final leafs, we use the method of maximum likelihood with a significance level of 0.05. The highest impact on the respondent's interest in life insurance coverage has savings. Approximately three quarters (75.6%) of respondents who own some form of the life insurance are making life savings. Their responsibility is not shown only by the making savings but also by buying life insurance policy to secure spouse and children. Up to 82.2% of the respondents which are making savings and are aged between 40 to 61 years have life insurance contract. Analogously, we can continue even in the specification of additional characteristics through other explanatory factors - social status and education, which are used to further splitting.

Do the characteristics of the typical consumer of non-life insurance policy vary from life insurance? Our findings shown in the following Figure 2, that consumer characterized by his/her interest in the non-life insurance contract has different characters, as in the case of life insurance. A crucial impact on the interest in non-life insurance policy has following determinants: age, savings, income and whether an individual is head of the family.

Figure 1 Classification tree – Life insurance
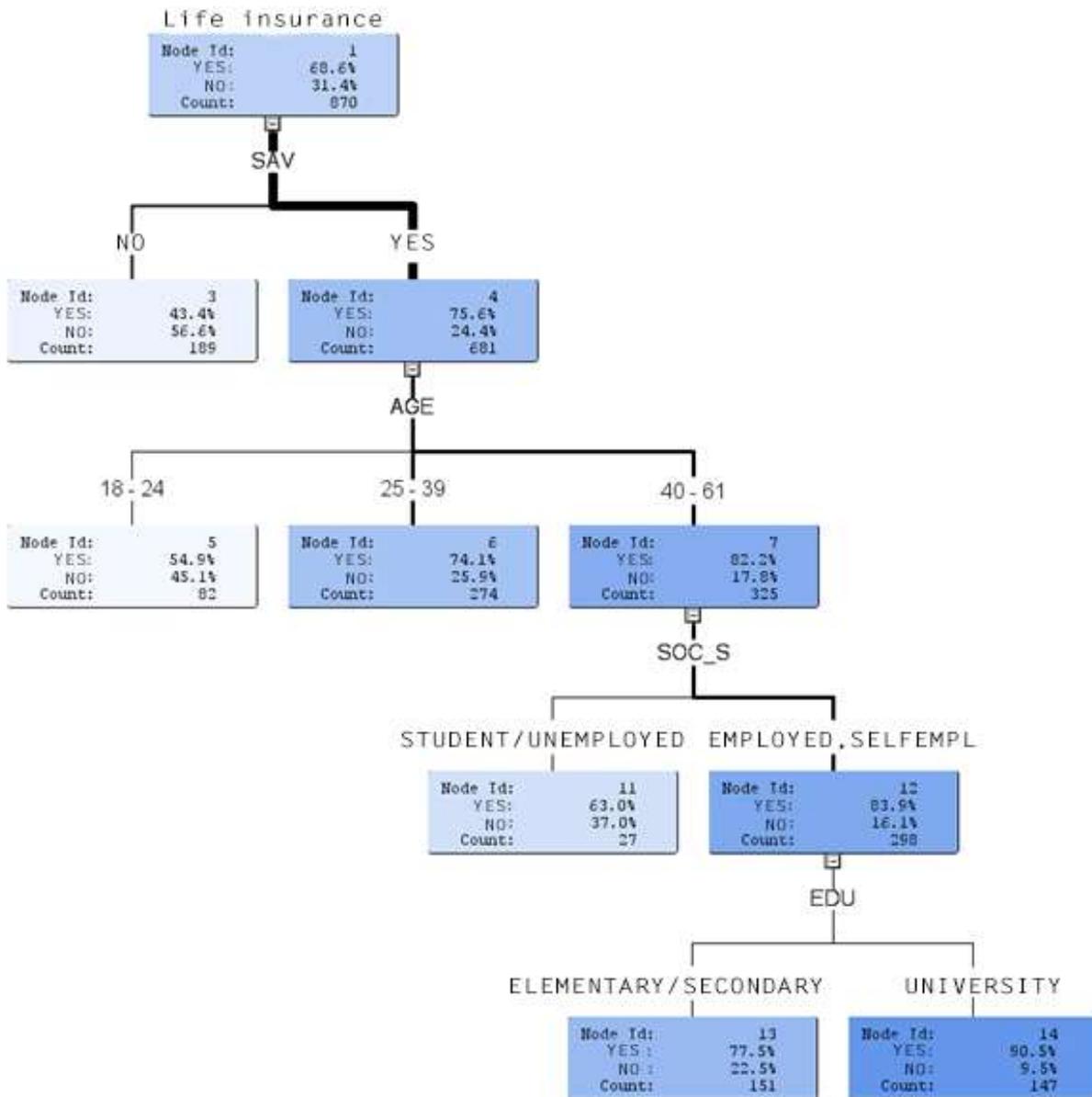
Source: Authors

A typical consumer of non-life insurance products is an individual who is aged between 40 to 61 years, who is making savings, with the gross income over € 880 and is the head of the family as can be seen in the Figure 2. Moreover, we can see from Figure 2 that not only the need for coverage but also interest in the non-life insurance is changing during various stages of life. The highest impact on individuals' interest in non-life insurance contract has age, when 72.1% of respondents owning life insurance fall into age category 40-61. This is probably connected with the accumulation of assets, which is typical for this phase of human life. Afterwards, splitting of the nodes takes place on the basis of savings, when 79.1% of individuals who own life insurance belong to the mentioned age interval together with their saving up. Next splitting node is associated with the income, when the crucial income is above € 881. The last leaf, which represents 113 respondents, is associated with the status of the individual as a head of household (family). Around 92% of respondents who are aged between 40 to 61 years, who are making savings, with the gross income over € 880 and are the head of the family own some type of non-life insurance policy.

Figure 2 Classification tree – Non-life insurance
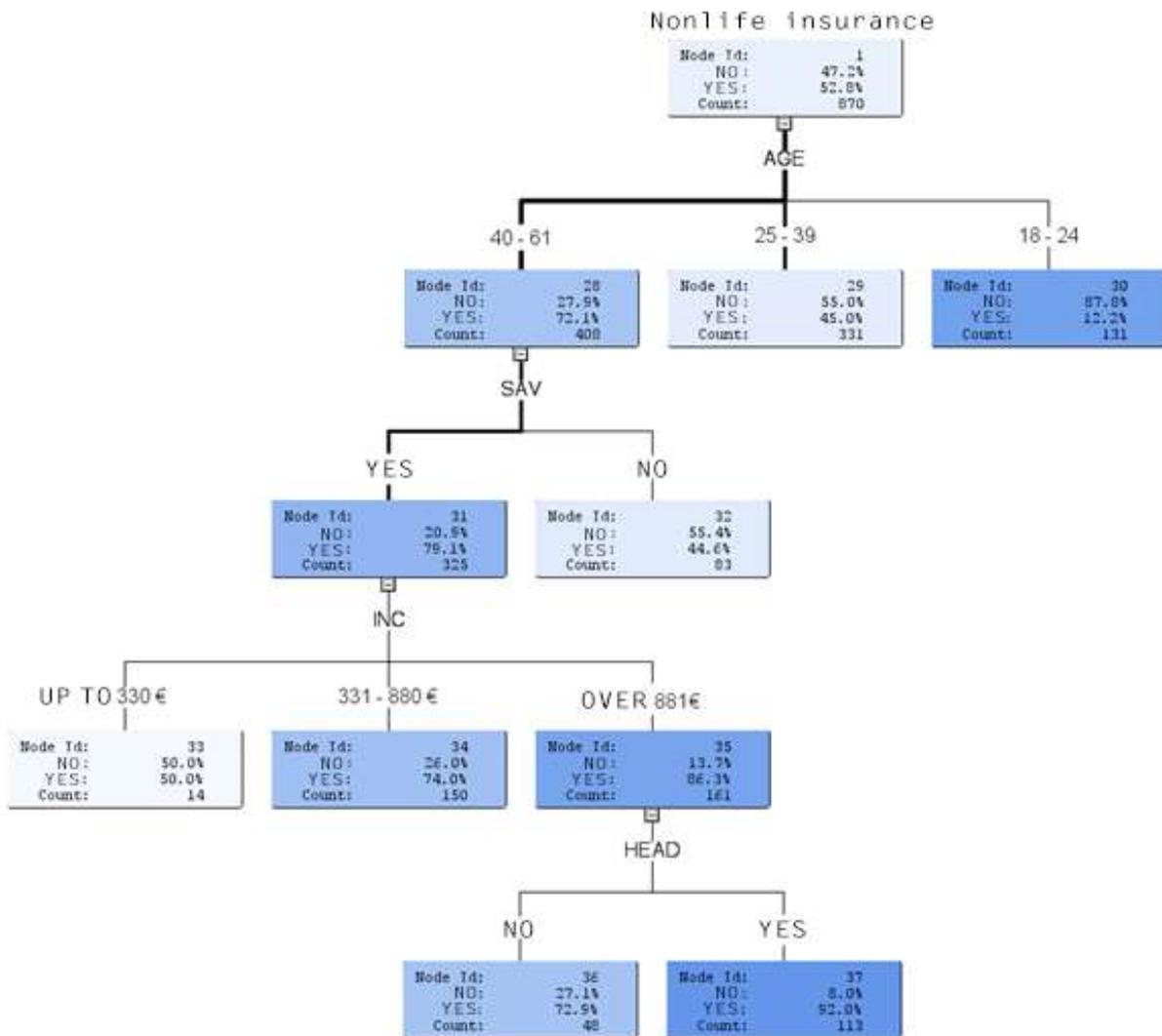
Source: Authors

Specification of typical consumers either of life or non-life insurance can help insurers in better identification of potential clients who have the highest assumptions of their interest in insurance. We focused through the classification trees not only to individual factors, but we took into account several characteristics of the consumer at the same time. The target segment of potential consumers can be narrowed through the selected criteria, what can contribute to a higher efficiency of the resources spent on a marketing campaign of commercial insurance companies. Our results can be used by insurance companies not only to select the appropriate strategy for segmentation of customers, but also to the effective utilization of resources for distribution channels and marketing. This knowledge may help in customer satisfaction because satisfied customer is a major importance for current and future financial performance of insurance companies (Korauš et al., 2015). Results also indicate that there are different factors that insurers should take into account for the market segmentation in case of life and non-life insurance products. Insurance company by knowing these characteristics can separate promising segments, which represent a potential for growth out of non-perspective segments.

4 Conclusions

Based on the classification tree method we identified the typical consumer of life and non-life insurance in Slovakia through personal, demographic and financial characteristics

of individuals. Sample used in analysis consist of 870 respondents of the questionnaire survey and classification tree method allowed us to identify the key characteristics of insurance consumers. We would like to point to the fact that there are differences in the characteristics that indicate interest of individuals in life or non-life insurance protection. Typical consumer of the life insurance in the Slovak Republic according to our survey is employed or self-employed individual, aged between 40 and 61 years, who save up and has university education. On the other hand, typical consumer of non-life insurance products is an individual who is aged between 40 to 61 years, who is making savings, with the gross income over € 880 and is the head of the family.

Our results can be used by insurance companies not only to select the appropriate strategy for segmentation of customers, but also to the effective utilization of resources for distribution channels and marketing.

The limitation of the research can be represented by the overall view of life and non-life insurance. A suggestion for future research may be detailed examination of different types of life and non-life insurance.

Acknowledgments

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Lebanese Loop and Protection Techniques against this Type of Fraud

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Abstract: *Lebanese loop is one of the most frequent types of frauds relating to cash withdrawals from ATMs when an ATM is modified by a defrauder by installing special additional equipment to gain user's payment card and then payment card user's trust and ignorance are exploited by the defrauder to gain the PIN code. If the defrauder has user's payment card and knows the right PIN code, he/she can withdraw cash, pay for goods and services at shops and e-shops etc. Though currently frauds using the principle of Lebanese loop do not belong to common types of frauds in the Czech Republic, this risk should not be underestimated. Recommendations to reduce Lebanese loop risk are variable. The aim of this paper is to describe Lebanese loop frauds, identify the usual way for realizing this type of fraud and its warning signs, create a scheme of the usual way for Lebanese loop fraud, introduce and interpret results of own quantitative research focused on knowledge of Lebanese loop and define the basic recommendations for payment card users and banks to reduce security risks connected with using of payment cards at ATMs.*

Keywords: e-banking, security, risk, fraud, Lebanese loop

JEL codes: G020, G210, G290

1 Introduction

One of the most frequent types of frauds relating to cash withdrawals from ATMs is so-called "Lebanese loop". Lebanese loop fraud can be defined generally as a criminal mechanism when an ATM (Automated Teller Machine) is modified by a defrauder by installing of a special additional equipment to gain user's (victim's) payment card and then payment card user's trust and ignorance are exploited by the defrauder to gain sensitive information - the PIN code. If the defrauder has user's payment card and knows the right PIN code, he/she can withdraw cash, pay for goods and services at shops and e-shops etc. Though currently according to Salmon (2012) and Klufa, Scholz and Kozlová (2012) frauds using the principle of Lebanese loop do not belong to common types of frauds in the Czech Republic, the Lebanese loop risk should not be underestimated. In the Czech Republic most ATMs do not allow installation of additional equipment on input slot for payment cards, but the situation is not the same all over the world. And then we should mention, that according to Prague police press agent Miklíková (MF DNES, 2015) Lebanese loops occur in cycles – if information of Lebanese loops appears, defrauders retire for a time.

The aim of this paper is to describe Lebanese loop frauds, identify the usual way for realizing this type of fraud and its warning signs, create a scheme of the usual way for Lebanese loop fraud, introduce and interpret results of own quantitative research focused on knowledge of Lebanese loop and define the basic recommendations for payment card users and banks to reduce security risks connected with using of payment cards at ATMs.

2 Methodology and Data

Data for own quantitative research (focused on knowledge of Lebanese loop fraud) were collected electronically in 2012. The target group were people studying at Faculty of Economics and Administration of Masaryk University, number of respondents was 910. It is important to note on the definition of target group, that formulated conclusions can

be generalized to the population of people studying at economic colleges in the Czech Republic, for them the research sample is representative. A part of the realized and here presented research was focused on frauds in the e-banking and e-shopping field. Respondents should mark type (or types) of fraud in the e-banking and e-shopping field, which principle they know. Collected data are evaluated by methods of descriptive statistics (especially by the statistic number of respondents who know the principle of Lebanese loop fraud/number of respondents).

Normative and positivist methodologies have been employed to reach the aim. The positivist methodology is used in parts, when researched issues are described only, not evaluated. The normative methodology is used, when it is not possible or desirable to avoid evaluating researched facts. The normative methodology is used to define the basic recommendations for payment card users and banks to reduce security risks connected with using of payment cards at ATMs too. The paper's aim is reached by using of general science methods, primarily description, analysis, synthesis and deduction.

3 Results and Discussion

As it was recognized, generally Lebanese loop fraud can be defined as a criminal mechanism when an ATM is modificated by a defrauder by installing of a special additional equipment to gain user's (victim's) payment card and then payment card user's trust and ignorance are exploited by the defrauder to gain sensitive information - the PIN code. If the defrauder has user's payment card and knows the right PIN code, he/she can withdraw cash, pay for goods and services at shops and e-shops etc.

The usual way for realizing of Lebanese loop frauds is following: In the beginning a defrauder accesses to an ATM and modificates the ATM by installing a special additional equipment on input slot for payment cards to gain user's (victim's) payment card. The installed special additional equipment causes, that it is possible to insert payment card into the ATM, but it is not possible to take the payment card back out of the ATM. In reality the ATM does not accept the inserted payment card, but the payment card gets tangled up in the installed special additional equipment. In this case the problem is, that the user (victim) can not take his/her payment card out of the ATM. So if a payment card user (a potential victim) inserts his/her payment card into the ATM, the ATM does not accept this payment card due to the installed special equipment, but taking the payment card out of the ATM is not possible, because the payment card is taken by the installed special equipment. Ussualy the defrauder (or his/her colleague) is moving nearby the ATM and if the payment card gets tangled up in the ATM, he/she accesses to the user – his/her potential victim with help offer. Although the defrauder can abuse the victim's payment card without knowledge of the PIN code, it is easier with the knowledge of the PIN code. Therefore the defrauder (or his/her colleague) passes off as a random passer-by or payment card user who wants to use services of this ATM etc. and accesses to his/her potential victim and offers him/her help with the tangled up payment card. He/she requests the victim to enter his/her PIN code in his/her presence, becaue it can help. In this situation entering of the PIN code can not help to take the payment card out. It serves only to gain the PIN code by the defrauder. If the victim finds out, that entering of the PIN code does not help and the payment card is still in the ATM, he/she leaves the ATM. In this moment he/she makes another mistake, because if he/she leaves the ATM, the defrauder can finish the operation. He/she accesses to the ATM and takes the victim's payment card out of the installed special equipment. Then abuse of the gained payment card is already too easy. Now it is enough to insert the payment card into the ATM and enter the right PIN code to withdraw cash etc.

As we can see in the Figure 1, the special additional equipment can be very simple.

According to Juřík (2003, p. 226) the defrauder can gain the PIN code without his/her presence by the ATM and without personal contact with the payment card user – potential victim (the defrauder can use field glasses to gain the PIN code etc.). Juřík (2003, p. 226) mentions too, that installation of an additional equipment does not have to cause non-acceptance of the payment card, but the whole transaction can pass off

without problem to the moment, when the ATM should return the payment card to the user.

Figure 1 Lebanese loop fraud – special additional equipment - example

Source: Krhovják, J., Kumpošt, M., Matyáš, V. (2012). Attacks on payment systems (in Czech). *Newsletter ÚVT MU*. Retrieved from: http://www.ics.muni.cz/bulletin/articles/562.html.

In the end it can be mentioned, that according to Hlaváček (2015) Lebanese loop frauds are considered to be predecessor of skimming frauds when the original data are copied from the magnetic strip on the payment card (more information about skimming are published for example in Oškrdalová (2012)).

3.1 Scheme of Lebanese Loop Fraud

As we have noted there is an usual way for realizing of Lebanese loop frauds. This way is represented in the following figure "Lebanese loop fraud".

3.2 Knowledge of Lebanese Loop

In the previous text we could see, the role of payment card user is important to reduce the Lebanese loop risk. His/her knowledge, skills, behaviour etc. can contribute significantly to reduce the risk.

In the following section the results of own quantitative research are presented, focused on knowledge of Lebanese loop fraud. The mentioned research was realized during writing my dissertation, data were collected electronically in 2012. The target group were people studying at Faculty of Economics and Administration of Masaryk University, number of respondents was 910. The structure of the sample is represented in Graph 1 (by sex, age and education). It is important to note on the definition of target group, that formulated conclusions can be generalized to the population of people studying at economic colleges in the Czech Republic, for them the research sample is representative. More information about this research is in Oškrdalová (2013).

A part of the research was focused on frauds in the e-banking and e-shopping field. Respondents should mark type (or types) of fraud in the e-banking and e-shopping field, which principle they know. As we can see in Graph 2, only 7 % respondents know the principle of Lebanese loop fraud. It is very small number of respondents. In this context, it should be noted, that the role of payment card user is important (or his/her behaviour and knowledge are important), because the user can contribute to reduce the Lebanese loop risk. The basic recommendations for payment card users to reduce the Lebanese loop risk are introduced in the part 3.3 Recommendations to reduce the Lebanese loop risk.

Figure 2 Lebanese loop fraud

Modification of ATM by a defrauder

↓

The defrauder is moving nearby the ATM

↓

A payment card user - potential victim is approaching to the modificated ATM

↓

The potential victim inserts his/her payment card into the ATM

↓

The payment card gets tangled up in the ATM

↓

The defrauder accesses to the payment card user – potential victim with a help offer

↓

The payment card user – potential victim enters his/her PIN code on the defrauder's request and in his/her presence

↓

The payment card is not taken out of the ATM despite the defrauder's „help"

↓

The victim leaves the ATM

↓

The defrauder approaches to the ATM

↓

The defrauder takes the payment card out of the ATM

↓

The defrauder inserts the payment card into the ATM, enters user's PIN code and withdraws cash

Source: Author

Figure 1 Structure of the sample

Basis: All respondents, n = 910

Sex
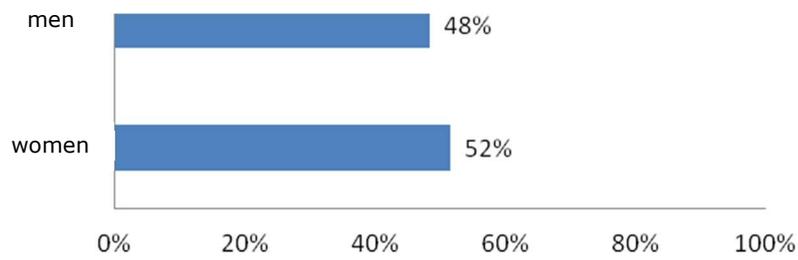
Age

Education

Source: Author

447
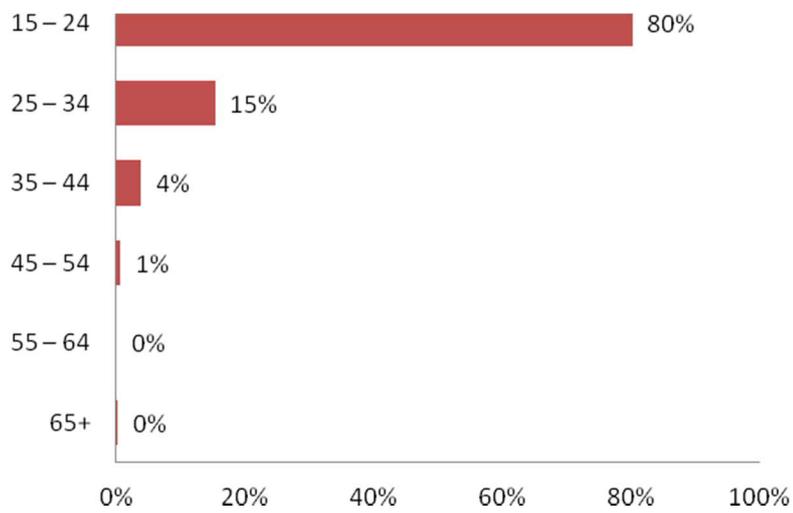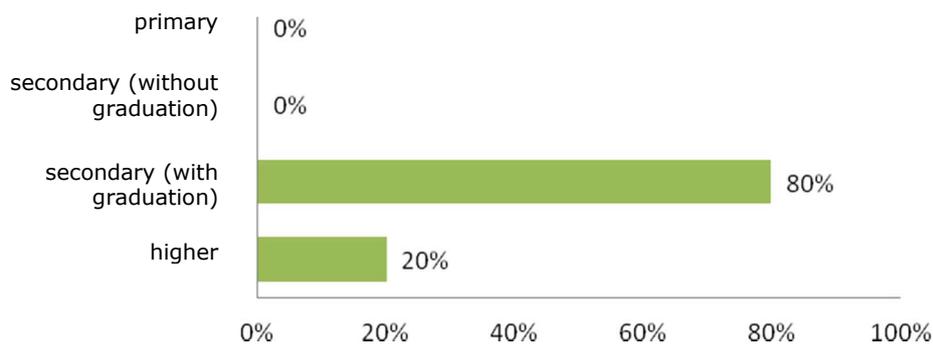
Figure 2 Knowledge of Lebanese loop fraud

Basis: All respondents, n = 910

yes
7%

no
93%
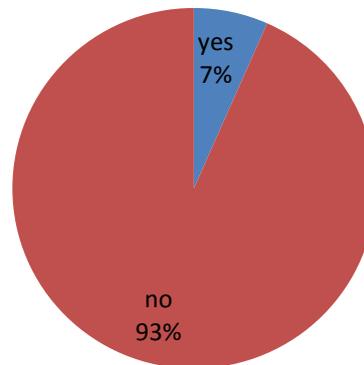
Source: Author

3.3 Recommendations to Reduce the Lebanese Loop Risk

Recommendations to reduce Lebanese loop risk are variable. There are recommendations for banks and payment card users. With regard to banks as first we should mention a technical solution of ATMs, especially inputs slots for payment cards, that prevents frauds from installing a special additional equipment (nowadays this protection of ATMs against installation additional equipments is possible in most cases and for example according to Klufa, Scholz and Kozlová (2012) installation of additional protective adapters on ATMs is effective protection). Besides technical solutions of ATMs we can mention monitoring of ATMs. To reduce the risk banks can inform payment card users about security risks and rules for correct and safe using of payment cards and remind it repeatedly. These rules and bank phone contact (for example to block the payment card) should be mentioned on ATMs or nearby ATMs.

As we have noted there are recommendations for payment card users too. To reduce Lebanese loop risk it contributes when payment card user knows and observes basic security rules for correct and safe using of payment cards. For example, we can mention "do not share the PIN code with anyone", "do not write the PIN code on the payment card", "do not keep the PIN code near the payment card", "choose and use a safe, strong PIN code", "check an ATM and their surroundings" (is this equipment modified or not?, was an additional equipment installed? (but it is true that nowadays Lebanese loop frauds, especially special additional equipments installed on ATMs, can be on very high quality level which increases the success probability of this attack), is using of payment cards observed by somebody?). When using a payment card, a payment card user should not be disturbed, should be concentrated and should not allow anybody to distract his attention. When using ATMs, a payment card user should observe instructions on ATM screen. If payment card user has a suspicion, he/she should interrupt the transaction and contact the bank or police. Interruption of the transaction is right in cases when the personal safety zone is disrupted. When entering a PIN code, a payment card user should blot out the keypad by the opposite hand to prevent a fraud from obtaining his/her PIN code. If a payment card gets tangled up in the ATM, its user should contact police and the bank to block the payment card (before leaving the ATM).

In connection with these security recommendations we should remind common e-banking services security recommendations as "use day, week or month limits for e-banking
(in this case especially payment card) transaction", "check carefully your bank account

and payment card statements, when you get them", "if you find a discrepancy in your bank account and payment card statements (for example a transaction you have not made by your payment card), you should contact your bank, payment card issuer and complain about this transaction" too.

4 Conclusions

Lebanese loop is one of the most frequent types of frauds relating to cash withdrawals from ATMs. This fraud can be defined generally as a criminal mechanism when an ATM is modified by a defrauder by installing of a special additional equipment to gain user's payment card and then payment card user's trust and ignorance are exploited by the defrauder to gain the PIN code. If the defrauder has user's payment card and knows the right PIN code, he/she can withdraw cash, pay for goods and services at shops and e-shops etc. Though currently frauds using the principle of Lebanese loop do not belong to common types of frauds in the Czech Republic, this risk should not be underestimated. In the Czech Republic most ATMs do not allow installation of additional equipment on input slot for payment cards, but the situation is not the same all over the world.

Recommendations to reduce Lebanese loop risk are variable. There are recommendations for banks and payment card users. With regard to banks as first we should mention a technical solution of ATMs, especially inputs slots for payment cards, that prevents frauds from installing a special additional equipment. Besides technical solutions of ATMs we can mention monitoring of ATMs, informing payment card users about security risks and rules for correct and safe using of payment cards and remind it repeatedly. These rules and bank phone contact should be mentioned on ATMs or nearby ATMs.

As we could see, the role of payment card user is important to reduce the Lebanese loop risk too. His/her knowledge, skills, behaviour etc. can contribute significantly to reduce the risk. To reduce this risk it contributes especially when payment card user knows and observes basic security rules for correct and safe using of payment cards as common e-banking services security recommendations too.

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The Interest Rates of the Central Bank and the Banking Sector

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Abstract: The text contains the issue of the custody of the interest rates of the central bank and interest rates in the banking sector of the Czech republic. The text includes the characteristics of the instruments of monetary policy of the central bank, their current options for the use and the reasons for the currently limited the effectiveness of the interest rates of the central bank on the banking sector. In the text is used for the model identification of the nature of the dependence of the time series of interest rates of the central bank and the commercial banks in the last ten years. The conclusion includes a summary of the knowledge gained custody of the interest rates of the central bank and rates of the commercial banks and the causes of the influences acting on these links.

Keywords: central bank, commercial bank, interest rate, affectiveness of instrument, rate time series

JEL code: G28

1 Introduction

The Central Bank's monetary policy is implemented by the monetary policy instruments, in particular at the discount instruments and operations on the open market. Current development on the financial market in the past five years have affected the crisis phenomenons and the policy of monetary easing. The banking sector has a long-term surplus liquidity especially in small open economies, including the Czech Republic.

The influence of achieving virtually zero level of interest rates set by the Central Bank, changes the use of monetary policy instruments in order to achieve monetary policy objectives.

What is the current level of interest rates to influence the Central Bank on the interbank interest rates used in the banking sector?

The aim of the text is the analysis of the effectiveness of the Central Bank's main interest rate on interbank reference interest rates of commercial banks in the standard mode of the financial market.

The text also analyzes the behavior of the commercial banks in setting interest rates, non-banking institutions in the course of the crisis, and the relationship to the interest rate of the Central Bank.

For the drawing up of the text were used methods, description, comparison, analysis and prediction.

2 The Functioning of the Central Bank's Main Interest Rate

The level of the main interest rate is under the control of the Central Bank, its change is substantial monetary decisions to achieve the monetary policy objective.

The Central Bank has to maintain the level of rates, the repo in the longer term with a view to maintaining an optimal level of supply and demand of reserve funds. The Central Bank takes into account the current state of the surplus and lack of liquidity in the banking sector. Restricts the possibility of larger fluctuations in interest rates as an interim response to abrupt changes in supply and demand of funds.

When the value of the main interest rate is no longer in accordance with the established goal, considering inflation, the Central Bank of its change. Change in interest rates is the

internal decision of the Central Bank, affects the macroeconomic constraints of credit expansion or support economic growth. In the prediction of the level of interest rates is also skilled in the use of uncertainty analyses economic trends.

3 Analysis of the Influence of the Central Bank's Interest Rate on Interbank Lending Rates

Time series of interest rates of the Central Bank and the interest rates of commercial banks we understand as realization of stochastic processes. Dependency ratios of these series, it is possible to express the correlation analysis. We assume that the intervention in the development of one series are reflected in the development of the next series.

The development of the values of the interest rate for the period (2004-2014) reaches a maximum around the year 2008. In the next period of the CNB's interest rates and the interest rates PRIBOR are sharply declining trend. In contrast, the interest rates of commercial banks to lower low rate. Time series of interest rates used to determine the extent of correlation appears to be transient, thus changing the probability of impacts over time.

Correlation Analysis

The degree of correlation between time series indicates the correlation coefficient. The correlation coefficient value of 0,9-1 expresses the strong positive correlation dependence between the variables. The value of the correlation coefficient below 0.5 express weak to negligible correlation.

Table 1 Correlation coefficients in the interest of time series

	01/2004-12/2007	01/2008-08/2014
	Correlation coefficient	
PRIBOR 1D - REPO	0,9826	0,9976
PRIBOR 1M - REPO	0,9916	0,9916
PRIBOR 1Y - REPO	0,9386	0,9756

Source: Author on the basis of the interest of time series CNB (years 2004-2014)

The correlation coefficients are positive for positive correlation relationship.The interest rate PRIBOR and the interest rate Repo demonstrates a strong correlation in the period 2004-2014.

Table 2 Correlation coefficients in the interest of time series

	01/2004-12/2007	01/2008-08/2014
	Correlation coefficient	
PRIBOR 1D - client credits	0,1882	0,7188
PRIBOR 1W - client credits	0,1532	0,729
PRIBOR 2W - client credits	0,1484	0,7329
PRIBOR 1M - client credits	0,1309	0,7437
PRIBOR 3M - client credits	0,1308	0,7581
PRIBOR 6M - client credits	0,1174	0,7749
PRIBOR 1Y - client credits	0,1111	0,7937

Source: Author on the basis of the interest of time series CNB (years 2004-2014)

Low degree of correlation relationship watch between the rate PRIBIOR and client credits of commercial banks. In the period before the financial crisis, interest rates were weakly correlated. The situation changed in the strong correlation in the period of decline and slow recovery of the economy.

On the basis of the correlation coefficients, there is the impression that the central bank has a greater impact on the banking sector during the financial crisis. This finding, however, refutes the fact of the sharp fall in interest rates in the crisis period and related to the general reduction in the volatility of interest rates.

The Behavior of the Commercial Banks in Times of Crisis

The level of interest rates of commercial banks in relation to non-bank entities subject to the difference in the behavior of the commercial banks in times of economic stability or in times of financial crisis.

The level of interest rates of commercial banks in their business activities influences the level of interest rates of the central bank and the prices of financial resources in the financial market, the risk of banking operations, the period of the maturity of the instruments of commercial banks, the volumes of the bank's business, competition in the banking and non-banking sector.

Interest rates of commercial banks further affects the macroeconomic situation, its cycles and unexpected disturbances. The structure of the interest rates then includes additional margin associated with fluctuations in prices and the availability of cash resources to complement and ensure bank liquidity.

The structure of the interest rates of the commercial bank:

Net interest margin
Liquidity premium (in crisis)
Risk margin
Basic interest rate

Source: Author

The change of the structure of interest rates the commercial banks in times of stability, economic environment, and at the time of the crisis period expresses the changes of the business environment for commercial banks. Arises the possible contradiction between the reduction of interest rates by the central bank to support the growth of the economy and the trend of raising interest rates by commercial banks in the crisis period.

4 Conclusions

In the period after 2008 has undergone the monetary policy of the Czech national bank of a difficult period. The central bank of the Czech republic was one of the first in the world, which launched the easing of monetary policy. The reduction of interest rates, the strengthening of the liquidity of commercial banks through reverse repo operations, however, did not prevent the open Czech economy, its collapse.

The correlation coefficients reveal that the central bank has a greater impact on the banking sector in the obdoboí of the financial crisis. This fact is affected by the sharp decline in interest rates in the crisis period and related to the general reduction in the volatility of interest rates and non-stationary characteristics of the interest of time series.

The level of interest rates of commercial banks affects the level of interest rates of the central bank and the prices of financial resources in the financial market, the risk of banking operations, the period of the maturity of the instruments of commercial banks, the volumes of the bank's business, competition in the banking and non-banking sector.

Reduction of interest rates by the central bank aimed at supporting the economic growth and the tendency of increasing the interest rates of the commercial banks in times of crisis, operates in the contrary and limiting the influence of the action of the interest rates of the central bank in the banking sector.

The continuing economic downturn and the reduction in the interest rates of the central bank on the level of technical scratch necessitated discussed and the business entities and the public criticised the use of additional instruments of monetary policy.

From 2013, is as the main tool used rate of the domestic currency. The depreciation of the currency exchange rate interventions with a view to the avoidance of the feared deflationary tendencies. The impact of this tool cannot be at the same time clearly

evaluated, the evaluation of its real impact is the issue of the future also in connection with the entry of our country into the euro area.

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Credit Risk Assessment

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Abstract: *Credit risk is the main risk in the banking business. It can significantly influence the bank's profitability and is closely related to the bank's liquidity and interest rate risk. For these reasons, the bank's credit risk management is priority concern not only of the banks themselves but also of the banking supervision. Therefore banks are trying to reduce this risk by precise assessment of client´s creditworthiness. The aim of this article is credit risk evaluation in the corporate segment in assessing credit transactions by the bank and suggestion of other possibilities for measuring credit risk. We went through studies focused on bankruptcy of corporate entities which were done in different countries and selected six of them where linear regression was used. We have chosen these studies because their objective is similar or the same as our planned research. We found that logistic regression improved assessment done by discriminant analysis in all cases and also confirmed well known relations - higher profitability, higher liquidity and higher volume of assets means lower risk of default, while higher indebtedness, higher leverage means higher risk of default.*

Keywords: credit risk, risk assessment, corporate entities, linear regression, probability of default

JEL codes: G21, G11

1 Introduction

Banking transactions are connected with various risks. Their correct identification, measurement and management belong to one of the basic conditions for the effective operations of the bank.

The most important risk in the banking business is the credit risk. It can significantly influence the bank's profitability through provisioning and reducing interest income. It is also related to the liquidity of the bank. Outstanding loans, even if well secured, are the illiquid assets for the bank. Very important is the relationship between credit risk and interest rate risk. If clients are no longer repay loans, interest rates will increase and the bank's net interest income will be reduced, despite the classic method of credit risk measuring not alerted to this danger. Because of these reasons, the bank's credit risk management is a priority concern not only of the banks themselves but also of the banking supervision.

The aim of this article is credit risk evaluation in the corporate segment in assessing credit transactions by the bank and suggestion of other possibilities for measuring credit risk.

The first part is focused generally on banking risk we introduce different types of banking risks there. In the second part we describe the current assessment of the bank's credit risk when assessing creditworthiness of corporate clients. Other possibilities of credit risk measurement focused on linear regression method are proposed in the third part. We went through studies focused on bankruptcy of corporate entities which were done in different countries and selected six of them which used linear regression and were similar to our planned research. Selected studies are from Finland (1999), France (2009), Malaysia (2015), Serbia (2013), United Kingdom (2014) and Czech Republic (2008).

2 Banking Risks

Main objective of the bank is to harmonize the bank targets, which are solvency, liquidity and profitability. Solvency is the ability of banks to pay on time its own obligations also in cases where the economy of the Bank has been lost. Liquidity means the ability of banks to pay on demand deposits of creditors. Banking profitability means such management where revenues exceed expenses and the bank achieves a profit. These goals are in conflict however. The bank will be perfectly liquid when keeping all assets in the form of cash in hand. But the bank will not generate any profit in this case. If the bank provides risky loans, it will increase profit, but the potential danger of insolvency grows currently (Polidar, 1999).

Activities of financial institutions like any other activities are connected with risks. But it is a risk somewhat different from other business entities. Correct identification, measurement and management of risk are one of the basic conditions of effective activities of the bank. The risk sorting is not stabilized and the literature proposes different approaches to risk sorting. However most of authors describe five categories of banking risks. The credit risk, market risk, liquidity risk, operational risk and other risks belong among the most important types of banking risks.

Credit risk is the risk that a client does not fulfil agreed terms of financial transaction and bank is creating a financial loss. The credit risk arises from insolvency or unwillingness of borrowers to repay their obligations to the bank, which come from payable loans, including interest, but also from securities that the bank have in its portfolio, from provided guarantees, from foreign exchange transactions, from transactions on the money market, etc.

The bank's profitability, liquidity and interest rate risk are closely linked to the credit risk. Impact of credit risk on earnings is reflected in the creation of provisions and reserves and in interest income decrease. The connection of credit risk and liquidity consists of illiquid assets. Well secured outstanding loans can still represent value for the bank, but that value is nearly impossible to use to repay debts. There is also very important connection between credit risk and interest rate risk. If the interest rates increase, clients may stop to repay loans and net interest income can decrease, despite the classic method of credit risk measuring not alerted to this danger. (Ziegler et al., 1997)

Market risk is the second most important financial risk. This is the risk of loss from changes in market prices as changes in the value of financial and commodity instruments due to unfavorable changes in market conditions, i.e. unfavorable changes in interest rates (interest rate risk), share prices (stock risk), commodity prices (commodity risk) and exchange rates (currency risk). Some authors appropriate interest rate risk, currency risk and stock risk from the market risk and state them separately. (Pavelka et al., 2001)

Liquidity risk means that the bank will be unable to meet its due obligations, notably to pay the customer deposits in required form. Liquidity is closely related to the bank profit, while there is an exclusionary relationship between liquidity and profitability of the bank. The most liquid assets bring the lowest profit. Liquidity risk is also closely connected with other banking risks – credit risk, capital risk and interest rate risk.

Operational risk can be understood as transactional risk. It is the risk of losses from operations carried out as a result of employee error, as an operational risk management, which is the risk of loss from errors in the management of activities in the front, middle and back office system or as a software risk which is the risk of loss from errors in support softwares.

Other risks include the legal risk (the risk from violation of partner´s legal requirements or from non-possibility to stand up for contracts), reputation risk (the risk from reputation decrease on markets), regulatory risk (the risk of non-possibility to fulfil regulatory arrangements), etc. (Jílek, 2000)

Only several authors mention the capital adequacy risk. According our opinion it is also very important risk. It is the risk of insufficient amount of equity to cover losses. The

same importance for the bank has the absolute amount of equity and the determination of capital adequacy in relation to risks. The amount of capital adequacy determines the international document for regulatory measurement of financial risks BASLE I and the Appendixes to this document, known as the BASLE II, BASLE 2,5 and BASLE III.

3 The Current Method of Credit Risk Evaluation

The bank must be protected from the adverse consequences arising from credit risk. In order to credit risk be as low as possible, the bank performs detailed evaluation of the client and limiting credit before granting any loan product. The bank regularly assesses the creditworthiness of the client and monitors the borrower during all the time of the loan transactions. Based on the evaluation results, the bank decides whether and under what conditions provides loan.

Mostly used method to assess the client is discriminant analysis done by Beaver in 1967. It uses financial indicators of corporate clients to predict the probability of default. Other credit risk model to predict default is Z-score model done by Altman in 1968 and afterwards enhanced by Altman, Haldeman and Narayanan in 1977. (Nikolic et al, 2013)

Client assessment includes an analysis of the legal situation of the loan´s applicant. The bank verifies that the client - the borrower - meets the legal requirements to enter into economic commitments. Furthermore, an analysis of the personal credibility of the applicant as a reliable business partner banks is made. A key part of the client creditworthiness verification is the client economic situation analysis. The analysis includes two related parts - the business and financial situation of the client. Bank lending decisions first and foremost take into account his status as a manufacturer and trader. It analyzes the dynamic of firm´s growth, position of a firm on the market in terms of its reputation, quality of products, whether it has diversified or highly specialized manufacturing program, its share on the market, the level of traded prices and costs in comparison with other competitors, etc.

The bank also assesses the branch position of the client and risks associated with the business. The current and future development in the relevant business is assessed, e.g. its increase, stability or decrease, a particular approach to the business of government (support or the effort to reduction).

After evaluating a client from a business point of view, more in-depth financial analysis of the basic financial statements - balance sheet, profit and loss and cash flow is assessed. Financial analysis measures received data among themselves and enhance their predictive ability against the basic financial statements, which provide current data, mostly in the form of state absolute quantities placed on a specific date, respectively flow values for a certain period.

Subsequently, the bank proceeds to the analysis of financial ratios. Indicators of profitability, activity, indebtedness and liquidity are monitored. Regarding the size of the calculated values, it is not possible to establish some firm recommended or even optimal values that have universal validity. Ratios do not constitute absolute precision scales for reporting characteristics of the enterprise, but they have largely probabilistic nature.

4 Other Possibilities for Credit Risk Analyzing

As it was already stated, the bank makes effort to minimize the credit risk by a number of arrangements. However the credit risk is measured by means of development in the past. The bank creates reserves and provisions on the basis of actual behavior of borrowers. The bank considers loans those who stopped repaying as loans with certainty outstanding (creates adjustments and reserves in full amount) and vice versa credits those still repaying regularly considers as loans that will be repaid in the future.

But the reality is different. The bank responds only to the current situation, instead of trying to capture future developments. Much safer is to estimate the fair value of the portfolio of assets based on the expected rate of default. The process is usually managed

that the loan portfolio is divided into several categories according to risk and the probability of default over a certain period is calculated for each category.

Other possibilities for analyzing and measuring the creditworthiness of corporate clients could be models built on conditional probability – logistic regression. It is about models of binary choice. These models are created from historical data. There are chosen variables which have the most information ability from original amount of variables. Prof. James A. Ohlson applied logit analysis on non-financial companies as the first in 1980. Even the first reported logistic regression prediction results had less predictive power than the ones reported in discriminant analysis studies, later on linear regression have shown that it has a powerful statistical approach for credit risk assessment. The above mentioned methods were criticized by Shumway (2001) or Hillegeist at al. (2004) and also Ohlson states in the conclusion of his research that account variables are not able to improve the model more and it is necessary to extend variables using market variables.

That is why new, innovative methods have appeared in last years, such as neutral networks. This method classifies corporate entities to simulate processes which are going on in human brain. Authors who applied neutral networks in their researches are for example Anadarajan et al. (2001), Angelini et al. (2007), Lin (2008), Bekhet et al. (2014), Chen et al. (2011).

Another method which is able to predict default is decision trees. Decision trees represent set of questions, which are arranged hierarchically and the answers lead to final decision. Decision trees were used in researches done by Messier and Hansen (1988), McKee (1995), McKee and Greenstein (2000), Muller, Steyn-Bruwer, Hamman (2009).

Hazard models have appeared because of imperfection of other methods, which mentioned Shumway (2001) in his research. Hazard models are based on dynamic logistic regression. There are taken into account all years of corporate entities life in the process of default prediction. Hazard model uses time as dependent variable.

Last innovative models are option models which are based on stock exchange options. The model can be simply define as own capital perceiving Europe call option in amount of total assets. If the amount of total assets decreases under amount of realization expressed by amount of liabilities, call option stays unutilized. When the option reach maturity day there are two situations. Assets are higher than liabilities – option will be used. The second situation is that assets are lower than liabilities – option stays unutilized – what is the signal of default. (Jackson, Wood, 2013) However these models are not usable in Czech Republic because of weekly developed capital market.

Even with the existence of more sophisticated classification models for credit risk assessment the popularity and usage of logistic regression is growing due to its practicality and theoretical soundness. Aziz and Dar made comparison of these models in their study in 2006 with the aim to find the best one. The best results reached models of discriminant analysis and logit models according their study.

We went through studies focused on bankruptcy of corporate entities which were done in different countries and selected six of them where linear regression was used. We have chosen these studies because their objective is similar or the same as our planned research. Selected studies are from Finland (1999), France (2009), Malaysia (2015), Serbia (2013), United Kingdom (2014) and Czech Republic (2008).

Laitinen from Finland realized his study in 1999 and included 3200 companies from Finland with 5 years financial data. The model contents of 15 financial and non-financial variables which were classified as the background variables, payment history variables, responsible person variables, industry variables, financial variables about the company and about the group of companies. The results showed that financial ratios do not play as important role in credit rating as the background variables that describe payment history and the properties of the responsible persons. The shareholder´s equity to total assets ratio seems to be the most important ratio.

Another study was done in France in 2009 by Psillaki et al. They included data of 4751 French companies operating between 2000 and 2004 in the textiles industry, wood and paper industries and computer activities and R&D industries. The model contents financial and non-financial indicators such as profitability, liquidity, leverage, turnover, collateral and growth opportunities. They compared results from the chosen industries and they found that non-financial performance indicators are useful ex-ante determinants of default. They showed that managerial inefficiencies are an important ex-ante indicator of the company´s financial risk. Their results confirmed known relations – more efficient companies are less likely to default, profitability is important ex-ante indicator, more profitable companies are less likely to default, companies with more liquid assets have less chance to fail. The effects of leverage and growths opportunities varied across industries while collateral, the capital-turnover ratio and company´s size generally had a negative relation with the probability of default.

The study realized in Malaysia in 2015 by Manab et al focused on non-financial indicator – earnings management. 30 companies – 15 healthy, 15 financially distressed were included with data 2006 - 2012. They constructed two models including four financial ratios – liquidity, profitability, productivity and leverage. First model was unadjusted and content above mentioned financial ratios, second one was adjusted so that the earnings management was subtracted from numerator and from denominator of particular book entries from which the ratios are calculated. For the unadjusted model, liquidity ratio and profitability ratio were significant while for the adjusted model, liquidity and productivity ratio were significant. Both models had similar accuracy rate in predicting distressed company, under Type I error. For Type II error the unadjusted model performed better than adjusted model. Including of earnings management indicator failed to increase the accuracy rate of predicting financial distress companies.

The authors from Serbia proposed in 2013 corporate entity credit scoring model capable of predicting probability of default in 1 year period. Dataset in this study consisted of 5 years financial statements dating from 2006 to 2011. The study took into account 7590 corporate entities. The list of 350 financial ratios has been constructed based on corporate financial statements and default event data. The study used brute force linear regression to come up with the most predictive credit scoring model. The weight of evidence data transformation technique has been applied in order to divide financial ratios into corresponding attributes and to eliminate problems connected to special values in financial ratios. Finally they proposed the credit scoring model that consist of 8 adjusted variables - debt ratio, leverage ratio, liquidity ratio, activity ratio, debt repaying capability (consist of two ratios), cash generating ratio and net sales growth ratio. They found that the most predictive variable is debt repaying capability which achieved information value of 0.923.

A study of around 340 000 international and 340 000 domestic SME companies was done in United Kingdom in 2014 by Gupta et al with the aim to compare the risk of international and domestic SMEs. Finally they used 9 financial and non-financial indicators such as retained earnings/total assets, cash/total assets, EBITDA/interest expenses, capital employed/total liabilities, log of current ratio, trade debtors/total assets, tax/total assets, trade creditors/total liabilities, intangible assets/total assets. They compared domestic and international SMEs separately but with the same ratios. They found that all the factors which affect the default probability of international SMEs are also highly significant in explaining the default probability of domestic SMEs. Furthermore, all the variables capturing the impact of exports on default probability of international firms are highly insignificant in the univariate analysis, thus contradicting the suggestion of Arslan and Karan (2009) to consider domestic and international firms separately while modelling their credit behavior. The results confirm that the ratio intangible assets/total assets is highly significant in assessing credit risk for both domestic and international SMEs. They also found that non-financial factors may play an important role in understanding credit behavior.

There was also study in Czech Republic in 2008 done by Jakubík and Teplý. The have tried to create aggregated model of creditworthiness for whole business sector in Czech Republic. They used 757 companies from which 151 were in bankrupt. They identified 22 variables from which 7 most predictable variables were selected based on logistic regression. The variables were liabilities/own capital, long-term payables/own capital, EBT/interest paid, EBIT/sales, (inventories/sales)*365, working capital/total assets, EAT/own capital. The model was statistically significant, Gini´s coefficient was 80,41%. According their study the JT index was created. The probability of whole business sector default was from 2,6% to 2,9%.

Based on this analysis new, additional criteria for measuring credit risk of variously defined client groups could be established and it could be another supportive criterion for the bank in evaluating the creditworthiness of clients. Moreover the above mentioned studies confirmed that logistic regression improved assessment done by discriminant analysis in all cases and also confirmed well known relations - higher profitability, higher liquidity and higher volume of assets means lower risk of default, while higher indebtedness, higher leverage means higher risk of default.

5 Conclusion

Bank risk management issue is the bank´s main interest. The bank's financial result depends besides on how the bank is able to predict various phenomena affecting its revenues and from these predictions to draw consequences for strategic and tactical planning. The most important risk in the banking business is the credit risk.

Currently, the bank assesses the credit risk connected with the provision of loan product to corporate clients by analyzing the economic situation of the client. It uses financial analysis indicators that have evolved within corporate finance. But the credit risk is measured by means of development in the past. Bank responds only to the situation, instead of trying to capture future developments. Much safer is to estimate the fair value of the portfolio of assets based on the expected rate of default. Other possibilities to measure credit risk of corporate clients could be models built on conditional probability – logistic regression and new, innovative methods such as neutral networks, decision trees, hazard models and option models. Even with the existence of more sophisticated classification models for credit risk assessment the popularity and usage of logistic regression is growing due to its practicality and theoretical soundness.

According a study of Aziz and Dar who made comparison of these models in 2006, the best results reached models of discriminant analysis and logit models. We went through several studies in different countries which used linear regression and selected six of them which are similar to our planned research. Selected studies are from Finland (1999), France (2009), Malaysia (2015), Serbia (2013), United Kingdom (2014) and Czech Republic (2008). These studies confirmed that logistic regression improved assessment done by discriminant analysis in all cases and also confirmed well known relations - higher profitability, higher liquidity and higher volume of assets means lower risk of default, while higher indebtedness, higher leverage means higher risk of default.

The bank could then take advantage of additional criteria for measuring credit risk of variously defined groups of clients as an additional supportive criterion for evaluating credit risk and minimize the risk of default.

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The Costs of Deflation: Are they Really so High?

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Abstract: *The recent financial crisis raised several challenges for central banks. Monetary policy that was fundamentally based on interest rate regulation was neutralized by a liquidity trap. Central banks started to look for and use unconventional instruments: quantitative easing (QE), negative interest rates, currency floor. The reason for such radical steps was fear of deflation: most economists consider deflation (a fall in the price level) as a very costly development of economies. It seems politicians and central bankers are even more afraid of deflation. The Swiss National Bank (SNB) is one of the first central banks that started to use unconventional monetary policy measures. The Czech National Bank (CNB) does not hide it is inspired by SNB in its fight against deflation. Are unconventional steps a good way how to avoid deflation and are they necessary? In this context we focus only on a fragment of this very broad area: deflation and growth. Several recent studies confirm that the link between output growth and deflation is relatively weak. We try to find how strong the association between goods and services price deflations and growth is in Switzerland where a recent period of deflation starts in the end of 2011. We are not able to discuss data from the Czech Republic – there was no deflation in postwar period. The issue we address through the means of time series modelling.*

Keywords: ARMA, cyclicity, deflation, growth

JEL codes: E31, E58

1 Introduction

Deflation is usually defined as a sustained decline in the aggregate price level (not to be confused with a slowdown in the rate of growth of prices). All deflations are not alike and therefore may require different approaches, different monetary policy answers or different evaluations. What are the consequences of deflation and which are the most damaging interactions? How vigorously should central banks fight deflation scares?

Historically, deflations were more common and they were viewed in a more positive light. Bordo and Filardo (2005, p. 4 and table 1, p. 28) discuss alternating waves of inflation and deflation in 36 countries in 1801-2002. They show that during the past 50 years deflation has been relatively rare, for instance in 1970-1989 it was recorded only in 6 countries (Germany, Netherlands, India, Singapore, Thailand and Taiwan-China) and in 1990-2002 in 8 countries (Japan, Sweden, New Zealand, China, Hong Kong SAR, Singapore, Thailand, Taiwan-China, Argentina) while in 1950-1969 it was recorded in 26 countries and in earlier periods it was even more frequent.

In economic textbooks we can find several arguments against deflation: costs of deflation arise first of all from the opportunity cost of holding money balances (in an economy with fully flexible wages and prices). Another cost of deflation is related to redistributive losses and threat to the financial stability. One of the most visible, strong and very often used argument against deflation is that falling prices are associated with recessions. As an example the Great Depression or Japan experience are usually mentioned. The Czech National Bank (CNB) and its representatives argue in the same way and emphasize, according to them, an extremely negative experience with deflation in 30-ies of last

century and negative experience of Japan with deflation in last two decades. (http://www.cnb.cz/cs/faq/duvody_a_prinosy_oslabeni_koruny.html). Nevertheless we can find studies arguing that the Great Depression is one of few exceptions when falling prices were associated with recessions and that the Japan deflation does not have only negative consequences. Bordo and Filardo confirm that looking at the long history "… deflation need not be associated with recessions, depressions, crises and other unpleasant conditions" (2005, p. 26). Many deflation episodes were associated with productivity-driven economic growth (Bordo and Filardo, 2005, p. 1). We focus on deflation and growth in empirical section of our paper.

Falling prices do not always or even often lead to declines in output as the association between goods and services price deflations and growth is generally weak. Atkeson and Kehoe (2004) found the only link between deflation and depression during the 1930s. They argue that in the rest of the data for 17 countries and more than 100 years, there is virtually no evidence of such a link. As an example disagreements about Japan "lost decade" can also serve. Japanese economy has suffered a prolonged recession and deflation that dates back to 1998. The general decline in price levels cannot be explained by competitive pressure from abroad, or excess capacity and deregulation in certain industries. Prolonged, unanticipated deflation appeared to reflect relative weaknesses in the economy and the problems in the banking sector finally spoiling the monetary transmission mechanism. Despite this fact Japan economy is constantly very competitive and growing economy. Mankiw and Taylor conclude that the result of deflation "… is that there is little growth, …" (Mankiw and Taylor, 2011, p. 660).

In April 2013, a huge program of quantitative and qualitative monetary easing (QQE) has also been deployed to end the period of deflation in Japan. Raising inflation expectations was both an objective of QQE and, at the same time, the key to implementing the QQE to overcome deflation (Kuroda, 2015, p. 3). The central bank has long resisted to combat price deflation by buying unconventional assets. But government packages were in reality aimed to help troubled big commercial banks, owners of too much stock – a legacy from times when business relationships were sealed by taking stakes in partners. Already in September 2002 the Bank of Japan started to think about buying stocks directly from the nation's troubled banks. At that time a drop in stock prices directly threatened bank capital and the whole financial system stability.

Discussions about impacts of deflation on Japanese economy are quite contradictory. Many studies argue that "the generalized decline in the price level, however gradual or mild, has created distortions in many parts of the economy and substantially exacerbated the adjustment process under already difficult economic conditions (Baig, 2003, p. 20). As to Kuroda (2015, p. 5) "the greatest lesson from Japan's experience is that the best is not to fall into deflation in the first place, since … deflation becomes protracted". On the other side, in 2009, the Bank of Japan conducted a public survey on deflation. Instead of considering deflation to be a disaster, 44 per cent of those surveyed deemed it "favourable"; 35 per cent felt neutral about the phenomenon; and just 20,7 per cent described it as "unfavourable" (Financial Times, March 27, 2015).

Deflation is also thought to complicate the conduct of monetary policy: first of all central banks are not able to pursue countercyclical monetary policy because of a liquidity trap. Interest rates are very low so there is very little incentive for institutions to lend money and for households to save money. Expecting further deflation why spend or invest today when prices should be cheaper tomorrow? Central banks have difficulties in generating positive inflation expectations when prices are falling on a persistent basis. In some papers it is really assumed the most significant impact of deflation is on monetary policy, "which has been constrained by the zero bound on nominal interest rates" (Baig, 2003, p. 13). Maybe this is one of reasons why central bankers refuse deflation. Central banks are engaged in a strong fight to prevent deflation, almost at any cost. That is the reason why they started to use an unconventional monetary policy instruments: quantitative easing (QE), negative interest rates, currency floor. The reason for such radical steps is

evidently the big fear of deflation and strong belief it is possible to overcome it through innovative monetary policy (Kuroda, 2015, p. 5).

Swiss National Bank (SNB) was one of first central banks in small open economies that started to use all three of these unconventional instruments. The CNB does not hide it is inspired by SNB in its fight against deflation and that for small economies the exchange rate is a key economic variable. At the same time the CNB strategy differs from that of Switzerland and Japan (Franta at all, 2014, p. 5). In the Czech Republic the currency floor is the most visible instrument in this proceeding and the question is which steps will follow. Are the unconventional steps a good way how to avoid deflation and are they necessary?

In Switzerland a currency floor of 1,20 SFR to the euro was introduced on 6 September, 2011 and SNB announced that it would not tolerate stronger exchange rate. Further appreciation of the Swiss franc would have a major impact on salary and price structures, companies would be forced to cut costs drastically to remain competitive. The Swiss authorities have been claiming that it was also crucial to prevent a deflation trap, but its primary motive was to respond to the strong appreciation caused the franc's safe haven status (Franta et al., 2014, p. 16). While this regime was in effect the SFR fluctuated either at or on the weaker side of the exchange rate floor. The currency floor has created a flood of excess liquidity within Switzerland, bank lending has jumped and it has set off a property boom. The SNB's balance sheet has ballooned with reserve accumulation, money poured into Switzerland from Russia, funds were flooding into Switzerland from the Eurozone as the European Central Bank was issuing Eurobonds in the QE program.

On January 15, 2015 the Swiss National Bank decided to return to a free exchange rate. The announcement sent the Swiss franc up by around 15 % in a short period. This was a huge hit to the SNB credibility. But according to the SNB, the end of an exchange floor inevitably requires subterfuge, you can only end a policy like this by surprise. Nevertheless the basic problem has been the failure to explain why the SNB now judges the damage of external currency intervention to be even more dangerous than the threat of a systemic deflationary shock. The fears of excessive growth in SNB forex reserves (growth from around 20 % of GDP in 2006-2007 up to nearly 90 % of GDP in 2014) probably prevailed behind the exit (Jordan, 2015, p. 1-2).

The CNB introduced the currency floor of 27 CZK to the euro on November 7, 2013 and expressed one-sided exchange rate commitment with potentially unlimited foreign exchange interventions to prevent excessive appreciation of CZK. As in the case of Switzerland while this regime has been in effect the CZK fluctuates on the weaker side of the exchange rate floor. The CNB promises the Czech outcome from a currency floor will be different in comparison to Switzerland: gradual finishing of Czech crown currency floor or gradual decreasing of targeted exchange rate. How to make it is not clear enough. Despite the fact that this step is not expected before 2016, it is logical the Czech economy will be in a different standing and the inflation expectation will be different as well.

The SNB used also another unconventional deflationary instrument – negative interest rates. It imposed a rate of minus 0,25 % on sight deposit account balances at the SNB in December, 2014, on January 15, 2015 (concurrently with the discontinuation of the minimum exchange rate) this interest rate was lowered to minus 0,75 % (Jordan, 2015, p. 3). It only affects banks and large companies because it was applied on deposits over 10 mil. SFR. Switzerland typically sees money inflow during economic uncertainty. The goal of this step was to make it less attractive to hold Swiss franc investments, and thereby to support the minimum exchange rate. At the beginning of June, 2015, the SARON interest rate (formerly repo overnight index of SNB) was minus 0,72 %.

Several recent studies confirm that the link between output growth and deflation is relatively weak. We try to find how strong the association between goods and services price deflations and growth is in Switzerland where a recent period of deflation starts in the end of 2011. The issue we address through the means of time series modelling. This

paper is organized as follows: Section 2 outlines our used model specifications, Section 3 discusses our results and Section 4 concludes.

2 Methodology and Data

Empirical testing of the association between goods and services price deflations and growth is not an easy task. In postwar period there are not much consecutive deflation observations available and studied time series suffer from autocorrelation within their error terms. If we use simple OLS regression technique on our selected time series, the errors would have a time series structure. This violates the original OLS assumption of independently distributed errors and as a result the estimates cannot be view as best linear unbiased (BLUE). Suppose simple regression model is:

$$y_t = \alpha + \beta x_t + \varepsilon_t \tag{1}$$

and we suspect autocorrelation in error term. We can model autocorrelation in two ways, using moving average (MA) or by far more common autoregressive (AR) process. If the model has AR(p) errors, then:

$\varepsilon_t = \rho_1 \varepsilon_{t-1} + ... + \rho_p \varepsilon_{t-p} + u_t$, or in other form

$A(L)\varepsilon_t = u_t$, where $A(L) = 1 - \rho_1 L - ... - \rho_p L^p$

$$\varepsilon_t = A(L)^{-1} u_t \tag{2}$$

As stated by Lütkepohl and Poskitt (1991), Qin and Gilbert (2001) and Kelee and Kelly (2005) models with AR errors are more difficult to interpret as the dynamic component is present within the model errors. Another disadvantage of AR errors arise from lagging variable y. For example, let us set following notation:

$$y_t = \alpha + \gamma y_{t-1} + \beta x_t + \varepsilon_t \text{ where } \varepsilon_t = \rho \varepsilon_{t-1} + u_t \tag{3}$$

which clearly implies a correlation between y_{t-1} and error term, unless $\rho = 0$. At this point it is more satisfactory to use the dynamically complete model oppose to using autoregressive errors. Formally written we have $E(y_t | x_t, y_{t-1}, x_{t-1}, ...) = E(y_t | x_t)$, making x_t variable exogenous and residuals are automatically serially uncorrelated $E(u_t | x_t) = 0$.

Hence, we decided to use dynamically complete model which allow us to remove the autocorrelation from error term. Consider following notation where x_t accounts for explanatory variable:

$$y_t = \alpha + \rho_1 y_{t-1} + ... + \rho_p y_{t-p} + \beta_0 x_t + ... + \beta_a x_{t-a} + u_t \tag{4}$$

where u_t is white noise. Letting $A(L) = 1 - \rho_1 L - ... - \rho_p L^p$ and $B(L) = 1 - \beta_1 L - ... - \beta_a L^a$ we can rewrite the (4) more compactly as:

$$A(L)y_t = \alpha + B(L)x_t + u_t \tag{5}$$

Let Y and π denote the GDP and inflation. For the analysis, we are using changes over the previous period, so that our model takes form:

$$A(L)\Delta y_t = \alpha + B(L)\Delta \pi_t + u_t \tag{6}$$

where $\Delta y_t = y_t - y_{t-1}$ is the growth rate of GDP and $\Delta \pi_t = \pi_t - \pi_{t-1}$ is the change in the rate of inflation.

Our procedure is as follows: above all, we need to make sure our time series are stationary $I(0)$ and if they need to be de-trended. Here, we run a simple regression with constant, linear time trend and a lag chosen by sequential testing (maximum lag of four). If the t-statistics was significant for corresponding trend with particular lag, the variable was detrended. The stacionarity is tested via ADF and PP test. Note that nonstationarity

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is the ADF test null hypothesis. Now we need to decide how many lags to apply to each repressor variable and to check for autocorrelation in errors. We use standard Akaike's information criterion (AIC) to choose the appropriate lag. Autocorrelation is tested via Breusch-Godfrey and Ljung-Box technique[1].

We use quarterly GDP growth and CPI change provided by Swiss National Bank. Time series are collected from 1981/Q1 to 2014/Q4, given the total of 272 observations. For our analysis purposes, we divide our time period into four. First, we are reporting results for the whole time period covered (272 observations). In the second, we use only deflation time series from 2011/Q4 to 2014/Q4 (26 observations). Third, we analyze the crisis period 2009/Q1-2011/Q3 (22 observations) and last we run tests on only inflation time period without any deflation 1981/Q1 to 2007/Q4 (224 observations).

3 Results and Discussion

Taking into account only one country, one relatively short period and two variables, without any complicated statistical method or deep consideration we can see from the Table 1 that deflation was accompanied by economic growth in Switzerland in recent period. In this way the latest deflation around the world confirms association from rare postwar deflation periods as well as many earlier deflations - deflation need not be associated with depression or mostly unpleasant growth impacts. The growth around 2 % in several quarters during this period is remarkable not only because of deflation in Switzerland itself but because of economic environment in Europe and in the world economy. The country's success has a lot to do with rising productivity, a business-friendly tax system and prudent currency management.

Table 1 Inflation and GDP growth in Switzerland (2011Q4-2014Q4)

Time	Inflation (in %)	GDP growth (in %)
2011Q4	-0.45097	0.625623
2012Q1	-0.87577	0.825586
2012Q2	-1.01898	0.200643
2012Q3	-0.5262	1.371458
2012Q4	-0.34399	1.653554
2013Q1	-0.3731	0.577553
2013Q2	-0.42324	2.130821
2013Q3	-0.03423	2.104768
2013Q4	-0.03611	2.046464
2014Q1	-0.02799	2.602494
2014Q2	0.102808	1.520137
2014Q3	0.005303	1.994589
2014Q4	-0.13325	1.885495

Source: Swiss National Bank

As the next step we test the link between inflation (deflation) measured by CPI and GDP growth. This is a bit more complicated task. We divided the postwar period into several fragments and we are looking for correlation between inflation and growth. In most studies mentioned in previous parts of our paper the association between goods and services price level changes and growth was reported to be generally weak.

The model specified in Section 2 assumes our time series to follow a $I(0)$ process. From the inspection of our data seen in Figure 1, the data may follow a stationary process. We start off with ADF and PP tests to check for stationarity which confirmed our previous assumptions of a stationary time series[2].

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[1] Note that the Durbin-Watson test cannot be used when there is lagged y.

[2] The results of ADF and PP tests are not reported here due to space constrains but are available on request.

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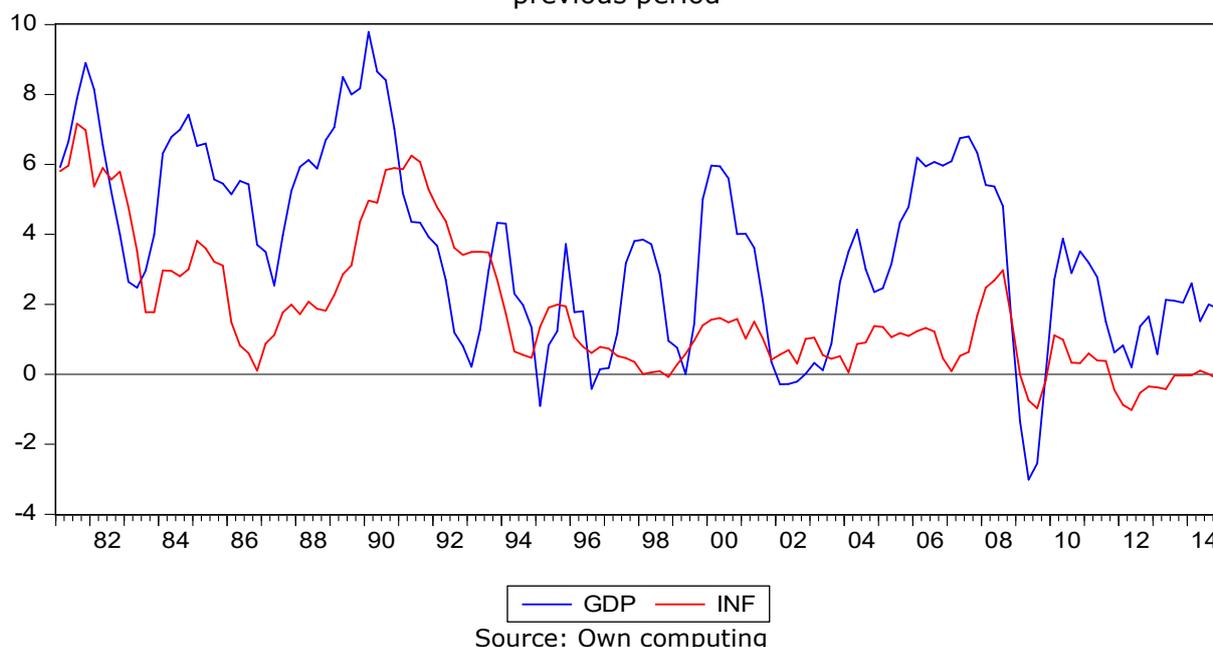
Source: Own computing

If we choose to continue with ARMA(p,q) model specification, we can argue that ARMA is stationary as long as $A(L)$ component in equation (6) is invertible. The stationarity of ARMA processes only depends on the AR parameters and not on the MA. In case of pure MA(q) process, the stationarity is assured if we present MA with finite number of MA coefficients, so that $\sum_{k=0}^{\infty} \theta_k^2 < \infty$.

Next step is to determine the appropriate order of our L operators. We can either use the t-/F-stat approach where we start with a large number of lags and stop our reduction process when the last lag is significant or use simple information criteria by Akaike, Schwarz or Hannan-Quinn. We use AIC to choose the appropriate lag. As specified we are estimating ARMA(p,q) processes for two time periods. Table 2 presents our point estimates together with 90 % confidence bounds for 1981/Q1-2014/Q4 which covers our entire sample.

Table 2 Model Estimates for Time Period 1981/Q1-2014/Q4

Variable	Coefficient	Low 90% CI	High 90% CI
INF	0.700761 (0.0000)	0.463295	0.938228
C	2.308053 (0.0000)	1.427064	3.189042
AR(1)	0.586780 (0.0000)	0.410348	0.763213
MA(1)	0.594278 (0.0000)	0.397818	0.790738
MA(2)	0.650672 (0.0000)	0.480231	0.821114
MA(3)	0.311344 (0.0041)	0.134952	0.487735
R-squared	0.888189	Prob(F-statistic)	0.000000
Breusch-Godfrey LM Test			
F-statistic	0.107824	Prob.F(2,102)	0.7432
Obs*R-squared	0.113544	Prob. Chi-Square(2)	0.7361

Source: Own computing

Our first model follows an ARMA(1,3) process. The AR part roots have both their modulus >1 so we can conclude that they follow a stationary process. To verify if the MA part of the process is invertible we check again for the modulus to be >1. The AR and MA coefficients are significant so the model is properly specified. The Breusch-Godfrey LM Test confirmed that there is no autocorrelation present within model residuals. Next, we turn our attention to discussion over INF coefficient which is positive and rather significant, meaning that GDP growth will positively respond to a unit change in inflation rate.

Our second time period ranges from 2011/Q4 to 2014/Q4 and can be described as deflation time series. Table 3 presents our model estimation results. It should be noted that we are working with rather short time period (13 observations) so the results need to be treated with caution.

Table 3 Model Estimates for Time Period 2011/Q4-2014/Q4

Variable	Coefficient	Low 90% CI	High 90% CI
INF	1.613711 (0.0000)	1.339448	1.887974
C	2.081106 (0.0000)	1.998965	2.163247
MA(1)	-0.962776 (0.0000)	-1.063082	-0.862470
R-squared	0.822082	Prob(F-statistic)	0.000178
Breusch-Godfrey LM Test			
F-statistic	0.117552	Prob.F(2,102)	0.8906
Obs*R-squared	0.307423	Prob. Chi-Square(2)	0.8575

Source: Own computing

The model follows a pure MA(1) process. The MA roots lie inside the unit circle (that is have a modulus <0) so the time series remains stationary. The Breusch-Godfrey LM Test confirms no autocorrelation. The INF coefficient, although it should be stressed out that we are now working with deflation time series, is rather large and significant. This contradicts the usual view over deflation as GDP growth positively responds to a unit change in deflation.

The crisis period reported in Table 4 confirmed linear positive link between our studied variables as well while the model is described as ARMA(2,1).

Table 4 Model Estimates for Time Period 2008/Q1-2011/Q3

Variable	Coefficient	Low 90% CI	High 90% CI
INF	1.715979 (0.0008)	1.064621	2.367337
C	0.929927 (0.0175)	0.337102	1.522752
AR(1)	1.590478 (0.0000)	1.403579	1.777377
AR(2)	-0.782147 (0.0001)	-1.012948	-0.551346
MA(1)	-0.911563 (0.0002)	-1.197242	-0.625883
R-squared	0.964082	Prob(F-statistic)	0.000000
Breusch-Godfrey LM Test			
F-statistic	1.250003	Prob.F(2,102)	0.3370
Obs*R-squared	3.085436	Prob. Chi-Square(2)	0.2138

Source: Own computing

Our fourth model reported in Table 5 follows an ARMA(2,2) process. Again we can conclude a stationary process judging from the modulus inspection. The AR and MA coefficients are significant so the model is properly specified. The INF coefficient is positive and rather significant, meaning that GDP growth will positively respond to a unit change in inflation rate.

Table 5 Model Estimates for Time Period 1981/Q1-2007/Q4

Variable	Coefficient	Low 90% CI	High 90% CI
INF	0.523694 (0.0014)	0.258551	0.788837
C	2.871271 (0.0000)	1.842332	3.900210
AR(1)	1.179568 (0.0000)	1.016714	1.342422
AR(2)	-0.425053 (0.0000)	-0.581929	-0.268177
MA(2)	0.455414 (0.0000)	0.291804	0.619023
R-squared	0.881798	Prob(F-statistic)	0.000000
Breusch-Godfrey LM Test			
F-statistic	0.701882	Prob.F(2,102)	0.4981
Obs*R-squared	1.479129	Prob. Chi-Square(2)	0.4773

Source: Own computing

Since we established that our two variables relationship can be described as linear and positive, we end the analysis with simple correlation matrix to show the strength of that link.

Table 6 Correlation Matrix

Variables	1981/Q1-2014/Q4	2011/Q4-2014/Q4	2008/Q1-2011/Q3	1981/Q1-2007/Q4
GDP/INF	0.57865	0.75252	0.83291	0.48619

Source: Own computing

The correlation matrix reveals several important findings in combination with a linear regression analysis using ARMA framework even though it provides a simple inspection of a statistical relationship between variables. The stronger correlation link was found in specific time periods, particularly the crisis and deflation time periods, rather than for periods of a steady GDP growth.

In future research, we would like to focus on historical decomposition of used time series. It will allow to capture the response of explained variable on shock generated by explanatory variables or specifically simulated structural/innovation shock. We provide here only preliminary results. Figure 2 shows the historical decomposition of the shocks to GDP (output shock and inflation/deflation shock). As seen, this tool might be helpful in identifying the true response of GDP both to inflation and deflation. In late-1990s the Switzerland suffered real estate crisis that led to a wave of consolidations among the regional banks. Inflation shocks played minor role, but still add negatively to output. GDP's own shocks on itself provide mixed results in this period.

More interesting for the analysis are results reported on right-sided graph. As the inflation turned into deflation in 2011, we can see clear positive GDP response to the shock oppose to the negative response during financial crisis. This response stayed positive during the whole deflation times.

Figure 2 Historical decomposition of GDP
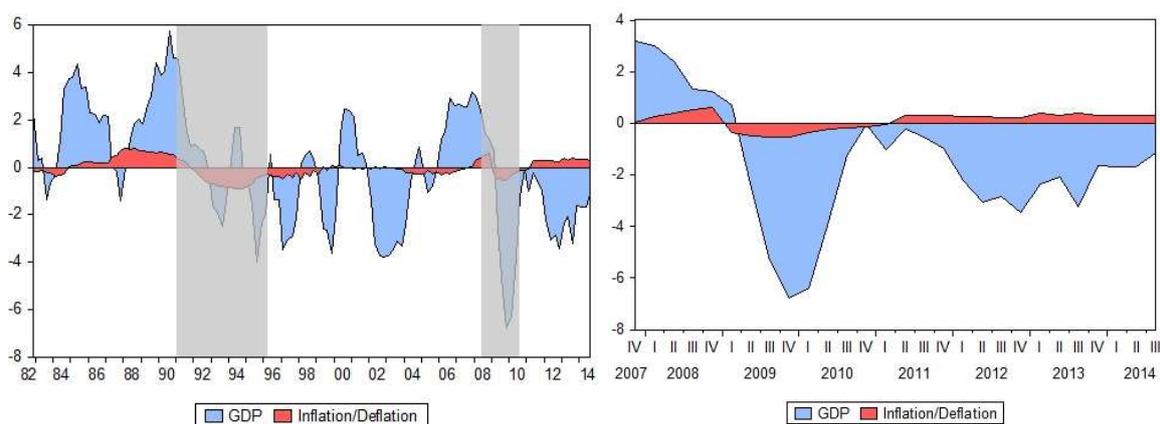
Source: Own computing

4 Conclusions

We focus on deflation, growth and cyclicity in market economies. Generally deflation and growth do not have much common. Inflation means nominal GDP growth as well as deflation means decrease of nominal GDP. The data of most studies confirm this is true not only for a short-term but first of all for a long-term period. In postwar period consistent economic policy focused on growth allowed natural cyclical development of economies, that is the development comprising price decrease, only in a few countries – for instance in Japan, New Zealand, Switzerland or in China. In some countries this development incorporated deflation despite of the effort of central banks to avoid it. Recently deflation concerns countries only exceptionally, a cyclical development can be recorded only in selected industries or in the case of prices of some important commodities (oil, agricultural products, food, drugs).

For the same reason the monetary policy of central banks itself seems to be controversial. In developed market economies many of them started to use inflation targeting that is basically refusing cyclicity of market economies. Why to have in a market economy only growing prices? Why deflation is a threat? If the Swiss can survive deflation and grow, why is Europe so afraid of it?

We have studied the link between GDP growth and inflation/deflation in Switzerland from 1980 to 2014 using ARMA modelling technique. We divided the postwar period into several fragments and we are looking for the relationship between studied variables. We established that our two variables relationship can be described as linear and positive, even in deflation times. ARMA models and historical decomposition technique preliminary results confirmed the hypothesis that deflation does not necessarily mean loses in output.

Acknowledgments

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Analysis of the Effectiveness of Selected New Types of Bonus-Malus Systems – A Simulation Approach

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Abstract: *Bonus-malus systems are used for the classification of the insured in different tariff classes based on the individual history of claims. The aim of such systems is to differentiate premiums for clients with high and low claims ratios to limit the phenomenon of the negative selection of customers and to attract low-claims ratio customers. Thus, bonus-malus systems also fulfil a marketing function and are a tool for gaining competitive advantage. In typical bonus-malus systems, the tariff class to which the client is classified is determined on the basis of the class to which the client was assigned in the previous year and the number of claims made in the last year. In the insurance market in recent years there has been a tendency to modify bonus-malus systems so that the history of losses over the past two or even three years is taken into account. In addition, premiums are differentiated depending on how long the insured has been a client of the insurer. This paper is devoted to the analysis of typical systems and modern modified systems according to the structures available in the Polish market, calculating measures of the effectiveness of the tariff systems.*

1 Introduction

Bonus-malus systems are used by insurance companies to diversify insurance premiums for customers who have different levels of risk of injury. They are used by most insurers for motor third party liability (MTPL) insurance and Autocasco insurance, although some insurers also attempt to apply them in real estate insurance. Through the use of bonus-malus systems, insured parties are classified in tariff classes with different rates of premiums depending on the history of reported losses in previous years. In some countries, there is one bonus-malus system laid down by law (e.g. the Belgian system until 2002), whereas in other countries insurers determine the structure of the bonus-malus systems themselves. In Poland, the legislature (Act on Obligatory Insurance, Insurance Guarantee Fund and Polish Motor Insurers' Bureau of 22 May 2003; Act on Insurance Activity of 22 May 2003) has established only a minimal amount of discount over the course of insurance. Currently, an interesting trend in introducing modifications to bonus-malus systems can be observed. Bonus-malus systems are an important tool for competition. Among the most interesting modifications are changes to systems to take into account not only the history of the last year, but 2–3 years of claims ratios. In addition, increasingly often dedicated systems are being designed for holders of more than one car, based on the total number of losses in the last 2–3 years. The aim of this paper is to examine selected bonus-malus systems in the Polish market and to compare systems forming a typical structure (based on the number of claims that have been reported in the last year) and systems based on the claims history over the last few years.

In the literature, there are a number of analyses of bonus-malus systems. An overview of bonus-malus systems and methods for assessing their effectiveness can be found, for example, in Lemaire (1995, 1998), Loimaranta (1972), Bonsdorff (1992). In the Polish literature, interesting works worth mentioning are Szymańska (2014) and Cieślik (2013).

2 Methodology and Data

Modelling Bonus-malus Systems

The classic approach to analysing bonus-malus systems is to model them using homogeneous Markov chains (for more detail, see Cieślik, 2013; Lemaire, 1995; Szymańska, 2014). In the case of such an approach, a bonus-malus system can be described by the following elements:

- Tariff classes C_i, where $i = 1, \dots, s$; i is the class number and s denotes the number of classes; it is important to define the initial class to which a new insured without a history of claims is classified as C_{i0}; it is convenient to define the initial class of the system using the vector $a(0)$, which consists of 1 for the initial class and 0 for the other classes.

- The values of coefficients in each class, defining the percentage of the basic premium paid by the customer (sometimes described as a percentage discount or increases to the consumer); synthetically this can be described by a vector of rates $b = (b_1, \dots, b_s)$.

- The algorithm of moving from class to class depending on the number of claims in the previous period, which can be determined by the transition matrix $\boldsymbol{M}(\boldsymbol{\lambda})$, which is a synthetic way of writing the algorithm and the probabilities of transition from class to class.

Thus:

$$\boldsymbol{M}(\lambda) = \sum_{k=0}^{\infty} \boldsymbol{p}_k(\lambda) \boldsymbol{T}_k \tag{1}$$

where $\boldsymbol{p}_k(\boldsymbol{\lambda})$ denotes the probability of reporting k claims in a period and $T_k = \left(t_{ij}^{(k)}\right)$, where
$t_{ij}^{(k)} = \begin{cases} 1 & \text{in the case of transition from class } C_i \text{ to } C_j \\ 0 & \text{otherwise} \end{cases}$.

The probability of a certain number of claims is most commonly modelled using Poisson regression and negative binomial distribution (Szymańska, 2008, 2014). For the purposes of this paper, it is assumed that the number of claims is modelled as a Poisson distribution with the parameter λ=0,1; this value is close to the average frequency of claims in European countries (Lemaire, 1995) (the average frequency of claims for 2010 in the Polish market according to the Insurance Guarantee Fund – UFG –was 0.0552).

Selected Measures of the Effectiveness of Tariffs in Bonus-malus Systems

The effectiveness of bonus-malus systems can be understood in different ways. In this paper, attention is focused on the effectiveness of the send tariff. Here, an effective bonus-malus system is one which effectively performs the tariff-setting function (correctly differentiating premiums according to the risk level of the insured) and the preventive function (using high increases to prevent an excessive loss ratio). Basic measures of effectiveness of bonus-malus systems are based on the stationary distribution of the process (for more, see Lemaire, 1995; Ronka-Chmielowiec, 2013; Szymańska, 2014). For stationary distribution a vector can be calculated containing the probability of being in each of the tariff classes over the long term (at stationary state), estimated as $\bar{a}(\lambda) = [a_1(\lambda), \dots, a_s(\lambda)]'$. This vector can be obtained in practice using the recursive formula $\bar{a}(n; \lambda) = \bar{a}(n-1; \lambda)M(\lambda)$, where $\bar{a}(0; \lambda) = a(0)$ is the initial vector.

In the analysis of selected systems the following measures are applied.

The average asymptotic premium – this is the average premium the insured with a fixed level of claims ratio pays in the long term (after reaching stationarity) and is given by:

$$B(\lambda) = \sum_{i=1}^{s} a_i(\lambda) b_i, \tag{2}$$

where b_i is the level of premium in class i.

This measure can be used to analyse a single system (if $B(\lambda) = \lambda$ the system is considered to be fair; if $B(\lambda) > \lambda$, premiums are overpriced; if $B(\lambda) < \lambda$ premiums are understated)

and to compare systems (systems with higher levels of $B(\lambda)$ will bring higher expected profit from a single policy, but will be "more expensive" for the customer). This measure, if it is used to compare systems, should be analysed taking into account the fact that the basic premium value in the various systems can vary.

The relative stationary average level (RSAL) (Lemaire, 1985)

$$RSAL(\lambda) = \big(B(\lambda) - min_i(b_i)\big)/\big(max_i(b_i) - min_i(b_i)\big) \tag{3}$$

This measure takes values in the range [0, 1], where the lowest possible premiums are allocated the value 0 and the highest 1. This ratio determines the position of the average insured party with claims frequency λ after reaching a stationary state in the system. Therefore, it determines where the insured is located on the scale spanning the entire system. According to the author of this measure (Lemaire, 1985), in an ideal system, this ratio should be around 0.5 for the average frequency of claims. A small value for the ratio means that the system will be in disequilibrium and over time most policyholders will be in classes with the largest discounts; high values indicate an even distribution of policyholders among classes of the bonus-malus system. In the literature, several modifications to this measure have also been proposed (for more, see Szymańska, 2014).

The coefficient of the variation of the insured's premiums, defined as follows:

$$V(n;\lambda) = \sqrt{\sum_{i=1}^{s}\big(b_i - B(n;\lambda)\big)^2 a_i(\lambda)}\big/B(n;\lambda) \tag{4}$$

This ratio measures the degree of variation in premiums. If it is less than 10%, the premiums are not differentiated (in practice, most insured parties are concentrated in discount classes). In the case of high values of V, there is great diversity in premiums and the system is "rigorous". It is worth analysing changes in the value of this measure over time (the coefficient of variation in the first year is zero, then increases until reaching a maximum discount, then decreases until reaching stationarity) and its dependence on the level of the parameter λ, which may be a tool for comparing systems.

A measure of the total variation of the system (Bonsdorff, 1992). This is the sum of the deviations from the stationary vector after n periods.

$$(TV)_n = \sum_{j=1}^{s}\big|p_{ij}^n(\lambda) - a_j(\lambda)\big| \tag{5}$$

where $p_{ij}^n(\lambda)$ denotes the probability of transition from class C_i to C_j after n years.

It measures how fast the system becomes close to stationarity and how it differs from its target state after n years of operation. It may be a measure of the sensitivity of the system to reported claims. The desirable value of this measure remains a point of discussion. If, on the one hand, the system reacts overly strongly to the occurrence of claims, or on the other with too much sensitivity, the system assigns the insured parties to their respective classes only after a very long time, which seems to contradict the idea of the system. For the most part, poorly developed systems with only a few classes stabilize quickly and the more complex systems much more slowly (Lemaire, 1998). This indicator can be used to analyse the impact of modifications made to the system design on the pace of stabilization.

Elasticity of the mean stationary premium with respect to claim frequency (Lemaire, 1995, p. 72; Loimaranta, 1972) – this is a measure of the system's reactions to changes in the frequency of claims.

$$\eta(\lambda) = \frac{dB(\lambda)}{B(\lambda)}\Big/\frac{d\lambda}{\lambda} = \frac{B'(\lambda)}{B(\lambda)}\lambda \tag{6}$$

This measure allows specification of the extent to which drivers with different levels of risk are evaluated by the system.

The Characteristics of the Bonus-malus Systems Analysed

The author analysed selected bonus-malus systems in the Polish market. These are the

systems of the following insurers: PZU (participation in the collection of gross written premiums from non-life insurance higher than 30%), Compensa and Hestia (MTPL and Auto Casca – AC). The systems analysed for Compensa were the "old" version (prior to November 2013) and a new version, interesting because of its construction, being based on a history of claims reported in the past three years. Moreover, Compensa highlights among its advantages the fact that a client could attain the maximum discount within three years.

The most important characteristics of the systems are summarized in the form of tables (Tables 1 and 2). For each system presented, it is assumed that the initial class is the class with a basic premium equal to 100%.

Table 1 Vectors of premiums for selected bonus-malus systems

System	Vectors												
Compensa "old"	2,6	2	1,5	1,2	1	0,9	0,8	0,7	0,6	0,5	0,4	-	-
Hestia AC	-	2	1,5	1,3	1	0,9	0,85	0,8	0,7	0,6	0,5	0,5	0,4
Hestia MTPL	-	3	2	1,5	1	0,9	0,85	0,8	0,7	0,6	0,5	0,5	0,4
PZU	2	1,5	1,3	1,2	1	0,9	0,8	0,8	0,7	0,6	0,5	0,5	0,4

Source: Author's own elaboration based on general conditions of motor insurance (information taken from the websites of insurance companies)

Table 2 Transition matrices for selected bonus-malus systems

Compensa "old"
```
p1+  0   0   0   0   p0  0   0   0   0   0   0
p1+  0   0   0   0   p0  0   0   0   0   0
p1+  0   0   0   0   p0  0   0   0   0   0
p2+  p1  0   0   0   p0  0   0   0   0   0
p2+  0   p1  0   0   p0  0   0   0   0   0
p3+  p2  0   p1  0   0   p0  0   0   0   0
p3+  0   p2  0   p1  0   0   p0  0   0   0
0    0   p3+ p2  0   p1  0   0   p0  0   0
0    0   0   0   p3+ p2  p1  0   0   p0  0
0    0   0   0   0   p3+ p2  p1  0   0   p0
0    0   0   0   0   0   p3+ p2  p1  0   p0
```

Hestia AC and MTPL
```
p1+  p0  0   0   0   0   0   0   0   0   0   0
p1+  0   p0  0   0   0   0   0   0   0   0   0
p1+  0   0   p0  0   0   0   0   0   0   0   0
p2+  p1  0   0   p0  0   0   0   0   0   0   0
p2+  0   p1  0   0   p0  0   0   0   0   0   0
0    p2+ 0   p1  0   0   p0  0   0   0   0   0
0    0   p2+ 0   p1  0   0   p0  0   0   0   0
0    0   0   p2+ 0   p1  0   0   p0  0   0   0
0    0   0   0   p2+ 0   p1  0   0   p0  0   0
0    0   0   0   0   p2+ 0   p1  0   0   p0  0
0    0   0   0   0   0   p2+ 0   p1  0   0   p0
0    0   0   0   0   0   0   p2+ 0   p1  0   p0
```

PZU
```
p1+  p0  0   0   0   0   0   0   0   0   0   0   0
p1+  0   p0  0   0   0   0   0   0   0   0   0   0
p1+  0   0   p0  0   0   0   0   0   0   0   0   0
p2+  p1  0   0   p0  0   0   0   0   0   0   0   0
p2+  0   p1  0   0   p0  0   0   0   0   0   0   0
p3+  p2  0   p1  0   0   p0  0   0   0   0   0   0
p3+  0   p2  0   p1  0   0   p0  0   0   0   0   0
p4+  p3  0   p2  0   p1  0   0   p0  0   0   0   0
p4+  0   p3  0   p2  0   p1  0   0   p0  0   0   0
p5+  p4  0   p3  0   p2  0   p1  0   0   p0  0   0
p5+  0   p4  0   p3  0   p2  0   p1  0   0   p0  0
p6+  p5  0   p4  0   p3  0   p2  0   p1  0   0   p0
p6+  0   p5  0   p4  0   p3  0   p2  0   p1  0   p0
```

Source: Author's own elaboration based on general conditions of motor insurance (information taken from the websites of insurance companies)

The new system of Compensa is described in Table 3.

Table 3 Bonus-malus system in Compensa

Number of full years of insurance in the last 3 years	Number of claims during the past 3 years			
	0	1	2	3 or more
	Discount/increases for premiums in %			
0/less than 1	0	50	100	160
1	-20	20	50	160
2	-40	-10	50	160
3 or more	-60	-40	30	100

Source: Information taken from the websites of insurance companies

The first step is to transform the system into a form in which it is possible to determine the values presented by the measures. Thus, in a system based on a history of claims with a frequency of three years, differentiating the premium depending on whether there are 0, 1, 2 or 3 or more claims, it was necessary to convert to a system consisting of 64 real classes, namely, the system given in Table 4.

For the initial class, the class adopted was that to which new customers with no history of claims were assigned.

Table 4 Summary of the converted form of Compensa bonus-malus system

Class number	Year before penultimate year	Penultimate year	Last year	Total number of claims	Premium			
					less than 1	1	2	3 or more
1	0	0	0	0	1	0,8	0,6	0,4
2	1	0	0	1	1,5	1,2	0,9	0,6
3	2	0	0	2	2	1,5	1,5	1,3
...	...	...	...	...	...	...	...	...
64	3	3	3	9	2,6	2,6	2,6	2,6

Source: Author's own elaboration

3 Results and Discussion

The results of the calculation of the average premium after n years of operating in the bonus-malus system for $\lambda=0,1$ and the values of the average asymptotic premium dependent on λ are presented in Figure 1. The average asymptotic premium for the typical insured is the highest for the new bonus-malus system of Compensa (48.02% of the basic premium), compared to 44.17% in the old Compensa system and 42.7% for Hestia MTPL, 42.69% for Hestia AC and 42.66% for PZU. However, it is worth stressing that in the new Compensa system, the average asymptotic premium is achieved after three years, whereas in the other systems this takes 10–15 years (the difference between the average premium and the average asymptotic premium divided by the average asymptotic premium is lower than 5% for PZU after 16 years, for Hestia MTPL and AC after 14 years and for the old Compensa system after 10 years).

Figure 1(a) Average premium after n years of operating in the system (for $\lambda=0,1$);
1(b) Average asymptotic premium dependent on λ

(a)   (b)
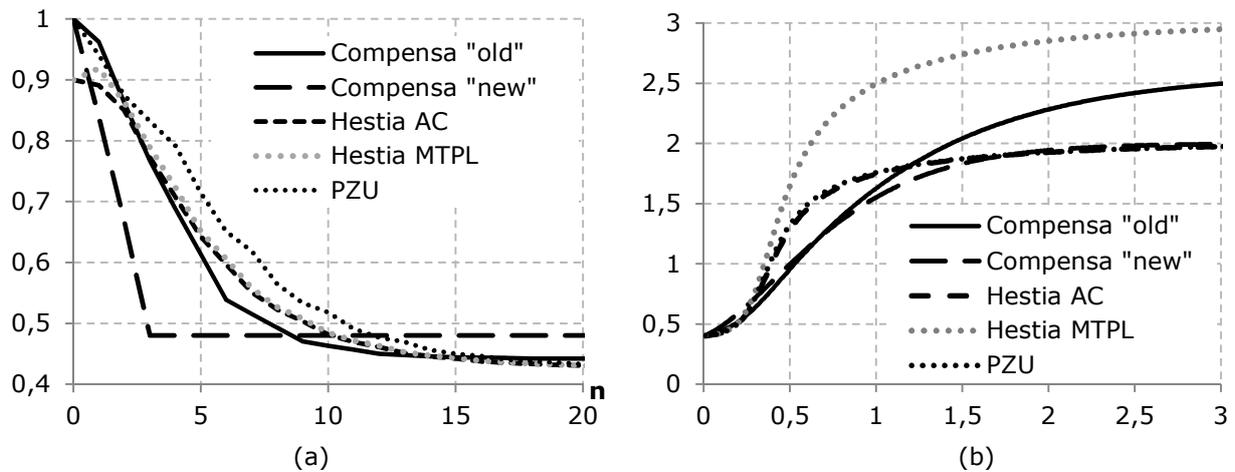
Source: Author's own calculations

Similar conclusions can be drawn from the analysis of the measure of total variation (TV) of the system (Figure 2). The TV value for new Compensa system is close to 0 after four years and for all the other analysed systems is over 0.2 after eight years (old Compensa), 13 year (Hestia) and 17 years (PZU).

Figure 2 The measure of total variation (TV) for the bonus-malus systems analysed

Source: Author's own calculations
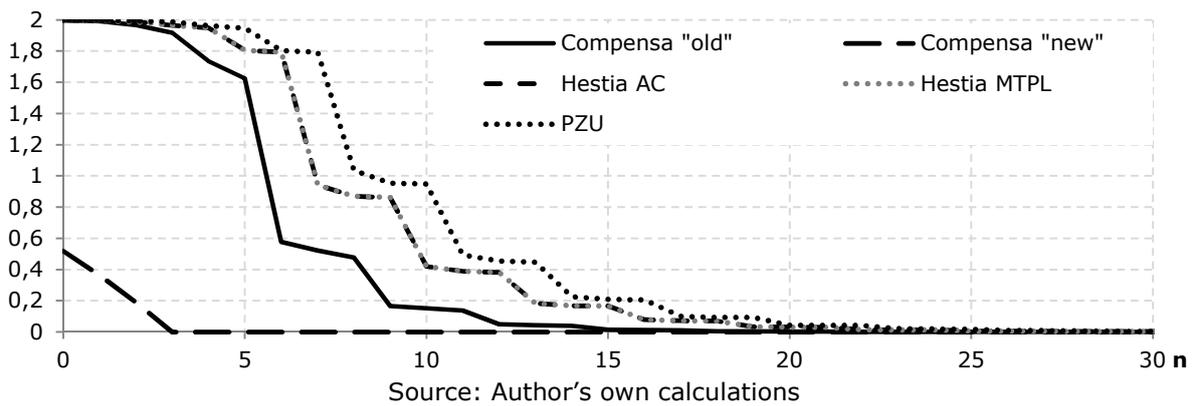
As previously mentioned, the desirable value of this measure is debatable. The typical construction of bonus-malus systems is rather complex and reacts strongly to the occurrence of claims; on the other hand, new constructions, based on a three-year claim history, are less sensitive to claim occurrence.

In Figure 3, the values of the RSAL (relative stationary average level) are shown. A common objection to bonus-malus systems is that they tend to classify many of the insured parties in the lowest classes, whereas only those with a much higher than average frequency of claims are classified ultimately in classes with higher premiums. The new Compensa system is much "flatter" than the systems of PZU and Hestia, but not as much so as the old Compensa system. Thus, for insured parties with a claims frequency of less than 0.3 (one claim per 3 years), the new Compensa system is a little stricter than PZU and Hestia, but those with a higher claims frequency are distributed more evenly over the scale spanning the entire system. In addition, it can be said that the new Compensa system is a little closer to other systems present in the market in comparison to the old system.

Figure 3 RSAL dependent on λ for the bonus-malus systems analysed

Source: Author's own calculations
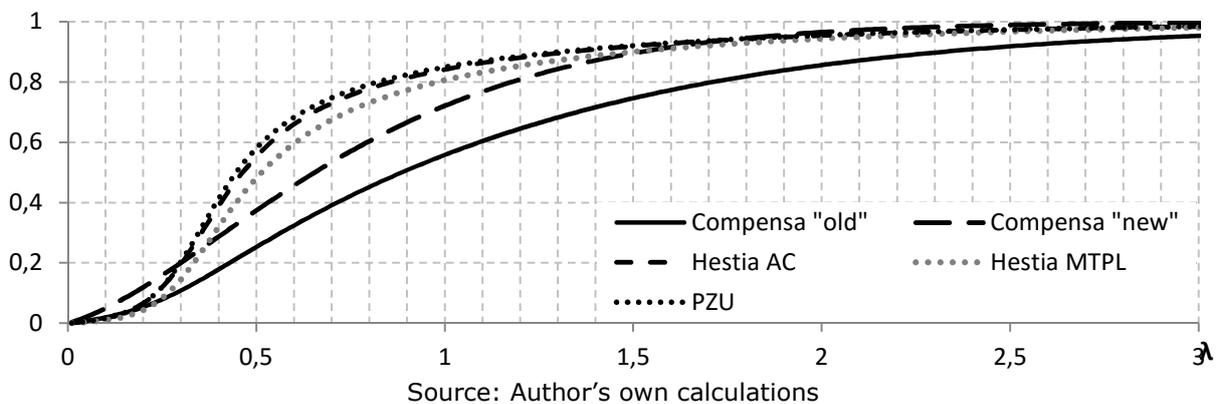
When analysing the values of the next of the measures, the coefficient of the variation in premiums paid by the insured (Figure 4), it is worth remembering that this measure can be interpreted as a measure of solidarity among the insured. In the absence of insurance, the coefficient of the variation of losses faced by the insured shall be equal to the coefficient of variation of claims that may occur. In the case of an insurance policy and a lack of differentiation of premiums, the coefficient of variation in payments by the insured is 0. In the case of bonus-malus systems, it is a value between these extremes.

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Figure 4 Coefficient of variation in premiums paid by the insured dependent on time for $\lambda=0,1$ for the bonus-malus systems analysed

Source: Author's own calculations
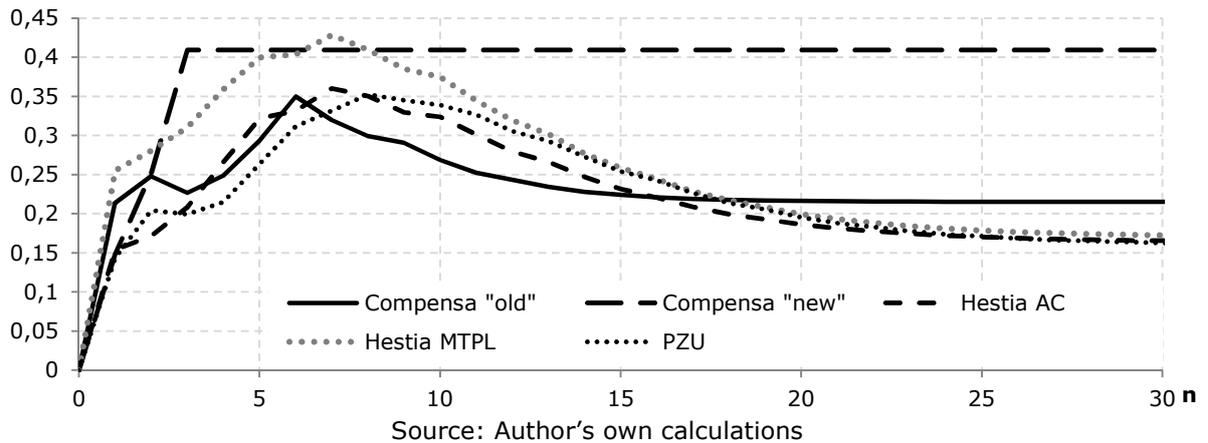
Figure 5 Coefficient of variation of premiums paid by the insured dependent on λ for the bonus-malus systems analysed

Source: Author's own calculations
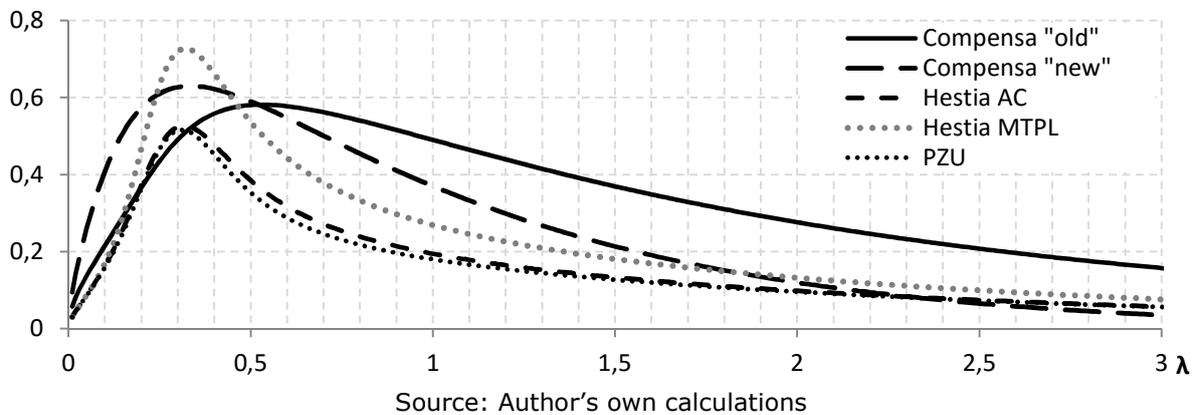
As can be observed, the new Compensa system obtains the target level of this measure in three years and then is stable. Compared to the other systems analysed, the target level is much higher. The new Compensa system is less variant for insured with high claims frequency than the old system (Figure 5), but is more variant for insured with a claims frequency of less than 0.2 (the majority of insured) than the bonus-malus systems of PZU and Hestia.

The last of the measures analysed is the elasticity of the mean stationary premium with respect to claim frequency (Figure 6). This ratio is defined as the price elasticity of demand. In a well-constructed bonus-malus system, the amount of the premium should be an increasing function of claims frequency; in the ideal case, this should be a linear function, $\eta(\lambda) = 1$. This means that with an increase in the relative risk of a claim of one unit (e.g. one percentage point), the relative increase in premiums should be the same. However, in most bonus-malus systems operating in the world, elasticity is less than 1 (Szymańska, 2008).

Figure 6 Elasticity of the mean stationary premium with respect to claim frequency (λ)
for the bonus-malus systems analysed

Source: Author's own calculations
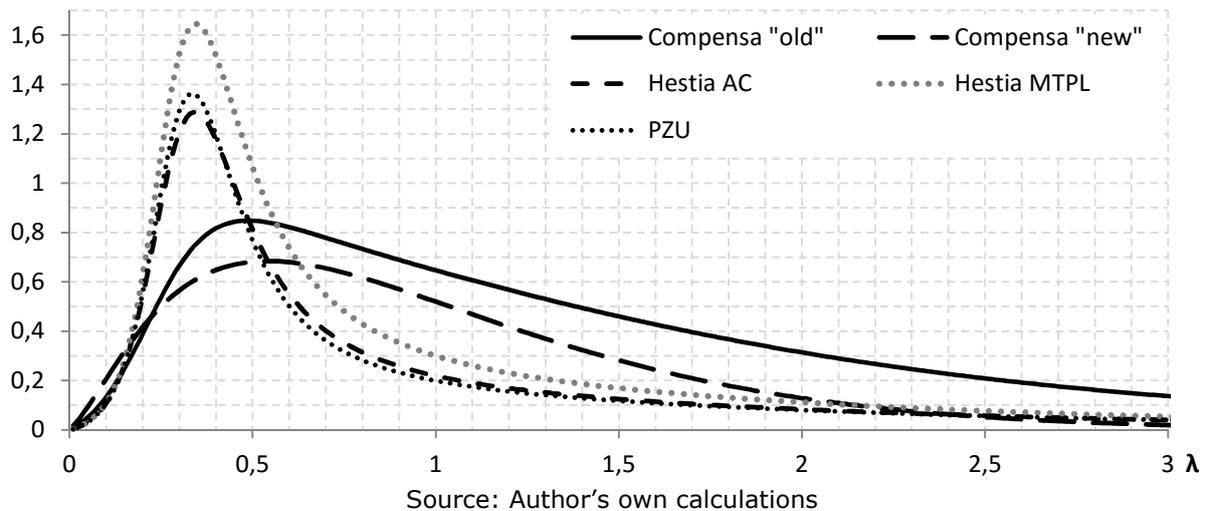
As can be observed from Figure 1(b) and Figure 6, for all of the systems analysed the amount of the premium is an increasing function of claims frequency. For insured with a claims frequency higher than 0.25 but lower than approximately 0.5 for the PZU and Hestia systems, premiums grow more quickly than the claims frequency; for other values, i.e. insured with low claims frequency and very risky insured, the elasticity is lower than 1, so the premiums grow slower than the probability of a claim. Both Compensa systems – old and new – are very different from the others analysed. The new system is even "flatter" than the old one.

4 Conclusions

Modifications to bonus-malus systems towards models based on a long history of claims are becoming more common (Warta, the second insurer in terms of market share in Poland, has recently started to use a similar system to Compensa). Furthermore, an increase in the market share of insurers from other markets has resulted in the extension of solutions from other markets into the Polish insurance market.

Due to strong competition in the insurance market (not just in Poland, but in most European countries), insurers continue to looking for new solutions that will make the offer of the insurer more attractive to customers. Bonus-malus systems are an important part of this offer, particularly as one of their advantages is the "attachment" of the insured to the insurer. Thus, the analysis of these systems – and in particular any new solutions – seems to be important both for the insured and insurers.

The measures of the effectiveness of tariff setting used in the paper are not exhaustive. Moreover, it must be emphasized that they are not full measures of effectiveness; rather, each of the measures analysed is fragmentary. Nonetheless, the analysis shows that systems based on a history of losses over several years in place of claims reported only in the last year can be analysed using measures well known from the literature. However, they require transformation to a form in which the actual rules of the transition from class to class depends only on the number of claims that have occurred over the last year.

The resulting values of the indicators show that as insurers highlight, using bonus-malus systems, insured with a low frequency of claims can indeed quickly be classified in classes with high discounts and that these are systems that quickly stabilize. It must be borne in mind that this can be interpreted both as an advantage and disadvantage of such systems.

It should also be noted that by using the traditional construction (the "old" Compensa system), similar values can be obtained for measures of the efficiency of tariff setting.

However, systems based on a claims history covering several years can be perceived psychologically as providing better value by the insured.

Construction of a bonus-malus system based on a long history of claims gives the insured the impression of less randomness in determining the final amount of the premium. This may increase the insured's belief that even in the case of one unlucky year, the insured will not immediately be punished by a high premium in the following year. This construction of bonus-malus systems can thus attract customers with a low claims ratio, which may also favourably influence the outcome of the insurer.

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Vienna Insurance Group's Development on the Slovak Insurance Market between 2005 and 2013

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Abstract: *The aim of this article is to evaluate how the premium written and market share of the Vienna Insurance Group (VIG) developed on the insurance market of the Slovak Republic. This article also wants to find out whether this development was affected by strategic transformations which insurance companies belonging to the VIG underwent. The time period monitored and evaluated was 9 years – from 2005 to 2013. First, this article describes individual insurance companies belonging to the VIG group and their historical development. The article also summarizes the most significant strategic transformations in each insurance company's development. Using insurance market indicators, the article analyses individual insurance companies and compares them with the Slovak insurance market. Consequently, differences between all insurance companies are being summarized with accent put on significant strategic changes. Finally, their influence on the development of insurance market indicators is evaluated.*

Keywords: premium written, market share, insurance group, strategic transformation

JEL Classification: G22

1 Introduction

This article focuses on the very current issue of the formation of new insurance groups in the Slovak Republic. The object of my research is the insurance group Vienna Insurance Group (hereinafter referred to as VIG), which is, with its market share, one of the most influential insurers in the Slovak Republic. This group is represented by the KOOPERATIVA poisťovna, a.s. Vienna Insurance Group (hereinafter referred to as KOOP), KOMUNÁLNA poisťovňa, a.s. Vienna Insurance Group (hereinafter referred to as KOM) and Poisťovňa Slovenskej sporiteľne, a.s. Vienna Insurance Group (hereinafter referred to as PSS). These insurance companies were not part of the VIG when established and each of these insurers has, in its own history, undergone significant strategic transformation. The article is trying to find the answer to the question whether or not these transformations affected the insurance market indicators.

It is essential to emphasize that an important transformation took place in 2008 when the Erste Group and the VIG concluded their long-term strategic cooperation contract. This was a significant move not only for insurance companies belonging to the VIG in the Slovak Republic but in other countries too. Soon thereafter, both of these financial service providers started offering products of the other. Sales of bancassurance products have boomed and both companies started exchanging their experience.

The core of this article is in ascertaining of the most significant strategic transformations in the development of the insurance companies belonging to the VIG in the time period 2005 – 2013. What transformations are considered to be strategic? It is mainly fusions of insurers, strategic cooperation with another subject, entering the VIG and also the cooperation between the Erste Group and the VIG. As mentioned above, this article also performs an analysis of insurance market indicators and a comparison of each insurer's own development with the global Slovak insurance market and the insurance group VIG. The article tries to find and compare differences of selected attributes. Consequently, connections induced by the strategic transformations and changes of the monitored indicators will be commented on and evaluated.

Insurance companies use various market strategies. The most significant of these strategies are the growth strategy and the market positioning strategy. The growth strategy demonstrates itself by offering new or innovated insurance products. Another way is taking advantage of experience gained on developed insurance markets and the insurance market's growth potential in other countries and increasing offer and variability of investment life insurance. The growth strategy is tightly linked to the market positioning strategy. Increasing and sustaining of the market position is a priority for insurance companies. Without growth and without increasing of the market share, insurance companies would not be able to achieve a lasting profit. It is also important to mention the bancassurance strategy which means taking advantage of the synergic effect and finally the development of distribution networks. (Řezáč, 2009)

Although bancassurance is natural phenomenon in the present financial market, studies focus mainly on some aspects of this level of cooperation between banks and insurance companies which can be established on different principles. The method of entry of banks into the insurance sector may include de novo entry, merger/acquisition, joint venture, distribution alliance and are described e.g. by Valihorová-Kobík and Mužáková (2012) or Hoschka (1994). Clipici and Bolovan (2012) focused on distribution channels and regulatory barriers to financial conglomerates. Factors influencing bancassurance such as structural differences, limited the extent of convergence due to factors as demographics, the structure of liabilities, the scale of operations, regulation and accounting practices and distribution channels are described by Beltratti and Corvino (2008).

The formation of the insurance groups is a demonstration of current tendencies on insurance markets. Aforementioned market strategies can demonstrate themselves well within insurance groups. It is a manifestation of globalization tendencies related to the level of cooperation of insurance companies within insurance groups based on bancassurance and other strategic agreements. According to Ducháčková, Daňhel and Radová (2009), the financial crisis led to noticeable corrections of trends of intersectoral integration and implementation of more efficient regulatory projects which commenced in the 1990s. According to Ducháčková and Daňhel (2009), fusions and acquisitions take place on the Czech insurance market, which is relatively fragmented, beyond the intersectoral integration. The development of the VIG cannot be yet predicted and it is impossible to say how the holding will develop. (Ducháčková and Daňhel, 2009).

Based on the analysis of the VIG in the time period 2005 – 2013 in the Czech Republic (Přečková, 2014), it was found out that Česká podnikatelská pojišťovna, a.s. and Pojišťovna České spořitelny, a.s. differ from the development of the Czech insurance market. Both insurers attained roughly the same market share in 2013 (approximately 5%). Česká podnikatelská pojišťovna was, in the monitored period, growing more quickly, mainly owing to its life insurance and compulsory third-party insurance. During the same time period, Pojišťovna České spořitelny experienced fluctuation. A significant drop in premiums written took place between 2007 and 2009. In 2008, the insurer started its strategic cooperation with the Erste Group and became a member of the VIG. The drop in premiums written was caused just by these demanding strategic transformations.

2 Methodology and Data

The aim of this article is to evaluate the development of premiums written and the market share of VIG on the insurance market of the Slovak Republic. It also wants to ascertain whether or not this development was affected by strategic transformations undergone in the insurance companies belonging to the VIG. The article then performs its own analysis of historical development of the VIG in the Slovak Republic. It selects and summarizes the most significant moments which were turning points for the VIG. In order to do this, I collected data from the VIG's website. Consequently, using the method of description, I characterized each insurer belonging to the VIG. I used data available on insurers' websites and also their annual reports. For every insurance company I

performed an analysis covering the time period from 2005 to 2013, based on premiums written and a market share.

Data on premiums written were collected from the statistics of the Slovak Association of Insurers (hereinafter referred to as SLASPO). Based on the performed analysis of individual insurers I selected differing characteristics and compared these. Whilst performing this evaluation, I also took significant transformations in the development of the VIG into consideration. The final part of this research focuses on analyzing and evaluating of the insurance group VIG. I perform an analysis of the VIG depending on the pace of growth of premiums written (year-on-year change of premiums written expressed in percents) in the time period 2005 – 2013. I am also going to compare the calculated figures with the global Slovak insurance market. Finally, I am going to comment on connections between strategic transformations of insurance companies and changes of indicators of the insurance market. I will also calculate the VIG's market share in the time period 2005 – 2013 and I will compare it with the market share of each insurance company.

3 Results and Discussion

Analysis of KOOPERATIVA Poisťovna, a.s., Vienna Insurance Group

KOOP has been a member of the VIG since 1990, when it was established. KOOP was the first commercial universal insurance company established in the Slovak Republic. In 2003, KOOP and Slovenská Sporiteľňa, a.s. (hereinafter referred to as SS) concluded a cooperation agreement. KOOP's branches offer SS's products and information about its products. It is especially its giro account, electronic banking services, payment cards and term deposits. SS's branches offer KOOP's products. It is mainly KOOP's household insurance, car insurance, compulsory third-party insurance, civil buildings insurance and stay abroad insurance. Another KOOP's partner is HVB Bank Slovakia, a.s. (www.koop.sk, 2015)

Based on the data published in KOOP's annual report, it is owned by two companies, VIENNA INSURANCE GROUP AG Wiener Versicherung Gruppe (94.23 %) and SECURIA majetkosprávna a podielová s. r. o (5.77 %). SECURIA is owned solely by the VIG.

Table 1 KOOP and indicators of the insurance market in the time period 2005 – 2013

	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
PW total on IM, mil Eur	1720	1784	1915	2108	2027	2067	2110	2114	2169
KOOP's PW total, mil Eur	350.6	373.5	420.0	461.0	467.8	471.5	486.3	491.0	509.1
KOOP's share on IM, %	20.4	20.9	21.9	21.9	23.1	22.8	23.0	23.2	23.5
KOOP's non-life PW, mil Eur	243.4	237.8	264.1	278.0	275.4	248.0	253.1	250.0	250.6
KOOP's life PW, mil Eur	107.2	135.7	155.9	183.0	192.4	223.5	233.2	241.0	258.5

Source: Own work based on SLASPO's annual reports and statistics

The table above shows the development of KOOP's premiums written (PW in the table) and KOOP's market share on the Slovak insurance market (IM) in the time period 2005 – 2013. The market share of KOOP on the IM increased absolutely by 3.1%, meaning 15.2% relatively between 2005 and 2013. KOOP's premiums written increased by 45.2% between 2005 and 2013, whilst the global Slovak insurance market increased only by 26.1%. In 2013, KOOP's market share was 23.5% which is the highest market share ever achieved by KOOP in the monitored period. KOOP's total premium written shows an

upward tendency. 2013 shows higher figures of PW of life insurance. According to SLASPO's 2012 annual report, surpassing PW of life insurance on the global Slovak insurance market took place already in 2008.

Analysis of Komunálna Poisťovňa, a.s., Vienna Insurance Group

The insurance company KOM was established in 1994 and it has been a member of the VIG since 2001. In 2001, an acquisition took place and the insurance company KOOP bought up a majority share in this company. KOM specializes in insurance of Slovak towns and cities. According to data collected from KOM's annual reports, the insurance took over the insurance portfolio of the insurer KONTINUITA poisťovňa, a.s. Vienna Insurance Group (hereinafter referred to as KON) in 2009.

The insurer KON was owned by two companies, namely by WIENER STADTISCHE Versicherung AG Vienna Insurance Group (33 %) and Kooperativa poisťovňa, a. s. (67 %). KON commenced in 1997 and became a universal insurer in 2003. Afterwards, it started specializing in life insurance and injury insurance. In 2001, it became a member of the VIG. (peniaze.pravda.sk, 2015)

According to KOM's annual report, in 2008 KOM concluded a partnership agreement with its strategic partner, Slovenská Sporiteľňa, a.s. This contract has been aimed at sales of bank products using the insurer's vending network. The initial stage involved only credits secured by the right of lien and non-cash payment services. Since 2012, there has been a new consumer credit called „Čokoľvek" (meaning „Anything"). The insurance company KOM cooperates also with the association Združenie miest a obcí Slovenska (Association of Slovak towns and cities.) This cooperation dates back to 1994. The insurance company KOM is a general partner of this association and it supports cultural and social activities of Slovak towns and cities as well as public educational programs in the area of insurance and prevention.

According to KOM's annual report, it is owned by two companies, namely by KOOPERATIVA poisťovňa, a. s. Vienna Insurance Group (81.14 %) and VIENNA INSURANCE GROUP AG Wiener Versicherung Gruppe (18.86 %).

Table 2 KOM and indicators of the insurance market in the time period 2005 – 2013

	2005	2006	2007	2008	2009	2010	2011	2012	2013
PW total on IM, mil Eur	1720	1784	1915	2108	2027	2067	2110	2114	2169
KOM's PW total, mil Eur	44.0	56.4	59.2	63.2	136.9	149.6	159.1	165.6	171.3
KOM's share on IM, %	2.6	3.2	3.1	3.0	6.8	7.2	7.5	7.8	7.9
KOM's non-life PW, mil Eur	39.9	52.4	53.5	54.0	48.6	51.9	55.0	58.9	60.5
KOM's life PW, mil Eur	4.1	4.0	5.7	9.2	88.3	97.7	104.1	106.7	110.8

Source: Own work based on SLASPO's annual reports and statistics

Table 2 shows the development of KOM's premiums written and its market share on the Slovak insurance market between 2005 and 2013. KOM's market share on the insurance market increased absolutely by 5.34% between 2005 and 2013, meaning 208.6% relatively. KOM's premiums written increased by 289.2% between 2005 and 2013, whilst the global Slovak insurance market increased by 26.1%. In 2013, KOM attained 7.9% of market share which is the highest market share ever attained in the monitored period. Higher figures of premiums written of the life insurance in 2009 owe to the take over within which KOM bought up KON's insurance portfolio.

Analysis of Poisťovňa Slovenskej Sporiteľne, a.s. Vienna Insurance Group

PSS has been part of the Slovak insurance market since 2003. It offers life insurance. Since its establishment, it has been a member of the international banking group Erste Group. PSS specializes in bancassurance and it offers products to its bank clients. SS's distributional network is used by PSS as its distributional channel. In 2008, PSS's insurance part s-Versicherung was sold and the insurer became a part of the international insurance group VIG. In 2013, Prvá stavebná sporiteľňa, a.s. became a distributional channel for PSS. (www.pslsp.sk, 2015)

According to PSS's annual report, the insurance company is owned by 3 companies, namely by VIENNA INSURANCE GROUP AG Wiener Versicherung Gruppe (90%), KOOPERATIVA poisťovňa, a. s. Vienna Insurance Group (5%) and Slovenská sporiteľňa, a. s. (5%).

Table 3 shows the development of PSS's premiums written on the Slovak insurance market in the time period 2005 – 2013. The market share of PSS on the insurance market increased absolutely by 1.74% between 2005 and 2013 meaning 39.3% relatively. PSS's premiums written increased by 76.8% between 2005 and 2013, whilst the global Slovak insurance market increased by 26.1%. The time period 2010 – 2013 shows growth of the premiums written and also growth of the insurer's market share. In 2013, PSS attained a market share of 3.2% which is the best result achieved in the monitored period. In 2013, the insurance company attains highest figures in the monitored period as far as premiums written are concerned.

Table 3 PSS and indicators of the insurance market in the time period 2005 - 2013

	2005	2006	2007	2008	2009	2010	2011	2012	2013
PW total on IM, mil Eur	1720	1784	1915	2108	2027	2067	2110	2114	2169
PSS's PW total, mil Eur	39.3	40.0	27.8	41.7	33.5	37.9	44.3	53.0	69.3
PSS's share on IM, %	2.3	2.2	1.5	2.0	1.7	1.8	2.1	2.5	3.2
PSS 's non-life PW, mil Eur	0	0	0	0	0	0	0	0	0
PSS's life PW, mil Eur	39.3	40.0	27.8	41.7	33.5	37.9	44.3	53.0	69.3

Source: Own work based on SLASPO's annual reports and statistics

Comparison and Evaluation of the Vienna Insurance Group in the Slovak Republic

Based on the description above and the analysis of insurance companies belonging to the VIG, I will summarize important data and compare it (see table 4). Since 2008, all insurance companies have been members of the VIG. 2008 was significant for all insurance companies belonging to the VIG not only in the Slovak Republic but also abroad because the VIG concluded a long-term strategic partnership with Erste Group. This strategic cooperation primarily means that both of these financial services providers offer products of the other.

The insurance company PSS specializes in life insurance in the form of bancassurance. KOM and KOOP offer insurance products of life and non-life insurance, where KOM focuses on insuring Slovak towns and cities. Since 2003, KOOP and SS have been cooperating, both of them offering products of the other. In 2009, KOM took over the insurance portfolio of the insurance company KON.

Total premiums written on the global Slovak insurance market between 2005 and 2013 increased by 26.1%.

Table 4 Comparison of KOOP, KOM and PSS based
on selected indicators and characteristics

	KOOP	KOM	PSS
Member of VIG since	1990	2001	2008
Specializes in	Universal insurer	Insuring Slovak towns and cities	Life insurance, bancassurance
Maximum share on IM	2013: 23.5 %	2013: 7.9 %	2013: 3.19 %
Minimum share on IM	2005: 20.4 %	2005: 2.56 %	2007: 1.45 %
Change of total PW between 2005 and 2013	45.2 %	289.2 %	76.8 %
Relative change of share on IM between 2005 and 2013	15.2 %	208.6 %	39.3 %

Source: Own work

The following analysis focuses on the VIG group in the time period between 2005 and 2013. Graph 1 shows the development of year-on-year changes of premiums written of the global Slovak insurance market, the VIG insurance group and individual insurance companies KOOP, KOM and PSS.

Based on year-on-year changes of premiums written between 2005 and 2013 it can be stated that the development of VIG's and KOOP's premiums written follow the development of the global Slovak insurance market. KOM and PSS show different development.

Figure 1 Year-on-year changes of premiums written between 2005 and 2013

	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13
IM - PW change	3,72%	7,34%	10,08%	-3,84%	1,97%	2,08%	0,19%	2,60%
VIG - PW change	10,07%	12,05%	11,75%	-2,80%	3,26%	4,65%	2,88%	5,64%
KOOP - PW change	6,52%	12,44%	9,78%	1,40%	0,86%	3,14%	0,97%	3,68%
KOM - PW change	28,28%	4,86%	6,73%	116,73%	9,28%	6,36%	4,05%	3,45%
PSS - PW change	1,68%	-30,45%	49,96%	-19,62%	13,09%	16,75%	19,76%	30,68%

Source: Own work

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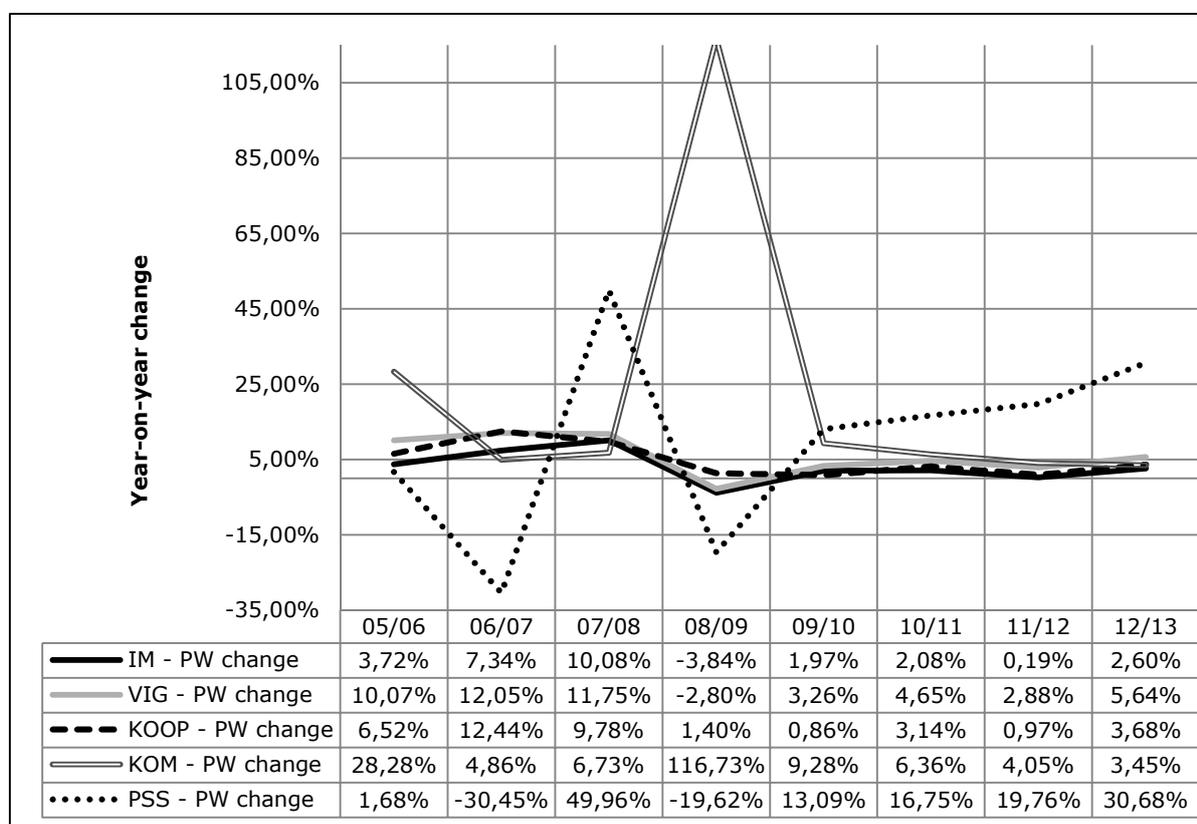
KOM's sharp increase between 2008 and 2009 was caused by fusion with the insurance company KON. The growth pace of KOM's PW after taking over KON's insurance portfolio, i.e. between 2009 and 2013, is higher than what the Slovak IM is showing. The reason for this growth lies in aforementioned strategic transformations within the company. Buying KON's insurance portfolio led to significant increase of KOM's life insurance. The insurance company KOM took advantage of KON's distribution network. The cooperation with Slovak towns and cities also affected the growth of premiums written. The strategic partnership with the Erste Group and membership in the insurance group VIG led to strengthening of KOM's trade name. Also, KOM started benefiting from VIG's experience.

The insurance company PSS's pace of growth shows some fluctuation. The most significant year-on-year drops took place between 2006 and 2007 and between 2008 and 2009. According to PSS's annual report, the Slovak National Bank reduced technical interest rate to 2.05% in 2007 which led to less interest in products of capital life insurance.

This led to a sudden drop of PW in 2007. To prevent another decline, the insurance company started offering new life insurance products. In 2008, the premiums written rose. Another drop took place in 2009, caused by strategic transformations related to PSS's entering the VIG insurance group. Since 2010, PSS's premium written has been growing and the growth pace exceeds the global Slovak IM's growth. The upward tendency of the premiums written between 2010 and 2013 was affected by PSS's entering the VIG insurance group.

Table 5 The development of VIG's market share on the Slovak insurance market.

	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
PW on IM, mil Eur	1720	1784	1915	2108	2027	2067	2110	2114	2169
VIG'S PW, mil Eur	476.4	524.3	587.5	656.3	638.2	659.0	689.7	709.6	749.6
VIG'S share on IM, %	27.7	29.4	30.7	31.3	31.5	31.9	32.7	33.6	34.6

Source: Own work

Table 5 shows the development of the VIG's market share between 2005 and 2013. It is obvious that the market share in this period and in 2013 attained the maximum value of 34.6%. Between 2005 and 2013, the relative market share growth was 24.9%. Premiums written between 2005 and 2013 increased by 57.3% with the global Slovak insurance market reaching 26.1%.

4 Conclusions

This article is focused on an analysis of the insurance market formed by the insurance group VIG. It characterizes the VIG group itself, as well as individual insurance companies KOOP, KOM and PSS on the Slovak insurance market and it emphasizes some significant changes in their histories. This article presents an analysis of premiums written and the market share on the insurance market of insurance companies KOOP, KOM and PSS in the time period between 2005 and 2013. It also presents basic differences in selected attributes. The main part of this article is an analysis of the insurance company VIG including the development of the growth pace (year-on-year change expressed in percents) of the premiums written between 2005 and 2013. This article compares the growth pace of the premiums written of individual insurance companies, the insurance company VIG and the global Slovak insurance market. Finally, this article shows the development of VIG's market share between 2005 and 2013.

The aim of this article is to evaluate the development of the premiums written and market share of the Vienna Insurance Group (VIG) on the insurance market of the Slovak

Republic. It also aims at ascertaining whether or not this development was affected by strategic transformations undergone in insurance companies belonging to the VIG. Through analyzing and subsequent comparing, it is found out that the development of the VIG group and the insurance company KOOP follows the development of the global Slovak insurance market. KOOP did not undergo any significant changes in this time period. Differences were found at the insurance company KOM and PSS.

The insurance company KOM underwent several strategic transformations in the monitored time period. These affected indicators of the insurance market. In 2008, KOM and KON fused which led to a sudden rise of premiums written between 2008 and 2009. The fusion affected the following period 2010 – 2013 during which life insurance boosted, mainly because of availability of KON's distribution network. The insurance company cooperates with Slovak towns and cities and this strategic cooperation has further influence on growth of premiums written in the period 2010 – 2013. Finally, the strategic partnership of the Erste Group and the VIG which has been developing since 2008 has also had a positive influence on the growth pace of premiums written.

In 2008, PSS became part of the VIG. PSS's premiums written dropped in 2009 but in 2010, it started growing again. The growth pace exceeds the growth of the global Slovak insurance market, the insurance company KOM and also KOOP. The drop in 2009 was caused by strategic transformations related to PSS's entering the VIG group. The development of premiums written between 2010 and 2013 was affected by the cooperation with the VIG.

VIG's market share had an upward tendency between 2005 and 2013. In 2013, it reached its maximum level at 34.6%. VIG's market share on the Slovak insurance market between 2005 and 2013 increased relatively by 24.9%. The relative growth of KOOP's market share between 2005 and 2013 was 15.2%, with KOM reaching 208.6% and PSS 39.3%.

Acknowledgments

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Unit-linked Insurances as an Element that Shapes the Savings Portfolio of Households in Poland after the Accession to the European Union

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Abstract: *Household savings constitute a very important factor that triggers the economic growth. Savings accumulation is also an element that shapes the pension policy system, particularly in the segment of individual, voluntary savings products that can be burdened with a considerable value impairment risk, which results from macroeconomic factors. This is a current problem in the face of the financial crisis, where diversification of household savings portfolio that provides security to households under changing economic conditions gains significance. The aim of this research is to present one of the constituents of this portfolio - unit-linked life insurances where the investment risk is borne by the policy holder – compared to other savings products available on the Polish market in the years 2004-2013. In order to set the mathematical model that describes the variable, i.e. a provision in unit-linked life insurances where the investment risk is borne by the policy holder, the analysis of multiple regression has been carried out. The results of analyses indicate that as part of inspected savings schemes the importance of insurances gradually increases and they are more and more frequently chosen as an element that shapes household savings portfolios.*

Keywords: household savings constitute, unit – linked, life insurance, mathematical model, multiple regression

JEL codes: G22, D14

1 Introduction

Household savings constitute a very important factor that triggers the economic growth. Savings accumulation influences numerous sectors of the economy and in the present-day reality of globalization and international integration it has an additional impact on the global economy. Therefore, this issue draws attention of many analysts. Keynes's income theory (1936), which stated that consumption level depends on current income, may serve as a basis for analysis. This issue was widened to a certain extent by Friedman's (1957) permanent income theory, which claims that consumption expenditure of households depends on average lifetime income. Modigliani's (1954) life cycle theory strongly corresponds with this statement: it indicates the necessity to accumulate savings throughout the period of occupational activity in order to level out consumption after retirement - which is mostly associated with a drop in income. The abovementioned issue was also explored by Xiao and Noring (1994) who studied the motifs behind saving money reported by households and observed their strong correlation with financial resources of households. Along with the increase in households' financial resources and the resulting affluence, motifs behind saving money undergo a change (Xiao and Noring 1994, Fisher and Montalto 2010). In this context we need to stress that income is a factor that substantially determines money-saving activities of households. The income level determines the sole fact of having savings by sparking off the propensity to save money. The increase of income triggers the reduction of consumption in favour of boosting the propensity to save money (Wójcik 2007). Looking at the issue of savings

from a macroeconomic point of view, we need to emphasize that – as demonstrated by numerous analysts – their level depends on the economic growth (Wildowicz 2006, Wójcik 2007, Ang 2009, Misztal 2011), whereas one of the key long-term factors that contribute to the economic growth is the development level of the financial system (Ahmed, Ansari 1998). It takes place through:

- accumulating savings by financial institutions and markets,
- creating a vast array of investment instruments,
- an efficient capital allocation,
- channelling capital into dynamically developing sectors of the economy,
- solving the problem of negative selection,
- stimulating specialized production, developing entrepreneurship and adapting new technologies.

Therefore, the financial system – a collection of interlinked financial institutions, financial markets and elements of the financial system infrastructure – allows the provision of services that make the circulation of purchase power in the economy possible. It also plays a vital role when it comes to the transfer of capital from entities with savings to entities that need the capital to start their investments. Within the framework of the financial system, the insurance sector – a significant link in the development of the free market economy – plays an important role as well. We need to stress that the significance of the insurance sector for the economic growth has increased in the recent years. It is a bi-directional relationship between financial development, economic development and economic growth. Owing to insurances, among others, a non-consumed part of households' current income is postponed. It is worth noting that on the one hand insurers participate in and prompt the process of accumulating savings and on the other hand, they influence their allocation. It results from their mission, which is diversified depending on the type (life or non-life insurances) (Owsiak 2002). Life insurances, which hold an important position in mobilizing household savings, play a special role in this process. The demand for life insurances is strongly correlated with the savings rate and the level of disposable income per capita. The stronger the propensity to save money and the higher the household income, the higher the development and demand for life insurances (Carmichael, Pomerleano 2002). Insurers also stimulate the efficiency of the financial system through, among others, increasing the liquidity of financial markets, reducing transaction costs and boosting economies of scale resulting from investments. This is particularly important in the face of governments' tendency to withdraw from the direct provision of retirement benefits. Under such conditions, commercial insurances – due to their substitutability and complementariness to social insurances – are beginning to play a more important role in maintaining a certain living standard in the post-retirement period (Bednarczyk 2012, Nečas 2014).

2 Household Savings after the Polish Accession to the European Union

The Polish accession to the European Union was a breakthrough moment for the economy that began to function in a new economic dimension. The increased trade triggered by the abolition of tariff barriers, inclusion of Polish enterprises into the European trade outlet, freedom to move and conduct business or the access to considerable structural funds were a few of the factors that stimulated the economic growth. It was reflected in the increased income of business entities operating on the market and the society in general and in consequence contributed to the enhanced living standards of the citizens.

We need to emphasize that savings generated by all sectors of the economy constitute one of the most important factors of the economic growth and development. It is due to the fact that savings are the basic source of capital accumulation and they indicate investment possibilities of each economy, thus marking the opportunities for enhanced performance. Additionally, the increase in savings creates conditions for increased consumption in the future (Nowak and Ryć 2002). A consequence of these processes was the doubling of household revenues and savings in the years 2004-2013. It needs to be

said that accumulated household savings are an important element of national savings. Owing to them, the entire market and the households themselves can function in a proper way. Certainly, it is strongly correlated with a gradual increase in the disposable income in the analysed period – see a Figure No 1 below.

Figure 1 Average monthly disposable income and expenses per capita in households (in PLN) and the share of expenses in disposable income (in %) in the years 2004-2013
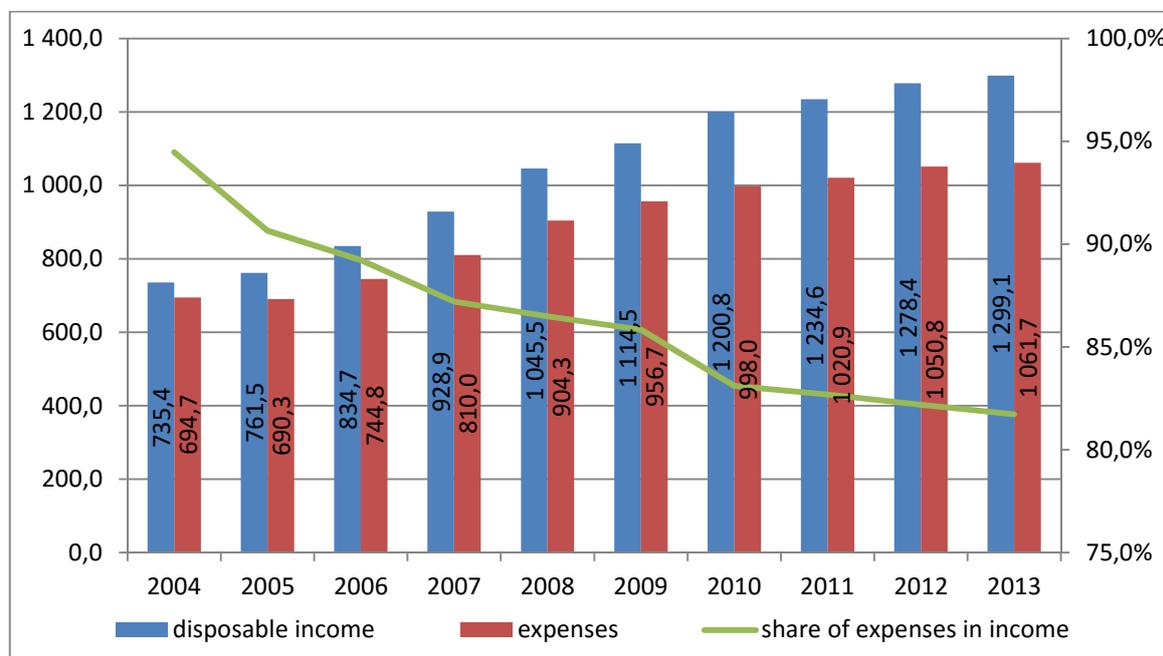
Source: Sytuacja gospodarstw domowych w 2013 r. w świetle wyników badania budżetów gospodarstw domowych, http://stat.gov.pl/obszary-tematyczne/warunki-zycia/dochody-wydatki-i-warunki-zycia-ludnosci/sytuacja-gospodarstw-domowych-w-2013-r-w-swietle-wynikow-badan-budzetow-gospodarstw-domowych,3,13.html.

A constant decline in the share of expenses in the household income, observed since 2004, demonstrates that the remaining financial surplus is a factor that stimulates saving. By making financial decisions concerning the level of consumption and saving, households aim at satisfying their current and future needs. It is the future needs that particularly shape the standard of living and increased expenses related to ageing in the light of an aggravating inefficiency of the public social security system. Therefore, the accumulation of savings constitutes an important factor of households' financial planning. The demand for financial services offered by financial institutions that is created in this process contributes to the emergence of various sorts of savings products, the structure of which is very diverse and burdened by different risk levels: starting from the safest ones, such as bank deposits or government bonds, to equity investments or aggressive investment funds burdened with high investment risk. The risk level is an important selection factor, particularly under economic instability or crisis. It is especially observable during the current global debt crisis that undermined clients' confidence in financial institutions operating on the market and influenced the shifting of the stream of savings towards instruments with low investment risk. The level of household savings broken down by five basic categories is presented in Figure No 2.

Figure 2 Structure of household savings in Poland in the years 2004-2013
(in PLN billion)

What deserves particular attention when analyzing the structure of household savings portfolio is a large share of bank deposits that grow steadily with time. They also demonstrated stability during the financial crisis in the years 2007-2008. It does not hold true for other categories of savings, as they demonstrated a significant breakdown in that period. Beyond doubt, under the growing investment risk some clients decided to repurchase investment fund units or sell their shares and transfer their savings into safer bank deposits. Similarly, after the peak of the crisis, starting from 2009, the share of financial instruments burdened with increased risk went up demonstrating a practically unaltered market share until 2013. There is relatively little diversity in the development of particular groups featured in the savings structure in the years 2004-2013. Compared to the significant growth of bank savings level, other categories have remained virtually unchanged. This is due to a number of elements, including inter alia:

- the lack of a habit of saving,
- trust in the public social security system's efficiency, particularly in the area of retirement and healthcare benefits,
- a relatively low real income,
- unfamiliarity with products offered by the financial market,
- fear of investment risk magnified by the global financial crisis.

We have to note, though, that in a global sense, as indicated by studies carried out by the Kronenberg Foundation, each year there are more and more Poles who save money. Among those who save, the percentage of people who save irregularly and regularly has grown. Regular and long-term saving particularly determines the need to diversify the savings portfolio and, consequently, to look for financial products that can generate a higher profit rate from the invested capital than bank deposits. In this context, this article is now going to devote special attention to the unit-linked policies where the risk is borne by a policy holder. They can constitute one of the products aimed at long-term capital accumulation with a view to future needs, e.g. after retirement. The unit-linked policy is a pure investment product that takes advantage of benefits offered by the legal

form of an insurance. By offering such policies insurers enable clients to accumulate savings in an individual portfolio consisting of various investment funds. The added value of unit-linked policies is not only the possibility to choose different funds from insurers' offers, but also the fact that they are managed by various companies, which is of utmost significance from the point of view of diversification of investment risk. What is particularly important is that an insurance company that offers unit-linked policies preselects funds that are available in the programme, as the majority of clients are unable to evaluate particular funds. Usually, such a superficial evaluation is based on a long-term rate of return, which is not the best criterion. At selecting funds to be offered insurance companies use more refined parameters that take account of an accompanying risk through using different indicators, apart from the rate of return. Unit-linked policies have an open framework and are transparent. Such structure allows an easy identification of a strategy and its regular verification. It also allows the hunt for bargains that appear on the market. Therefore, the composition of a portfolio can be adjusted to a changing market situation at any time. In the analysed period their share in the savings portfolio ranged between 4.1% in 2004 and the peak of 6.3% reached in 2007. As of end 2013 it amounted to 5.8% and continues to go up. We need to highlight here that unit-linked policies are perceived as prospective products in Poland and that insurers attach much hope to them in the context of increasing their sale and share in the portfolio of life insurance products available. However, it ought to be emphasized that due to their structure that is based on the use of various types of investment funds, they are susceptible to risks resulting from direct offers made by competing investment funds.

3 Methodology and Data

The subject of the analysis is to determine the relationship between the propensity to save money by households through unit-linked life insurance and other savings products available on the market in analyzed groups. Additionally, it strives to find out what the relationship between the propensity to save money and selected macroeconomic factors that boost the demand for increased household income and savings is. To this end, in order to set the mathematical model that describes the variable, i.e. a provision in unit-linked life insurances where the investment risk is borne by a policy holder, the analysis of multiple regression was carried out. In order to more precisely ascertain the relationships between particular categories, two analysis methods were applied.

The first one used a stepwise forward regression, the essence of which consists in a stepwise inclusion of variables with a significant impact on a dependent variable – until the "best" model is achieved, i.e. to achieve a state when all explanatory variables with a significant impact on a dependent variable are included in the model. Additionally, the analysis included:

- a calculation of multidimensional determination index that informs us about the share of variability caused by a determined model in the entire variability of results,
- an analysis of relevance of the assumed regression model by means of F statistics (at relevance level $\alpha = 0,05$),
- analysis of relevance of regression indexes by means of a Student's t-test. Verification of the zero hypothesis H_0: b = 0 was carried out at the relevance level $\alpha = 0,05$.

Calculation results are presented in Table No 1 below.

Table 1 Analysis of propensity to save money as part of unit-linked life insurance where the risk is borne by a policy holder in relation to other selected factors conducted by means of a stepwise forward regression model

X		Regression index		Regression index testing		Multidimensional determination index [F; p]
		Value	Standard error	t	p	
	Free term	-7079,579	2835,559	-2,80	0,045	
X1	Financial assets of households	0,041	0,007	5,92	0,004	
X2	Investment funds for natural persons	0,150	0,040	3,75	0,020	0,999 [F=870,5; p=0,000]
X3	Life insurance premium	0,147	0,065	2,77	0,046	
X4	Gross National Product (current prices)	-0,011	0,007	-1,47	0,215	
X5	Investments in stocks and bonds individuals	-0,086	0,070	-1,22	0,288	

Source: Own calculations assisted by the use of Statistica 10 software

As a result of conducted calculations a mathematical model that describes the analysed variable was constructed in the following form (1):

Y = - 7079,579 + 0,041*X1 + 0,150*X2 + 0,147*X3 - 0,011*X4 – 0,086*X5 (1)

Where: Y – a dependent variable representing the demand for unit-linked life insurances where the risk is borne by a policy holder, X1 – financial assets of households (PLN billion), X2 – investment funds for natural persons (PLN billion), X3 – life insurance premium (PLN billion), X4 – Gross National Product (PLN billion, in current prices), X5 – natural persons' investments in bonds and shares (PLN billion).

The analysis must take account of the fact that the item "financial assets of households" indicates a collinear relationship with the following items: investment funds for natural persons, life insurance provision and investments of natural persons in shares and bonds. This results from the fact that the abovementioned items form a total portfolio of assets, as part of which mutual influence of particular elements takes place depending on macroeconomic and cyclical factors. The structure of the portfolio, as indicated earlier, exhibited considerable changes in the analysed period of 2004-2013. It is a consequence of shifting economic conditions resulting mainly from the impact of the global financial crisis that contributed greatly to changes in the structure of household savings.

As seen from the presented model, there is a strong positive relation between unit-linked life insurance where the risk is borne by a policy holder and the increase in household assets and consequent expenditure on investment funds and life insurances. If GDP level and efficiency of investments in bonds and shares fall down, this relationship observes a downward trend. A strong correlation between the analysed variables goes beyond doubt as well.

The second analysis used a stepwise backward regression, the essence of which consists in a stepwise removal of variables that do not have a significant impact on a dependent variable – until the "best" model is achieved, i.e. to achieve a state when only those explanatory variables that have a significant impact on a dependent variable remain in the model. Similarly as in the previous case, this analysis included:

- calculation of multidimensional determination index that informs us about the share of variability caused by a determined model in the entire variability of results,
- analysis of relevance of the assumed regression model by means of F statistics (at relevance level $\alpha = 0{,}05$),
- analysis of relevance of regression indicators by means of a Student's t-test. Verification of the zero hypothesis H0: b = 0 was carried out at the relevance level $\alpha = 0{,}05$.

Calculation results are presented in Table No 2 below.

Table 2 Analysis of propensity to save money as part of unit-linked life insurance where the risk is borne by a policy holder in relation to other selected factors conducted by means of a stepwise backward regression model.

	X	Regression index		Regression index testing		Multidimensional determination index [F; p]
		Value	Standard error	t	p	
	Free term	-11239,521	998,713	-11,25	0,000	0,996 [F=1022,2; p=0,000]
X1	Financial assets of households	0,034	0,001	32,70	0,000	
X2	Investment funds for natural persons	0,114	0,011	10,02	0,000	

Source: Own calculations assisted by the use of Statistica 10 software

As a result of conducted calculations a mathematical model that describes the analysed variable was constructed in the following form (2):

$$Y = -11239{,}521 + 0{,}034 \cdot X1 + 0{,}114 \cdot X2 \qquad (2)$$

Where: Y – a dependent variable representing the demand for unit-linked life insurances where the risk is borne by a policy holder, X1 – financial assets of households (PLN billion), X2 – investment funds for natural persons (PLN billion).

As seen from the presented model, there is a strong positive relationship between unit-linked life insurances where the risk is borne by a policy holder and the increase in household assets and consequent expenditure on investment funds and life insurances. A strong correlation between analysed variables is also certain.

Both models expressly indicate that unit-linked life insurances where the risk is borne by a policy holder strongly depend on macroeconomic fluctuations and competing substitute products available on the market.

4 Conclusions

As seen from the conducted analysis, the savings level of Polish households after the accession to the European Union grows steadily. It is reflected in the possibility to use various financial products burdened with various investment risk levels as part of savings programmes. Under the financial crisis the savers focus mostly on bank deposits, however, in the recent period greater interest in other investment programmes, including insurance products where the risk is borne by a policy holder, can be observed. They are becoming a more and more popular offer in insurance companies' portfolios. At the same time, as indicated by the studies, they depend on numerous market factors that emerge under changing economic conditions. We need to assume, though, that their market

relevance will continue to grow and they will constitute an important pension product that supplements benefits obtained from the public social security system.

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Contemporary Development of the European Monetary Union and its Risk Factors

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Abstract: The paper deals with the problems of the development of financial system of the European Union (EU) countries with special focus on solution of existing crisis. First and foremost, reasonability and present advancement in accomplishing "Euro Area" project, including the process of progressive introduction of single European currency is assessed. In connection with this, existing development of the European Union, with special focus on specification of contemporary economic problems that are currently being solved by enforcing so called "rescue" measures, is analysed. This is described as „European Stability Mechanism" (ESM), which is related to recent adoption of principles of so called "banking union". As these are non-standard political decisions with exceptionally important economic and social impact, their content is analysed in system context, with the goal to evaluate their benefits and risks, not only in the context of future economic development of the European Union, but from the point of view of benefits with respect to European population and human society.

Keywords: financial system, Eurozone, regulation, central banks, quantitative easing

JEL codes: E43, E58, F36, G15, G18

1 Introduction

Non-standard management of economy with the goal to support economic growth as much as possible can be currently seen worldwide. This is a result of the fact that economies have not overcome the consequences of economic crisis, launched by considerable downswing of American mortgage market and subsequently stock market in 2008 and that spread into further spheres of most national economies.

European Union has been playing an important role in this problematic development. The reason is that EU is not only an economic community of sovereign states, but it is an important multinational economic community, gradually creating monetary union, so called "eurozone". Functionality, or non-functionality of this system, based on the principle of single currency, significantly influences successfulness or unsuccessfulness of the development of the whole European Union and it substantially influences functionality of world economy.

2 Methodologies and Data

Current problems of the European Union were not a bolt from the blue. They emerged as a consequence of numerous reasons, resulting from human faults. By identification of key reasons and by prediction of potential consequences the paper aims to assess the way of development of the European Monetary Union and connected with it risks. To be able to identify mentioned reasons and consequences, system context must be considered. Thus the applied methodology represents a mix of qualitative and quantitative analysis based on snowball approach assuming a gradual movement from analysis of key reasons standing behind establishment of the European Monetary Union, through study of its development during and after financial crisis and up to evaluation of perspectives of its further development. The qualitative component is represented by review of existing studies, while quantitative component is given by analysis of descriptive statistics on public debt to GDP and to government revenue ratios, raw data on which were derived from Česká spořitelna and Eurostat database, and Bloomberg terminal.

3 Results and Discussion

3.1 Analysis of Historical Development of the European Union

European Union was officially established by signing Maastricht treaty in February 1992. Principles of further course, leading to common currency, were defined and schedule stipulating January 1st 1999 the latest term for establishing monetary union was agreed on. Convergence criteria were formulated; meeting these criteria should have been obligatory for those who would participate in the monetary union and, at the same time, institutional form of the Eurozone, lead by newly established European Central Bank (ECB); its primary goal should have been to take care of price stability. ECT took over its powers in June 1998; its monetary strategy was introduced in October 1998. Subsequently, non-cash Euro was introduced in the first 11 countries; banknotes and coins were launched three years later, on January 1st, 2002.

As Singer said in 2012, the first decade of Euro made impression that it was a functional and successful project. Monetary integration proceeded quickly, credits were flowing over the border in growing volumes, interest rates were converging, eurozone encouraged business growth and southern countries were growing rapidly. Since it was clear that individual countries, their central banks respectively, would lose possibility to perform their own monetary policies, as soon as they accept common currency, concerns arose that economically weaker countries might have big public budget deficits. This was why EU member countries accepted common coordination mechanism of Stability and Growth pact (SGP) in 1997; the objective of SGP was to prevent fiscal indiscipline. Ways how to coordinate budget policies of EU member countries were detailed and it was obligatorily stated that meeting of medium-term budget goals should be balanced; countries that infringe this rule will be subject to Excessive Deficit Procedure (EDP), which might lead to financial sanctions. On the other hand, the way how to solve financial crises and procedure how to help governments that might become insolvent as well as possible access to eurozone remained undefined, as well as potential exit from Eurozone. Belief that membership in Eurozone would result in better discipline of economy policies proved to be a mere illusion; in 2002, European Union suggested to penalize excessive deficits of France and Germany; these very strong countries enforced that sanctions would not be imposed on them as well as "softening" of original rules from the year 2005.

Findings of a number of authors, especially Singer (2012), Zahradník (2005) and Prušvic suggest that main drawbacks of early development of Eurozone include following:

- Eurozone was, with regards to differences in competitiveness of individual member countries, optimum currency area neither in the time of its commencement, nor later.
- Weaker economies that offered higher interest return gained capital, but solely at the cost of higher risk, which was long ignored by creditors' banks, as they supposed EU management to solve the situation. It implies that Eurozone did not improve capital allocation, it was more or less the other way round.
- Easy access to cheap credits supported fast growth of private and public expenditures, which caused deficits of current accounts.
- Capital inflow and low real interest rates in countries with higher inflation lead to overheating of their economies.
- Eurozone rules were not observed.
- EU political elites (including ECB) kept downplaying the problems and, instead of real solutions, only operative measures, so called "buying time" were adopted.

As a result of this situation, economically strongest Germany was gaining, due to common European currency (that could not depreciate in relation to currencies of weaker countries), more and more significant price competitiveness, while current accounts deficiencies of, before all, South European countries, were more and more counterweighted by surplus on German current account. This led to overheating of weaker economies, which kept hidden structural differences among countries, as well as insufficient fiscal discipline and institutional framework imperfections.

3.2 Analysis of European Union Development in the Period of Financial Crisis

Current "financial crisis" may be considered to be a consequence of world, before all American, economy, however, its particular impacts on individual European Union countries are results of their previous economic activities. Some of the countries "lived beyond their means" (primarily Greece). Other countries (e.g. Spain or Ireland) were relatively economical, but recession and rescue of banks significantly worsened their fiscal situation. Approximately two months after financial crisis outbreak, investors started to distinguish between the value of government debts of individual member countries, which resulted in the fact that public debt financing was expensive, or even impossible, for a number of countries. As a result, fiscal policy, instead of absorbing financial shocks, became their additional source in most Eurozone countries; this resulted in massive transfer of debts into public finances, which made contribution to beginning of recession. (Singer 2012).

Gradual worsening of economic situation in the European Union is shown in Table 1; growth of indebtedness of the whole European Union, Eurozone respectively, from 2006 to 2014, or from the time before the crisis up to now.

**Table 1** Development of indebtedness in the European Union 2006 - 2014

State / Year	2006	2007	2008	2009	2010	2011	2012	2013	2014
EU – 28						80.9	83.7	85.5	**86.8**
Eurozone – 19						85.8	89.1	90.9	**91.9**
Belgium	90.7	86.8	92.2	99.2	99.5	102.0	103.8	104.4	**106.5**
Bulgaria	21.3	16.6	13.3	14.2	15.9	15.7	18.0	18.3	**27.6**
Czech Republic	27.9	27.8	28.7	34.1	38.2	39.9	44.6	45.0	**42.6**
Denmark	31.5	27.3	33.4	40.4	42.9	46.4	45.6	45.0	**45.2**
Germany	66.5	63.7	65.1	72.6	80.5	77.9	79.3	77.1	**74.7**
Estonia	4.4	3.7	4.5	7.0	6.5	6.0	9.7	10.1	**10.6**
Ireland	23.8	24.0	42.6	62.3	87.4	111.2	121.7	123.2	**109.7**
Greece	103.4	103.1	109.3	126.8	146.0	171.3	156.9	175	**177.1**
Spain	38.9	35.5	39.4	52.7	60.1	69.2	84.4	92.1	**97.7**
France	64.4	64.4	68.1	79.0	81.7	85.2	89.6	92.3	**95.0**
Croatia	38.3	37.1	38.9	48.0	57.0	63.7	69.2	80.6	**85.0**
Italy	102.5	99.7	102.3	112.5	115.3	116.4	123.1	128.5	**132.1**
Cyprus	59.3	54.1	45.3	54.1	56.5	66.0	79.5	102.2	**107.5**
Latvia	9.9	8.4	18.6	36.4	46.8	42.7	40.9	38.2	**40.0**
Lithuania	17.2	15.9	14.6	29.0	36.2	37.2	39.8	38.8	**40.9**
Luxembourg	7.0	7.2	14.4	15.5	19.6	19.1	21.9	24.0	**23.6**
Hungary	65.0	65.9	71.9	78.2	80.9	81.0	78.5	77.3	**76.9**
Malta	64.6	62.4	62.7	67.8	67.6	69.7	67.4	69.2	**68.0**
Netherlands	44.9	42.7	54.8	56.5	59.0	61.3	66.5	68.6	**68.8**
Austria	67.0	64.8	68.5	79.7	82.4	82.1	81.5	80.9	**84.5**
Poland	47.1	44.2	46.6	49.8	53.6	54.8	54.4	55.7	**50.1**
Portugal	69.2	68.4	71.7	83.6	96.2	111.1	125.8	129.7	**130.2**
Romania	12.3	12.7	13.2	23.2	29.9	34.2	37.3	38.0	**39.8**
Slovenia	26.0	22.7	21.6	34.5	38.2	46.5	53.7	70.3	**80.9**
Slovakia	30.7	29.8	28.2	36	40.9	43.4	52.1	54.6	**53.6**
Finland	38.2	34.0	32.7	41.7	47.1	48.5	52.9	55.8	**59.3**
Sweden	43.1	38.2	36.8	40.3	36.8	36.2	36.6	38.7	**43.9**
Single Kingdom	42.5	43.6	51.8	65.8	76.4	81.8	85.8	87.3	**89.4**

Source: Česká spořitelna, Eurostat

Table 1 shows the fact that although the speed of EU indebting has slowed down a bit in recent years, this is mainly caused by balanced economic activities of Germany, while strong indebting of France, Italy and Spain, the most important Eurozone countries after Germany, has been persisting.

Although indebtedness, calculated as public debt of GDP is threatening, the real situation is even much worse. In fact, public debt of government revenue is more precise indicator; it compares public debts with incomes of public budgets, from which both paid interests and all instalments are paid. As figure 1 below (its right part) shows, this indicator shows more than twice worse results both for the EU and for individual countries.

Figure 1 Comparison of present-day indebtedness in EU
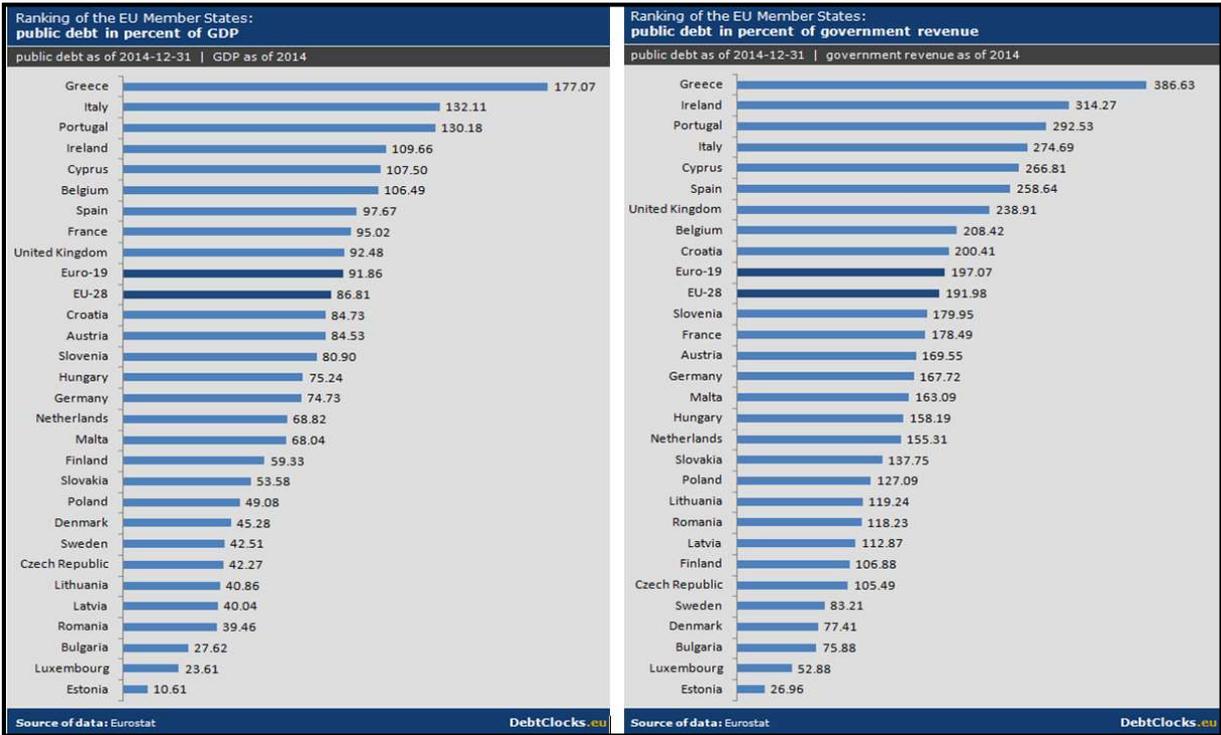
Source: Eurostat and Bloomberg

In this case, a question arose, what has the European Central Bank been doing so far? After financial crisis outbreak in 2008, it started providing almost unrestricted amount of money with one per cent interest to banks, which gradually changed into unsystematic and chaotic management of European bank system. Among particular examples of this ECB behaviour belong, according to Sulík (2012): gradual decreasing of required guarantees in case of bonds purchase from merchant banks, including those without any rating, "printing money" by Eurozone national banks within the framework of approved programme Emergency Liquidity Assistance (ELA), while being aware that central banks of two largest and the most indebted Eurozone countries – France and Italy – belong to private banks. Furthermore, there is legislatively unauthorized purchasing of Eurozone government bonds, enabling banks to create Asset Backed Securities and subsequently accept it first as guarantees and afterwards even repurchase it from them. And last but not least, they did not pay attention to illegal operations of merchant banks (e.g. providing bank loans so called "to themselves", issuing bonds that have maturity several thousand years etc.) Above mentioned facts suggest that the main problem of the Eurozone is based in its heterogeneity and ignorance of accepted rules. Furthermore, uniform monetary policy caused noticeable deepening of differences between the southern countries and core EU countries, so that Eurozone survival (which is, from the long term point of view, showing worse results, compared with the whole EU) is more and more dependent of ECB crisis measures, particularly on non-standard loans, fiscal transfers and "political solidarity" among European countries. It means that the greatest

EU project with the ambition to speed up economic growth has not brought anything positive; furthermore, there is a danger of collapse with catastrophic consequences (Singer 2012).

3.3 Analysis of Contemporary European Union Rescue Measures

There are two, partially related rescue programmes of the European Union, first of all "European Stability Mechanism" (ESM) and newly accepted so called "Banking Union".

3.3.1 Analysis of European Stability Mechanism

ESM programme represents management of the institution, performing the function of rescue fund of financial assistance for countries paying with Euro. This programme became valid on October 15th, 2012. What are its questionable aspects?

- ESM is a "subject of public law", it is, de facto, "government above countries".
- In it, member countries are irrevocably and unconditionally bound to pay any capital requirement, put forward towards them by the ESM. Board of Governors (consisting of the Ministers of Finances of member countries) can unrestrictedly increase it. As all European Union member countries are, according to this treaty, obliged to use Euro, introduction of Euro in existing non-member countries (with the exception of United Kingdom and Denmark) is decided and approved by qualified majority of the Council of the European Union, but only the countries that use Euro will vote.
- ESM officials are supposed to have the privilege of immunity, they will not be controlled and it will be impossible to take legal action against them. ESM archive will be completely inaccessible, and it will be impossible to confiscate its property (not even distrained) and it will not be subject of taxation in any way.

3.3.2. Analysis of the Rescue Programme of the "Banking Union"

According to Dědek (2014), European leaders started to deal systematically with the topic of Banking Union only in May 2012. These were:
  A) Single banking regulation
  B) Single banking supervision
  C) Single solution of banking problems,
  D) Single system of deposits insurance.

These so called "four pillars" of approved "banking union" are currently performed as follows:

A) Single banking regulation: This means establishing "Single rules of banking regulations"; to do it, three supervisory authorities were newly established in January 2011:

- European Banking Authority (EBA) in London,
- European Insurance and Occupational Pensions Authority (EIOPA) in Frankfurt,
- Securities and Market Authority (ESMA) in Paris.

These authorities are competent to issue technical standards and methodologies, obligatory in all European Union countries. They ensure unified application of approved rules and they judge differences of opinions between national regulators.

B) Single banking supervision: Single Supervisory Mechanism (SSM) entered into force in November 2014; it is characterised by:

- European Central Bank will take responsibility of performing Single supervision in the whole Eurozone banking system; it will directly supervise all banks with the value of assets exceeding 30 billion EURO or reaching 20 % of domestic economy.
- Supervision of other banks is still performed by national supervisory authorities, but they are obliged to inform the ECB on all important decisions, where ECB is authorized to overtake the supervision over any credit institution, in case it is required by the situation.
- All Eurozone countries became involved, where participation is "open" for its "provisional" non-members.

- Supervisory Board was authorized to control supervisory activities within SSM; it consists of representatives of all countries, including ECB Board of Governors.

C) Single solution of banking problems: This "pillar", called Single Resolution Mechanism (SRM), is supposed to unify national access to solution of banking sector problems within the EU. Harmonization of rules is supposed to relate to national institutions powers, crisis management tools, and financial support organization; it will become fully effective on January 1st, 2016. Firstly, the principle of self-help (bail-in) shall be promoted, in order to involve public resources into bank restructuring only in necessary extent. Bank recovering costs shall be preferentially born by shareholders and creditors (debts write-off, or their transformation into shares). Involvement of creditors in losses should be a subject of hierarchy that would guarantee protection of insured deposits and deposits of small and medium companies. Secondly, it should transfer powers to perform banking supervision on EU level; this requires transferring banking supervision responsibilities to EU level as well. For this, sufficient financial capacities for banks rehabilitation must be made.

- SRM shall include all countries, involved in SSM which means not only Eurozone members, but associated non-members as well.
- Single Resolution Fund (SRF) will be created that will be funded from banks contributions. In the beginning, it will consist of national segments that will "gradually increase their mutuality", in other words, "decrease the relation between the origin of the contributions and the seat of recovering bank". Mutual loans among national segments will be enabled.
- SRF will be secured by means of public resources. In the beginning, this function will be taken by national public resources and by European Stability Mechanism resources. Unified securing is supposed to be established within 10 years. Involvement of public resources will be refunded from contributions of banks, in case of need even on ex-post basis.
- Banking troubles solution committee shall have wide responsibilities as well; it will, from its own initiative or on the basis of ECB impulse, identify endangered banks and decide of the way how to solve the bank problem and use of SRF funds.

D) Single system of deposits insurance: This means harmonization of national accesses and interconnection of national systems of deposits insurance. The tool how to ensure these goals is based on proposal of directive on deposits insurance systems; it deals with following four areas:
- Single definition of insured deposits,
- Simplification of insured deposits compensation,
- Funding of insured deposits funds on ex-ante basis and fixed rate from deposits,
- Voluntary loans among national systems of deposit insurance.

Above "agreed" solutions of Eurozone rescue by means of banking union sound, according to politicians' declaration, really distinguished, however it is just decision of political elites, aims of European population are not considered; when they participated in a referendum on European Union accession, they gave their vote to completely different project than the one that is being realized. This brings many different risks, not only economic ones. This is why it is criticized by many political and economic personalities, e.g. Klaus (2012), who mentioned "downfall of democracy", Robejšek (2015), who predicts unorganized disintegration of Eurozone, as well as Soros (2015), or Roubini (2011), Kohout (2012) and a number of others. In this connection, Margaret Thatcher's memorable quotation must not be omitted. In 1976, she said that "The problem with socialism is that you eventually run out of other peoples' money", and it seems that banking union is in similar situation. It brings peace to banks and governments, but, sooner or later, it will run out of money that might be redistributed. This will subsequently lead to its collapse, leaving totally devastated banking sector behind.

3.4 Analysis of Other Factors, Influencing European Union Development

When analysing the development of the European Union more complexly, it is necessary not only to take into account economic data, but to consider factors that are related to

them. Kuras (2008) applied this attitude when analyzing contemporary development of the European Union. He divided these factors into four categories: legal, politico-security, economic and demographic-ethnic factors. He analysed them and made following findings:

1. European Union changed from democracy to jurocracy. Creating, issuing, checking, explaining and enforcing laws and regulations have become the fastest growing profession, although it is an example of unproductivity. The total extent of EU documents has reached several million pages. Neither individuals nor companies know, what they are allowed to do, what they must do and must not do. Each company has to employ unproductive consultants; their only task is to monitor new European Union regulations in order to know whether the things they are doing are still in compliance with law. Companies have to cancel or change their production very often, or they have to introduce new measures and controls on their own expenses. In history, no state has ever had so complicated legal system. Historical experience shows that once the laws are so complicated that they cannot be naturally observed, the sense of legal order breaks down. And in this case the Union itself breaks its own laws.

2. Politicians are, before all, lawmakers. The source of European Union lawmaking has been moving away from their citizens. Nowadays, it is mostly outside reach of electoral influence of voters, the Constitution will take it far away. Politicians have changed into pen pushers who approve laws, but they did not participate in legislating, they approve laws, but are unable to prevent introducing them. Citizens are not interested in politics any more, as they know they cannot change anything. Tens of authorities – taxing, business, medical and local authorities are granted rights to monitor citizens' private lives, including phone calls, internet communication, health condition, social relations and consumer habits. Under the guise of combating terrorism, governments arrogate to themselves the right to cancel any civil rights at their own discretion. We are approaching the status when remote executors of total power will know everything about each citizen, while the citizens will know nothing about them. Unfair economic policy towards the third world supports their envy, hate and their desire to humiliate Europe, to wring it out with growing terrorism and influx of refugees, who will not be integrated into the European society.

3. Small businessmen go bankrupt under the load of costly regulations and orders, while their activities are taken over by multinational mega-companies. Unemployment is growing in productive sector, while employment is "artificially created" by establishing new vacancies in unproductive public sector. More and more companies cancel jobs for Europeans and they outsource production to cheaper workers in India or China. Immigration, which used to be a source of economic revival, has been changing into economic strain, as growing number of immigrants, whose "professional qualification" of "Ulama" (Koran expert) or "holly water carrier" does not bring any benefits.

4. Europe is endangered by the development of age composition of the population, which has been ageing rapidly. The politicians "solve" the problem by permitting immigration from the third world. This results in growing number of untraditional ethnics (mainly Muslims) whose number is, not only due to their high birth rate, growing rapidly; their number is supposed to reach more than half of the population of most European cities in near future.

Except for above mentioned areas of problems, it is necessary to pay attention to the development of the Eurozone in connection with issues of competitive environment. As Rejnuš (2014) says, countries without their own currency, which "fell victim to higher ambitions" and lost an important part of their legal sovereignty and became legally incapable participants of the development, and their governments do not have any tools to control their economies any more. As the number of fully sovereign countries with its own currency is gradually decreasing, the number of legally competent subjects is decreasing as well, which deteriorates competition that cannot be replaced with political control (moreover with politicians who are obliged to "someone" for financial support to be elected).

4 Conclusions

European Union was originally based on favourable alliance and cooperation of sovereign countries, but it has changed into exceptionally complicated bureaucratic system, dominated by big countries, deliberately extended by accepting further countries that are economically underdeveloped. Unreasonably bureaucratic decisions of the European Parliament, incompetence of European Union leaders and disputes of individual countries, long-term incorrect, purpose-built ECB policy, connected with single currency enforcing brought the European Union to current serious crisis condition, on the border with possible collapse. This does not only mean stagnating economy, but, before all, extremely high indebtedness of the whole European Union, as well as most of its economically important countries (France, Italy and Spain from eurozone, and United Kingdom) that cannot be solved by standard tools any more. This lead to political enforcement of so called "eurozone rescue" by means based on centralized control and violent redistribution of money among countries by means of purpose-built "special funds". Further risk factors include extreme growth of questionable legislature and its common ignorance, further meaningless extending of the EU and unregulated immigration, connected with problems not only with the immigrants, but with some ethnics (mainly Muslims). And last but not least, there is a problem of elitism, namely providing unjustified advantages to European Union MPs and Brussels officials, which results in common people's hatred against them and against the whole European Union, as well as purposeful weakening of national awareness and loss of democracy for traditional Europeans. As soon as approved rescue solutions are realized, which will result in making people in some countries poor at the expense of others, massive resistance of European inhabitants will emerge, firstly by euro sceptics' election victory, secondly by violent protests of inhabitants in those countries whose money would be redistributed to others. In the end, this will lead to the situation when so called "eurozone project rescue" will lead to European Union disintegration; it will be followed by immense suffering of many million European inhabitants and it might even result in civil (possible ethnically or nationally motivated) wars.

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The Brand in Accounting and Economic Concepts - Comparison of the Czech and the International Approach

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Abstract: *The paper examines the accounting aspects of the new available dispositions such as accounting procedures, methods of valuation, options of depreciation, etc. The brand can be represented not only by a trademark but also by the enterprise name, i.e. the name under which the entrepreneur is registered in the Commercial Register („firma"). While before the recodification of the Czech Civil Code was the transfer of the business of the company bound to the concurrent transfer of a business (today, the business establishment) or its part, the concept of the business of the company and disposition with her is in the new civil code completely different. The enterprise name is now understood as a thing in the legal sense and is the subject of property rights that can be transferred through traditional institutions such as purchase or donation and it is possible to consider the transfer of the exploitation rights such as a license agreement. The aim of this article is to compare consequences of the usage of this new instrument of transfer of a brand in form of a business name with a more traditional one as a trademark for business valuation criteria based on accountancy. The result of the research is the identification of the differences resulting from the comparison of the approaches and their economic consequences in the financial position and the business performance of the firm.*

Keywords: brand, trademark, enterprise name, accounting, revaluation, comparison

JEL codes: M31, M41, G14, O16

1 Introduction

Brands were originally meant to symbolize quality, but today they are more of a testament to the social level of their consumers. A brand can be basically anything at any time. Brands do not need to be only of functional nature, but they can function as symbolic tools that allow consumers to create their own image (the emotional nature of the brand). According to the American Marketing Association (2015), a brand is a "*Name, term, design, symbol, or any other feature that identifies one seller's good or service as distinct from those of other sellers*".

The aim is to distinguish goods or services of one seller or a group of sellers from goods or services of rival sellers. Keller (2003) sees the importance of a brand for the consumer in the fact that it identifies the source or the manufacturer of the product and it allows matching responsibility to a particular manufacturer or distributor, it makes consumer's decisions about product selection easier and it helps to reduce the risks of this decision making. According to Zimmerman (2001), brands play an important role for customers in the sense of communication and identification.

A brand then represents a valuable, legally defined asset for businessmen, which is capable of affecting customers' behavior. The asset may be bought or sold and it provides the owner with secure sustainable future profit and at the same time, it helps owners of a brand to create customer loyalty.

A high-value brand is an important corporate asset, which can have a longer life than the products themselves. A high value of a brand provides a company with a wide range of competitive advantages. Brands with a high potential play a significant role in consumer awareness and they gain consumers' loyalty more easily. Brands with a high potential

also provide their companies with a certain degree of protection in fierce price competition (Kotler and Armstrong, 2015).

Brands have been known for centuries, ranging from brands on prehistoric ceramics to medieval brands of printers and bakers on their bread, or brands of various guilds, which were meant to attract buyers and they also served as a measure of guild monopolies to exclude producers of second-rate goods. Keller (2003) divides the history of brands since 1860 into four periods. In the first period, until 1914, brands of national manufacturers in the United States originated. During the following 15 years, consumers increasingly accepted and respected brands of manufacturers and this period meant the dominance of brands for the mass market. The time of the Great Depression posed new tasks and challenges for brands of manufacturers. The last period, after the Second World War, was marked by the introduction of standards of brand management. Taylor (2013) distinguishes product brands, which are often the cheap brands in retail sale, lifestyle brands (Dommer et al., 2013) and megabrands, which are the common consumer brands.

A brand is thus an asset of a business and its ownership brings additional revenue. However, from the accounting point of view, certain problematic areas can be outlined, particularly in connection with the principle of fair and true view, e.g. the determination of fair value, the issue of depreciation (in the sense of whether to depreciate or not and, if so, in what way), or the issue of brand revaluation (in which cases should a brand be revalued).

This article focuses on accounting consequences of business name transfers and implications for several business performance criteria in particular in comparison to a transfer of a trademark. The aim of this paper is to identify differences arising from the comparison of the approaches of the Czech accounting legislation and the international standards and their economic consequences in the financial position and performance of the company.

2 Methodology and Data

Identification, guarantee and personalization are the basic functions of a brand (Vysekalová, 2009). Zamazalová (2010) lists, for example, the following functions: identification, differentiation, diversification, time and material continuity, bearer of tradition and guarantee of quality, image creator of the customer, representative of a lifestyle, bearer of a certain culture, bearer of a relationship between people and a symbol of the time. According to Aaker (2003), brand awareness, perceived quality, image, brand loyalty and legal protection of intellectual property are the main sources of the value of a brand.

In the Czech legal environment, the brand is generally protected against unfair competition. However, the brand may have a specific form of a trademark, which falls within the trademark law. In addition, the brand may also have the form of a business name, i.e. the name under which a business is registered in the business register (Civil code, 2012). Before the new codification of the Czech private law, a transfer of a business name was bound to a concurrent transfer of the business establishment or its part. However, the concept of a business name and its disposition is completely different in the new civil code. A business name is now perceived as a thing in legal terms and falls within the property right, which can be transferred via classic institutes such as purchase or donation, and a transfer of usufruct rights by e.g. a license agreement may also be considered.

The methods of analysis and comparison have been used. The focus is on accounting aspects of the disposition with a brand in the form of

1. a trademark,
2. a business name (collectively referred to hereinafter as "brands"),

and the comparison of approaches to such dispositions in the context of (i) the Czech Accounting Standards (CAS), (ii) the International Financial Reporting Standards (IFRS/IAS).

The outputs of the comparison are further examined by the economic impact analysis. The probable implications are demonstrated on the accountancy based values of ROA (return on assets) and ROS (return on sales) in case of the IFRS/IAS, the CAS, the trademark and the business name.

3 Results and Discussion

The Czech accounting legislation is particularly represented by Act No. 563/191 Sb., Local ordinance No. 500/2002 Sb. and the Czech accounting standard No. 13. Intangible assets are regulated by IAS 38, impairment of assets by IAS 36, and business combinations are regulated by IFRS 3.

Conditions of Capitalization

The Czech Accounting Standards (CAS) do not contain a definition of intangible assets. Only an illustrative list of intangible long-lived assets and the conditions for inclusion are given, and valuable rights are also one of the items. The trademark and the business name are included in this category if they reach the required size of valuation (they fall into the category according to the size of valuation determined by the accounting entity). The condition of having useful life longer than one year is met in this case. In the case of ownership of a trademark, the useful life is based on the fact that the validity of the registration of the trademark in the register lasts ten years starting from the date of filing the application (this period, however, may be extended every ten years if the owner applies for renewal of registration and pays a fee). In the case of ownership of a business name, an unlimited (indefinite) period of useful life is assumed. Furthermore, they must be self-generated in order to trade with them (this option, however, does not seem likely and will no longer be considered), or they must be acquired from other persons.

The international standards regulate intangible assets in IAS 38, namely as non-monetary assets without physical substance. An asset must be separately identifiable (clearly distinguishable from goodwill), controlled by the entity as a result of past events. Furthermore, it must be probable that the future economic benefits attributable to the asset will flow to the entity and that the acquisition cost can be measured reliably. A self-generated brand is not accounted for, as it is not separately identifiable.

Valuation

Under CAS, valuation of a brand as an intangible long-lived asset is primarily realized by the purchase price or, in the case of free acquisition (a gift, inheritance, a deposit), by current replacement cost. Determination of the (correct) valuation is up to the accounting entity, in some cases, e.g. non-monetary investment in registered capital of a business corporation, an expert opinion is required by the legislation. Valuation is regulated by Act No. 151/1997 Sb. and Local ordinance No. 540/2002 Sb. in the Czech Republic.

Generally, Svačina (2010) defines the following methods for valuation of intangible assets:

- the comparative approach (the method of multiples),
- the cost approach (the costs of reproduction, the costs of replacement),
- the yield approach (license analogy, the ordinance for valuation method, the profit share, premium methods, the net present value, excess profits and other models).

The yield approach is also accented by Damodaran (2006). However, using the risk-premium method for valuation of a trademark is considered to be significantly problematic (Jurečka, 2006).

Under IFRS/IAS, an intangible asset is primarily valued by the acquisition costs, which consist of the purchase price and other expenses directly related to preparing the asset for further use. In the case of free acquisition, an asset is valued at fair value. If an asset

is acquired in a business combination, the acquisition costs are then equal to its fair value on the acquisition date. The fair value reflects market expectations in relation to the likelihood of the entity gaining future economic benefits from the asset. It is always necessary to examine whether the acquired asset meets the identifiability criterion. The acquirer shall recognize and report separately also the intangible assets which the acquired business establishment did not report in its accounts, if they meet the identifiability criterion.

There exist the international valuation standards IVS for valuation. IVS Handbook No. 4 recommends particularly the market value for valuation in the category of intangible assets. Krabec (2009) describes the difference between the definition and understanding of the concepts of market value within IVS and fair value within IFRS/IAS, when he says that the market value according to IVS will always be the fair value as understood in IFRS/IAS. Fair value is therefore defined as the amount for which an asset may be exchanged, or a liability settled, between knowledgeable, willing parties in an arm's length transaction. In contrast, the current replacement cost is defined as the amount for which an asset would be purchased at the time of accounting.

Depreciation

In CAS, no time limit is set for depreciating intangible long-lived assets, the assets will be depreciated in accordance with the depreciation plan and in accordance with accounting principles during the selected period of time. The selected period may be based on the time of registration (ten years) in the case of a trademark. However, this approach cannot be taken in the case of a business name with assumed unlimited useful life. The accounting entity will then probably opt for a longer period of useful life when depreciating.

In accordance with the international standards, finite useful life (a trademark) and indefinite useful life (a business name) periods are distinguished. In the first case, the asset is depreciated. The depreciation method chosen must reflect future consumption of economic benefits. The amount of depreciation should be netted against the profit and loss account and the residual value must be zero, with the exception of some cases. Intangible assets with indefinite useful life are not depreciated, however, an impairment test in each accounting period must be performed.

Reporting

In accordance with the Czech accounting legislation, revaluation of assets is implemented on the balance sheet day by the residual value or the lower of the values (residual value vs. market price). Upward revaluation is not allowed with regard to the universally applicable principle of financial prudence (Sedláček, 2010).

In accordance with the international standards, for the purpose of valuation an accounting entity chooses:

1) the cost model – where the asset is accounted for at cost less accumulated depreciation and impairment losses, or

2) the revaluation model, which also allows upward revaluation, cannot be considered in the case of a brand with regard to the requirement of existence of an active market.

Business Combinations and the Possibility of Revaluation

The Czech Accounting Standards allow carrying out revaluation at fair value on the basis of expert opinion in those cases in which the Transformation Act imposes an obligation to value the business establishment (Sedláček, Valouch & Konečný, 2013).

The international standards require revaluation of all already reported assets and liabilities and it also requires valuation of the newly identified assets and liabilities of the purchased business establishment.

Disposal Sale

In accordance with CAS, the net book value of intangible long-lived assets is included into costs, and sales revenue is then included into revenue.

In accordance with the international standards, an asset is standardly cleared from the books and the result from the sale is reported as a difference in the statement of profit and loss. An asset may also be disposed of if it is no longer used, the residual book value shall be accounted for in the costs.

Quantifying Differences

The differences that result from the distinction of a trademark and a business name are demonstrated on ROS (return on sales) and ROA (return on assets). The differences in values of ROS and ROA after acquiring new intangible assets in case of trademark and business name result from the following equations:

$$ROS_1 = (Z_0 + ROS_{IA} * S_{IA})/(S_0 + S_{IA}) \tag{1}$$

where ROS_1 is ROS of all assets after the acquirement of new asset, Z_0 is the original level of income, ROS_{IA} is ROS of the acquired intangible asset, S_{IA} are the sales related to the new intangible asset and S_0 are the sales before acquiring the new intangible asset. If the ROS_{IA} is bigger than the initial ROS_0 it contributes to the bigger ROS_1. If we suppose the intangible asset to be a trademark, then a lower ROS_{IA} can be expected than in case of a business name, because of probably higher depreciation in first years after the acquirement (everything other equal).

In respect to ROA we can form the following equation:

$$ROA_1 = (Z_0 + ROA_{IA} * A_{IA})/(A_0 + A_{IA}) \tag{2}$$

where ROA_1 is ROA of all assets after the acquirement of a new asset, ROA_{IA} is ROA of the acquired intangible asset, A_{IA} is the book value of acquired new intangible asset and A_0 are the assets hold before the acquirement. The probably higher depreciation in case of a trademark in the first years following an intangible asset acquirement cause lower Z_{IA} (income from the intangible asset), everything other equal, but also leads to lower A_{IA} in the following years. If we suppose positive ROA_{IA} lower than 1 and positive A_{IA} it leads to lower ROA_{IA} in case of a trademark (everything other equal) in comparison to a business name. It leads then to lower ROA_1 in case of an initial ROA_0 being lower than 1 and positive and positive A_0.

4 Conclusions

As we observe the differences in the accounting view of a trademark and a trade name according to CAS and their implications for a business corporation, we come to the conclusion that a shorter useful life is more likely in the case of a trademark (registration in ten-year periods) than in the case of a business name. The probable result is then a faster creation of depreciation (costs) and faster reduction of the balance sheet total of the accounting entity in the early years of reporting. If a business name is acquired (compared with acquisition of a trademark), more favorable (higher) indicators ROS (return on sales) and also indicators ROA (return on assets) can be expected in the early years in the case of a positive balance sheet total and initial profitability < 1 (no tax influence).

In accordance with IFRS/IAS (when using the cost model), assets with indefinite useful life (a business name may be considered one of these) are not depreciated. Assuming a depreciation period of a trademark to be ten years (over the duration of its registration), and provided that the value of the acquired business name does not decrease over this period of time, a more noticeable disproportion arises between the impacts of a transaction with a trademark and a business name on the economic result in individual years than in the Czech Accounting Standards. The acquisition of a business name has once again a more favorable impact on ROS of an accounting entity (it is higher) in the

stated period, and also on the ROA indicator in the case of a positive balance sheet total and profitability < 1 (no tax influence).

When comparing financial statements of a business name drawn up in accordance with the Czech Accounting Standards and IFRS/IAS, it is obvious that a business corporation recording in accordance with IFRS/IAS achieves more favorable values of both ROS and ROA indicators in the current accounting periods (if there is no revaluation).

More detailed characteristics of intangible assets, even though they are intangible assets related to the use of a trademark in both cases, have an impact on their reporting and depreciation (and, by extension, profitability and the balance sheet total). The choice of accounting standards also exerts an impact. Characteristics then affect the performance indicators of a business corporation (e.g. ROA and ROS), which are based on the accounting data.

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Valuation of Companies in an Early Stage
of Development Using S-curve

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Abstract: *Valuation of companies in the early stage of development is a task particularly difficult and important from the point of view of potential strategic investors, financial (private equity funds) as well as the owners themselves. The presented proposal of model where cash flow will be predicted using s-curve. S- curve is most frequently used to describe economic or natural phenomena which obey the logistic growth law.*

Keywords: companies in the early stage of development, valuation, s-curve

JEL codes: C51, G32

1 Introduction

Valuation of companies in the early stage of development is a task particularly difficult and important from the point of view of potential strategic investors, financial (private equity funds) as well as the owners themselves (Cumming and Dai, 2011; Gompers, 2010; Damodaran, 2009). In theory and practice draws attention to the problems related to the valuation of such entities resulting from the short history (or lack thereof), a solid foundation to prepare cash flow forecasts and determining the cost of equity (Achleitner and Nathusius, 2004; Vinturela and Erickson, 2004). That is why it is often thought that the valuation of small companies do not make sense for this reason as well as high uncertainty and the likely variability over time, which is especially important when analyzing the development of companies. Indeed, the future of small companies is less certain then big companies, but still you can estimate future cash flows and goodwill (Damodaran, 2009). It should be noted that large companies also have an uncertain future and it would seem that their valuation is impossible, as was written by Niels Bohr and Edwards Deming, "it's hard to make predictions. Especially about the future", and "all models are wrong. Some models are useful". In order to identify the stages of company development. It can be said that values of the company mentioned financial parameters (eg. revenue, EBIT) and FCFF are linked with sector, company value drivers. Depending on the cycle phase, the growth of FCFF is different. In the early stage of small companies, the value of the above mentioned data is not high and their growth rate is low. After some time the young enters the phase of intensive growth. At this stage exponential data growth such as FCFF. The growth in time is increasingly smaller and the market enters the stability stage. It can be noticed that if company growth is stable, the shape of the index usually assumes the form of a logistic curve. The presented proposal of model where cash flow will be predicted using s-curve. S-curve is most frequently used to describe economic or natural phenomena which obey the logistic growth law.

2 DCF Method for Companies in Early Stage of Life

In the DCF method, the enterprise value is equal to the sum of all of realized investment projects, which is the sum of the discounted cash flow, which can be written by the formula 1:

$$V = \sum_{i=1}^{\infty} \frac{FCFF_i}{(1+k)^i}$$

(1)

where:
FCFF - free cash flow,
k – The discount rate,

The effectiveness of the method of discounted cash flow (DCF) depends on the possibility of identifying value drivers and thus is determined by the phases of development of the company. In the early stages of development, namely the creation of intense growth and there is too much information and pricing is mainly based on financial planning and analysis, business plan, hence the use of this method is not easy. It is known that in the initial period is very difficult to determine the condition of the company, because it is based on the condensed financial statements (often these companies do not conduct a full accounting), and companies often have low sales revenues, losses due to large investments and a small market share. As we know, it's the beginning of a period of ideas and build its vision of what should be the main factor in the analysis. As the company should grow dynamically different financial figures, such as revenues, profits, assets and working capital, which allows for easier analysis and forecasting cash flows and cost of capital. In the event of bankruptcy or severe financial difficulties the use of this method seems to be impossible, and the valuation is based mostly on so-called. liquidation value of assets.

In the early stage, in the initial period of rapid growth and valuation involves the determination of "hope" and was not verified by the market plans. Despite the high uncertainty about the future development scenarios of the future can be determined and predict cash flow. It is also important to estimate the risk of failure (bankruptcy), which in this phase is often very high and take them into account in pricing or adjusting the discount rate, or designate it as the expected value. According to research (see Argenia and Siedlecki, 2013) over 80% of companies going bankrupt in the first and second year of existence.

In the literature (Damodaran, 2011; Fernandez, 2007) for small businesses, there are two- and three-phase models. The first assumes rapid growth in the first phase (detailed forecast period), and then a stable smaller increase (see equation 2).

$$V = \sum_{i=1}^{n} \frac{FCF \cdot (1+g_1)^i}{(1+WACC)} + \frac{FCF_{n+1}}{(WACC - g_2) \cdot (1+WACC)^n}$$

(2)

The second is designed for companies that in the first period to rapid growth, followed by moderate (ie, the transition between the phase of intensive growth and stable growth phase), and finally stable growth (see equation 3):

$$V = \sum_{i=1}^{n} \frac{FCF \cdot (1+g_1)^i}{(1+WACC)} + \sum_{i=n+1}^{m} \frac{FCF \cdot (1+g_2)^i}{(1+WACC)} + \frac{FCF_{n+1}}{(k - g_3) \cdot (1+k)^n}$$

(3)

These models, however, do not take into account the initial phase of the period in which growth is small and can be used in case there is in the early stages will not have the negative values of cash flows. If the forecasted cash flows will be negative above models should be corrected for their discounted value.

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In these models, the growth rate refers to the cash flows rather than sales revenues or profits, hence it should take into account macroeconomic factors conditioning the future investments (Damodaran, 2002 and 2009; Festel, Wuermseher and Cattaneo, 2013).

3 The Use of the S-curve to Estimate the Cash Flow and Valuation of Companies in their Early Stage of Development

For the valuation and forecasting a growth FCFF alternative to the two and three-phase models, it seems useful to use known in economics logistic law of growth, assuming the going concern basis for the companies in the early stages of the life cycle. In this approach, it can be assumed that differential equation (Robertson, 1923; Siedlecki, 2014) can be used to describe the formation of the company's cash flow:

$$\frac{dy}{dt} = \frac{c}{FCFF\max} y(FCFF\max - y), \tag{4}$$

where:

FCFFmax – free cash flow during saturation period (maximum level)

t – time

with the initial condition

$$y(0) = \frac{FCFF\max}{1+e^b}.$$

Cash flow can be written as a logistic function:

$$f(t) = \frac{FCFF\max}{1+e^{b-ct}},$$

where *a > 0, b > 0, c > 0*

Development of cash flows and growth rates are shown in Figure 1.

Figure 1 The increase in cash flow based on the logistic function
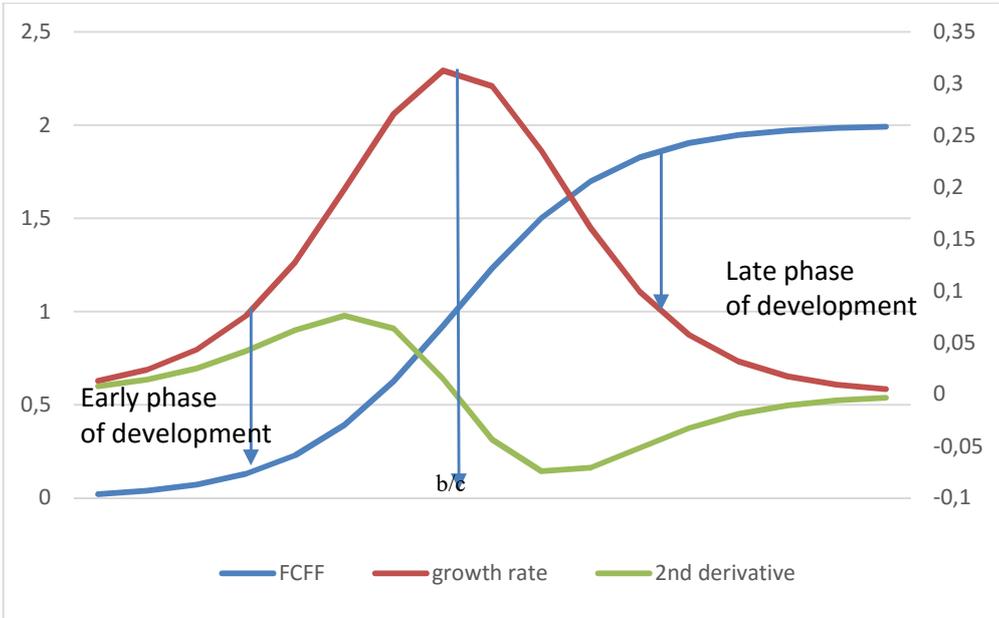
Source: Own study

Analyzing the differential equation shows that the rate of change of cash flows is directly proportional to the product of *y* (*FCFFmax - y*) for which *y* is the momentum factor and

(*FCFFmax - y*) is an inhibiting factor (Stanisz, 1986; Siedlecki, 2014). When *t* tends to infinity the function tends to a maximum *FCFF* (saturation level). Logistic function allows extrapolation of long time series. This is important in determining phases of company development and growth forecasting cash flows, as in the determination of cash flows should be taken into account transition time from one phase of development to another, and the saturation level. Establishing moments of change cycle phases can be done using analytical methods and expertise, (which determines the point of transition to a phase of intensive growth). This moment is important, because wrong assessment of the situation will result in large errors. To determine this point, the use of historical data, analysis of the sector and macroeconomic similar companies are very useful, as it turns out in many cases. Moments of transition of the company in the of phase of intensive growth or in stagnation period is determined on the basis of the analysis of I and II derivatives (Siedlecki and Papla, 2013). Determining the moment of transition in the phase of intensive growth automatically determines the moment of transition in the phase of stagnation, because the first derivatives at these points are identical. The second derivative of this function can determine the change bulge function is as follows. After solving the equation of II derivative we get the following features: the function is convex for $0 \leq t < \frac{b}{c}$ and concave for t> $\frac{b}{c}$. Assuming that the initial cash flows are negative, we need to modify this function by inclusion of the intercept. In this case, the intercept (*d*) is the value of the minimum flow (negative) and the saturation level will amount to *FCFFmax = a + d*. Accordingly to those assumptions goodwill can be written as:

$$V = \int_{t}^{\infty} \left(\frac{a}{1+e^{b-ct}} + \mathrm{d} \right) \cdot e^{-WACC \cdot t} dt. \tag{5}$$

Determining a function for FCFF also allows for a sensitivity analysis. Appropriate change of parameters b and c leads to change shape and thus function sets a different trajectory achieve a level of saturation. A good solution is to determine the time to market and opportunities for success (the likelihood of continuation of activities and implementation of plans) and the net asset value (liquidation value) in case of failure.

Example 1

Let's assume that Company X is planning for another three years following cash flows: in the first year -0.3 million EUR in the second year of -0.08 million EUR in the third 0. Assuming that cash flow growth will be shaped in accordance with the logistic law of growth, with the assumption level market saturation (capacity of the market research) at the level of 1,4 million EUR, the transition phase of rapid growth will take place after three years, after seven in the stabilization phase (moment of change of the convexity of the function - five years) and WACC = 15%.

The logistic function of future FCFF (see Figure 2) is has the following form (using iterative estimation method (Siedlecki and Papla, 2013):

$$FCFF(t) = \frac{1.7}{1+e^{3.7891-0.7578t}} - 0.3$$

Moment of transition into the intensive growth phase, equals $t_1=3$. If the assumption, that first derivative in that moment is the same as in the moment of transition into the stagnation phase, is true, we determine by solving the equation:

$$\frac{df(3)}{dt} = \frac{df(t_2)}{dt}$$

where

$$\frac{df(3)}{dt} = 0.1902$$

We get two solutions: $t_1= 3$, and $t_2= 7$.

To determine the point of change the following equation should be solved:

$$\frac{df'(t_3)}{dt} = 0 \,,$$

Where

$$f''(t) = \frac{3 \cdot 1.7 \cdot 0.7578^2 \cdot e^{2 \cdot 3.7891}}{\left(e^{0.7578 \cdot t} + e^{3.7891}\right)^2} - \frac{2 \cdot 1.7 \cdot 0.7578^2 \cdot e^{3 \cdot 3.7891}}{\left(e^{0.7578 \cdot t} + e^{3.7891}\right)^3} - \frac{1.7 \cdot 0.7578^2 \cdot e^{3.7891}}{\left(e^{0.7578 \cdot t} + e^{3.7891}\right)}$$

We get solution $t_3 = 5$. In point t_3 change of growth rate takes place.

Figure 2 Phases of growth based on the logistic function
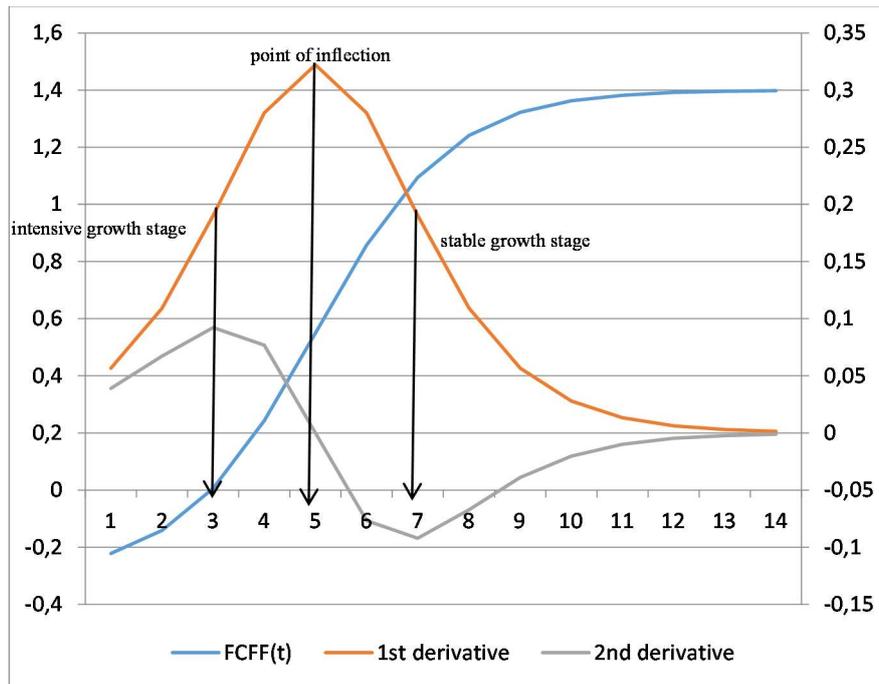
Source: Own study

Based on above calculations the value of firm is equal:

$$V = \int_t^\infty \mathrm{FCFF(t)} \cdot e^{-0.15 \cdot t} dt = 3.6520 \text{ mln EUR}$$

In our example, the valuation of the company also extended the study of the sensitivity analysis, which allows to determine the minimum and maximum values of the company. In the first stage it was assumed in this case, change the parameters b and c of 30% and was determined alternative trajectories for FCFF to achieve the planned level of saturation (see Fig. 3)

The next step was the foundation of different WACC values which the risk of financial distress. In the analyzed example additionally we assume WACC of 20% and 30%. The values of company for the different scenarios presented in Table 1.

Table 1 Valuation in million EUR

WACC	Initial forecast	Change +30%	Change -30%
15%	3,65	3,58	3,78
20%	3,01	2,98	3,13
30%	2,14	2,13	2,19

Source: Own study

As can be seen from Table 1, the minimum value is EUR 2.12 million and a maximum of 3.79. Of course, in practice, the discussed analysis can be extended to a larger number of scenarios by changing the parameters b and c in different ways.

Figure 3 Sensitive analysis of FCFF
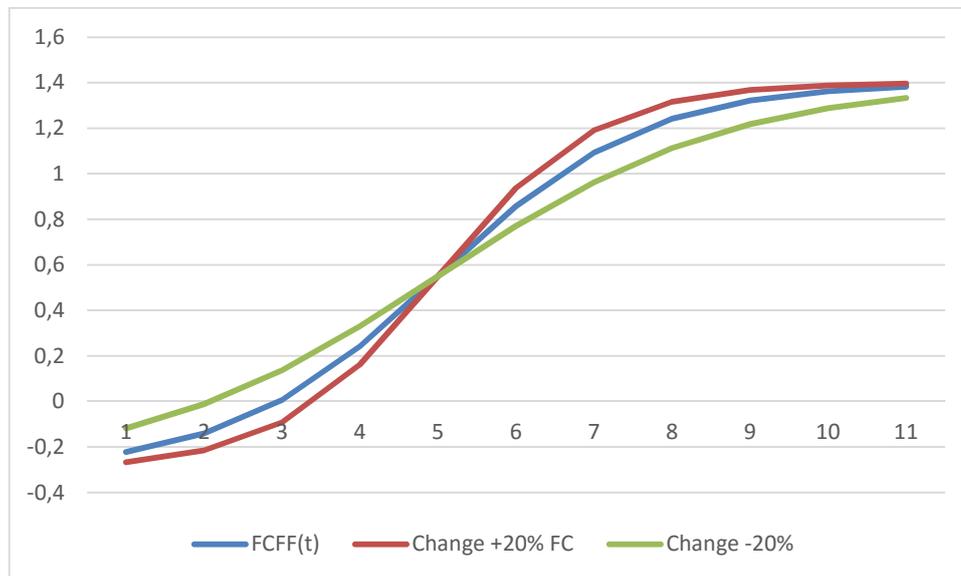
Source: Own study

4 Conlusions

Valuation of companies in the early stage of development is a very difficult task. Estimating valuation metrics such as cash flow and cost of capital is a major challenge. This is due to the small amount of information about the history of the company and great uncertainty as to the company's development and success of the business. Valuation is therefore based on a much larger number of factors determined on the basis of experience and subjective evaluation than is the case in mature companies. The article presents the concept of valuation methods using logistic law of growth that is used successfully in economics and analysis of the product life cycle. It seems that the tool is presented in the functional form, can be effective especially for investors who analyze this type of company to determine the purchase price and the moment of exit from the investment, but also for owners who want to determine the value of its operations for informational purposes, planning the development or transformation into commercial company.

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Assessment of Institutions of Financial Education and Literacy in the Czech Republic, the Slovak Republic and the United Kingdom of Great Britain and Northern Ireland

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Abstract: *This paper discusses financial literacy issue, its definitions and deviations in chosen countries with a purpose to show different approaches to financial literacy in the world. The attention is also aimed at assessment of financial literacy institutions in the Czech Republic, the Slovak Republic and the United Kingdom of Great Britain and Northern Ireland. This analysis sums up activities of governments of chosen countries with a goal to show national differences in financial literacy approaches.*

Keywords: financial literacy, financial education, national strategy

JEL codes: D140, D310, G20

1 Introduction

People are nowadays facing many changes in the financial world. Together with rising standard of living, costs of living are growing, too. People are more responsible for their own lives, investments, savings and dealing with money than they were in the past. These factors contribute to transfer of responsibility from government to individuals. This shift initiated a creation of a new financial term so called *financial literacy*. In the literature we can find many alternatives of this term, for example *financial education*, *financial capability* or *financial inclusion*.

Firstly, we focus on studying these definitions and its deviations to sum up what is the basis of the definition, what they have in common and if there is same comprehension and meaning in analyzed countries.

Lately, we analyze situation in financial literacy and education in chosen countries, i.e. in the Czech Republic, the Slovak republic and the UK to evaluate to what extent are countries implementing policies in financial literacy and to compare their achievements in this sector.

2 Methodology and Data

The aim of our paper is to describe and compare existing definitions of financial literacy and related terms and then to compile findings. To do that we used qualitative research in which the main part consisted of literature review and documents study.

"The literature review is a complex process that can be defined as an interpretation of a selection of published and/or unpublished documents available from various sources on a specific topic that optimally involves summarization, analysis, evaluation, and synthesis of the documents" (Onwuegbuzie et al., 2010, p. 173).

We used a between-study literature form of literature review which involves comparing data from two or more sources of literature and the type of Qualitative Comparative Analysis which enabled us to systematically analyze similarities and differences across sources (Onwuegbuzie et al., 2012).

Secondly we analyzed situation in the chosen countries utilizing a document of Organisation for Economic Co-operation and Development (OECD) called Recommendation on Principles and Good Practices for Financial Education and Awareness (OECD, 2005) and a document of The World Bank called Financial Literacy around the World: An Overview of the Evidence with Practical Suggestions for the Way Forward (The

World Bank, 2012). These documents offer guidelines for governments of countries on how to implement financial education and present advices in order to help countries with guiding new policies into work. Based on this document we set criteria to evaluate and compare differences between our chosen countries.

3 Results and Discussion

Financial literacy can be considered a worldwide trend. Even though financial literacy exists since the start of using money (Balabán, 2011), in many countries of the world it has not been noticed as an issue of a modern society and on the other hand in other countries there is much more attention devoted to financial literacy. It is a difficult task to find a start point of solving this issue as financial literacy is by many people perceived as something that has always been here. We know that the term itself has showed up recently together with need of implementing financial education and spreading financial knowledge. The concept of financial literacy is very young and still evolving. This causes that there is no single accepted definition for financial literacy and there exist plenty of definitions and related terms for this issue.

Our primary goal was to analyze definitions of these terms and to find what they have in common as well as what are main differences between them.

Theoretical Basis of the Financial Literacy

As we went through literature we found out that there are four basic terms that are used in conjunction with financial literacy, it is: *financial education, financial literacy, financial capability* and *financial inclusion*; that slightly differs from one another.

Financial education is a long term procedure in which people are gaining knowledge, learning how to deal with money and financial products in order to become financially literate. According to OECD, financial education is "a process by which financial consumers/investors improve their understanding of financial products and concepts and, though information, instruction and/or objective advice, develop the skills and confidence to become more aware of financial risks and opportunities, to make informed choices, to know where to go for help, and to take other effective actions to improve their financial well-being." (OECD, 2005, p. 13)

Financial inclusion embodies financial education, financial literacy and financial capability together with consumer protection. Cohen (2011) sees *financial inclusion* as multi-dimensional, pro-client concept, encompassing better access, better products and services, and better use of them.

We mainly focus on two remaining definitions: financial literacy and financial capability. Our first finding is that financial literacy itself is the most spread term used in translations from different languages and its main representative are the United States of America (USA).

In the USA are many institutions that define financial literacy. It is crucial to know that the definitions are still evolving and we can't label any of them as the only valid definition for financial literacy, therefore we mention definitions created by United States Government Accountability Office (GAO) and Jumpstart coalition for Personal Financial Literacy that are important institutions for the financial literacy in the USA.

According to GAO, "Financial literacy encompasses both financial education and consumers' behavior as it relates to their ability to make informed judgments. Financial education refers to the processes whereby individuals improve their knowledge and understanding of financial products, services, and concepts. However, being financially literate refers to more than simply being knowledgeable about financial matters—it also entails utilizing that knowledge to make informed decisions, avoid pitfalls, and take other actions to improve one's present and long-term financial well-being." (GAO, 2011, p. 4)

The other widespread definition in the USA is the one defined by Jumpstart Coalition for Personal Financial Literacy as "the ability to use knowledge and skills to manage one's

financial resources effectively for a lifetime of financial security. Financial literacy is not an absolute state; but rather, a continuum of abilities that is subject to variables throughout the life cycle. It is an evolving state of competency that enables individuals to respond effectively to ever-changing personal and economic circumstances." (Jumpstart Coalition for Personal Finance, 2015, p. 4)

Very important body of financial literacy represents OECD that influences the worldwide trend of financial literacy by creating frameworks, guidelines and advices member countries with this topic.

OECD itself uses term financial literacy and defines it as "a combination of awareness, knowledge, skill, attitude and behavior necessary to make sound financial decisions and ultimately achieve individual financial wellbeing." (OECD INFE, 2011, p. 3)

The second term used for the issue is *financial capability.* This term is commonly used in the United Kingdom of Great Britain and Northern Ireland (UK).

According to Cohen (2011) is term *financial literacy* more connected with consumer who has duty to inform himself about financial products and has to understand contract he/she is signing. From the institutional point of view it means that financially literate people have access to suitable products and services. Term financial literacy includes knowledge, abilities and attitudes; meanwhile *financial capability* embodies using gained knowledge in practice.

In the strategic document called Financial Capability: the Government's long-term approach by HM Treasury UK deputies describe financial capability as: "...a broad concept, encompassing people's knowledge and skills to understand their own financial circumstances, along with the motivation to take action. Financially capable consumers plan ahead, find and use information, know when to seek advice and can understand and act on this advice, leading to greater participation in the financial services market." (HM Treasury, 2007, p. 19)

The principal institution responsible for financial capability in the UK was until 2010 the Financial Services Authority (FSA) that identified five key areas within financial capability: "being able to manage money, keeping track of finances, planning ahead, choosing financial products and staying informed about financial matters" (FSA, 2006, p. 9).

A common feature of mentioned definitions is the aim to raise awareness about financial theme and to improve skills and knowledge in finance in order to provide a better ability to make informed decisions about person´s financial future.

Assessment of National Strategies in Chosen Countries

Countries around the world registered the lack of support of this issue, that's why their governments are solving a lack of financial literacy. It is done mostly by implementing national strategies (NS) that describe steps to improve this issue and consequently people´s financial knowledge and literacy. On the figure below we can see in red highlighted countries where national strategies were adopted. By dark blue are highlighted countries where creation of national strategies is in advanced stage and in light blue are countries where preparations of national strategies are in beginnings.

Figure 1 Spread of financial literacy national strategies around the world
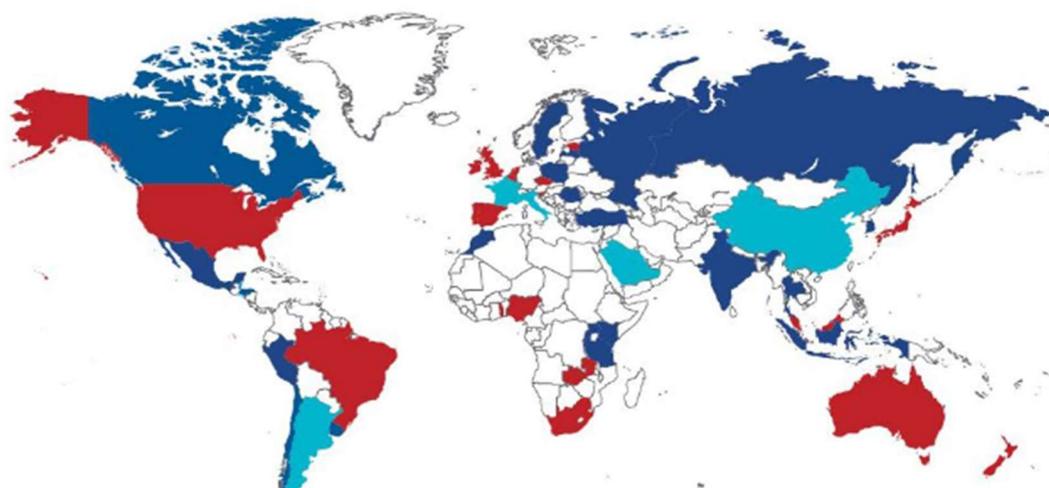
Source: OECD, 2013

Until the year 2013 twenty countries have implemented national strategies for their activities. Twenty five countries were in advanced phase of creation of the national strategy and in five countries the form of national strategy was considered.

As we went through literature we found out that there are three basic terms that are used to explain financial literacy, it is: financial literacy, financial capability and financial inclusion.

According to Cohen (2011) financial literacy is more connected with consumer who has duty to inform himself about financial products and has to understand contract that is signing. From the institutional point of view it means that financially literate people have access to suitable products and services. Term financial literacy includes knowledge, abilities and attitudes, meanwhile financial capability describes/embodies using gained knowledge in practice.

For our purposes we focused on three countries: the Czech Republic, The Slovak Republic and the UK. The Slovak Republic was chosen because in the OECD PISA survey from 2012 ranked on the first place where availability of financial education was tested but on the last place when the financial knowledge of pupils was evaluated. The UK is one of the first countries that noticed the problem of financial illiteracy and took steps to improve it. In our work we concentrate on improving the situation in the Czech Republic, so the Czech Republic plays essential role against which we compare other mentioned countries.

We evaluated progress of countries in the financial literacy issue based on criteria formed from documents by OECD and the World Bank as following:

1. When were conducted surveys on financial literacy of citizens on national level?
2. Does the country have the national strategy (NS)?
3. In which OECD surveys did the country take part?
4. On which groups has the country targeted in the national strategy?
5. Has the country included financial education into primary education?
6. Has the country set goals that it wants to achieve within the national strategy?
7. Are gains from activities continuously evaluated? If they are then how.

Findings of our analysis can be found in the table 1.

Table 1 Assessment of national strategies

	The Czech Republic	The Slovak Republic	The United Kingdom
When were conducted surveys on financial literacy of citizens on national level?	Pilot in 2007 The second in 2010	Pilot in 2007	Pilot in 2003 The second in 2006 The third in 2013
Does the country have the national strategy (NS)?	Yes NS arose from updating of Strategy of financial education document in 2010	No National Standard of financial literacy is established that should be in the future implemented into national strategy	The first NS originated in 2004 The second NS in 2006 developed from the first NS The third NS is expected in 2015
In which OECD surveys did the country take part?	OECD/INFE 2010 PISA 2012	PISA 2012	OECD/INFE 2010
On which groups has the country targeted in the national strategy?	Focused mainly on students of primary and secondary schools Thanks to Fund of further education unemployed are educated in financial literacy Other groups are to limited extent informed through private activities	Focused mainly on students of primary and secondary schools Other groups are in limited amount informed through private activities	Yes NS is devoted to detailed description of activities in all endangered groups
Has the country included financial education into primary education?	Yes In 2009 to secondary schools In 2013 to primary schools	Yes In 2014 to primary and secondary schools	Yes In 2008 to primary and secondary schools
Has the country set goals that they want to achieve within the national strategy?	Yes CZ set co called Action Plan of Activities which is to be fulfilled	No Targets were set only for students within the implementation of financial literacy into school frameworks	Yes UK set quantitative goals targeting on measuring reach of activities on pre-defined target groups New NS is planned to target more on change of financial attitudes and behavior of citizens
Are gains from activities continuously evaluated? If they are then how.	No	No Only at the level of third sector institutions	Yes Main institutions (Money Advise Service, former Financial Service Authority) dealing with financial capability make available detailed evaluation of achievements in the field of financial capability

Source: Own analysis

Looking at the table in the detail provide us with a good comparison of chosen countries. We found out that UK is the most advanced of the three analyzed countries in the financial literacy issue. The British government has developed two national strategies and currently is working on the third that should implement in the practice new findings from behavioral finance and economics. UK has also in its second NS set clear goals that were accomplished on time or even before a scheduled deadline. We need to highlight the UK ability to aim at target groups within the second NS and also to evaluate activities influence after a period of time.

Our analysis shows that the Slovak Republic is from the financial literacy point of view the least developed among studied countries. The national strategy has not been approved yet and the Slovak Republic still operates only with National Standard of Financial Literacy that should serve as pattern to national strategy in the future. This could cause that Slovakia is the last country to implement financial literacy into the primary education and that no goals were set in order to improve financial literacy on the national level.

The Czech Republic ranked second in the evaluation. It is not as advanced as UK but not in the beginning as Slovakia. The Czech deputies created NS in 2010. This NS arose from Strategy of Financial Education. The Czech Republic is the only country that participated in both surveys conducted by OECD on multinational level where financial literacy was in the center of interest concerning financial literacy. There are goals set in the Czech NS nevertheless they are not as precise as those in the British NS. The Czech strategy lacks the written purpose to evaluate past activities.

4 Conclusions

Financial literacy is a complex issue that is on its rise hand in hand with consumer protection. We can encounter many terms explaining the issue of dealing with money and behaving on the financial market and in the paper we defined terms: financial literacy, financial capability, financial education and also financial inclusion.

Our core finding is that all terms include a reference about making responsible decision and understanding the financial issues in order to provide better living for consumers in the future. We also noticed that this issue is mainly spread within developed countries of the world and that developing countries do not by most solving/talking about financial literacy. As we went through the literature, our observation shows that in poorer countries financial literacy is not so broadly in the center of attention. This can be caused by scarcity of funds and focus on locally more important matters such as poverty, etc.

The following analysis of financial literacy in the chosen countries has shown that the most developed (of the analyzed countries) is the UK, followed by the Czech Republic and Slovakia in the end. The Czech and Slovak deputies can learn from the British policies and attitudes as Britain turned out to be the leader of innovation within financial literacy.

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Could Financial Literacy Overcome Price Information Asymmetry: Empirical Study

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Abstract: *Our empirical study is focused on retail core banking services provided through the payment account and financial literacy. Financially literate consumer makes sound financial decisions and so we study on the real market if the optimal choice is made. There are factors that make the choice more difficult due to demand on monetary literacy such as various pricing, tariff complexity and links between products. We perform wide empirical study with a sample of 14 484 individual consumer payment account usage records to study the magnitude of the consumer decision making problem. Our results show very low share of optimal choices defined by the range of individually demanded services and the lowest price. The 95% confidence interval of optimal share is only (0,159; 0,171). Our next analyses narrowed the studied sample to filter off the geographical differentiation influence. We found slight improvement in both optimal choice share and the difference between the costs paid and the costs of optimal product. In discussion we compare our findings to other surveys, discuss other factors participating on the results and propose to emphasize price search tools in financial literacy education otherwise the specific market issues will continue to prevent the optimal choice.*

Keywords: retail core banking services, financial literacy, optimal choice, empirical study

JEL codes: A29, D12

1 Introduction

This paper is focused on the retail core banking services (thereinafter RCBS). This term relates to basic day-to-day needs that are common to all payment accounts. There are differences among the national payment instruments usage and types such as cheque preference in France, Malta and Cyprus. The RCBS stands for basic instrument that are offered by every payment account. As the instrument of high importance in modern economy (allows participating in modern electronic markets and helps to prevent socio-economic exclusion) it is also included in financial literacy education. Also the ability to use and understand RCBS is considered as a part of being financially literate. However the RCBS inclusion in financial literacy education in the Czech Republic is limited to cash and cashless payment instruments with no regard to price i.e. fees and charges. RCBS inclusion in financial literacy assessment partially regards the price of RCBS. In PISA testing (OECD, 2012) the students were supposed to solve non-routine financial problems, such as calculating the balance in a bank statement while accounting for transfer fees. Generally there is almost no attention paid to the price of the RCBS unlike it is for loans and other financial services. The reason might be that the RCBS are considered as so basic everyday need that it does not need more attention.

A wide survey (STEM/MARK, 2010) regarding the financial literacy in the Czech Republic contained also a few questions concerning the payment account. One of the findings was that only 45% of consumers were thinking about at least two different account provider offers. Information if it was just a consideration or thorough assessment is not available. Nevertheless the 45% is a low share suggesting that the RCBS market might not be an

object of a standard economic maximization approach. This leaves substantial space for suboptimal choice within the frame of "search for lowest price in set of products that meet the demand" rule. In contrast to this other two surveys show high sensitivity of the consumer on price. A survey (Gabčová et al., 2014) shows that 67% consumers find high price of products as one of the most dissatisfactory factor in retail banking. In (Ernst&Young, 2012) is 69% of RCBS consumers ready to change the RCBS provider due to high payment account fees. How could consumers judge the level of fees if less than a half compared two or more offers? If financially literate consumer makes sound financial decisions does it mean an optimal account is chosen? Can the ratio of optimal choices suggest the financial literacy regarding the RCBS and its price? What problems carry the price acquisition task? These are the questions to be answered in our study.

2 Problem Characteristics

Financial and generally the economic environment transformed greatly in the last decades. The main trends to be mentioned are especially increased number and complexity of financial products, demographic changes and the change in retirement finances, income changes. A significant attention was paid among the OECD and other countries to the financial education to support the consumers and make their decision easier in such environment. Only the financially educated consumers can keep the markets run efficient. The financial education focuses on increasing the financial literacy. The financial literacy is defined by Atkinson and Messy (2012) as "a combination of awareness, knowledge, skill, attitude and behaviour necessary to make sound financial decisions and ultimately achieve individual financial wellbeing." In some countries such as Canada and Great Britain a term financial capability is being used. As Orton's (2007) comparison implies the first term is narrower, less accurate and less fulsome than the latter one. In spite of it the term financial literacy is being used in OECD's documents regarding adoption and progress of national financial education strategies. OECD (2005) defines financial education as "the process by which financial consumers/investors improve their understanding of financial products, concepts and risks and, through information, instruction and/or objective advice, develop the skills and confidence to become more aware of financial risks and opportunities, to make informed choices, to know where to go for help, and to take other effective actions to improve their financial well-being." Three main components are involved in personal assets management regardless of the term capability or literacy (Ministry of Finance of Czech Republic, 2010) – monetary, price and budget literacy. As Doláková (2014) points out, the financial literacy is associated with the next set of literacies. Links of monetary and price literacy to the next literacies is a key for this paper:

- numerical literacy stands for the ability to use and interpret mathematical information and ideas in order to actively cope with the financial related tasks (figures, charts and tables handling).
- information literacy represents the ability to search, use and assess the relevant information within the context of available data.
- legal literacy covers ability to orientate oneself in rights and obligations and the knowledge where to ask for help.

Now let us present the tasks mentioned literacies has to tackle with. Let us start at the beginning with the information gathering task related to mostly information literacy. Let us presume that consumer is able to quantify his or hers own consumer behaviour e.g. by creating an excel table with usage frequency of each demanded instrument as well as noting the average turnover, minimum balance and what other financial products are currently used. Then the tariff data has to be found and noted. A student search was performed to simulate this task. Our goal was to find lower bound of price search time interval for the most known accounts. We gained roughly, for demonstration purposes only, the time needed to find and note the price data for model consumer profiles. Two model consumer profiles were taken from (Draessler et al., 2011). The first one was the average consumer with e-banking preference and the second one the average consumer with mixed preference of communication channel. The first task was to find the tariff

location on the bank's web page. The second one was to find, note individual fees. We included 13 most representative non-exclusive payment accounts.

Table 1 The fees search and calculation time in minutes

	Tariff	Profile 1	Profile 2
Mean	1.0	14.3	20.3
Standard deviation	0.8	2.6	5.3

Source: Own research

Our results logically concluded that the greater the range of demanded services, the higher the total time. The time will be also higher if we count in all the conditions regarding the price. We take into account only the prices per instrument usage, turnover and balance conditions. However there are other ones. This problem is not just a problem of the Czech Republic. An expert group (European Commission IMS DG, 2007) stated that RCBS prices are difficult to compare because the information is available in a way that implies high search costs. As a main issue were mentioned tariff incompleteness, complexity and the links between the products. The first issue we can consider as solved due to the directive 2007/64/EU and the latest Directive 2014/92/EU. The latter one not just states how the consumer is to be informed moreover it states obligatory duty of creating national glossary related to the payment account. The terms from those glossaries are then obligatory to be used in commercial banks' tariffs.

The second and the third issue mentioned higher are mostly untreated and are part of the problem known as price information asymmetry or price information acquisition problem. Although Directive 2014/92/EU states the duty to inform whether the service or product accompanying the payment account is provided separately or not, the main problem lies somewhere else. It is described in wide survey (Centre for European Policy Studies, 2009). There are specific links between financial products affecting the price - bundling, tying and loyalty or conditional prices and practices. The most frequent forms are conditional practices and mixed bundling that is usually associated with package rebates. In (Centre for European Policy Studies, 2009) researchers found that more than 50% of banks estimate the share of consumers involved in some form of bundling is higher than 80%. Then under these conditions the data gathering process is not just at least a bit demanding for information literacy but it is time consuming.

The next literacy linked to monetary one relates to calculation. Even without links between products mentioned earlier the fee calculation requires a certain level of numerical literacy. Let us demonstrate. Let y_f represents fixed lump sum (costs) related to e.g. account management, card fee or other fixed fees. Variable costs are represents the services such as ATM withdrawal, payment orders etc. The variable costs are scalar product of services fee vector c and usage frequency vector x with total of k used services. Then the easiest way how price y is calculated in real world is that *we* define y as sum of both costs. However large share of RCBS products includes more conditions. The most common is that certain service is provided for free until specified usage frequency x_0 is reached by the consumer. Over this free usage limit the service is charged per every usage (the same way as in the first example):

$$y = y_f + \sum_{i=1}^{k} c_i \max\{0; x_i - x_{i0}\}.$$

(1)

This pricing method has more complex version based on relation to other services. If the condition is met the free usage limit x_0 is increased. This model is very common for so called package accounts. This pricing strategy is based on prepaid free usage. This pricing strategy is based on marketing psychology "you will pay 5 euro fee and we will provides services that worth 10 euro". Consumer pays the lump sum y_f but additionally has higher sum available for the services usage. Let y_Δ be the difference between y_f and the total sum available for spending:

$$y = y_f + max\left\{y_\Delta; \sum_{i=1}^{k} c_i \, max\{0; x_i\right.$$

(2)

In the last step let us include conditional price or sale and it can be combined with free usage limit service. This condition was included even in the low cost RCBS provider where the consumer would expect more simplicity – in case of low payment card usage the ATM withdrawal under the x_0 limit was charged as well however with some discount. Then the model with free usage services limit would be:

$$y = y_f + \sum_{i=1}^{k} [b_i x_i + (c_i - b_i) \max\{0; x_i - x_{i0}\}],$$

(3)

where b_i stands for the unit price under the limit x_{i0} and c_i is the unit price over the x_{i0} limit usage. In case of $b_i = 0$ the formula would be the same as (1). The model could be even much more complicated if other conditional prices, bundling or tying would be taken into account. The requirements for numerical literacy, in a way not just to calculate but to interpret mathematical ideas, are obviously higher than expected and there was not taken into consideration the stochasticity of consumption yet.

3 Objectives, Data Source and Methodology

In the environment outlined in previous chapter with a certain requirement on numerical and information literacy we pose a question of optimal choice. The terms "*sound financial decisions*" and achieving "*individual financial wellbeing*" from the financial literacy definition can be interpreted for our target market as "*to choose the account providing all demanded services for the best price*" or in other words the optimal choice. In (STEM/MARK, 2010) 45% consumers considered more than one payment account provider and so we construct a single tailed hypothesis: *at least 45% consumers use optimal account*. The next goal is to answer research question: *what is the share of optimal choices* and *how much do does the consumer overpay*.

The term "all demanded services" is rather difficult part to quantify since for specific consumers the geographical preference is significant. The consumers with a strong preference of at the desk services define "demanded services" through a specific location of the branch in contrast to consumer with a strong or exclusive preference of e-banking usage. That is why we limit the scope of the survey to e-banking users in order to minimize the influence of the geographical preference. Also we focus on non-exclusive accounts only. We exclude exclusive accounts because they offer special features that can take part in consumer decisions making (free family travel insurance, VIP lounge waiting room access at the airport, concierge package services, FX account etc.) and moreover are far beyond the RCBS. Also the consumer with this account is supposed to have higher income making the price for RCBS services even more negligible and making the regular RCBS unwanted due to a the snob effect. Other limitations for our results come from the data source and so we study, the results can be applied to, consumer that has the payment account kept by provider in the Czech Republic, has an access to the Internet and possess at possesses least basic level of PC skill.

The data source of our survey is the database of the web comparison tool Kalkulátor bankovních poplatků (thereinafter as Calculator) within the frame of our long-term cooperation. This service provides individualized market overview regarding the RCBS since 2010. The consumer inputs his or her individual RCBS usage pattern and the name of currently used account. Then for every account that provides demanded services the average month charges are calculated. All the data we gained access to are anonymous. The Calculator's tariff coverage is 15 banks (more that 98% of the RCBS market in the Czech Republic) and 38 offered accounts. The range of monitored services is as wide as

53 services (for every payment instrument we count each communication channel as one service) however most of the user choose the shorter version providing half of the services compared to the full version. Regardless of the version we gain the detailed consumer profile regarding all main variables:

- activity (turnover, balance),
- communication channels (statements, ways of establishing payments)
- card usage,
- standard payment instruments,
- cash utilization.

We study the data gathered during the 30th June, 2010 – 28th December, 2013 period. The total number of gathered valid records is 19 051. The data refining consists of raw data treatment and filtering off consumers without activated e-banking or exclusive account. 14 484 records is left for the analysis. Analysis of each record consists of two phases. Firstly there are removed the accounts that do not provided all the demanded services, e.g. some low cost providers do not allow to deposit/withdraw cash over the counter. Secondly there is compared the price for currently used account to other prices. If the price or currently used account is the lowest or the same then the record is considered as optimal choice. If not the difference between the actual account price and the lowest price possible respecting the range of services is calculated. This amount represents the opportunity costs that come from taking a specific choice or in another word it represents the loss.

A one-sample binomial distribution test is used for right-tailed hypothesis testing at alpha level 0,05. A confidence interval calculation is used for population parameter estimation - optimal choice share. We presume normal distribution due to very high number of observations.

4 Results and Discussion

The tested hypothesis is rejected at alpha = 0,05. From the result it is clear that much less consumers made optimal choice regarding the price respecting demanded range of services. Our analysis shows unexpected results, see Table 2. The share of optimal choice is within the 95% confidence interval of (0,1588; 0,1710). The mean value for optimal choice share 16,49% is very low and opportunity costs are as high as 6,2 euro per month.

Table 2 The analysis with all services

Variable	Mean	95% Confidence Interval	
		Lower Bound	Upper Bound
Optimum choice share	16.49%	0.1588	0.1710
Opportunity costs	6.16 EUR	6.1 EUR	6.23 EUR

Source: Own research

Yet it is true that the result is at least partially influenced by geographical differentiation. That is the reason we narrowed down studied sample by consumers demanding at the desk services (deposit, withdraw, establishing payment instrument). A new sample counted for 9 448 records of consumers with electronic services only with the exception of ATM withdrawals. We found a small improvement compared to the first analysis yet not a major one, see table 3.

Table 3 The analysis with electronic services and ATMs

Variable	Mean	95% Confidence Interval	
		Lower Bound	Upper Bound
Optimum choice share	20.45%	0.1964	0.2127
Opportunity costs	5.76 EUR	5.68 EUR	5.83 EUR

Source: Own research

Such a low share of optimal choice shows that the magnitude of the suboptimal choice of the RCBS products is significant. Also there has to be mentioned that filter cut off the services high fees services. Then it is natural that the opportunity costs diminished. The result of the second analysis is even more conclusive since the population with very limited geographical differentiation was studied. Due to surprisingly clear-cut results we decided to study the third group of the market. Although the ATMs can create only limited geographical differentiation we filter off all consumers demanding ATM service. This leaves only 507 records to be analysed since around 97% of consumers uses ATM. The results in table 3 show again slight improvement and, due to smaller sample, show also wider confidence interval.

Table 4 The analysis with electronic services only

Variable	Mean	95% Confidence Interval	
		Lower Bound	Upper Bound
Optimum choice share	21.82%	0.1817	0.2547
Opportunity costs	4.59 EUR	4.34 EUR	4.84 EUR

Source: Own research

Our results are inconsistent to result of other surveys. At first one of the results of (Ernst&Young, 2012) is that 69% of RCBS consumers would change the RCBS provider due to high payment account fees. That is above European average of 53% consumers. How is such a low share of optimal choices possible if consumers claim such high wiliness to change the provider? Similarly (Gabčová et al., 2014) finds that consumers see retail banking products costs as one of the most important aspects. Also Wruuck (2013) claims that prices play a central role for customer satisfaction and profitability in retail banking. To be more specific, satisfaction with products prices does not automatically mean total and complete satisfaction, but it is one of the most important preconditions and pricing is thus of particular importance. Also Baumann et al. (2012) emphasises that consumer's economic benefits should protect the bank against competition. On the other hand Chen, Liu, Sheu and Yang (2012) suggest that for broader understanding of consumer behaviour it is needed to monitor the perception of fairness in service. However we do not conclude that fairness is the explanation of our results. We presume the explanation stands on two connected pillars.

The empirical one comes from the problem mentioned in the (European Commission IMS DG, 2007) – the price information asymmetry. It comes from the links between the products and pricing models and overall pricing - see the formulas 1-3. Both features are demanding for monetary literacy linked literacies. But could this be interpreted as a general gap in financial literacy? As mentioned before, we found only one set of task related to payment account and it concerns the payment instrument usage. The only RCBS price related task we found was an example in (OECD, 2012). So it seems that financial literacy focus does not concern RCBS price and then within its frame it is a certain gap. Then the first conclusion is that we do not expect much of improvement in young adults group with financial education group just on its own. The second is that introducing the examples where the students would be calculating the price under the different conditions as a part of financial education might help. But forcing consumers to do the RCBS prices calculation themselves and generally create oneself market overview is not the right way as we explain in the next paragraph.

The second pillar brings the theoretical explanation within the frame of the behavioural economy. The basic principle introduced by Simon (1996) is clear – in information rich world the consumed and scarce resource is the attention as a time needed to comprehend the message. In combination with Stigler's approach to price search focused on marginal return from search it creates a question whether it pays off to give the attention to products such as RCBS or not. The share of the RCBS costs on household spending is negligible and so consumer tends to focus more on other items. Also the product is generally homogenous within the studied sample of consumers with activated e-banking. Homogeneousness comes from standardisation (payment time frame),

regulation and supervision (central bank supervision, obligatory deposit insurance etc.). This again weakens the consumer's attention because he or she gets the same products with only different packing (brand and its marketing). Then it is rational to "consume" the attention on more costly matters such as loans. This explains high percent of consumers willing to change the provider but high percent of suboptimal choice share. Those consumers are not aware of market situation, they lack the market overview and so they cannot claim for sure whether the fees they pay are high or not.

To sum up and conclude the discussion we offer a way how to reduce this task to much simpler one. The independent comparison services can create market overview without the need of long calculation. That is why we propose to add "how to perform a systematic market search" lesson to the financial literacy courses. This is what we see as a gap in financial literacy or education and it is also an area for further research. It is not just a question of RCBS market but insurance, loans, electricity, gas, mobile services too. However the question of independence and data quality arises quickly. This problem is now being solved thorough the EU regarding the RCBS comparison services, see the Directive 2014/92/EU. There has to be at least one free of charge web RCBS comparison service that is the subject of independence and data quality evaluation from the side of the government. Market search lesson could include also a topic of multi-criteria analysis to better assess and evaluate available and suitable accounts. A demonstration for payment accounts can be found e.g. in (Hedvičáková and Pozdílková, 2015).

5 Conclusion

Our research is focused on the share of optimal choices on the RCBS market. We study this problem because we could use it as an alternative assessment of financial literacy in so far peripheral part. The financial literacy education is rightfully focused more on other financial products and life situations than RCBS choice and price although the demands for monetary literacy (and linked information and numerical literacy) are higher than expected. It is a problem of search costs that come from tariff complexity and links between products making the market overview creation very time consuming. This creates a barrier for consumer that is too high to overcome because of limited consumer's attention. It is not rational to invest one's attention to thorough payment account costs calculation. The return from this action is lower than possible gain.

This results in our findings that are unexpectedly negative regarding the common economic maximization rule and also in contrast to other surveys. We study 14 484 consumers with activated e-banking that used comparison tool the Calculator. We find optimal choice at only 16,5% consumers and in average more than 6 euro is paid over the optimal price. The hypothesis based at the result of (STEM/MARK, 2010) that at least 45% of consumers performed an optimal choice is rejected. Our studied sample was narrowed regarding the range of services, to see to the development under more homogenous conditions – firstly filter off branch services, secondly all cash services. This step slightly increased the ratio of optimal choices to 20,5% respectively to 21,8%.

The financial literacy within the frame of numerical and information literacy is not the main source. It would not be logical to force consumers to do the complete RCBS price calculation. We propose to solve the problem or remove a certain gap in financial literacy in another way. In financial literacy framework, and the education in civics subject in the Czech Republic, we miss the "how to perform a systematic market search" lesson. The role of independent and reliable comparison services should be emphasised in this lesson. For RCBS market it is guaranteed that there will be independent and reliable comparison service due to the adoption of Directive 2014/92/EU in the next two years. Then the financial literacy could overcome the price information asymmetry.

Acknowledgment

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Labour Costs and Capital Employed of Limited Liability Companies in the Czech Republic

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Abstract: The problem of the differences of labor costs in the agricultural sector has been well-known mainly for the agricultural sector due to its specific characteristics of the agricultural production and seasonal workforce. Less monitored intra-industry labor costs differences are used for the analysis and for the uncovering of the reasons behind the labor costs differences among limited liability companies in different regions. The aim of this paper is to find out differences of the labor costs to output ratio and capital employed to output ratio of limited liability companies across regions in the Czech Republic for a period from 2007 to 2013. For this research there will be used the different variables of labour costs to output ratio, capital employed to output ratio and labour costs to capital employed ratio and their differences from average across the regions of Czech limited liability companies. The results show that there is a strong negative relationship between variables of the working capital management and profitability. The results show that the region with highest positive disparity from the average of the labor costs to output ratio and capital employed to output ratio during the monitored period is Karlovy Vary region and the region with highest negative disparity is Prague.

Keywords: labor costs, capital employed, limited liability companies, output ratio

JEL codes: D24, J24

1 Introduction

The agricultural sector is an important part of the national economy. This sector has its own specifics which are mainly seasonal nature of production and dependence on natural conditions. These specifics are mirrored in the economic results of farm companies, through which influencing their capital structure and particularly their labor costs. The problem of the inter-industry differences of labor costs in the agricultural sector was well-known primarily for the agricultural sector due to its specific characteristics of the agricultural production and seasonal workforce. Nevertheless, less monitored inter-industry labor costs differences, that are the main subject of this paper, are used for the analysis and countable for the uncovering of the reasons behind the labor costs differences among limited liability companies in different regions.

The simplest measure of labor costs is based on wage rates or total compensation. Therefore, differences in compensation often reflect productivity tend to have high labor compensation. For this reason, most studies of comparative labor costs focus on unit labor costs which are defined as total compensation per hour employed divided by productivity, or total output per hour (Hooper and Larin, 1989). Competitiveness in agricultural sector could be measured by assessing a country's success in exporting certain types of goods and services. Two recent researches measured the sensitivity of countries' export performance to changes in labor costs (Carlin, Glyn and Reenen, 2001; Páges and Ruíz-Núñez, 2001). To evade the problem that higher wages are just a measure of higher labor productivity, and that´s way not of higher labor costs, both researches differentiated between the raw cost of labor (such as wages and other non-wage components of labor costs) and productivity-adjusted wage measures. These measures adjust labor costs because there is the fact that some workers are more productive than others – because they have more and better capital to produce, they make more effort, or because the technology used by some plants is more efficient than others. The most greatly used productivity-adjusted measure is the unit labor cost. This

measure can be calculated as the nominal wages are divided by the average productivity of a worker (Inter-American Development Bank, 2001). In the literature is a large range of factors that determine regional wage inequalities, such as specific labor market aspects, human capital differentials, general regional characteristics that may attract or reject enterprises and employees etc. From the employers' point of view, human capital differentials represent a key determinant of territorial differences in wages (Goschin, 2014). The close relationship between labor productivity and wage is a long-running theme in economics which is solved both in theoretical and empirical studies. Most empirical researches confirm their tendency to correlate (Fisher and Hostland, 2002; Feldstein, 2008), supposing that productivity growth may exceed average wage growth, depending on country and period of time (Sharpe, Arsenault and Harrison, 2008).

As shown in researches, the relationship between wages and productivity (more specifically, the relationship between wage growth and productivity growth), it became one of particular policy relevance in recent years (Meager and Speckesser, 2011). As the International Labor Organization has observed – trade requires that wages should grow in compliance with national productivity. In another way counties with relative higher growth in unit labor costs systematically lose market share and build up trade deficits. Hoffer and Spiecker (2011) analyzed the case with a coordinated wage policy to evade imbalances. The effect of an increase in unit labor cost is larger in low-technology industries, which probably depend more on low-skilled labor (Inter-American Development Bank, 2001). Kwok and Leland (1982) focused on asymmetric information in the labor market as the reason of brain draining and so they showed that wage differentials among countries or regions are only a consequence and not cause of this phenomenon. Otherwise, Miyagiwa (1991) emphasized the importance of scale economy in education in attracting skilled workers of places with significant concentration of qualified labor force. According to this author, the scale effect in education improves productivity, and therefore skilled people income in a region showing significant skilled labor agglomeration. To this fact, Miyagiwa explained wage differentials among regions. As well, this situation was described by Freguglia, Conçalaves and Ribeiro da Silva (2014). Enterprises do care about labor costs because they track the relationship between their total labor costs and how productive workers are. If a enterprise's labor cost increases, most probably it will lose market share and its growth expectations will be negatively affected. The solution to this problem is a combination of wage restraint and labor productivity increase - it is achieved by introducing labor-saving techniques that are profitable (Felipe and Kumar, 2011). In the 1930s, 1940s and 1950s the topic of the functional distribution of income was frequently discussed and economists were trying to measure and understand the shares of labor and capital (Giovannoni, 2014).

The aim of this paper is to evaluate the differences between the agricultural holdings, especially limited liability companies in manufacturing industry, among Czech regions (NUTS3) and to try to find out the correlation between the indicators of the value of labor costs relative to the total output of the limited liability companies (labor costs per one unit of output) and total capital employed in the enterprise for respective regions.

2 Methodology and Data

Data were obtained from the database Albertina for time series from 2007 to 2013. After cleaning the data file (for the sake of duplicates or incomplete information accounts) were analyzed 287 limited liability companies (3 in Prague region, 48 in South Bohemia Region, 31 in South Moravia Region, 4 in Karlovy Vary Region, 67 in Vysočina Region, 20 in Hradec Králové Region, 8 in Liberec Region, 7 in Moravia-Silesia Region, 22 in Olomouc Region, 16 in Pardubice Region, 12 in Pilsen Region, 29 in Central Bohemia Region, 9 in Ústí Region and 11 in Zlín Region). They were selected businesses focusing their activities in manufacturing industry. For the purpose of this analysis the regions are divided with respect to their Gross Domestic Product per capita (average of years from 2007 to 2013) with region of Prague on the top, then all other regions below the average during the monitored period and the worst value is for region of Karlovy Vary.

There were analyzed data for period of six years. Other authors analyzed these variables for period for example from 1960 to 1988 (Hooper and Larin, 1989), or from 1919 to 1955 (Massell, 1960).

For this analysis there are used the different variables, such as:

- Labor costs to output ratio (L/O)
- Capital employed to output ratio (K/O)
- Labor costs to capital employed ratio (L/K)

Also there were used differences of ratios (Labor costs to output ratio, Capital employed to output ratio and Labor costs to capital employed ratio) from average among limited liability companies across the regions.

As well, in this research there is used correlation analysis of the ratios mentioned above with respect to the regional perspective.

In this article is used the Pearson's Correlation coefficient (King, Rosopa, Minium, 2011) which is a statistical measure of the strength of a linear correlation between two variables X and Y, giving a value between plus one and minus one, where one is total positive correlation, zero is no correlation, and minus one is total negative correlation. Pearson's Correlation coefficient between two variables is defined as the covariance of the two variables divided by the product of their standard deviations. Pearson's correlation coefficient, represented by the letter r, measures quantitatively the extent to which two variables x and y are correlated. For a set of n pairs of values x and y, correlation coefficient can be calculated as (Sharma, 2012):

$$r = \frac{\text{cov}(x, y)}{\sigma_x \cdot \sigma_y}$$

(1)

Where covariance is:

$$\text{cov}(x, y) = \frac{1}{n} \cdot \sum (x - \bar{x}) \cdot (y - \bar{y})$$

(2)

Where standard deviation of sample data on variable x and variable y is follow:

$$\sigma_x = \sqrt{\frac{\sum (x - \bar{x})^2}{n}}$$

(3)

$$\sigma_y = \sqrt{\frac{\sum (y - \bar{y})^2}{n}}$$

(4)

Where whole formula for Pearson's correlation coefficient is:

$$r = \frac{\frac{1}{n} \cdot \sum (x - \bar{x}) \cdot (y - \bar{y})}{\sqrt{\frac{\sum (x - \bar{x})^2}{n}} \cdot \sqrt{\frac{\sum (y - \bar{y})^2}{n}}}$$

(5)

I.e.:

$$r = \frac{n \sum xy - (\sum x) \cdot (\sum y)}{\sqrt{n \sum x^2 - (\sum x)^2} \cdot \sqrt{n \sum y^2 - (\sum y)^2}}$$

(6)

There was also counted p-value. P-value (Hendl, 2004) is a lowest possible level of significance, where can be rejected the null hypothesis. If the p-value is lower than 0.05, variable is significant.

3 Results and Discussion

The table number one shows the selected summary statistics of the calculated labour costs to output ratio, capital employed to output ratio and labour costs to capital employed ratio and labour costs to capital employed ratio across the Czech limited liability companies in manufacturing industry in all Czech NUTS3 regions during the period from 2007 to 2013, especially their average values, standard errors, and also their difference from the average value of the calculated ratios for the Czech Republic as total. Nevertheless, the results are not overly consistent with the hypothesis. The region of Prague has the lowest disparity in labor costs to output ratios, more precisely highest negative disparity. The Moravia-Silesia region has the lowest disparity, primarily highest negative, in capital employed to output ratios. And disparity of the labor costs to capital employed ratios, it is the lowest for Karlovy Vary region. It is contrary to the hypothesis. The highest disparity in labour costs to capital employed ratio is in Olomouc region. In case of labour costs to output ratio and capital employed to output ratio, the highest disparity is in South Bohemia region, and Karlovy Vary is the second one.

Table 1 Selected summary statistics of the calculated L/O, K/O and L/K ratios for the Czech limited-liability companies

Region	L/O - average	L/O – stand. error	Disparity betw. L/O & tot. aver. L/O	K/O - average	K/O – stand. error	Disparity betw. L/O & tot. aver. K/O	L/K - average	L/K – stand. error	Disparity betw. L/K & tot. aver. L/K
CenB	0.16	0.03	-0.06	1.52	0.16	-0.32	0.11	0.04	-0.02
KarV	0.28	0.06	0.06	3.52	0.88	1.72	0.08	0.02	-0.06
HrKr	0.16	0.04	-0.06	1.64	0.45	-0.19	0.09	0.01	-0.04
Liber	0.14	0.06	-0.08	1.57	0.07	-0.26	0.10	0.03	-0.03
MorSi	0.13	0.08	-0.09	0.43	0.42	-1.40	0.09	0.02	-0.03
Olom	0.17	0.05	-0.05	1.20	0.31	0.08	0.32	0.29	0.19
Pard	0.16	0.04	-0.07	1.71	0.24	-0.12	0.10	0.01	-0.03
Pils	0.15	0.05	-0.08	1.28	0.65	-0.55	0.11	0.01	-0.02
Prag	0.08	0.06	-0.14	0.93	0.41	-0.91	0.10	0.02	-0.04
SouB	0.88	0.59	0.66	4.16	5.61	2.34	0.11	0.02	-0.02
SouM	0.18	0.04	-0.05	1.99	0.31	0.16	0.09	0.01	-0.04
Ústí	0.26	0.29	0.04	0.93	0.43	-0.91	0.27	0.35	0.15
Vysoč	0.16	0.03	-0.07	1.96	0.16	0.13	0.09	0.01	-0.04
Zlín	0.18	0.03	-0.04	2.07	0.24	0.25	0.10	0.01	-0.03

Source: Own processing

The correlation coefficients for the labor costs to output ratios, the capital employed to output ratios and the labor costs to capital employed ratios for the Czech limited liability companies in agricultural sector, especially in manufacturing industry, in all NUTS3 regions during the six year period, from 2007 to 2013, are comprised in the table number two, three and four.

In the table number two, Karlovy Vary region, South Bohemia region and Ústí region have very low or more likely negative correlation of labour costs to output ratio with other Czech regions, except for the correlation coefficients among them. The mentioned regions are those with highest disparity in labour costs to output ratio in table number one. The other regions are positively correlated among each other.

Table 2 Correlation coefficients of L/O ratios for the Czech limited liability companies, 5 % critical value (two-tailed) = 0.756

Region	CenB	KarV	HrKr	Lib	MorSi	Olom	Pard	Pilsen	Prag	SouB	SouM	Ústí	Vys	Zl
CenB	1.00	-0.74	0.92	0.99	1.00	0.99	0.95	0.99	1.00	-0.88	0.99	-0.64	0.99	0.99
KarV		1.00	-0.81	-0.66	-0.71	-0.72	-0.81	-0.77	-0.74	0.82	-0.73	0.71	-0.68	-0.83
HrKr			1.00	0.90	0.93	0.96	0.99	0.93	0.89	-0.69	0.94	-0.90	0.93	0.87
Lib				1.00	0.99	0.99	0.93	0.99	0.99	-0.84	0.99	-0.62	0.99	0.96
MorSi					1.00	0.99	0.97	1.00	0.99	-0.83	0.99	-0.66	1.00	0.96
Olom						1.00	0.97	0.99	0.98	-0.82	1.00	-0.75	0.99	0.96
Pard							1.00	0.97	0.94	-0.74	0.95	-0.82	0.96	0.91
Pilsen								1.00	0.99	-0.87	0.99	-0.66	0.99	0.98
Prag									1.00	-0.90	0.99	-0.59	0.99	0.99
SouB										1.00	-0.85	0.38	-0.81	-0.96
SouM											1.00	-0.70	0.99	0.97
Ústí												1.00	-0.67	-0.58
Vys													1.00	0.95
Zlín														1.00

Source: Own processing

Table 3 Correlation coefficients of K/O ratios for the Czech limited liability companies, 5 % critical value (two-tailed) = 0.798

Region	CenB	KarV	HrKr	Lib	MorSi	Olom	Pard	Pilsen	Prag	SouB	SouM	Ústí	Vys	Zl
CenB	1.00	-0.77	0.94	0.58	0.99	0.99	0.90	0.93	0.99	-0.06	0.98	-0.22	0.99	0.95
KarV		1.00	-0.65	-0.91	-0.75	-0.81	-0.88	-0.78	-0.76	0.41	-0.62	0.61	-0.73	-0.79
HrKr			1.00	0.55	0.90	0.93	0.93	0.95	0.85	0.30	0.91	-0.16	0.89	0.77
Lib				1.00	0.51	0.59	0.78	0.61	0.55	-0.20	0.38	-0.86	0.46	0.52
MorSi					1.00	0.99	0.86	0.91	0.99	-0.15	0.99	-0.14	1.00	0.98
Olom						1.00	0.94	0.98	0.95	-0.09	0.96	-0.17	0.99	0.93
Pard							1.00	0.98	0.81	0.06	0.80	-0.36	0.85	0.77
Pilsen								1.00	0.83	0.09	0.88	-0.14	0.91	0.81
Prag									1.00	-0.23	0.97	-0.26	0.98	0.99
SouB										1.00	-0.02	0.23	-0.15	-0.38

Region	CenB	KarV	HrKr	Lib	MorSi	Olom	Pard	Pilsen	Prag	SouB	SouM	Ústí	Vys	Zl
SouM											1.00	-0.02	0.99	0.94
Ústí												1.00	-0.07	-0.21
Vys													1.00	0.97
Zlín														1.00

Source: Own processing

In the table number three, Karlovy Vary region, South Bohemia region and Ústí region have very low or more likely negative correlation of capital employed to output ratio with other Czech regions, except for the correlation coefficients among them. Karlovy Vary region and South Bohemia region are those with highest disparity in capital employed to output ratio in table number one. Region of Ústí has the second lowest disparity and also this region has a negative correlation with other regions as the opposite extreme region. Another regions are positively correlated among each other.

Table 4 Correlation coefficients of L/K ratios for the Czech limited liability companies, 5 % critical value (two-tailed) = 0.647

Region	CenB	KarV	HrKr	Lib	MorSi	Olom	Pard	Pilsen	Prag	SouB	SouM	Ústí	Vys	Zl
CenB	1.00	0.79	0.92	0.99	0.97	-0.67	0.94	-0.10	0.99	0.99	0.89	0.19	0.92	-0.28
KarV		1.00	0.96	0.67	0.91	-0.75	0.53	-0.15	0.80	0.86	0.99	0.59	0.93	-0.24
HrKr			1.00	0.84	0.99	-0.84	0.74	-0.24	0.93	0.96	0.99	0.48	0.97	-0.38
Lib				1.00	0.92	-0.58	0.98	-0.04	0.99	0.95	0.80	0.07	0.86	-0.24
MorSi					1.00	-0.77	0.84	-0.21	0.99	0.97	0.98	0.30	0.99	-0.35
Olom						1.00	-0.54	0.71	-0.69	-0.70	-0.78	-0.41	-0.73	0.82
Pard							1.00	0.98	0.81	0.06	0.80	-0.36	0.85	0.77
Pilsen								-0.15	0.94	0.85	0.69	-0.17	0.78	-0.32
Prag									1.00	0.97	0.91	0.14	0.95	-0.31
SouB										1.00	0.93	0.40	0.91	-0.25
SouM											1.00	0.47	0.98	-0.30
Ústí												1.00	0.26	0.02
Vys													1.00	-0.30
Zlín														1.00

Source: Own processing

In the table number four, region of Zlín, region of Plzeň and region of Olomouc have very low or rather negative correlation of capital employed to output ratio with other Czech regions, except for the correlation coefficients among them. Region of Zlín and region of Plzeň are those with negative disparity in labour costs to capital employed ratios in table

number one, but not with the highest negative disparity that is contrary to the paper hypothesis. Region of Olomouc has the highest positive disparity and has a negative correlation with other regions as the opposite extreme region. Another regions are positively correlated among each other.

4 Conclusions

The hypothesis of the connection of a low or negative labour costs disparity and a high Gross Domestic Product growth rate in the region (NUTS3) during the six year period, from 2007 to 2013, was partially true for the region of Prague as the region with highest Gross Domestic Product growth rate in the case of limited liability companies, because the region of Prague has also the lowest labour costs ratio disparity, especially the highest negative labour costs ratio disparity. Nevertheless, this is not true for the disparity of capital employed where Moravia-Silesia region was the region with lowest disparity, specially the highest negative disparity. And as well, region of Karlovy Vary is the region with the lowest disparity of labor costs to capital employed ratio, i.e. the highest negative disparity, which is contrary to the hypothesis of this paper. As well, the hypothesis was only partially true for the region of Karlovy Vary as the region with lowest Gross Domestic Product growth rate in the case of limited liability companies, because the region with the highest disparity of labour costs ratio was South Bohemia region and the Karlovy Vary region was the second one. The same is true for the disparity of capital employed. Negative correlation coefficients with the rest of regions during the monitored period were achieved in region of Karlovy Vary, South Bohemia region and Ústí region as the regions on the range of all regions in terms of the highest positive disparity in labour costs to output ratio and capital employed to output ratio. Only the results of correlation for the Karlovy Vary region are in agreement with the expectations, i.e. negative correlation to the other regions. The results for region of Prague are completely contrary to the hypothesis of this paper. For further research there should be used more specified econometric regional model with all factors and without any bias.

In this research was found out that labour costs have increased in period 2007-2013 for limited liability companies in the Czech Republic. On the contrary, Hooper and Larin (1989) showed, in their research, that labour costs in manufacturing industry has been diminishing in recent years in the United States, Japan, France, Italy, Belgium, Netherlands, United Kingdom and Canada, but they observed that labour costs increased in Germany. Hooper and Larin (1989) stated that the highest average of labour costs in manufacturing industry was in the United States in 1980.

Creamer and Bernstein (1954) stated that labor costs to output ratio decreased between 1929 and 1948 that was in connection with the decrease of capital employed to output ratio. In this research was ascertained that when labour costs to output ratio decrease, capital employed to output ratio increase.

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Relationship between Estimated Value
of Public Contract and its Price

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Abstract: *The aim of this paper is to realise the study indicates that there are differences between the estimated value of public contract and its tendered (or final) price. This fact surfaces that in some cases due to an inaccurately estimated price of the public contract were such public contracts awarded within a different type of an award procedure than was needed due to the public contract Law in European countries or due to the European Directives. The Subject of analysis in relation to different type of contract: supply, services and works contracts and type of supplier (its business policy and its size - bigger and smaller suppliers). There were evaluated these described relations: estimated value of contract, price and factor for critical assessment. In this study the authors defined regression model of variables mentioned where the 97.97 % of variability was explained by regression model to the total variability. We also found out the relationship between estimated and real price of different types of contract when we have due to the model characteristics estimated that the real price in Public contracts on supplies is 99.73 % of the estimated price, the real price in Public contracts on construction works is 99.33 % of Estimated price and the real price in Public contracts on services is 61.68 % of the Estimated price.*

Keywords: public contracts, estimated value of public contracts, contract price, factor for critical assessment

JEL codes: H83

1 Introduction

According to § 13 Act no. 137/2006 Coll., on public contracts, "estimated value of a public contract" shall be understood as an amount of financial liability estimated by the contracting entity and ensuing from the performance of the public contract that the contracting entity shall be obligated to set for the purposes of the award procedure, prior to its initiation. In establishing the estimated value, the price net of value added tax, shall be always conclusive. The contracting entity shall calculate the estimated value in compliance with the rules laid down in this Act and on the basis of data and information on contracts of equal or equivalent subject-matter; where such information is not available, the contracting entity shall establish the estimated value based on data and information obtained by means of market research of required performance, or, if appropriate, on the basis of data and information gained in another suitable manner. In establishing the estimated value, the date of dispatch for publication of the contract notice or the call for competition shall be conclusive. The contracting entity shall not subdivide the subject-matter of the public contract to lower thereby the estimated value below the financial thresh-olds set out in this Act. If a public contract is subdivided into lots, the total estimated values of all such lots of the public contract shall be conclusive for establishing the estimated value (Guccio and Pignataro and Rizzo, 2014).

We can agree with authors that associate the increase of efficiency in public procurement with the possibility of an easier access of small and medium enterprises to the public contracts market (Nakabayashi et al. 2013, Loader, 2011). If the contracting entity provides for rewards, prizes or payments to participants in the design contest or to participants in the competitive dialogue, the estimated value shall, in addition, include the total amount of such rewards, prizes or payments.

If the contracting entity reserved in the tender conditions the option pursuant to § 99, the estimated value shall, in addition, include the estimated value of all public supply contracts, public service contracts and public works contracts required by the contracting entity in the exercise of such an option; in that case the contracting entity shall be simultaneously obligated to establish separately the estimated value of the public supply contract, public service contract or public works contract, and the estimated value of supplies, services or public works in the exercise of such an option. In the case of framework agreements and the dynamic purchasing sys-tem, the estimated value shall be the maximum estimated value of all public con-tracts to be awarded during the term of duration of the framework agreement or the dynamic purchasing system. When establishing the estimated value, the contracting entity shall be obligated to sum up all estimated values of all similar mutually related supplies or services to be procured in the course of the accounting period. This provision shall not apply to supplies or services the unit prices of which vary during the accounting period, and the contracting entity acquires such supplies or services repeatedly according to its imminent requirements; the contracting entity shall, however, be always obligated to comply with the principles pursuant (Jackson and Brown, 1994). In view of the authors, it is important to mention also the fact that efficiency of public contracts itself is based, last but not least, on the "quality" of the legislation framework for public procurement. Some authors concentrate on criticism of, for example, so called European public procurement law (Korthals et al., 2010).

In the field of public procurement, an important role is that of the rate of corruption which strongly devalues the quality of economic competition in individual countries. Therefore, some of authors deal with the influence of corruption in public contracts on economic competition (Ateljevic et al., 2010).

It is possible to refer to other authors dealing with efficiency in public procurement, this for example in public procurement of contracts for cultural heritage conservation works in Italy (Guccio et al., 2014) or it is possible to cover, in relation with assessment of efficiency of public contracts, the context of so called electronic public procurement which, according to many authors, improve its efficiency (Costa et al., 2013).

2 Methodology and Data

To describe a possible dependency of selected parameters influencing the relation between estimated value of public contract and its final price, we have performed the quantitative analysis of secondary data obtained from the Journal of Public Contracts (TED, 2014), sample covering tendered public contracts pursuant to the Public Contract Law. The authors have left aside small scale public contracts and bellow thresholds public contracts. The data have been chosen using systematic selection and cover only the period of 2014, it means a sufficiently long period. Due to a high error rate of the secondary data (missing values or two different tendered prices (the tendered price is the price offered by the winning bidder in the tender who carried off the contract) within one tender, the authors had to remove the faulty data because of impossibility to correct them. Together 200 records have been selected and validated. Aim of this work is to study relationship between the estimated value of a public contract without VAT established by the contracting authority before the tender according to § 13 et seq. Act no. 137/2006 Coll., on public procurement and real price of a public contract without VAT after tender. Relationship will be study using regression analyses.

Model Specification

Regression analysis is a statistical method, which goal is approaching to the so-called causal context. Causality means dependence existence of a one phenomenon on the occurrence of other phenomenon. More over regression analysis describes oscillation of one variable (dependant) as a function of one or more independent variables (explanatory, regressors) in a single regression model function. Regression analysis is capable of quantifying dependencies between economic variables and therefore, it is one of the most used statistical methods (Gujarati and Damodar, 2004). Relationship

between variables Y (dependant) and X (independent) can be described by general regression model:

$$Y = f(X) + \varepsilon \qquad (1)$$

More specifically linear regression model, which is used in this paper to study relationship between estimated value of public contract and its final price, has the following form:

$$Y = \beta_0 + \beta_1 X \varepsilon \qquad (2)$$

where β0 is a level constant, β1 is regression parameters and + ε is stochastic term. **Stochastic residual (error) term** ε is variable representing a wide array of factors influencing the dependent variable Y, which are not explained by the explanatory variables X included in the model (Marek et al., 2013).

In our case, there will be study relationship between real price of the public contract without VAT after tender (Y) and 1 regressor, price of the public contract without VAT established by the contracting authority before the tender (X):

Real price of the public contract without VAT after tender = β_0 + β_1*Price of the public contract without VAT estabilished by the contracting authority before the tender + ε (3)

After the performance of regression analyses between estimated and final price of the public contract there will be also performed the same analyses individually for public contracts on services, construction works and supplies. The same methodology will be used.

To estimate numerical values of β0 and β1, OLS method will be used. Method of ordinary least squares (OLS) is the most frequently used procedure to estimate numerical values of regression coefficients from a linear model. It is applicable to regression models, which are linear in parameters or can be linearized by some suitable transformation, such as logarithmic, reciprocal, etc. OLS estimates the coefficients of regression models linear in parameters, where the dependent variable Y is modelled as an additive function of the products between the β coefficients and explanatory variables X, the regressors or their function forms (Wooldridge, 2009).

However, performing a regression does not automatically gives a reliable relationship between variables. Classical assumptions of well specified model must be fulfilled.

- Regression model is linear in parameters; it is correctly specified and it has an additive error term.
- Expected value of the error term is zero.
- All explanatory variables are uncorrelated with the error term.
- Error terms are uncorrelated = No serial correlation.
- Error term has constant variance = No heteroskedasticity.
- No explanatory variable is a perfect linear combination of other explanatory variable(s) = No perfect multicollinearity.

3 Results and Discussion

Experts dealing with the issue of public procurement both abroad (see e.g. Bergman and Lundberg, 2013; Costa and Arantes and Valadares Tavares, 2013) and in the Czech Republic (Ochrana, Maaytová, 2012; Jurčík, 2011, Jurčík, 2013, 1) note, that one of the most significant breach of the law is the division of public contracts. To determine the type of public contract (if it is small scale contracts, which are not awarding according to public procurement law, above scale public contract and European union covered above thresholds public contracts) is paramount above the estimated values of public contract (Korthals, Taşan-Kok, 2010; Loader, 2011; Luo and Oliveira and BC Ramos and Maia and GS Osorio-de-Castro, 2014). The correct chosen of estimated value of public contract is necessary for the lawful public procurement procedure. The estimated value of public

contract which should be identifying before awarding of public contract we can define as real estimate of price of public contract (Jurčík, 2013, 2).

In this part of the paper we will study the relationship between the estimated value of a public contract without VAT established by the contracting authority before the tender according to § 13 et seq. Act no. 137/2006 Coll., on public procurement and real price of a public contract without VAT after tender. In other words dependant variable in the analysis is the real price of the public contract without VAT after tender. Independent variable is price of the public contract without VAT established by the contracting authority before the tender. There will be found out, what is the relationship between these two variables in total and also how this relationship changes when the public contracts are separated according to its purpose: public contracts on supplies, services and construction works.

Analysis of Real Price and Estimated Price of the Public Contract

In the beginning an empirical analysis of dependant variable and chosen independent variable is conducted. The first step is to model real price of the public contract without VAT after tender as a function of 1 regressor (price of the public contract without VAT established by the contracting authority before the tender) using OLS method in Gretl software.

Real price of a public contract without VAT after tender) = function (Estimated price of the public contract established by the contracting authority before the tender) (4)

We suppose that there will be a positive relationship between variables, in other words the higher is the estimated price of the public contract before tender, the higher is the real final price of public contract after tender.

Figure 1 Relationship between estimated and real price of the public contract
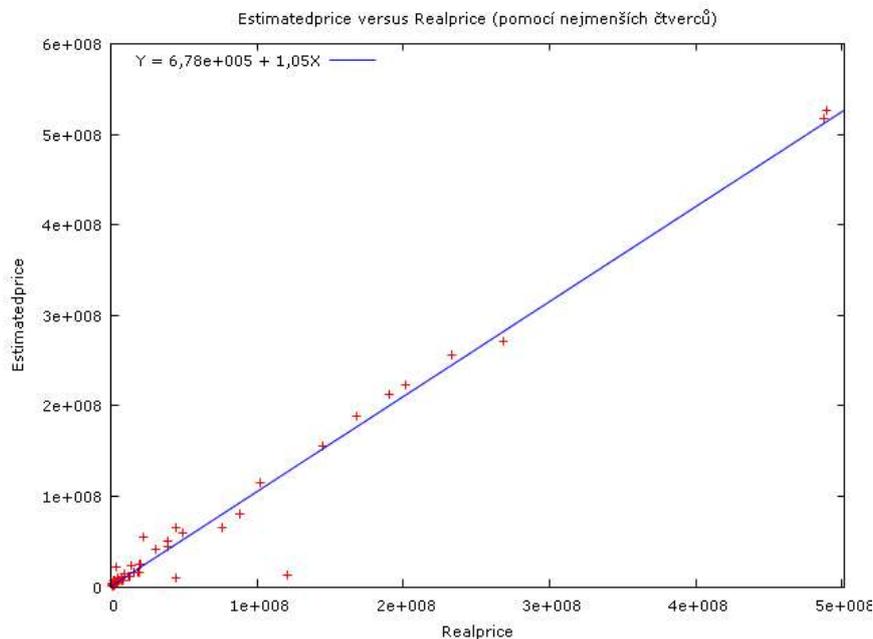
Source: Own preparation

Figure 1 shows linear relationship between variables. From the picture it is quite clear that linear relationship is suitable for this model. There can be also claim that the higher estimated price of the public contract, the greater real price of the public contract after tender.

Using OLS method there is recognized relationship between variables:

Table 1 Model 1 (linear): Dependent variable: Real price of the public contract
(OLS, using observations 1-120)

	Coefficient	Std. Error	t-ratio	p-value
Const	733262	1.69345e+06	0,4330	0.6658
Estimated price of the public contract	0.929764	0.0139076	66,85	$1.20e^{-095}$ ***

Mean dependent var	52994576	S.D. dependent var	1.02e+08
Sum squared resid	3.20e+16	S.E. of regression	16455984
R-squared	0.974277	Adjusted R-squared	0.974059
F(1, 98)	4469.336	P-value(F)	1.20e-95
Log-likelihood	−2163.208	Akaike criterion	4330.416
Schwarz criterion	4335.991	Hannan-Quinn	4332.680

Source: Own preparation

From table 1 it can be seen that the higher is estimated price of the public contract, the higher is its real price. But from the p-value of the constant can be claim, that constant is not significant (p-value is higher than 0.05). For this reason model is modified into the model without constant. Result can be seen bellow.

Table 2 Model 2 (linear without constant): Dependent variable: Real price of the public contract (liOLS, using observations 1-120)

	Coefficient	Std. Error	t-ratio	p-value
Estimated price of the public contract	0.932543	0.0122949	75.85	$1.32e^{-102}$ ***

Mean dependent var	52994576	S.D. dependent var	1.02e+08
Sum squared resid	3.20e+16	S.E. of regression	16399709
R-squared	0.979734	Adjusted R-squared	0.979734
F(1, 98)	5752.933	P-value(F)	1.3e-102
Log-likelihood	−2163.303	Akaike criterion	4328.607
Schwarz criterion	4331.394	Hannan-Quinn	4329.739

Source: Own preparation

From table 2 it is clear that between these two models the better one is the model 2 – linear model without constant. It has lower value of information criteria (Akaike, Schwarz and Hannah) and higher value of adjusted R^2. Also the variables is significant (p-value is much lower than 0.05).

Relationship between Variables

From the previous table can be say, than the relationship between real price of the public contract without VAT after tender and price of the public contract without VAT established by the contracting authority before the tender is:

Real price of the public contract (in CZK without VAT) = 0.9325 * Estimated price of the public contract established by the contracting authority before the tender (in CZK without VAT) (5)

Meaning that real price of the public contract represents 93 % of its estimated price established by the contracting authority before the tender. And if the estimated price of the public contract increases by 1 000 CZK the real price of the public contract increased only by 932 CZK.

Classical Assumptions

The estimation created through regression produced a linear relationship between the variables. However, performing a regression does not automatically give a reliable relationship between variables. Seven classical assumptions of well specified model must be fulfilled. The model must be tested on all classical assumptions. Firstly it will be test on correct specification. Because model is linear it can be tested by Lagrange Multiplier (LM) test of linearity.

Table 3 LM test

LM test: results	p-value
Polynomic form	0.530718
Logarithmic form	0.68771

Source: Own preparation

From the both results of LM tests it is obvious that function form of the model is OK and model is linear - logarithmic (both p-values are higher than 0.05, H_0: that the relationship is linear fail to be rejected. Model is linear. Another used test was Ramsey's RESET test for detection of omitted variable in the model or incorrect specification of the model. It's with p-value was 0.776 from which it is clear that null hypotheses that model is correctly specified failed to be rejected and model is correctly specified. More ways to verify correct model specification are adjusted coefficient of determination (R^2_{adj}) and Information criteria. Results of those tests were presented in the Model 2 (table 2), where can be seen that 97.97 % of variability was explained by regression model to the total variability which is great success.

Classical assumption number 1 which says that regression model is linear in parameters, it is correctly specified and it has an additive error term was confirmed. Another classical assumption is correlation. Existence of serial correlation implies that the error term from one time period depends on error term from other time periods. But because data are cross sectional, correlation cannot appear in the model. By the classical assumption number V error term has constant variance which is requirement for homoskedasticity of the error term. Homoskedasticity was tested using White test. Test resulted with p-value 0.860629. P-values is greater than alpha (0.05), not rejection of the null hypothesis, there is no heteroskedasticity in the model. Errors are homoskedastic. Assumption number V is fulfilled. Classical assumption VI refers about multicollinearity which can be detected by Variance Inflation Factors, VIF(β_j). But because in our model only one independent variable stayed, there can be no multicollinearity. Normal distribution of stochastic error is classical assumption VII. There are many ways to verify normality of the error term. One of commonly used statistical test is Chi-square test of goodness of fit. Its p-value was higher than 0.05, failure of H_0 rejection. Classical assumption number seven was fulfilled.

Public Contracts according to its Character

In this subchapter there is a comparison of models which represents relationship between dependant variable, real price of a public contract in total, on supplies, on construction works and on services without VAT after tender and chosen independent variable, estimated price of the public contract in total, on supplies, on construction works and on services established by the contracting authority before the tender.
When we analyse the relation between the estimated value and real price we can assume the greater difference is at public contract on services. To confirm this assumption there were performed analyses individually for public contracts on services, supplies and construction works. Using the same methodology which was described above, we obtained these results:

Public contracts in total: Real prices of public contracts represents on average 93, 25 % of the estimated prices.

*Real price = 0.9325 * Estimated price* (5)

Public contracts on supplies: Real prices of public contracts on supplies represents 99, 73 % of the estimated prices.

*Real price = 0.9973 * Estimated price* (6)

Public contracts on construction works: Real prices of public contracts on construction work represents 99, 33 % of the estimated prices.

*Real price = 0.9933 * Estimated price* (7)

Public contracts on services: Real prices of public contracts on services represents 61, 68 % of the estimated prices.

*Real price = 0.6168 * Estimated price* (8)

From the equation number 8 it can be say, than the relationship real price of a public contract on services without VAT after tender and estimated price of the public contract on services established by the contracting authority before the is positive, but, real price of the public contract on services represents only 61, 68 % of its estimated price established by the contracting authority before the tender. If the estimated price of the public contract on supplies increases by 1 000 CZK the real price of the public contract increased only by 617 CZK. All models were also tested by the same tests as the first one model number 2. All tests confirmed 7 classical assumptions of the well specified model.

4 Conclusions

Using regression analysis there was studying relationship between real price of the public contract after tender and estimated price of the public contract established by the contracting authority before the tender. There was concluded that this relationship exist and is positive (the higher the value of the estimated price of the public contract, the greater real price of the contract after tender).

But on the other hand real price of the public contract represents only 93 % of its estimated price established by the contracting authority before the tender. Meaning if the estimated price of the public contract increases by 1 000 CZK the real price of the public contract increased only by 932 CZK.

When it comes to public contracts on supplies and construction works, estimated price of the public contract before the tender was almost the same as the real price of the public contract after the tender. Real price after tender represented 93.3% and 99.7% of the estimated price. But real prices of the public contracts on services after tender are only 61.68 % of the estimated prices of the public contracts.

These relationships were also tested. All tests which were used concluded that classical assumptions of well specified model were fulfilled.

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Impact of Selected Value Drivers on the Performance of Companies in the Manufacturing Industry

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Abstract: *This paper presents the results of research aimed at examining the impact of selected factors belonging among value drivers on the performance of companies operating in the manufacturing industry (CZ-NACE 28). Primary data obtained by a questionnaire survey were supplemented with data from financial statements used to calculate company performance indicators. In the first stage of the research, three hypotheses of the impact of company management on performance were tested. The hypotheses were tested by the chi-square test, Fisher's exact test and Spearman's coefficient. The tests confirmed positive correlation between company performance and its reinvestment rate but failed to find any correlation between company performance and the aggressive financing strategy.*

Keywords: value drivers, performance measurement, financial strategy, reinvestment

JEL codes: G32

1 Introduction

The current practice of corporate governance is characterised by the focus on generating value for shareholders. One approach which reflects the key business objective (growth in the value of the company) is called the Value Based Management (VBM). The application of the value based approach is also connected to the use of so-called value drivers. These are factors that reflect environment in which companies operate and may be used to measure the company's performance and worth of its corporate strategy. Wide range of characteristics of this concept is given in the literature. For example, according to Rappaport (1998), Copeland and Koller and Murrin (2005), Scarlett (2001) and Akalu (2002) it relates to any variable that affects the value of the company. Similarly, the value driver is also defined by Koller and Goedhart and Wessels (2010). Woodcock (1992) states that it relates to all internal and external mechanisms, which may influence the formation or destruction of the company. In every company and industry the value drivers are specific and their identification plays the key role in the successful management of the company.

Minchington and Francis (2000) reported that, according to Alfred Rappaport (whose work is crucial in this field), there are seven key value drivers: a growth in sales, an increase in the operating profit margin, a reduction in the income tax rate, a reduction in the working capital investment, a reduction in the fixed asset investment, a reduction in the weighted average cost of capital; an increase in the competitive advantage period. Hall (2002) in determining the value drivers used, like Mařík et al. (2011) and Damodaran (2006), the analysis of the economic added value and stipulated that the most important factors (in the given order) are the return on capital employed (ROCE), weighted average cost of capital (WACC), (short term-borrowings+bank loan for operation)/capital employed, debt ratio, net operating profit before tax/capital employed and company income tax rate. Needles and Frigo and Powers (2004), who studied the relationship between the strategy and financial performance, found that among the factors they identified (asset turnover, profit margin, debt/equity ratio, operating cash flow/net income, sales to assets ratio), there is no correlation and as a result they are mutually independent. Framework of intangible assets and value generators were studied by Andreou and Green and Stankosky (2007) and among the factors included: customer, competitor, employee, information, internal and external stakeholders, process, product/service, technology. Horobet and Joldes (2008), Pfeffer (1994), Becker et al.

(1997), as well as Putnová (2011), state that the human resource is a significant value driver. Skibniewski and Ghosh (2009) determined on the basis of interviews with the ERP systems' end users the following nine factors that were important for their interviewees: cost of production, production time, estimation of the costs and time, wastage rate, customer satisfaction, occupational, profitability and productivity. Reino and Vadi (2010) rank among the major factors that affect the value of the Estonian industrial enterprises the human relations (traditions, care for employees, cohesiveness), open system (initiative, freedom and willingness), rational goal (competition, commitment to goals, rationality) and internal processes (procedures, stability and formality). From the results acquired by Acur, Kandemir and Boer (2012) it showed that the activities associated with the development of new products influence the strategic planning, innovativeness, living environment, technological development, technological alignment, market alignment, new product development marketing alignment. As the key value drivers, according to the research conducted in 2008 and 2009 by Waldron (2010) and Hall (2012), are considered the market capitalisation, cost of goods, the degree of manufacturing leverage, inventory turnover, efficiently inventory, plant and equipment intensity, fixed asset turnover and incremental manufacturing cash outflow rate.

2 Objective and Hypotheses Formulation

Following the results of the afore mentioned research the submitted paper's objective is to research the impact of selected factors, which are among the generators of value, on the performance of companies within the Manufacture of Machinery and Equipment (CZ-NACE 28) field.

The research tested the following hypotheses:

Hypothesis 1a: Companies with majority foreign ownership are predominantly export oriented.

Hypothesis 1b: Companies with majority foreign ownership using more precise methods of performance management.

It may be assumed that the foreign owner endeavours to hold a majority stake in the company and at the same time as the company owner uses its distribution channels as well as its know-how. Consequently, the companies owned by the foreign owner should be export oriented, utilise the proven managerial procedures based on well worked-out information systems and achieve higher performance than companies with dispersed ownership. Hypotheses shall be verified through the Fisher's exact test (Hypothesis 1a) and Chi-square test (Hypothesis 1b).In the first part of the hypothesis the ownership structure and the level of exports shall be tested. The entity whose ownership structure is more than 50 % of the total ownership is considered as the majority owner. The companies which export more than 50 % of manufactured products volume are considered as "predominantly export oriented". The second part of the Hypothesis examines the relationship between the ownership structure and the methods used in the management of a company performance, whilst the precise methods of the management of performance included in the questionnaire are considered: accounting in accordance with the Accounting Act supplemented by the comprehensive tailor-made software, which captures all areas of activity; comprehensive management information system within the selected concept (e.g. BSC, EFQM, TQM, ISO certification and others).

Hypothesis 2: Reinvestment rate is positively correlated with the company performance.

Investment is the significant contributing factor in the company growth (and condition for the renewal of its production capacity, product innovation, etc.). Thus the companies create the conditions to secure lasting perspective and in consequence sustained growth of the company value. From it follows that by reinvestment of generated profits the equity increases, however it could at otherwise unchanged conditions lead to a decline in the Return On Equity (ROE). The investment is also an essential condition for the growth of the company which can prove in upcoming years. The hypothesis will be tested

through Spearman's correlation coefficient between the percentage indicator of the equity growth using internal resources and indicators (here ROE and ROA indicators).

Hypothesis 3: Aggressive financing strategy is not associated with the growth of the company performance during the entire monitored period.

Aggressive strategy is the consequence of the effort to reduce the amount of invested capital in order to achieve a higher return on invested capital. It is associated with high risk, which allows for high yields, however in the short term. In the long term, this financing strategy is usually associated with the risk of insolvency, which may lead to limiting of investments and the loss of competitiveness. We evaluate the aggressive financial strategy of given company by using a current ratio indicator. The given strategy is evaluated as aggressive for CR <1, otherwise as non-aggressive (i.e. conservative).The hypothesises hall be verified through Chi-square test.

3 Methodology and Data

3.1 Methods Used

Data for the research was acquired through a questionnaire and supplemented by the data from financial statements. This information was obtained from the public database (www.justice.cz). Subsequently, the collected data was used for the verification of research hypotheses using statistical methods, namely Chi-square test, Fisher's exact test and Spearman's correlation coefficient.

3.1.1 Questionnaire

The questionnaire was divided into three sections. Questions in the first section related to the company name (due to the completion of financial statements), its identification data and further detail information associated with the company. The second section related to the measurement methods, management of the company performance and factors affecting the performance (e.g. management information system used; which indicators are monitored and the factors considered as the most endangering, alternatively increasing the company performance).The last section looked at whether managers have the awareness of what the company's value drivers are and what they perceive as the value drivers in the company governance.

The questionnaire consisted of three types of questions: questions with optional answers and only one correct answer; questions with optional answers with one or more correct answers; questions with open answers. The questionnaire was distributed to companies via e-mail.

3.1.2 Chi-square Test

Chi-square test is nonparametric statistical method that is used to determine whether between the two attributes exits a verifable relationship. The basic principle of the chi-square test lies in the comparison of observed and expected frequencies. Size differences between the observed and expected frequency are assessed using the χ^2 test statistics (test criterion):

$$\chi^2 = \sum_{i=1}^{r} \sum_{j=1}^{s} \frac{\left(n_{ij} - n'_{ij}\right)^2}{n'_{ij}} \tag{1}$$

where: n_{ij} – observed frequency of i-th category

   n'_{ij} – expected frequency of i-th category

The calculated value of the said test criterion χ^2 is compared with the quantile $\chi^2_{1-\alpha}[(r-1)(s-1))]$, where α is the selected level of significance (Řezanková, 2010).

3.1.3 Fisher's Exact Test

To enable to use the χ^2 test it is essential that the theoretical frequency n'_{ij} is greater than 5. In the event of low frequency the Fisher's exact test (test of the independence of

two attributes), which is classified among nonparametric tests, may be used working with data on nominal scale and in its simplest form in two classes. For each frequency option we can calculate the probability that for the given marginal frequencies n_1, n_2, n_1, n_2 frequency table $n_{11}, n_{12}, n_{21}, n_{22}$ is generated. Thus we get (Řezanková, 2010; Anděl, 2011):

$$P = \frac{n_1! n_2! n_1! n_2!}{n! n_{11}! n_{12}! n_{21}! n_{22}!} \tag{2}$$

3.1.4 Spearman's Correlation Coefficient

By the Spearman's correlation coefficient, whose theoretical value is denoted as ρ_s, we measure the power of the X and Y relationship if the linearity of the relationship or the typical distribution of X and Y variables cannot be assumed. Approximation of the ρ_s is given by the selective correlation coefficient r_s ($-1 \leq r_s \leq 1$), which for the given selection (x_i, y_i) we calculate in accordance with the following equation:

$$r_s = 1 - \frac{6 \sum D_i^2}{n(n^2 - 1)} \tag{3}$$

where: D_i are differences in R_x and R_y sequence's x_i and x_y values relative to the other values of the selection sorted by the size (Hendl, 2006).

The value r may take value between -1 and 1, if r = 0 (or close to this value) the variables are independent. Positive values of the correlation coefficient indicate a positive dependence. Negative values, on the other hand, indicate negative dependence (Řezanková, 2010; Anděl, 2011).

3.2 Research Sample

The basic sample was defined from the population of entities whose activities belong, according to the CZ-NACE, into the C section and their legal status is a public company, limited liability company, limited partnership or joined-stock company. Due to the large size of the basic sample groups 28.1 and 28.2 were chosen as the key groups for the formation of the research sample (according to the "Administrative registry of economic entities" database the total of 6101 entities were included to 15 October 2014).Subsequently the research sample was calculated as (according to Israel, 2012; Watson, 2001; Saunders, Lewis, Thornhill, 2009):

$$n = p \cdot q \cdot \left(\frac{Z}{e}\right)^2 = 0{,}5 \cdot 0{,}5 \cdot \left(\frac{1{,}65}{0{,}1}\right)^2 = 68{,}0625 \cong 69 \; entities \tag{4}$$

If the size of the basic sample is not known, the variables *p* and *q* (estimated share of an attribute within the total population) are equal to 0.5. The required confidence level is 90%, then the resulting sample is equal to the 69 entities (for the degree of reliability α = 0.90 the Z value equals to 1.65).The results show that 69 entities form the research sample. Given that the questionnaire data was acquired from 80 companies, this sample may be considered as representative on the 10% significance level.

4 Results and Discussion

To determine significant difference in each variable the data were statistically processed using the STATISTICA 12 software package. The data was immediately assessed in accordance with the above given classification of the interviewees.

4.1 Basic Characteristics of the Research Sample

Of the 80 questioned companies, in terms of size (measured by the sum of sales of goods, and own products and services), the largest group consisted of 36 medium sized companies (45 % share of the total). Similar division also resulted from the division of companies by the number of employees; the largest share consisted of a group of

companies, which employ 11 to 50 employees (38.75 %, in absolute terms 31 companies). Further breakdown by size is evident from the Table 1:

Table 1 Basic characteristics of the research sample

Company size	Number	%	Number of employees	Number	%
Very small	18	22.50%	**Less than 10**	15	18.75%
Small	16	20.00%	**11 – 50**	31	38.75%
Medium	36	45.00%	**51 – 250**	23	28.75%
Large	10	12.50%	**More than 251**	11	13.75%
Total	80	100.00%		80	100.00%

Source: Own research

More than 50 % of the surveyed companies had domestic majority owner – refer to the Table 2:

Table 2 Research sample by the ownership structure

Ownership structure	Number	%
Majority domestic owner	41	51.25%
Majority foreign owner	20	25.00%
Without a majority owner	19	23.75%
Total	80	100.00%

Source: Own research

Most companies export their production abroad (83.75 %), only 13 companies (16.25 %) do not export.

4.2 Results of Testing Hypotheses

Hypothesis 1

Only 61 companies meet the conditions set for testing this hypothesis (19 companies have dispersed ownership). To verify the assumption that statistically significant relationship exists between the type of the owner (foreign or domestic) and export focus or exactitude of the system used the Fisher's exact test was applied (Hypothesis 1a) since one of the frequencies is less than 5 and as a result the Chi-square test could not be used (see Table 1 in Appendix).

Result of testing on the significance level of $p < 0.05$ is shown in the following table:

Table 3 Established attribute for the Hypothesis 1a, 1b

Variables	Hypothesis 1a	Hypothesis 1b
Chi-square (df = 1)	8,41	6,83
p-value Chi-square	p = 0,0037	p = 0,0090
Fisher's p; one-sided	p = 0,0036	p = 0,0099
Two-sided	p = 0,0064	p = 0,0132

Source: Own research

On the basis of conclusions of Fisher's exact test (two-sided var.) exists at the 1 % level of significance relationship between the type of the owner and the type of export-oriented respectively companies with foreign owners are mainly export-oriented (29.51 %, i.e. 18 companies from a total of 61 subjects) to a greater extent than companies with domestic owner (27.87 %, i.e. 17 companies from a total of 61 subjects). A similar dependence can then be identified, but the 5 % level of significance, between the type of owner and used information system. Enterprises with foreign owners utilize exact methods of performance measurement (21.31 %, i.e. 13 companies from a total of 61 subjects) to a greater extent than businesses owned by domestic entities (18.03 %, i.e. 11 companies from a total of 61).

Hypothesis 2

In testing this hypothesis, it was assumed that the effect of investment is reflected in the following years. Consequently, the effect of profit reinvestment was tested for the following two years for which we had the data available – refer to the Table 4:

Table 4 Established attribute for the Hypothesis 2

Variables	Spearman (R)	p-value	Variables	Spearman (R)	p-value
Reinv10 & ROA11	-0,1416	0,2132	Reinv10 & ROE11	-0,1023	0,33697
Reinv10 & ROA12	0,0024	0,9835	Reinv10 & ROE12	-0,0223	0,8464
Reinv11 & ROA12	-0,0895	0,4360	Reinv11 & ROE12	-0,1199	0,2925

Source: Own research

The table shows that the variables are not statistically significantly correlated at any standard significance level. According to the results it may be said that the reinvestment rate has no effect on the performance, measured by the ROA indicator or ROE indicator in the period of one to two years of reinvestment.

Hypothesis 3

To verify the assumption that there is no statistically significant correlation between the aggressive financing strategy and growth in the company performance during the entire monitored period the Fisher's exact test was used (see Table 2, Table 3 in Appendix). Results of testing on the significance level of $p < 0.05$ are presented in the Table 5:

Table 5 Established attribute for the Hypothesis 3

	Variables	2009	2010	2011	2012
ROA	Chi-square (df = 1)	0,01	2,40	0,44	0,98
	p-value Chi-square	p = 0,9125	p = 0,1215	p = 0,5088	p = 0,3233
	Fisher's p; one-sided	p = 0,6398	p = 0,1302	p = 0,4078	p = 0,2759
	Two-sided	p = 1,0000	p = 0,2050	p = 0,6124	p = 0,3834
ROE	Chi-square (df = 1)	0,89	0,08	3,20	0,24
	p-value Chi-square	p = 0,3447	p = 0,7770	p = 0,0735	p = 0,6228
	Fisher's p; one-sided	p = 0,3169	p = 0,5357	p = 0,1067	p = 0,5274
	Two-sided	p = 0,6771	p = 0,6735	p = 0,1067	p = 1,0000

Source: Own research

No statistically significant relationship exists (on any standard level of significance) between the company performance measured by the ROA indicator and aggressive financing strategy. The same conclusions show the results of testing between the current ratio and ROE indicators.

4.3 Discussion

The research clearly confirmed that there is a correlation between the owner and the company's export orientation, as well as in the use of exact methods for the management of the performance. As a possible explanation seems to be the initial assumption that foreign owners use their distribution channels and their know-how. This confirms conclusions by Huček, Malý and Okrouhlica (2007); Hanousek, Kočenda and Mašik (2012), Ficbauer and Režňáková (2014).

The assumption of the existence of the positive correlation between the profit reinvestment and company performance was not statistically proven. It only may be concluded that the positive relationship between the rate of reinvestment (measured by the ratio of reinvested profit to the total profit) and company performance exists. This finding corresponds with the findings of other authors, such as Akalu (2002), Copeland et al. (2005), Damodaran (2006), Olsen (2008), Morard, Stancu and Jeannette (2013). Not proven correlation between the reinvestment rate using generated profits does not disprove our assumption that the investment is considered to be one of the major

generators of value, however this assumption shall be reformulated, i.e. seek another factor measuring the amount of investment.

Hypothesis 3 was aimed at testing relationship between the aggressive funding strategy, associated with low net working capital, and increase in the company performance. The results showed that between these variables there is no statistically significant relationship (regardless of whether the company performance is measured by the ROA or ROE indicator). Consequently, it cannot be concluded that the financing aggressive strategy affects the increase in the company's efficiency, even in the short term, as it is generally assumed. The same conclusion was also reached by Šmejkal (2010), who found that the company's aggressive strategy led to deterioration of profitability indicators (and other monitored areas).

5 Conclusions

The objective of this paper was to present the results of research into the influence of selected value generators on the performance of companies working in the Manufacture of Machinery and Equipment field. Primary data acquired from the questionnaires and supplemented by the secondary data obtained from financial statements were used for the research. Based on testing the research hypotheses, significant influence relating to the type of the owner (foreign or domestic) on the company's export orientation, as well as on the used management information system was identified, i.e. the impact of readily available information on the company's performance. On the other hand, the assumption that the aggressive financing strategies can improve company performance was clearly disproved. Presented research is part of a wider research focused on investigation of internal and external value drivers.

Acknowledgments

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Appendix

Table 1 Research sample by export orientation and information system

	Export > 50%	Export < 50%	Total	Exact	Not exact	Total
Foreign	18 (29.51%)	4 (6.56%)	22 (36.07%)	13 (21.31%)	8 (13.12%)	21 (34.43%)
Domest.	17 (27.87%)	22 (36.06%)	39 (63.93%)	11 (18.03%)	29 (47.54%)	40 (65.57%)
Total	35 (57.38%)	26 42.62%)	61 (100%)	24 (39.34%)	37 (60.66%)	61 (100%)

Source: Own research

Table 2 Research sample by aggressive strategy and ROE indicator

	2009			2010		
	CR*>1	CR<1	Total	CR>1	CR<1	Total
ROE>0	50 (65.79%)	8 (10.53%)	58 (76.32%)	58 (72.50%)	7 (8.75%)	65 (81.25%)
ROE<0	17 (22.37%)	1 (1.32%)	18 (23.68%)	13 (16.25%)	2 (2.50%)	15 (18.75%)
Total	67 (88.16%)	9 (11.84%)	76 (100%)	71 (88.75%)	9 (11.25%)	80 (100%)
	2011			2012		
	CR*>1	CR<1	Total	CR>1	CR<1	Total
ROE>0	60 (75.00%)	3 (3.75%)	63 (78.75%)	56 (72.23%)	8 (10.39%)	64 (83.12%)
ROE<0	14 (17.50%)	3 (3.75%)	17 (21.25%)	12 (15.58%)	1 (1.30%)	13 (16.88%)
Total	74 (92.50%)	6 (7.50%)	80 (100%)	68 (88.31%)	9 (11.69%)	77 (100%)

* CR = current ratio

Source: Own research

Table 3 Research sample by aggressive strategy and ROA indicator

	2009			2010		
	CR>1	CR<1	Total	CR>1	CR<1	Total
ROA>0	51 (67.11%)	7 (9.21%)	58 (76.32%)	56 (70.00%)	5 (6.25%)	61 (76.25%)
ROA<0	16 (21.05%)	2 (2.63%)	18 (23.68%)	15 (18.75%)	4 (5.00%)	19 (23.75%)
Total	67 (88.16%)	9 (11.84%)	76 (100%)	71 (88.75%)	9 (11.25%)	80 (100%)
	2011			2012		
	CR*>1	CR<1	Total	CR>1	CR<1	Total
ROA>0	58 (72.50%)	4 (5.00%)	62 (77.50%)	55 (71.43%)	6 (7.79%)	61 (79.22%)
ROA<0	16 (20.00%)	2 (2.50%)	18 (22.50%)	13 (16.88%)	3 (3.90%)	16 (20.78%)
Total	74 (92.50%)	6 (7.50%)	80 (100%)	68 (88.31%)	9 (11.69%)	77 (100%)

Source: Own research

Consumer Satisfaction and Enterprise Performance

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Abstract: *The subject of this paper is the relationship between consumer satisfaction and enterprise performance. The aim of this paper is to analyse the effect that consumer satisfaction has on enterprise performance. The paper is based on research into consumer satisfaction (consumers of the enterprises being surveyed) and the performance of the food industry in the Czech Republic. The research was conducted using a questionnaire (for consumers) and the Albertina database (for enterprises). The evaluation was carried out using standard statistical methods. In the research, the impact of consumer satisfaction (assessed using several factors and individual parameters) on enterprise performance was proven (statistically). It will be interesting to discover if performing enterprises have more satisfied consumers than non-performing enterprises.*

1 Introduction

The subject of this article is the effect consumer satisfaction has on an enterprise's performance. The article is based on the theory that consumer satisfaction affects an enterprise's performance. This relationship has been empirically proven by the Healthcare Organization (see Rust, Zahorik, 1993). The more satisfied a consumer is, the more likely it is that he will buy the product (also in the future – repeatedly). It is, therefore, possible to express the hypothesis that an increase in consumer satisfaction with an enterprise's product will lead to an increase in efficiency. The hypothesis is formulated on the basis of Heikkilä research (Heikkilä, 2002). For the purposes of this research it is necessary to transform this hypothesis into the following: more efficient enterprises will have more satisfied consumers (higher values for the consumer-satisfaction factors being observed).

In order for the assessment to be sufficiently rigorous, consumer satisfaction is assessed on the basis of several groups of factors. In defining consumer satisfaction the authors worked with cumulative consumer satisfaction as an overall evaluation based on the total experience (Spiteri, Dion, 2004). Consumer satisfaction will be built on a combination of technical quality aspects and functional quality aspects (Gronroos, 1984). "Technical quality corresponds to traditional quality control in manufacturing and it is a matter of properly producing the core benefit of the product. Functional quality or process quality is the way the product is delivered; it is the process in which the consumer is a participant and co-producer." (Ton Van Der Wiele, Boselie, Hesselink, 2002)

Enterprise performance is assessed on the basis of selected indicators for profitability and activity. These indicators were used by the authors for measuring performance in previous research (see, for example, Richter, Králová, Suchánek, 2014). Specifically, the use of ROA indicators can be found in the literature (Ittner, Larcker, 1996). Apart from ROA indicators, which are the most common of the ratio indicators, it is also possible to

encounter ROE indicators (Combs, Crook, Shook, 2005). The indicator asset turnover is not used so often in the literature, though the authors have found it useful for evaluating enterprise performance. The indicators liquidity (specifically L3) and indebtedness (namely an equity quota) are complementary indicators which should complete the picture of the overall financial situation (performance) of the enterprises under research.

2 Methodology and Data

The research processed both financial performance data from the Albertina database related to the enterprises under research and consumer-satisfaction data (represented by 31 quality-related factors) obtained from a questionnaire designed for consumers.

The sample of enterprises examined comprised 212 companies representing the food-industry sector of limited-liability companies and joint-stock companies. According to the Albertina database in 2012 there were 4,255 enterprises in this sector, however only 212 of them published their balance sheets and profit and loss accounts (for 2012) with all the quantitative data needed to derive the basic ratios of profitability (namely ROE and ROA), assets (namely asset turnover), liquidity (including long-liquidity L3) and indebtedness (namely own-funds ratio). These indicators were used by the authors in previous research and are in accordance with the design used by the Ministry of Industry and Trade of the Czech Republic (Suchánek, Špalek, 2007).

The questionnaire focused on consumer satisfaction was divided into four areas (consumer satisfaction with the product, product quality, comparison of product quality with that of competitors, consumer satisfaction with the seller of the product) which were represented by 31 rating scale quality-related questions. The rating scale ranged from 1 – 10 (except for "repurchase" and "recommendation" which were measured on a 4-point scale) where the higher the value, the better the result[1] in terms of consumer satisfaction. The questionnaire was completed by 7,233 consumers of the above-mentioned 212 enterprises, representing the young population of students aged 18 to 26 years old living in the Czech Republic. The average value (for individual quality factors) for all the respondents evaluating the same enterprise represented the evaluation by consumers of the enterprise under consideration. Thus for any enterprise in the sample there were, on the one hand, financial ratios data and, on the other hand, the average consumer evaluation of the enterprise with regard to the 31 quality-related factors.

Further, companies were divided into 'performing' and 'non-performing' ones on the basis of the economic indicators. Enterprises with two out of the three indicators (ROA, ROE, ATO) above the median, after discarding a-priori poor enterprises (Equity < 0), were regarded as performing by the study. The remaining enterprises were regarded by the study as non-performing.

Finally, for the 31 quality-related factors, the group of performing and the group of the non-performing companies were compared in order to identify those factors where the performing companies give better results in terms of consumer satisfaction. Thus the null hypothesis postulated that there is no difference between performing and non-performing enterprises with regard to the factor under consideration, whereas the alternative hypothesis claimed that performing companies "are better" with regard to the particular factor. For that reason the p-values of one-tailed tests were assessed; the tests were run on a 5% significance level.

The statistical significance of the difference between performing and non-performing enterprises was assessed either using two-sample t-tests or, in the cases where the

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[1] The only exceptions are "AFFECTION" and "COMPLAINT". In the case of "AFFECTION", where the respondent answered on a scale of 1 (not at all) to 10 (completely) the question: "Was your decision to buy the product influenced by a third party?", the interpretation of "better – worse" is irrelevant. For the "COMPLAINT" variable, the higher the value, the more the complaints and, therefore, the worse the evaluation for the enterprise.

assumptions of these tests were not met, using Welch's t-test and the Wilcoxon rank-sum test in accordance with the assumptions.

Model Specification

A simple model (see fig. 1) was established in the course of examining the issue of consumer satisfaction and enterprise performance. A total of 31 factors divided into four groups affect consumer satisfaction. Consumer satisfaction affects enterprise performance. At the same time, the factors from the groups which make up consumer satisfaction are able to divide enterprises into performing and non-performing ones. The division of enterprises into performing and non-performing occurs while separately (explicitly) using the selected ratio indicators of profitability and activity.

Figure 1 The relationship between consumer satisfaction and enterprise performance
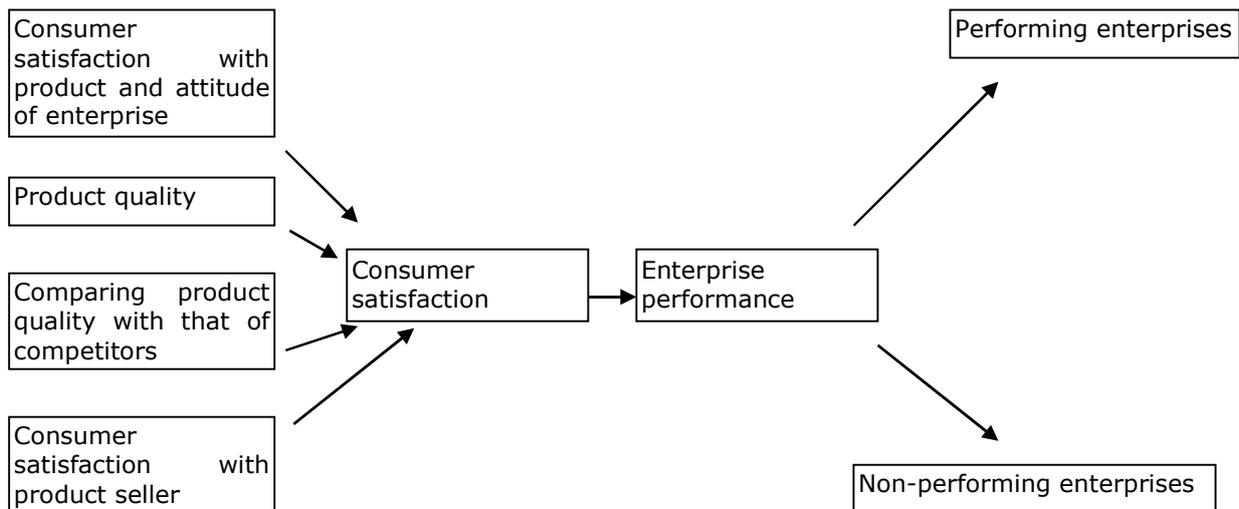
Source: Authors

3 Results and Discussion

In accordance with the methodology set out in chapter 2, the enterprises were first analysed financially and then divided into two groups – performing and non-performing enterprises. The characteristics of consumer satisfaction were then ascertained for the delimited groups of enterprises.

From a total number of 212 enterprises, 110 were classified as performing and 102 as non-performing, based on the ROE, ROA and ATO indicators. The enterprises were divided according to the median indicators: ROA = 0.0275, ROE = 0.0426 and ATO = 1.64.

Table 1 Ratio indicators for performing enterprises

Variable	Perf=1 Descriptive Statistics (Zastupci2.sta)			
	Valid N	Mean	Median	Std.Dev.
ROA_2012	110	0,1	0,077	0,1
ROE_2012	110	0,2	0,124	0,4
ATO_2012	110	2,1	1,824	1,3
EQUITY_2012	110	290519,9	65454,000	729016,4
EQUITY_A__2012	110	0,5	0,453	0,2
L3_2012	110	2,3	1,409	2,9

Source: Authors

Table 1 shows the average values and financial-indicator medians of the performing enterprises. In view of the way in which the enterprises have been divided into performing and non-performing ones, the medians of the selected ratio indicators will be

used to analyse financial performance. From the table it is apparent that for performing enterprises the median indicators ROA and ROE are almost three times greater than the medians of all the enterprises. However, the median indicator ATO is only slightly higher than the median indicator for all the enterprises.

The median equity indicator (EQUITY_A in the tables) is slightly higher for performing enterprises than for non-performing enterprises, which means that the performing enterprises are slightly less in debt than non-performing enterprises. The median L3 indicator for performing enterprises is also slightly higher than for non-performing enterprises, which means that the liquidity of performing enterprises is slightly higher than that of non-performing enterprises.

Table 2 Ratio indicators for non-performing enterprises

Variable	Perf=0 Descriptive Statistics (Zastupci2.sta)			
	Valid N	Mean	Median	Std.Dev.
ROA_2012	102	-0,0	-0,000	0,2
ROE_2012	102	-0,3	-0,012	1,0
ATO_2012	102	1,8	1,361	1,4
EQUITY_2012	102	118452,8	23385,000	352248,9
EQUITY_A__2012	102	0,4	0,421	0,3
L3_2012	100	2,7	1,285	7,8

Source: Authors

Table 2 shows the average values and median indicators for the financial performance of non-performing enterprises. From the results it is clear that not only are the median ROA and ROE indicators significantly lower than the medians for all the enterprises, but they are also negative. The median ATO indicator is slightly lower than the median indicator for all of the enterprises.

From the 31 factors affecting consumer satisfaction, significantly better results were achieved by the group of performing enterprises compared to the non-performing group for six factors. These factors are shown in table 3.

Table 3 Statistically significant consumer-satisfaction factors for performing and non-performing enterprises[2]

Variable	T-tests; Grouping: Perf (Zastupci2.sta in Workbook2_(Recovered)) Group 1: 0 Group 2: 1										
	Mean 0	Mean 1	t-value	df	p	Valid N 0	Valid N 1	Std.Dev. 0	Std.Dev. 1	F-ratio Variances	p Variances
REQUEST	6,70	6,99	-2,3234	210	0,021	102	110	0,88	0,91	1,09	0,67
SATISFACTION	7,03	7,33	-2,2773	210	0,024	102	110	1,01	0,93	1,17	0,41
EXPERIENCE	7,37	7,80	-2,3921	210	0,018	102	110	1,31	1,33	1,04	0,85
C_QUALITY	6,65	6,90	-1,8904	210	0,060	102	110	1,03	0,88	1,37	0,11
RECOMMENDATION	3,09	3,21	-2,2074	210	0,028	102	110	0,41	0,37	1,21	0,32
REPURCHASE	3,17	3,28	-1,9027	192,305	0,059	102	110				

Source: Authors

The first factor is the adaptation of the product to suit the consumer (REQUEST variable, p=0.0105) from the area of consumer satisfaction with the product and the attitude of

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[2] For the REPURCHASE variable, the test on its significant influence on financial performance was carried out using Welch's t-test; p-values in the table correspond to both aspects of the alternative hypotheses

the enterprise. For both groups of enterprises, the adaptation of the product (from the consumer's viewpoint) achieves relatively high values on the scale of 1 to 10. The second factor is satisfaction with the product offered (SATISFACTION variable, p= 0.012), also from the area of consumer satisfaction with the product and the attitude of the enterprise. Here too, consumer satisfaction in both groups of enterprises achieves higher values. The third factor is the first experience with the product (EXPERIENCE variable, p = 0.009), which is also from the area of consumer satisfaction with the product and the attitude of the enterprise. In this case the values for both groups of enterprises are also similar, with the consumers having had their first experience with the product 1-2 years earlier.

The fourth factor is the assessment of product quality in comparison with that of competitors (C_QUALITY variable, p=0.03) from the area of comparing product quality with that of competitors. For both groups of enterprises, consumers assessed the products as slightly better than the competitors' products. The fifth factor is the willingness to purchase the product again (REPURCHASE variable, p=0.029) from the area of comparing product quality with that of competitors. The last factor is recommending the product to other potential consumers (RECOMMENDATION variable, p=0.014), which is also from the area of comparing product quality with that of competitors. For both groups, consumers would strongly recommend others to purchase the product (here there was a maximum value indicator of 4).

When comparing performing and non-performing enterprises (using the selected median indicators) it is evident that the largest differences between the two groups of enterprises are in profitability. Both the median of the indicator ROA and the median of the indicator ROE for performing enterprises are several times higher than for non-performing enterprises. On the other hand, the differences in the remaining indicators (activity – ATO, indebtedness – equity ratio and liquidity – L3) are very small. Performing enterprises are either significantly more effective in their operation (they have lower costs) or they are able to realize higher margins (price), or a combination of these factors.

When examining the influence of the individual consumer-satisfaction factors on the performance of an enterprise (with enterprises divided into performing and non-performing ones), it was interesting to discover that the mean values of the statistically significant variables (factors) were very similar. This is in contrast to the marked difference discovered in profitability. Therefore, it would appear that relatively small differences in the consumer-satisfaction factors can cause relatively large changes in the performance of an enterprise. Another possible explanation is that there are other important factors which influence performance (this variant will be subjected to further research).

When the individual consumer-satisfaction factors are examined more closely, it becomes apparent that consumer satisfaction is influenced by other factors than just the level of fulfilment of consumer demands (the value of the SATISFACTION variable is higher than the value of the REQUEST variable). The relationship between consumer satisfaction and the level of fulfilment of consumer demands has been demonstrated by research (see, for example, Homburg, C., Bettina, R. 2001).

It can be inferred that an important factor influencing consumer satisfaction is the length of time using the product, i.e. familiarity with it (EXPERIENCE variable), where the longer a product is used, the higher the consumer's satisfaction. This factor is also linked to the comparison of the product with that of competitors (C_QUALITY variable), since it is only if I regard the product as better than that of the competitors that I will buy the product. If I am convinced of the higher quality of the product purchased, then not only will I buy the product again (REPURCHASE variable) but I will also recommend the product to others (RECOMMENDATION variable).

It is interesting to note that for the factors comparing satisfaction for performing and non-performing enterprises, none of the factors from the group related to consumer

satisfaction with the product seller was statistically significant. It would, therefore, seem that consumer satisfaction with an enterprise's performance is not affected by where (at which shop) the product is sold, and so none of the factors from this group can distinguish between performing and non-performing enterprises.

4 Conclusions

From the results it can be concluded that consumer satisfaction has a real influence on an enterprise's performance, and that there are consumer-satisfaction factors which can differentiate between performing and non-performing enterprises. These factors include adapting the product to suit the consumer's requirements, satisfaction with the product on offer, first experience with the product (and the length of experience), assessing the product's quality in comparison with that of competitors, and the willingness to buy the product again. All of the groups of factors are represented within the model apart from the factors related to consumer satisfaction with the product seller. However, it should be emphasized that only the separate ability of these factors to influence performance, i.e. to differentiate between performing and non-performing enterprises, was investigated.

Nevertheless, it would appear that if management were to focus on these factors, then it might be able to not only improve performance but actually turn the enterprise into one of the most efficient in its field. When comparing enterprises from the same field and their division into performing and non-performing, it is not important where (or how) the product is sold, because the shop (means of selling) does not affect performance (at least in the food industry).

It also transpires that with the aforementioned classification of enterprises as performing and non-performing, the largest differences in the indicators were for profitability, while there were much smaller differences in the indicators concerning the financial evaluation of an enterprise (activity, indebtedness and liquidity).

With regard to performance, it was established that better-performing enterprises are less indebted than non-performing enterprises, whereas (in the case of higher indebtedness) higher financial leverage with greater pressure to increase profitability might have been expected. It would appear that performing enterprises (at least in the food industry) prefer greater stability to profitability. Due to the fact that the profitability of performing enterprises is high, it would appear that performing enterprises aim for a certain level of profitability and once that has been attained, they improve the financial situation in other areas. Therefore, their situation is better overall than is the case for non-performing enterprises.

Acknowledgments

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Evaluation of Financial Strategy in Agricultural Companies

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Abstract: *The practice shows that the financial strategy is in current companies deeply underestimated. This fact can reduce the overall financial effectiveness of companies and cause its stagnation and impossibility to be developed. The main aim of this paper is to analyze and evaluate the financial strategy and financial policy of the selected agricultural companies in the Czech Republic. The scope of the activity is mainly focused on the analysis of capital structure and individual items of financial base. The data are received mainly from financial statements of the selected agricultural companies. The main criteria for selecting the agricultural companies were – legal form of the business, focusing on crop production and residence. The main methods of this paper are an analysis of financial statements and other documents about the selected companies, the selected methods of financial analysis and statistical methods. The results show that there is no existence of strategic concept of agricultural companies and many shortcomings in managing and organizing financial resources were identified. The paper therefore provides certain recommendations for strengthening the examined area in the long-term period.*

Keywords: agricultural companies, financial analysis, financial management, financial strategy, optimal capital structure

JEL codes: M21, M29

1 Introduction

The practice shows that the effective financial strategy is the main success key factor of business leaders in any scope of activity. However, in practice the corporate finance and other related financial aspects are conducted without a comprehensive insight and financial management is often confused with a functioning accounting. This fact may cause the inability to be developed in long-term period.

This paper focuses on the analysis and evaluation of the current financial condition and financial strategy of the selected agricultural companies. "The agricultural sector is included among the very sensitive areas of the economy, as it has its specifics that must be respected, such as the seasonal character of production, a high level of dependence on natural conditions, as well as the production structure" (Aulová, Hlavsa, 2013, p. 24).

The main reason for focusing on agricultural companies is the fact that not many researches were provided in this area and the financing of these selected companies is specified due to subsidies, donations and other financial interventions, which regulates agricultural market. The results of the research (Špička, Boudný, Janotová, 2009) indicate that the current subsidies have an impact on the stability of the farmers' income and furthermore, the current subsidies reduce the variability of the farmers' income.

2 Theoretical Background

The financial management could be defined as the business activity based on setting up the financial plan and achieving main financial objectives, thus corporate objectives. The main financial objectives are usually based on maximizing of market value, optimizing of the capital risk, maintaining the financial stability including the liquidity, profitability or cash flow (Kalouda, 2009, Valach, 1997). The main tasks of financial management are: defining and implementing the financial strategy, financial short-term and long-term decision making, such as deciding on allocation of capital to ensure the ordinary activities

of the company or deciding on the distribution of profit, i.e. to use it for investments, payment of dividends or profit shares of the company, financial planning that involves raising capital for the current and future needs of the company and deciding on its structure or recording, analyzing, checking and managing the economic activity of the company in such a way as to ensure its financial stability (Synek, 2002). Internal controls over assets, payments, and cash, as well as the production and distribution of financial statements are essential functions of the finance function, but several trends are expanding this scope (Smith, 2014). Main tools used in financial management are: financial analysis and planning, finding optimal capital structure, financial criteria for evaluating the managerial decision-making, cash-flow management, working capital management, budgeting or controlling (Grünwald, Holečková, 2007; Temte, 2005).

The financial strategy is defined as a relatively coherent and interconnected set of strategic financial objectives, criteria and rules that underlie such planning (Landa, Polák, 2008). The main purpose of setting up the financial strategy is to find the balance among controlling mechanisms, high company performance and minimizing the cost of financial operation to reach the effective management of all three mentioned financial areas (Irwin, 2005). Financial strategy is understood as a form of functional strategy that meets to main corporate and business strategy of the company and is derived from the long-term period and closely relates to the investment activities. Financial strategy is then necessary to edit, update and manage on the basis of changes in the external financial environment and significantly affect the financial stability of the company and contribute to the growth and efficiency of the enterprise and maximization of its market value (Grasseová et al., 2010). The main stages of financial management are following (Calandro, Flynn, 2007): 1) *strategy formulation*, or the determination of how to satisfy customer preferences in unique ways, 2) *resource allocation*, or the process of funding and staffing strategic initiatives that are tied to delivering customer satisfaction, 3) *performance measurement*, or an assessment of the relative success or failure of business activities.

The area of finance is declared by 93 % of Czech companies as the crucial for the evaluation of corporate performance (Stříteská, Svoboda, 2012). The main objective of financial planning is to ensure the need amount of capital that uses the prerequisite minimizing the cost of capital and optimal capital structure. For such reason, the structure of a business must be designed with the objective of its optimization, i.e. with the securing of sufficient capital with minimum costs expended for it (Nývltová, Marinič, 2010). The long-term financial decision-making is based on the investments and business development, the short-term financial decision-making is based on managing the components of working capital.

The prerequisite of long-term managing the corporate finances is the finding the optimal capital structure between own capital (equity) and external capital (debts) that minimize the cost of received total capital. The theories (Kislingerová, 2004) show that Czech companies prefer financing from the own sources (especially depreciations, reserves or undivided earnings) despite of the fact a certain amount of debts is cheaper than equity, it can be used the effect of tax shield and positive effect of leverage (debts enable increasing the profitability) and reduce the cost of received total capital (Jindřichovská, 2001; Synek, 2002). Petřík (2007) adds that external sources of financing assuming the appropriate extent have other benefits: if the debtor fulfils all its obligations timely and in full, the usage of external sources enables to maintain the independent original controlling and managing of the company (the creditor does not receive any voting rights); the company using external financing effectively can be developed and expanded faster and can receive a larger market share; an adequate external financing may result in induced synergy effects and contribute to the growth of company value.

The crucial factor of this fact is the asymmetry of market information (i.e. companies do not have during its decision-making the same information) and poor financial education of managers in this area (Kislingerová, 2004). Managers also manage corporate finance based on irrational reactions of surroundings (Růčková, Roubíčková, 2012). Therefore,

companies prefer sources of financing that require the least difficult receiving information. The own sources of investment financing non-financing corporations prevail in most industrialized countries. Their volume extends 50 % of overall investments in long period (Valach, 2006). In terms of external financing, the very conservative insight of managers prevails, such as the form of assurance (Raška, 2007). The bank credits are preferred in the Czech Republic and other EU countries, such as the easily conceivable instrument of financing, in the USA, the dominant external financing is bond issue.

Literature review (2010-2015) about financial condition and performances of agricultural companies is not dedicated to this issue. Aulová and Hlavsa (2013) explored the positive or negative effect of selected determinants (size of the business, profitability, tangibility, non-debt tax shield, retained profits and liquidity) on the capital structure of businesses, expressed by way of three categories of indebtedness among the selected agricultural companies with the help of regression analysis. Details about financing from EU funds have been recently provided among Czech agricultural companies (Homolka, Švecová, 2012). These findings said that differentiation of business activity, in the form of processing of raw materials, decreases dependency of the economic results on donations or subsidies. The research (Malá, 2011) was focused on the efficiency of organic agricultural companies compared with conventional agricultural companies. The research has confirmed the less efficiency of organic agricultural companies that have to be subsidized. Čechura (2012) identifies the key factors determining the efficiency of input use and the total factor productivity development.

Another research (Venclová, Salková, Koláčková, 2013) focused on the methods of the employee performance in the selected agricultural companies. This research has confirmed that agricultural companies apply selected methods of employee appraisal. The research (Davidova, Latruffe, 2007) provides the first analysis of the relationship between farm financial structure and technical efficiency in Central and Eastern European farming during the transition to a market economy shows that corporate livestock farms are the most homogenous in terms of technical efficiency. Another research (Špička, 2014) is dedicated to the agricultural companies indirectly with the focus on the evaluation production efficiency and its determinants of mixed crop and livestock farming among the EU regions. The Slovakian research (Adamišin, Kotulič, 2013) explores whether the change of legal status can influence the reached economic performance of the subjects. This research found out business companies show a higher economic success evaluated through the selected economic indicators than cooperatives even with subsidies. The previous researches were focused on Czech or Slovakian agricultural companies and no relevant data or researches about financial conditions of agricultural companies in last five years were founded for other European Union countries. Therefore, this paper could offer a new scope of research activities.

3 Methodology and Data

The main objective of the research is to analyze and evaluate the current financial strategy the selected agricultural companies. The research sample was selected according the database of economic subjects ARES (see http://www.info.mfcr.cz/ares/). The main criteria for the selection were: legal form of business as the joint stock company, the residence is in the Czech Republic and the scope of business is based on vegetable production (based on CZ-NACE: 01130: Growing and cultivation of vegetables and melons, roots and tubers). According to these criteria, 26 agricultural companies were founded; four of them had to be excluded due to incomplete information in financial statements. The research sample counted on 22 agricultural companies. The main reason for the selection of those criteria is a duty to publish the financial statements as the legal entities in terms of Commercial register (see www.justice.cz), focusing on the Czech environment and its production. The results of this research are served as the preliminary research of the financial management in Czech agricultural companies.

The main research methods are the selected indicators of financial analysis, such as liquidity, indebtedness, working capital, profitability or capital structure. These indicators

could provide the information about the quality of short-term and long-term financial decision-making process. This financial analysis is performed for the year 2013 compared with the year 2008. Subsequently, the selected statistical methods, with the help of Statistica program, are used to verify the formulated hypotheses, i.e. methods of descriptive statistics, correlation analysis (Spearman correlation coefficient) and regression analysis (Index of determination). Based on the result, the main shortcomings are highlighted and recommendations for their elimination are formulated.

4 Results and Discussion

The financial analysis uses the method of profitability (ROA, ROE), liquidity (current ratio, quick ratio, cash ratio) activity (turnover of inventories, receivables and liabilities, ratio fixed assets/current assets, fixed assets ratio, current assets ratio) and indebtedness, (interest coverage, indicator of capitalization, debt ratio, equity ratio, ratio equity/debts) and value of working capital (net working capital, the length of money turnover cycle) to analyze the current financial situation and to evaluate the financial strategy in short-term and long-term decision-making process. All 22 companies were included to this financial analysis. Then, the average value for this research sample was used and supported by modus, median, maximum, minimum and standard deviation values. Those values are monitored in the year 2013 compared with the year 2008, the year, in which the economic crisis has begun.

Details of calculation see in Table 1, where the percentage difference of average and median values are served. The year 2008 shows incoming economic crisis that could cause lower profitability but higher quick and cash liquidity. The year 2013 has noticed the increasing profitability on average by 39.3 % (ROE) and 25 % (ROA). Despite of the low research sample, it could be said that short-term decision making and orientation on high current liquidity prevail. The value of net working capital (in 2013) is relatively high and compared with the year 2008 increased on average by 6 % and the length of money turnover cycle increased on average by 131 %. The working productivity had increased by 52.5 %. The results also show that the selected companies are undercapitalized with the average value 0.91 in 2013 that was increased by 6.6 % (compared with 2008). The Figure 2 shows the box plots in 2013 and 2008 of the selected financial indicators. The bow plot show that the focus on net working capital prevails, differences in this indicator are the highest and other indicators are not financial decision making involved.

The selected indicators focused on capital structure (ratio E/D) and asset structure (ratio FA/CA) show that very conservative insight on investments prevails and no existence of long-term decision making is here noticed. The current ratio of equity to debts is approximately 75:25. This ratio was strengthened by 58.8% (compared with 2008). The current ratio of fixed assets to current assets is approximately 80:20 was increased by 7.5%. It could be stated that own financing dominate, and no alternative forms of financing as the form of financial strategy is used. The frequency histogram of the ratio E/D and ratio FA/CA in 2008 and 2013 is showed in Figure 3. These ratios can help then to verify hypotheses and evaluate the current financial strategy of selected companies.

Hypotheses Verification and Financial Strategy Evaluation

The following information verifies the defined hypotheses (H1, H2, H3) with the help of Statistica program that could evaluate the current financial strategy of the selected agricultural companies in 2013. For the hypotheses verification, the nonparametric statistic methods were used as we have doubts about the normal probability distribution.

H1: There is no dependency between the capital structure (ratio E/D) and the net working capital.

For the verifying hypothesis H1, the Spearman correlation coefficient was used. In this case, the *p-value* of Spearman correlation coefficient is **0.26210** that is higher than the set significance level *a=0.05.* Therefore, hypothesis H1 was not rejected, i.e. there is no dependency between capital structure and net working capital. This means that selected agricultural companies do not take into account its capital structure in setting up the net working capital volume, i.e. no strategic insight is here used.

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H2: There is no dependency between the asset structure (ratio FA/CA) and the net working capital.

For the verifying hypothesis H2, the Spearman correlation coefficient was also used. In this case, the *p-value* of Spearman correlation coefficient is **0.632976** that is higher than the set significance level *a=0.05.* Therefore, hypothesis H2 was not rejected, i.e. there is no dependency between ratio FA/CA and net working capital. This means that selected agricultural companies do not take into account its asset structure in setting up the net working capital volume.

H3: There is no dependency between the capital structure (ratio E/D) and the current liquidity.

For the verifying the hypothesis H3, the Index of determination test was used. The following scatter plot (see Figure 1) that uses the regression analysis shows the dependency between capital structure and current liquidity. Therefore, hypothesis H3 was rejected, i.e. the capital structure of selected agricultural companies could influence the value of current liquidity.

Figure 1 Scatter Plot (in 2013) of Dependency between Ratio E/D and Current Liquidity
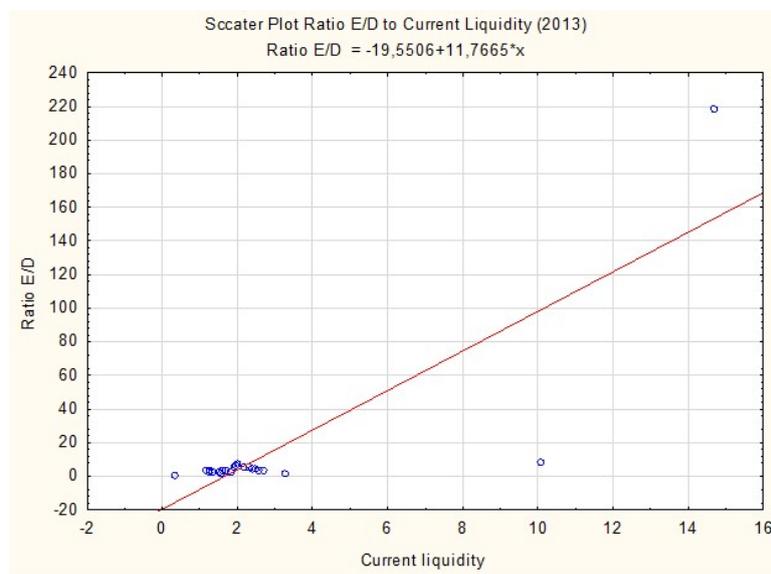
Source: Own research calculated in Statistica program

This information confirmed that no coherent financial strategy is in agricultural companies used and short-term decision making prevails. This could be caused by the lack of financial education of managers (Honková, 2013; Kislingerová, 2014), the current unsatisfactory financial situation (due to low profitability, bad economic results, often in loss and low capitalization) of the selected agricultural companies and very conservative insight on the investment activities prevails.

Recommendations

Based on the mentioned findings and recognized shortcomings, the following recommendations are for the selected agricultural companies served:

- increasing the financial education of managers in agriculture,
- investing to financial consulting on setting up the financial strategy by external specialized financial company,
- focusing primarily on optimizing capital structure to increase the investment potential and overall profitability of the company (in the form of investment and progressive strategy),
- focusing on alternative forms of financing that could support the investment strategy, i.e. venture capital, operational leasing, using the support from the EU funds or favorable business loans,

- fulfilling the financial strategy in accordance with the corporate strategy (to receive the competitive advantage and to increase the overall competitiveness).

Table 1 Financial analysis of the selected indicators (n = 22; research sample of agricultural companies)

Indicator of Financial Analysis	Arithmetic average			Median			Modus		Minimum		Maximum		Standard deviation	
	2013	2008	diff. (%)	2013	2008	diff. (%)	2013	2008	2013	2008	2013	2008	2013	2008
ROE (Return on Equity)	1,35	0,82	+39,3%	0,69	0,681	+1,3%	multiple	multiple	-0,6	-1,59	8,51	4,01	2,35	1,53
ROA (Return on Assets)	2,16	1,62	+25,0%	0,88	1,136	-29,1%	multiple	multiple	-0,6	-2,22	15,12	13,69	3,85	3,34
Current liquidity (1,5 – 2,5)	2,82	1,93	+31,6%	1,93	0,673	+65,1%	multiple	multiple	0,3	0,18	14,69	3,36	3,85	0,72
Quick liquidity (1 – 1,5)	0,63	1,91	-203,2%	0,515	0,865	-68,0%	multiple	multiple	0,2	0,07	3,40	11,35	3,24	3,01
Cash liquidity (0,5)	0,44	1,31	-197,7%	0,134	0,000	+100%	multiple	multiple	0,0	0,05	4,93	5,88	0,66	1,83
Net Working Capital	10702	10033	+6,3%	876,50	7919,5	-803,5%	multiple	multiple	-21443	-9874	44840	46453	13208	11449
Inventory turnover	338,46	58,54	+82,7%	145,95	49,747	+65,9%	multiple	multiple	0,0	0,00	2548,61	157,32	553,21	40,11
Receivables turnover	445,17	51,17	+88,5%	256,21	38,423	+85,0%	multiple	0,000	46,7	3,24	2896,17	196,17	624,40	50,15
Liabilities turnover	426,618	220,49	+48,3%	155,62	64,802	+58,4%	multiple	multiple	39,59	21,71	3081,58	2383,12	664,99	505,37
Ratio E/D	13,68	5,63	+58,8%	3,631	3,550	+2,2%	multiple	multiple	0,1	0,43	218,18	46,68	45,72	9,33
Money turnover cycle	357,015	-110,78	+131%	206,948	3,661	+98,2%	multiple	multiple	32,72	-2204	2363,20	238,13	516,152	485,17
Equity ratio	77,51	74,13	+4,4%	79,228	78,023	+1,5%	multiple	multiple	12,7	19,64	99,54	97,90	16,68	17,77
Debt ratio	25,02	22,80	+8,9%	21,599	21,599	+0,0%	multiple	multiple	0,5	2,10	87,26	67,88	18,38	12,51
Interest coverage	5,24	2,10	+59,9%	1,997	0,000	+100%	0,000	0,000	0,0	0,00	49,54	0,00	10,65	5,72
Ratio FA/CA	5,556	5,138	+7,5%	4,69	2,935	+37,4%	multiple	multiple	1,054	0,282	28,08	52,9	5,194	10,823
Fixed Assets Ratio	80,56	63,353	+21,4%	82,423	71,869	+12,8%	multiple	multiple	51,275	8,718	96,56	98,142	9,104	24,445
Current Assets Ratio	19,135	29,561	-54,5%	17,577	24,272	-38,1%	multiple	multiple	3,439	1,855	48,65	77,981	8,538	19,190
Long-term coverage (capitalization)	0,91	0,85	+6,6%	0,908	0,904	+0,4%	multiple	multiple	0,6	0,20	1,37	0,20	0,13	0,17
Working Productivity	1289,80	612,02	+52,5%	1197,119	293,801	+75,5%	multiple	multiple	13,8	41,08	3791,21	41,08	758,80	523,73
Capital productivity	0,32	0,32	0,0%	0,345	0,327	+5,2%	multiple	multiple	0,0	0,01	0,57	0,01	0,11	0,22

Source: Own research calculated in Statistica program (based on information from financial statements)
Legend: E – equity, D – debts, FA – fixed assets, CA – current assets

Figure 2 Box Plot of the Selected Financial Analysis Indicators in the year 2013 compared with the year 2008
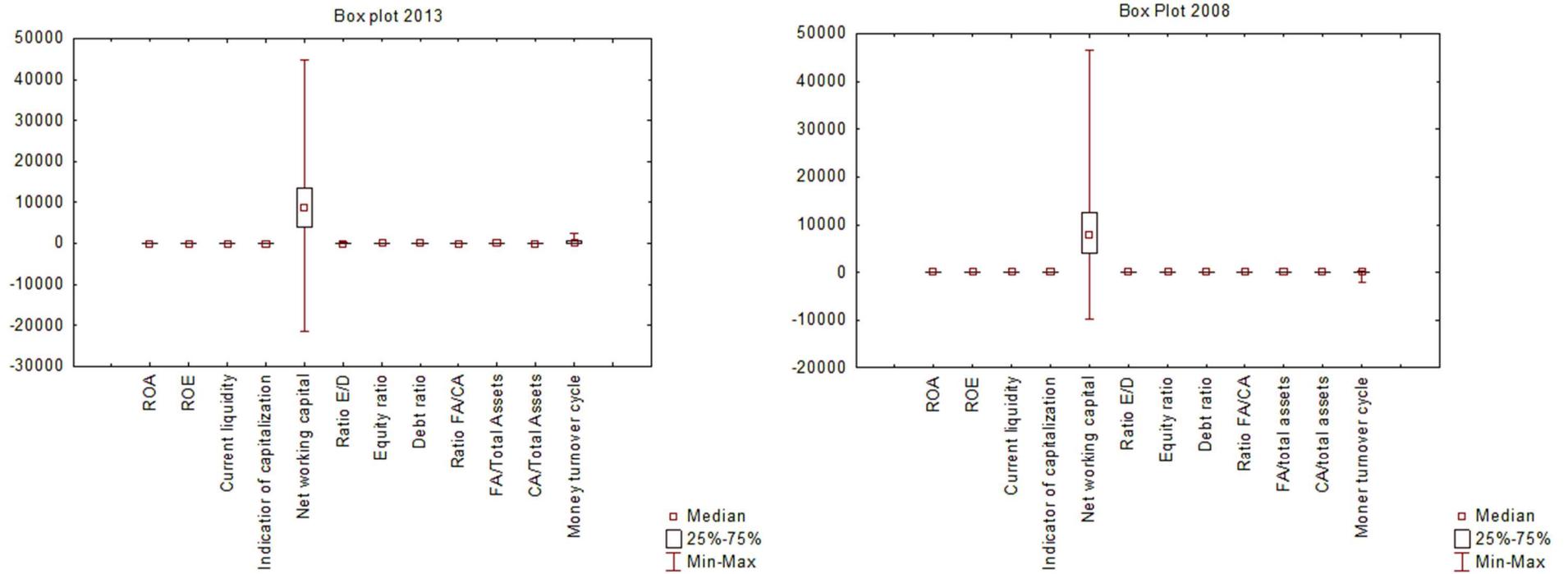
Source: Own research calculated in Statistica program (based on information from financial statements)

Figure 3 Histograms of the Ratio E/D and Ratio FA/CA in the year 2013 compared with the year 2008
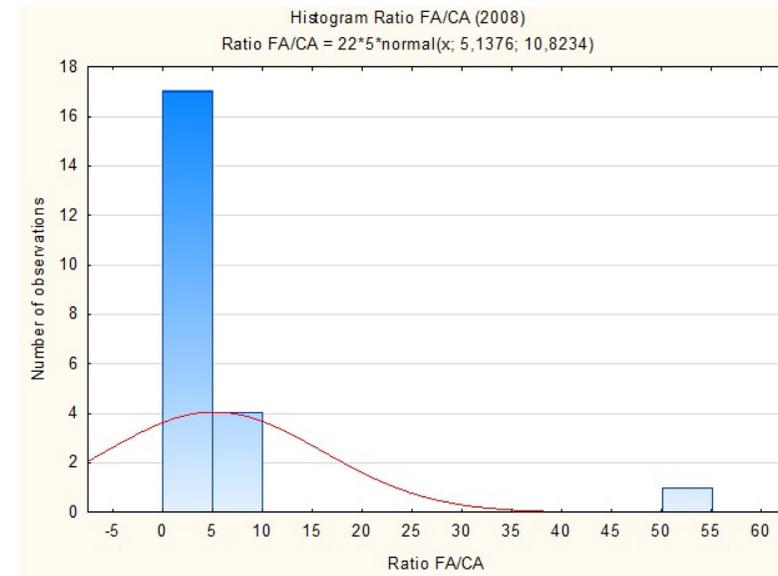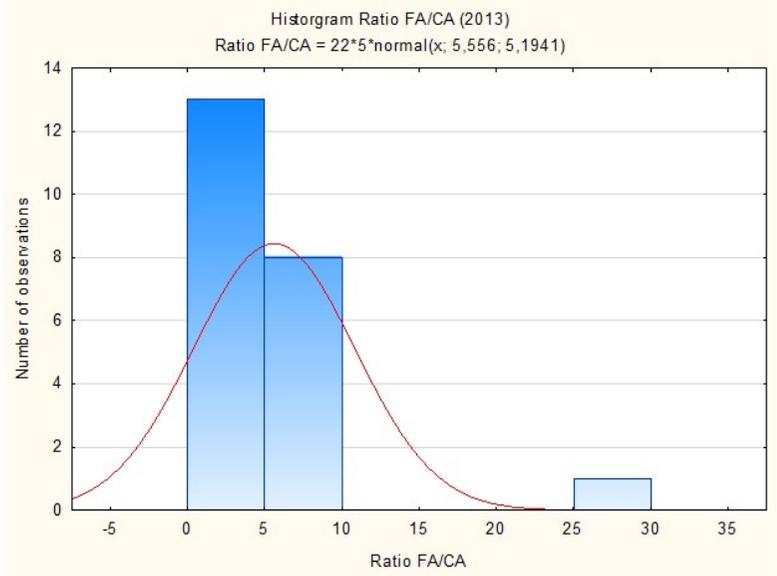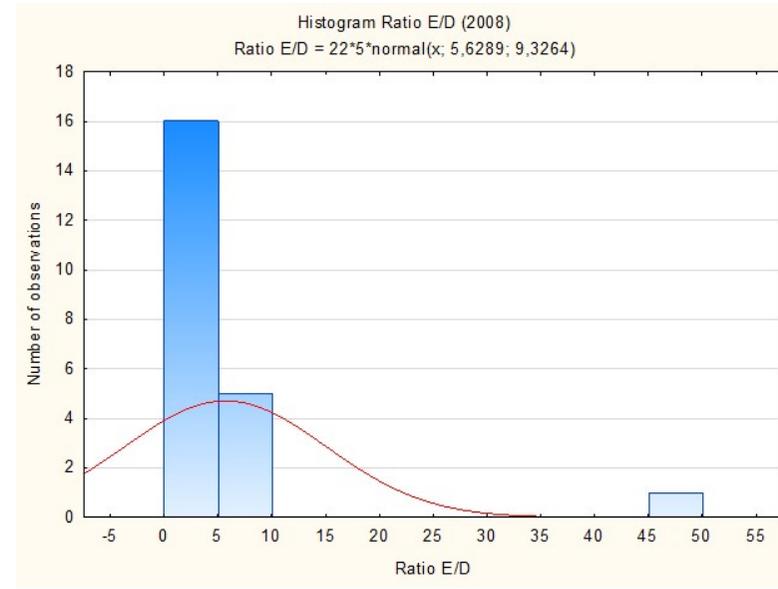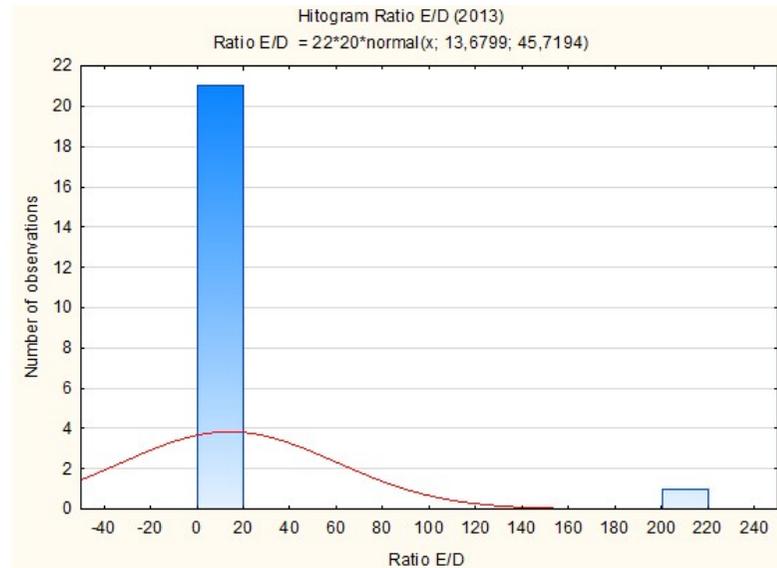
5 Conclusions

The results of the research show that the importance of financial strategy among selected agricultural companies is deeply underestimated. The testing hypotheses showed that the selected companies are focused mainly on short-term decision making and strategy on capital structure is not determined. The selected companies are focused mainly on higher liquidity that decreases the overall profitability and possibility to invest and set up a coherent l financial strategy. The research sample was quite small the output data to be generalized. However, the results confirm the practice that no coherent financial strategy is used in agricultural sector specialized on crop production. The main reason could be the situation that the selected agricultural companies are located in unsatisfactory financial situation due to high competition from other EU countries and Czech vegetable production is now stifled. Therefore, no space for setting up the financial strategy remains. The other reason could consist of the lack of financial education of managers. On the contrary, focusing on strategic financial insight and financial education could overcome the current financial problems of agricultural companies. The result of this preliminary research could be served for other research in this area and for modelling the optimal financial strategy in agricultural sector.

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Is Methodology Based on Rights-of-use Transfer Suitable for SMEs Lease Reporting?

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Abstract: FASB and IASB have been working on a long-term project Leases in order to unify the methodological procedures for leasing reporting under full IFRS. The main aim of the project is reduction of the possibility of adapting their lease contract intentionally in order to achieve the desired impact on the financial statements of entities. The paper concerns on evaluation of lease reporting principles based on the transfer of usage rights for SMEs leases reporting. The questionnaires are used for the proposed leases reporting methodology evaluation. The authors adjust the methodology proposed in the Re-ED Leases for full IFRS for SMEs reporting.

Keywords: small and medium-sized entities (SME), lease reporting, right-of-use, lessee

JEL codes: M40, M41

1 Introduction

Difference in national accounting systems is considered as the main reason of spending additional costs in companies that prepare financial statements based on multiple reporting models in order to raise capital in different capital markets. Financial reporting is a result of application of accounting treatments becomes a comprehensible source of information for users from different countries. The way out of this situation is a global harmonization of financial reporting. It is supposed that the use of IFRS enhances the comparability of financial statements, improves corporate transparency and increases the quality of financial reporting. It can significantly improve the communication between business users and all their statements.

On the other hand, only 0.20% of all business entities in Europe are large enterprises. The rest are small and medium-sized companies (SMEs). SMEs are considered as the key factor of economic growth and employment in the economies. They are socially and economically important and represent 99% of all enterprises in the EU. Their activities on the international markets are limited by a great deal of obstacles in comparison to listed companies. Different national financial reporting and tax systems can be considered as the most important obstacles (European Commission, 2003). In Europe, full International Financial Reporting Standards as a tool of financial reporting harmonization are required for about 7,000 listed companies while more than 7,000,000 unlisted companies (SMEs) mostly follow, thus not providing a satisfactory level of international comparability (Epstein, Jermakowicz, 2008). Due to the fact , that the rate of SME is significantly high, the International Accounting Standards Board was authorized to develop internationally acceptable accounting standards for companies, which are not obliged to prepare financial statements in accordance with IAS/IFRS.   The IASB published an International Financial Reporting Standard (IFRS) designed for use by small and medium-sized entities on July, the 9th 2009. The IFRS for SME is designed to meet the financial reporting needs of entities that (a) do not have public accountability and (b) publish general purpose financial statements for external users. The IFRS for SMEs is separate from full IFRSs and is available for any jurisdiction to adopt. This standard could be a suitable instrument for the SME financial reporting harmonization. The aim of the standard is to provide a simplified, self-contained set of standards. According to Deloitte (2013), this standard was meant to provide simplifications to the requirements in full IFRSs that reflect the needs of users of SMEs' financial statements and cost-benefit considerations. The IASB had decided that the IFRS for SMEs should be subject to a review approximately once

every three years in order to balance keeping the requirements of the IFRS for SMEs broadly in sync with those in full IFRSs.

The full IFRS has been subject of significant changes due to the convergence to US GAAP since 2002. The process of convergence has been realized through a series of sub-projects aimed at short-term or long-term period. The Lease project is one of the most significant projects. The IASB expects to issue a new Leases Standard in 2015. The IFRS for SME should keep balance with the full IFRS. The change of IFRS for would be in a form regular review in the 2015-2017 period.

2 Theoretical Background

Leases can be considered as one of sources of financing. Regardless the form of lease, a lessee obtains an asset or right-of-use (ROU) an asset and a liability arises when it enters into a lease. The only exception is lease with the term shorter than one year. Contrary to that view, according to the current treatments for lease reporting (IAS 17, Topic 840), most of leases are not reported on a lessee's balance sheet and this is the reason that the current lease accounting principles do not provide comparable, high-quality and comprehensive information to external and internal users of the financial statements. The most important standards IAS 17 and Topic 840 Leases ASC have different attitude towards disclosing financial and operating leases (Srnová, Bohušová, Blašková, 2014).

However, for many lessees, the effect on reported leverage can be substantial. It could affect the final decision of the financial statements users due to misleading assessment of the financial situation of lessee and lessor. According to El-Gazzar, Lilien, Pastena (1986) and Imhoff, Thomas (1988) firms are structuring leases as operating leases to avoid increasing of debt-equity ratio. It forces analysts to make their own assessments about the assets and liabilities arising from lease agreements. Jifri, Citron (2009) stress necessity of incorporation of information on lease, regardless whether it is in the financial statements or notes. The possible way of incorporation of off-balance lease for financial decision purposes is simulation of effects of operating lease capitalization on balance sheet items and related items of income statement – factor model, capitalization model of Fülbier, Lirio, Pferdehirt (2008), of Beatie, Edwards, Goodacre (1998), and the capitalization model of Imhoff, Lipe, Wright (1993). There are significant differences among the above mentioned models. The modelled effect of off-balance sheet lease capitalization can influence financial decision making of users of financial information.

On the basis of the arguments resulting from studies carried out and in the effort to develop a single high-quality financial reporting system, the IFRS and U.S. GAAP, the IASB and FASB began to work in 2006 on a joint project with the aim to develop a common standard for lease reporting (Svoboda, Bohušová, 2013, 2014). The main idea of lease reporting project is that lease reporting should be based on principles that fairly show the substance of the lease transaction. In March 2009 IASB and FASB published the discussion paper Leases – Preliminary Views and they invited professionals to take a stand to this material. Based on comment letters to the discussion paper the Exposure draft – Leases was issued in August 2010. The ED was based on the presumption that every lease contract with the term over one year represents transfer of ROU asset leased.

During 2011 the IASB and FASB considered the comments received on the exposure draft. Due to the existence of two alternative approaches to lessor´s reporting and responses from the professional community in the form of 786 comment letters, the boards decided that they re-expose the leases proposals. A re-exposure draft was issued in May 2013.

The maximum lease term over 12 months is the main criterion for identifying lease and subsequent recognition of assets and liabilities that arise from leases in the revised ED (2013) Re-ED. The performance obligation is not used in the Re-ED any more. The Re-ED use one model that is very similar to the current approach to the reporting of operating

leases. The Re-ED requires reporting of all leases on the lessee side using the ROU with the recognition of the corresponding obligation. The only exception is a short-term lease with lease term under 12 months. When developing methodologies, the Boards took into account not only the difficulty of the application of methods but also the anticipated costs incurred in connection with this amendment in reporting. Despite the fact that many respondents demanded use of a single methodology for reporting of all leases (it is one the main objective of the Lease project), the Boards took into account a wide variety of different forms of leases and evaluated the unification of treatment for reporting of all types of leases as impossible. Re-ED uses again the classification of leases, it introduces a lease Type A and lease Type B. A simplified methodology is optional for leases with lease term under 12 months.

Recognition, measurement and reporting of expenses and cash flows connected with lease is dependent on whether the lease term is for an significant part of the total economic life of the underlying asset or the present value of the lease payments is significant relative to the fair value of the underlying asset at the commencement date. If either criterion mentioned above is met, the lease is classified as a Type A lease. This classification is rather subjective in practice. The classification is dependent on many factors as the nature of the relevant assets and others.

Most leases of assets other than real estate (such as equipment, airplanes, cars and trucks), the lessee classifies lease as a lease Type A (it is expected that for the lease term is consumed a significant portion of the economic benefits associated with the leased asset) that requires recognition of these items for the lessee:

1. At the commencement date, a lessee shall recognize a ROU asset and a lease liability measured at present value of lease payments, and
2. After the commencement date, a lessee shall recognize in profit or loss, the unwinding of the discount on the lease liability as interest and the amortization of the ROU asset.

The lease expense is reported in a form of two items – financial expense (interest) and amortization of right–of–use asset.

The majority of leases of real estate (i.e. land and/or buildings or parts of buildings) is classified as a lease type B (it is not expected significant decline in value of leased asset over the lease term) and are recognized the following items:

1. ROU asset and a lease liability measured at present value of lease payments
2. A single lease cost, combining the unwinding of the discount on the lease liability with the amortization of the ROU asset, calculated so that the remaining cost of the lease is allocated over the remaining lease term on a straight-line basis. Due to the Boards requirement of steady progress of total lease expenses during the lease term it is necessary to amortize the right-of–use progressively. The interest expense decreases due to the shrinking of the lease liability during the lease term.

3 Methodology and Data

The paper focuses on the desirability and possibility of amendment of the IFRS for SMEs as a consequence of changes in the full IFRS lease reporting in the regular three years amendments. The main objective is the evaluation of the lease treatments developed for listed companies primarily from the perspective of the SME lessees.

Intention to take the views on this issue through sample of Czech SMEs is due to these reasons:

- amendment of the IFRS for SMEs is required after the approval of the proposed treatments of lease reporting in the full IFRS to keep compatibility. In the current methodology (IAS 17 and IFRS for SMEs), the treatments for lease reporting do not differ substantially

- the attitude to the proposed lease reporting of SMEs reporting entities should be considered in the IFRS for SMEs amendment,
- the cost and benefits of the new treatments for lease reporting in case of SMEs should be evaluated.

Qualitative research was involved. The questionnaire survey was used to achieving the aim. The Czech SMEs were subject of the survey. The SMEs in which was the assumption that the respondents would have been willing to meet with discussed leases reporting practices using the principle of the transfer of rights-of-use to the lessee).

Potential strengths and weaknesses of amended treatments for the operating lease for SMEs reporting identification was the main aim of the quantitative research. The right–of–use capitalization in the case of operating lease over 12 month reporting for SMEs is used. The following sources of information were distributed to respondents:

- effective IFRS for SMEs (English and Czech version) basis for conclusions including,
- IASB and FASB information on the Lease project, ED (2010) and Re-ED (2013) comment letters including,
- illustrative examples of operating lease reporting,
- operating lease agreement reported according to the current approach transformation,
- analysis of the impact of the new methodology on selected items of financial statements and financial analysis ratios.

The prepared questionnaires were distributed to representatives (financial directors, accountants) of the sample of SMEs. The respondents were asked for completion of questionnaires. The questionnaires were distributed by the LSR system to 2347 entities. The system enables preparation of questionnaires and makes possible to add respondent´s comments. The questionnaire was oriented to lease reporting of SMEs. The answers were obtained from 203 entities, the rate of return was 8,65%. After the analysis, 4 questionnaires (obtained from micro-entities) were excluded due to the low informative value (the system evaluated answers as random).The low rate of return was due to the low interest of the Czech entities in proposed methodologies until they are effective.

The structure of respondents according to the Directive 2013/34/EU was subject of the fig. 1.

Figure 1 Structure of respondents
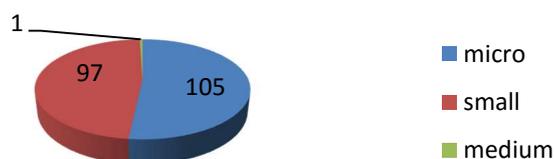
Source: Authors' research

4 Results and Discussion

The questionnaire focused on determining respondents' opinions on the appropriateness of ROU for reporting the lease transaction by SMEs lessees, on complexity of the future possible application of this approach in the sample of SMEs, and on suitability of particular methodologies applied for the recognition of assets and liabilities and the subsequent reporting of these items in the financial statements of SMEs.

The most significant aim was to obtain respondents opinion on the new way of reporting the especially the current leased classified as operating lease inception - use the item "right-of-use the leased asset" and its consequences. The share of 87,94 % respondents consider this way of operating lease reporting as a tool for elimination of

structuring of lease agreement and of manipulation with reported profit or loss a balance sheet items during the lease term. The high rate (78,4 %) of respondents considers the application of ROU concept as a tool of reduction of subjective point of view on lease reporting. On the other hand, there is a minority (14,57 % of respondents) which is against this opinion especially in particular situations. According to 23 respondents, the main reason is estimation of probability and measurement in case of lease agreements which are not entered for a fixed term or in a case of agreement with an option for extinction of a lease term. In an area concerning estimated time and cost consumption of transition to the new methodological approaches and their permanent use, 11,05 % of respondents consider the application of this approach equally time, cost and skills consuming. The majority of respondents expect increase in requirement on skills, cost and time consumption in case of the new principle application. Only 6% of respondents are in favor of the new approach. The majority of respondents (76,4%) stress the additional cost connected with training, update of information system and external advisors in SMEs. The additional aim of the research was a determination whether the transition to this concept would be so burdensome for reporting entity that the entity prefers to avoid entering the lease agreement representing current operating lease agreement. The question whether the decision on the form of financing would be affected by the reporting methodology was answered by 90.96% (181) of respondents negatively. They would prefer the optimal form of financing regardless the obstacles in financial reporting. The respondents stressed the positive and negative effects associated with the new approach to lease reporting as tax savings, effects on financial analysis ratios, simplification of information served to users of financial statements. Another issue focused on appropriateness of application of the approach based on ROU transfer for all kinds of lease agreements. The selected types of contracts which are appropriate for exclusion of the scope of this treatment had been defined by respondents. Key responses are listed in the following table:

Table 1 Candidates for exclusion

Type of agreement	Share of respondents (%)	Reason
Rent of real estates	6,03 (12)	Problems could arise on the side of lessor: - derecognition of a real estate in a case of multiple sub-leases entered and terminated in different periods and its transfer to leases
Short-term leases (slightly over 12 months)	43,21 (86)	Complicated accounting treatment in comparison to the benefits obtained by users of financial statements. It is not necessary to report as assets in the financial position statement, information in the notes is sufficient. It is considered suitable for inclusion in expenses based on cash.
Sale and leaseback	5,53 (11)	Two inter-related operations
All lease agreements	5,6 (11)	Very difficult treatment
None	5,6 (11)	Compatibility of application
Agreements with uncertain lease term	15,57 (31)	Subjective factor in lease asset and liability measurement
Lease of intangible assets	4,02 (8)	Problems with reliable measurement may arise. Difficulty in distinguish between intangible asset leasing and service.
Agreement including lease and connected services.	5,53 (11)	Difficulty in distinguish between lease and service costs.
Non-core assets	23,61 (47)	The cost of application exceeds benefits obtained.

Source: Authors´ research

One of the significant issues solved was measurement of balance sheet items arose due to the lease. The majority of respondents (95,99 %) prefer lease liability measurement based on present value of estimated cash flows connected with the lease agreement. Only the minority of respondents (4,01%) insist on the fair value measurement due to expected higher level of spatial comparability. The objection to this approach is based on difficulties in fair value of ROU determination and it is supposed that it is only a slight difference between the present value of lease payments and fair value of ROU. The difficulties with the fair value measurement stressed also Hýblová, Křížová, Sedláček (2013). The suitable interest rate estimation is necessary for present value of estimated cash flows calculation. The 85,42 % of respondents agree with the incremental interest rate of lessee involvement. Approximately 1% of respondents would not consider the factor of time. The main reason for incremental interest rate preference is the reality that the implicit rate of lessor is usually not available.

As concerns the lease asset measurement, 95,47% of respondents inclines to recognition and measurement of ROU based in the same value got by lease liability measurement. The rest of respondents insisted on fair value measurement of ROU despite of the difficulties connected. The questionnaire was focused on re-estimation of interest rate and following revaluation of appropriate lease assets and liabilities but the results are not significant due to difficulties of this issue for financial reporting of SMEs.

Respondent were asked about the appropriateness of increase of items connected with lease by estimated value of contingent rentals. The share of 40,20% of respondents are against the increase of reported items by any contingent rentals. This approach is probably affected by current approach to contingent rentals reporting and it is in an accord with liability definition in the conceptual framework of IFRS for SMEs. Approximately 5% of respondents demand distinguish contingent rentals in an accord with its substance and increase the lease liability and ROU by estimated value of contingent rentals in case that the situation is highly probable. The respondents could express own points of view on additional potential problems connected the new approaches to lease reporting of SMEs within comments. The most often mentioned issues are the subject of following table.

Table 2 Problems connected with application ROU which could arise in case of SMEs

Problem
The estimation of changes in rent is difficult for forthcoming periods and it could lead to difficulties in lease asset and liability measurement, especially in initial phases of lease.
In case of agreements entered for undefined lease term, it is difficult to estimate the lease term properly.
In case of option for the purchase of the leased asset after the lease termination, it is difficult to estimate whether the option is really exercised.
How to consider the rent discount

Source: Authors´ research

Based on results of questionnaire survey and controlled interviews the following issues concerning the simplifications appropriate for lease reporting of SMEs arose. The individual drafts were also submitted to selected respondents (86) for the evaluation of their impact on financial reporting of SMEs. The criteria for evaluation were the rate of simplification for reporting entity and the impact on a true and fair view of reality. The respondents rated by a scale from 1 to 5 (1- insignificant, 5- very high). The results are subject of the following table:

Table 3 Respondents´ opinions on selected drafted issues

Issue	Scale median	
	Simplification of reporting	**Impact** [1]
Classification of lease agreement to two groups: - over defined threshold – reporting of financial costs and depreciation, - under defined threshold – operating expense	**2,9**	**2,6**
Current finance lease should be reported in a current way. Current operating lease should be based on decreasing ROU and lease liability in the same way (accelerated depreciation of ROU).	**2,8**	**2,7**
Agreements with option for extension of the lease term – the lessee should consider the option only when the extension is almost certain from the lease inception.	**4**	**2,2**
Agreements with option for extension of the lease term – the lessee should consider only the primary lease term. At the extension, the new lease asset and liability are recognized.	**4,2**	**2,3**
Contingent rentals should be described in details only in the notes.	**3,9**	**2,1**

Source: Authors' research

5 Conclusion

The survey revealed some new issues concerning lease reporting of SMEs on a side of the lessee. Respondents expect the greatest simplification in the possibility of measurement lease asset and liability based on primary lease term stated in a lease agreement. It is obvious that the application of this approach can lead to an underestimation of assets and liabilities in certain cases. The information on options on extension or purchase is necessary to be presented in the notes. On the other hand, this approach can lead to significant reduction in a volatility of costs connected to lease and the value of appropriate lease asset and liability.

The results of the survey revealed that respondents expect that the highest simplification for entities would be attained by lease asset and liability measurement only for a primary lease term at the lease inception. On the other hand it could be considered as underestimation in case of a high probability of the lease extension. This weakness could be eliminated by presentation of relevant information in notes. The respondents consider this approach as a time and labor saving, it could also reduce volatility in reported profit or loss. The same result could be reached by inclusion of the option for extension of lease term to the value of lease asset and liability only in case when the probability of exercising is nearly certain. Respondents also demand the elimination of time value of money, it means to report only one item of lease expenses. This opinion is out of accord with IFRS for SMEs principles and it does not respect the principle of true and fair view.

Acknowledgements

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[1] Impact on true and fair view

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The Payment Cards and their Utilization in the Czech Republic

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Abstract: *The paper deals with payment cards. It can be expected that due to the development, investment and utilization of advanced technologies, there are changes in the area of banking services, specifically in the field of payment cards. The aim of the article is to map current situation in the field of payment cards in the Czech Republic. The first two parts bring the introduction into the topic and literature review. The main part of the submitted article is based on the comparison of selected results from three questionnaire surveys, which were conducted in previous years in the Czech Republic. Two surveys were done by the authors of the paper and the third was done by the official authority. In the article there will be stated hypotheses. They will be either confirmed or rejected. A detailed research together with the analysis and critical assessment of accessible materials will enable to identify the main objectives in the field of study. The analysis of the initial state will consequently enable to identify the key factors and knowledge. Primarily and secondary sources were used within the framework of the selected topic.*

Keywords: credit card, debit card, payment card, survey, utilization

JEL codes: G20, G21

1 Introduction

The issue of payment cards is current and touches large spectrum of population from teenagers to adults. Financial aspect is one of the essential part of our lives. Due to this fact it is important to follow the situation on the financial market and to follow the consumer behaviour.

Acceptance of payment cards in the Czech Republic respectively in Czechoslovakia was established before our first card was issued due to credit card Diners Club. Officially, the Czechoslovakia began to accept credit cards in 1965, but the first transaction was made in 1968. Card was firstly used for payment in the Prague branch of Čedok. The first payment card was issued in 1988 by Živnostenská banka. It was called as Dispositional cards to Tuzex accounts. In 1991, Živnostenská banka continued on this project by issuing VISA Classic and VISA Business year later. (Juřík, 2001)

Payment cards are divided into different types, which usually coincides citizens under the names of credit and debit card. Furthermore, the cards are divided into several groups according to various criteria that can be combined on the card as well.

The last part of the article will be devoted utilization of debit and credit cards by students of Faculty of Informatics and Management. Only big banks in the Czech Republic offer debit cards for students. They are Česká spořitelna, ČSOB (Československá obchodní banka), Evropsko-ruská banka, GE Money Bank, Komerční banka, Oberbank, Poštovní spořitelna, Raiffeisenbank, UniCredit Bank. Smaller banks do not offer special student accounts and cards, but underage students can there find current accounts (with debit cards) cheaper or completely free under certain conditions.

Settlement Method

Firstly were issued the credit card for payment (charge cards and credit cards), after which followed a debit card. Their development and the ratio in the Czech Republic are shown in Figures 2 and 3.

Charge cards

The reason was to simplify the payment of customer for purchases. It moved up to the aggregate amount at the end of the month. The payment occurs within 15-30 days upon receipt of monthly statements by bank transfer or check. For this reason, it is not necessary to have a bank account. Record of withdrawals is leading company issuing the card in a separate account. Charge card allow for simple and secure payments for private or business use. (the Bank Card Association)

Credit cards

This card apart from charge card can be repaid by installments or all at once. The credit card has a fixed credit limit that is determined by the client based on the assessment of its creditworthiness, and therefore allows him to draw money from the account, even though it does not have the necessary amount for the transaction. The loan is repaid through monthly installments. There is usually a tent amount of minimum repayments, which are in the range 3-10% of the outstanding amount. The client can pay its obligations in the interest-free period, usually within 45-55 days from the date of issuance of the statement. If the loan is not repaid on time, it bears quite a high annual interest rate, which usually reaches more than 20%. Banks offer credit cards that are especially designed to pay for goods and services. For cash withdrawals from ATMs their owner pays high fees and interest. Credit card also does not need to set up new bank account, even though banks offer it. (Juřík, 2001, Polouček, 2009, Platební karty a jejich druhy)

Debit cards

They widened to the development of information technology and telecommunications in the 70s. They are set up to current accounts, and they are intended to withdraw cash from ATMs and payments at commerce for goods and services. At some banks you can not go into overdraft, so it does not represent a credit risk for bank. The bank may on the basis to the development of the balance of the client to adapt the ceiling of drawing funds from his account. In the case that can be by debit card draw funds in the overdraft, to a certain extent, can be debit card maintain as the credit card. Overdraft allows the client to draw money from the account, even though it does not have the necessary cash. The client goes into minus the account balance. Each account has set an overdraft credit limit, or the maximum amount you can borrow from a bank. The interest rate varies depending on the bank in the range of 10-25% of the amount overdrawn. It is also important to take into account any charges associated with the use of an overdraft. (Juřík, 2001, Polouček, 2009, Půlpánová, 2007, Platební karty a jejich druhy)

Electronic wallet (prepaid cards)

The card has a chip on which may be stored financial value, which is reduced during the transaction without requiring authorization. The intention of the electronic wallet is a restriction on the use of small bills and coins. It use eg. public transport operators and telephone companies (telephone cards). (Juřík, 2001, Polouček, 2006, Půlpánová, 2007)

2 Methodology and Data

The article is based on primary and secondary sources. The primary sources are represented by the results from the conducted questionnaire investigation and by ideas of the author. The secondary sources are represented more. They comprise information about products, professional literature, information collected from professional press, discussions or previous participations in professional seminars and conferences relating to the chosen subject. Most of the information is gained from the Bank Card Association. Then it was necessary to select, classify and update accessible relevant information from the numerous published materials that would provide the basic knowledge of the selected topic.

Methodology of gaining and processing data is described in detail within individual investigations.

The aim of the article is to map current situation in the field of payment cards in the Czech Republic

It has been established the following hypotheses:

- It is expected that number of payment cards is rising in the Czech Republic.
- It is expected that Czech people use more debit cards than credit cards as the payment instrument.
- It is expected that number of payments by cards is higher than withdrawals.
- It is expected that by credit cards are paid higher amounts than by withdrawals.

Linear regression and binomial distribution are used for confirmation or rejection of stated hypotheses.

3 Results and Discussion

Results from Bank Card Association

The first part of the results is devoted to results from Bank Card Association (BCA). BCA Statistical data are collected and issued quarterly and annualy, based on data provided by Czech member banks. It describes therefore the Czech banking payments cards area and some non-banking cards, namely cards issued by Diners Club Czech, CCS a.s., and American Express Cards issued by Komercni banka,a.s.

BCA statistics contains data from following corporations: Air Bank, Cetelem, Citibank, Commerzbank, ČS, ČSOB, Equa Bank, Fio banka, GE Money Bank, ING Bank, J&T Banka, KB, LBBW Bank, mBank, PPF Banka, Raiifeisenbank, Raiffeisenbank im Stiftland, Sberbank, Unicredit Bank, CCS, Essox, Euronet, Diners Club, Home Credit, Zuno Bank.

Number of payment cards offered in the Czech Republic has an upward trend (see Fig. 1). This is due to the increased number of traders who accept payment cards, a larger number of ATMs and last but not least, a higher number of banks and institutions that issued the card. And also important factor are people in the Czech Republic that are not afraid to try the new technology and payment cards.

Figure 1 Evolution of the number of payment cards in the Czech Republic for the years 2001 to 2014

$$y = 448395x + 5E+06$$
$$R^2 = 0,9592$$
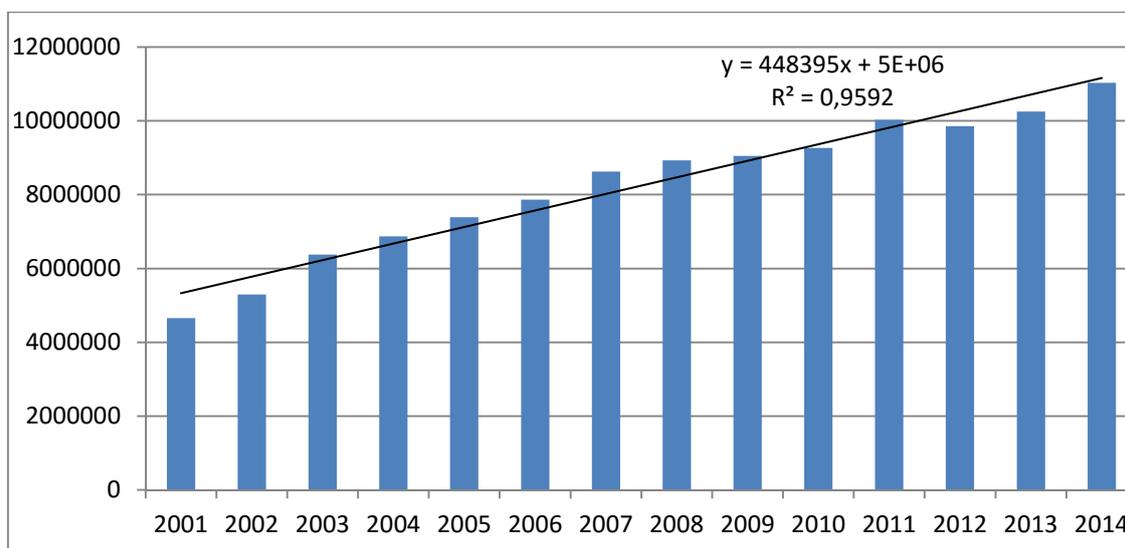
Source: The Bank Card Association

The number of payment cards in the Czech Republic more than doubled since 2001. Generally we can say that one citizen owned for more than one payment card.

Payment cards have the growing number in the Czech Republic (fig. 2). The number of debit cards recorded a significant growth in 2014. Conversely, the number of credit cards

increased only until 2011 and since then has been decreasing. The same case occurred with charge cards, but those have on a downward trend since 2009.

Figure 2 Evolution of the number of debit, credit and charge cards in the Czech Republic for the years 2003 to 2014
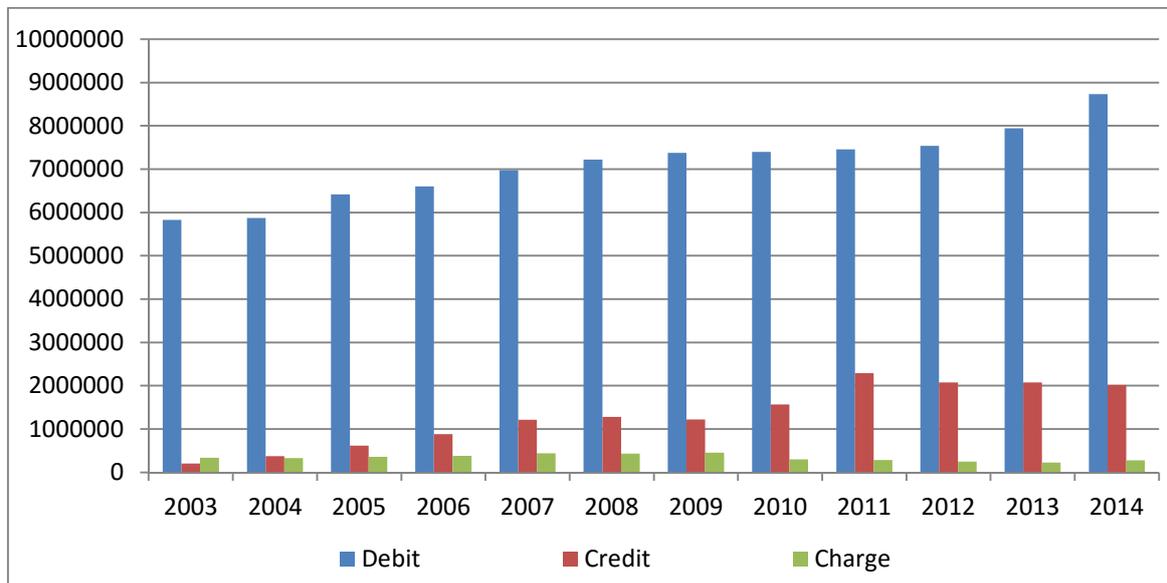
Source: The Bank Card Association

Debit cards in the Czech banking market significantly outnumber credit cards and charge cards. The largest part of the market was presented by 78% in 2014 of the total number of cards. In Great Britain were in 2014 more used debit than credit cards. The difference is smaller than in the Czech Republic. Credit cards used almost 40%. (UK Card Association) On the basis of statistics from European Central Bank is almost 22% credit and 78% debit cards in the European Union. (ECB) In Canada was used in 2013 more credit than debit cards by volume and also by value. (Bank of Canada)

Figure 3 Distribution of the Czech market for payment cards for 2014 by type
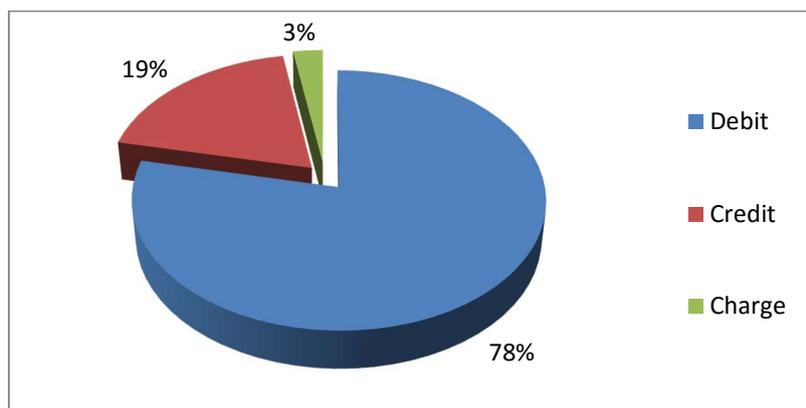
Source: The Bank Card Association

Publishers Association bank cards

On the market for payment cards operate several world-famous players. MasterCard with 55% of share, VISA with 43% are the best-known companies and absolute leaders issuing cards in Czech Republic. They control almost the entire Czech market for payment cards. More solvency clients are usually used cards American Express, JCB and Diners Club. Other cards belong only 2% of the Czech market.

The introduction of payment cards was used because for payments at traders for goods and services. However, their massive expansion meant enlarge their scope. So nowadays we can meet with them when we are withdrawing cash from an ATM or when we are making payments to trader. It increased the popular payment through the Internet. The current situation in the Czech Republic is shown in the Figures 4 and 5.

**Figure 4** The ratio of withdrawals from ATMs and payments at traders in 2014
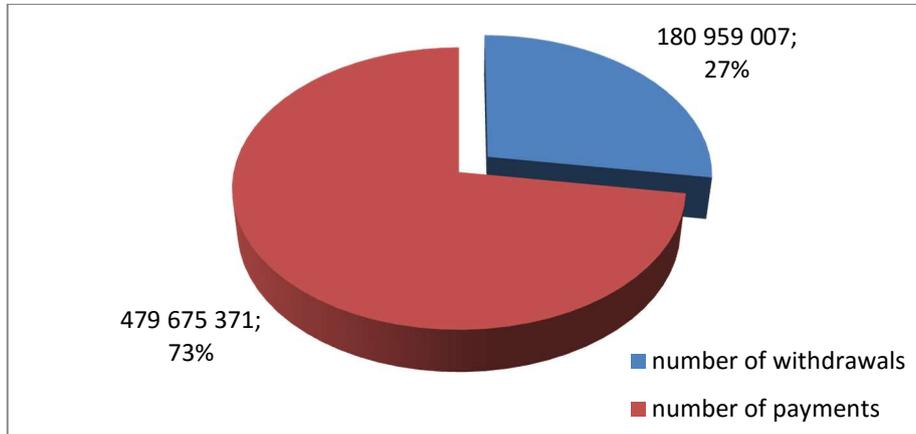
Source: The Bank Card Association

The Figure 4 shows that the payment card is used most frequently for payment at commerce for goods and services. The number of withdrawals is decreasing each year. This decline is reasoned by the more frequent use of payment card to pay directly. It is realized through them every year more and more purchases.

The volume of withdrawals and payments clearly shows the benefit of cash withdrawals from ATMs. Users of payment cards in the Czech Republic collected from ATMs generally larger amounts. By traders increased the number of smaller amounts that are paid with card, eg. for routine purchases.

Figure 5 The volume of withdrawals from ATMs and payments at traders in 2014
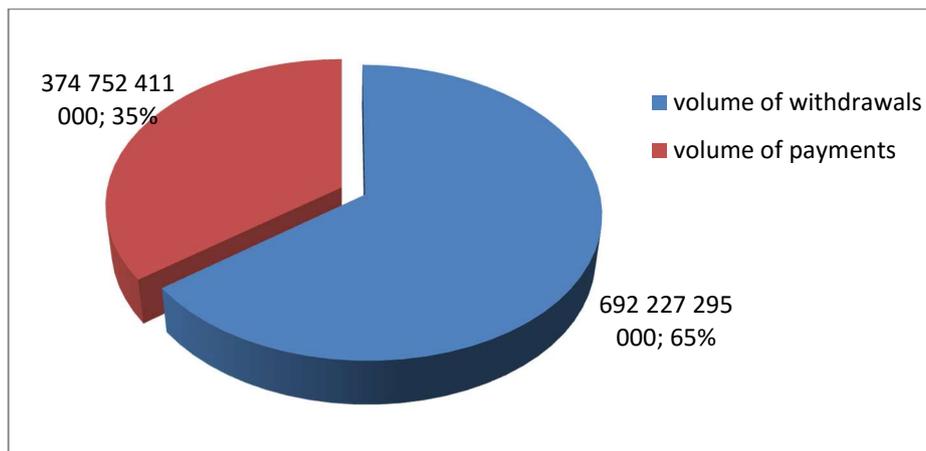
Source: The Bank Card Association

Results from Investigation

Calculator Bankovnipoplatky, credit and debit cards

The aim of the Calculator is to compare the services and products of individual retail banks in the Czech Republic within the offer of basic banking services. The Calculator provides a calculation and comparison of individual banks based on individual demand of

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banking clients. According to the bank account statement, a client fills the questionnaire in seven steps and the results will outline the most appropriate accounts (in terms of cost). Due to maximum accuracy of the data, the form does not include questions regarding irregular activities - for example, one-off establishment of a service or change processes (change of address, PIN, standing order, etc.). (Bankovní poplatky, 2014)

The data are evaluated monthly and quarterly by Martina Hedvičáková (co-author of the paper) and Ivan Soukal. The bank charges Calculator has been used by 88,711 bank customers so far.

In terms of marketing research, it includes the following data:

- multi-dimensional - 54 variables are monitored on the use of service, 2 system variables for each element in the set and 45 variables regarding pricing on individual accounts,
- primary – data was obtained directly from the users of banking services,
- subjective - data based on the client's judgment regarding their own use of banking services. (Bankovní poplatky, 2014)

Based on the data obtained from the Calculator, the Client and the Bank index are calculated.

Calculations and statistical analysis were performed using the statistical IBM PASW 18 software (formerly SPSS) and MS Excel 2013. Calculation is performed on a monthly and quarterly basis for the selection of the population obtained in the reference month or quarter. The calculation precedes verification-validation part to avoid skewing of results e.g. by the respondents who should not use the retail products (self-employed individuals, small businesses with the frequency of use of banking services, which in practice a client can never reach with a civil account), and the respondents who only clicked through the form without filling the key services. (Bankovní poplatky, 2014; Hedvičáková, 2015; Draessler et al, 2011)

There were 1364 involved respondents. They were interested in those products:

- 171 debit card, non-embossed,
- 837 debit card, embossed,
- 363 credit card,
- 101 no card.

These requirements clients ticked, that they want to have by a bank account. In either case was ticked all three options. Most often were given a combination of debit and credit cards. It is interesting, that the clients who want non-embossed debit card do not want credit card.

Results from the student´s questionnaire

Students from the second year of study at Faculty of Informatics and Management should mark financial products that they use. In this article we will focus on the selected areas. The first one is area of savings (current accounts and student accounts with debit cards) and the credit cards are the second. Students should be divided into two groups. The first one is composed from daily students. There were gained 125 of questionnaires from them. All of them are 18 – 25 years old. Figure 6 presents the age distribution of the combined students. It was gained 73 answers from them. Age and type of study may play a role in the interest and the granting of individual products.

Figure 6 Students of combined study by age
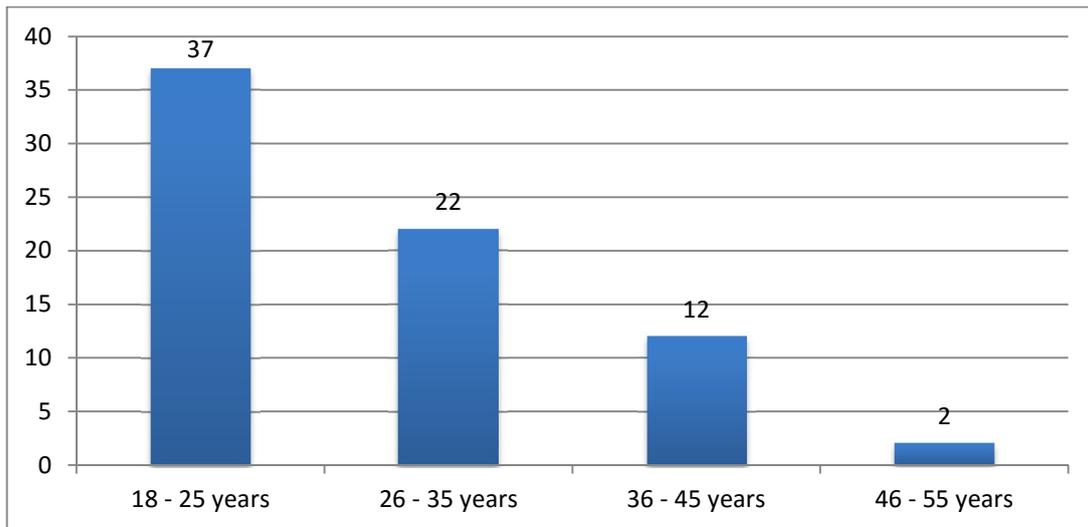
Figure 7 shows the type of study and field of study. Most students are studying the Tourism management. The second biggest group is the Financial management. The next two groups are Information management and Application informatics.

Figure 7 Students by type of study and field of study
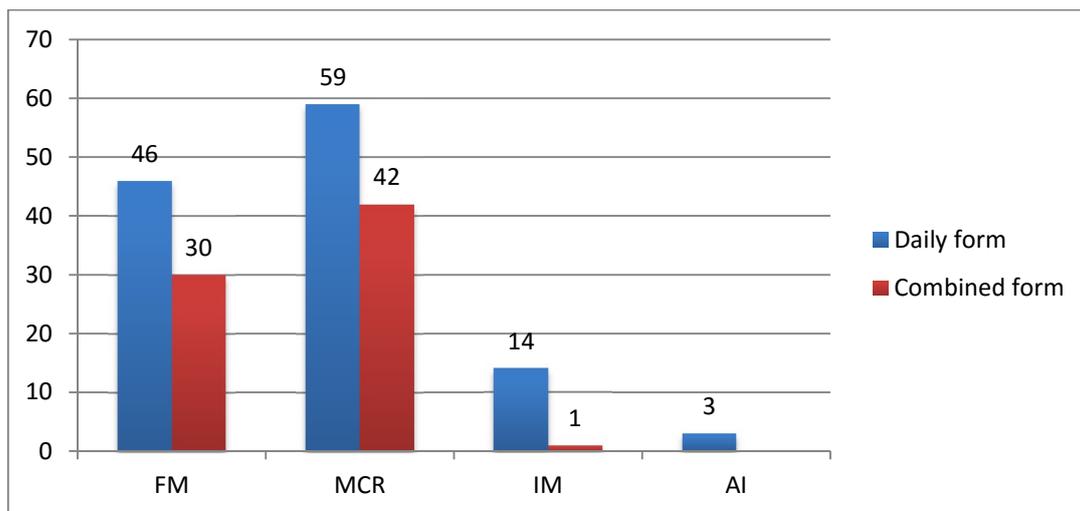
The results are divided on daily and combined form. It was expected that students of combined form will use the credit card more than daily students. It is also due to the terms of issue of the card. 12 % of combined students use credit card. On the contrary only 2,4% of daily students use it. Bank account with debit card is used for saving 33% of combined students and 20% of daily students. The student account with debit card is used by 32% daily students and 8% students of combined studies. Almost all students own student account or bank account with debit card.

Figure 8 Utilization of credit cards and bank accounts for savings by students
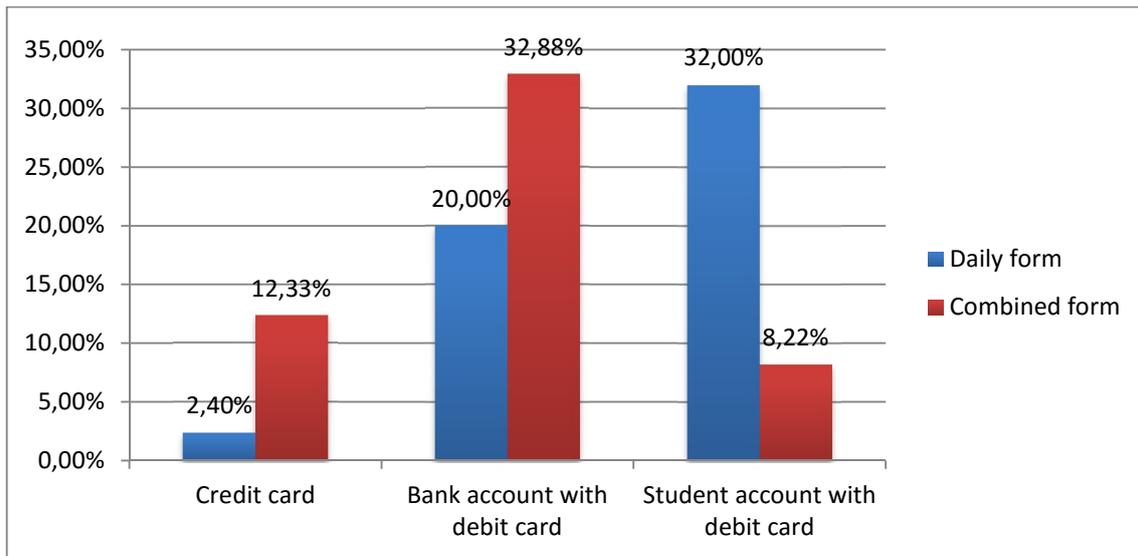
Source: Own elaboration

4 Conclusions

At the end it is possible to confirm three hypotheses and one reject.

The number of payment cards is rising in the Czech Republic. This hypothesis was confirmed, statistical significance is not indicated since the data are from the total population data and not from sample surveys. Linear regression shows an increasing trend in the number of payment cards which are of credit and debit types. Beta coefficient indicates an increase in one year, the coefficient R squared shows the percentage of variance explained. Specific values: debit ($R^2 = 0.93$, betta = 223,996), credit ($R^2 = 0.91$, betta = 187,172), charge ($R^2 = 0.27$, beta = -10926).

Citizens use more debit cards than credit cards and by payment cards are done more payments than by withdrawals. The hypotheses can be accepted. Since it is not a sample survey, but data for the entire population, no data need calculates the binomial distribution.

It is necessary to reject the hypothesis that by payment cards are paid higher amounts. The volume of withdrawals is 692 227 295 000 CZK. It is 65% of the amounts.

According to the www server bankovnipoplatky citizens are mostly interested in debit embossed cards and credit cards. The students from the Faculty of Informatics and Management at University of Hradec Králové used more bank accounts and student bank accounts than credit cards. Even though most students own student or bank account, they do not use it for saving money. Only 15% use credit cards. It is not surprising that 12, 33% of these respondents are students from combined form.

The results of the paper are beneficial not only for financial institutions but for shops and consumers as well.

Acknowledgments

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Relationship between Government Bond Yield Spread and Fiscal Fundamentals in Selected EU Countries

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Abstract: *This paper investigates relationship between government bond yield spread and fiscal fundamentals in selected European Union member states in the period 1995-2012. The aim of the paper is to examine impact of GDP growth, budget balance, debt and the fiscal rules index on government bond yield spread. The empirical evidence is based on unbalanced annual panel data of 15 EU countries (time span is divided into a pre-crisis and a post-crisis period), data are taken from Eurostat and OECD database. Explanatory variables are not examined in individual regressions, but the study uses Generalized Method of Moments. For a model specification, Dynamic Panel Data Model Wizard is applied. Evidence shows that before the financial crisis investors generally ignored bond risk factors in individual countries, but the spreads sharply diverged from year 2008. Results confirm statistically significant impact of fiscal fundamentals on government bond yield spread. In a post-crisis period, findings report raising of importance fiscal variables for spread and the GDP growth became a major determinant of government bond yield spreads, followed by the budget balance and debt development.*

1 Introduction

Generally, a government bond is issued by a national government and is denominated in the country`s own currency. The yield required by investors to loan funds to governments should reflect inflation expectations and the likelihood that the debt will be repaid. It means that the price of government bonds should reflect among other market confidence in governments' commitment towards sustainable fiscal policies. The financial and economic crisis has been associated with heterogeneity in financial conditions, following a period of low and more homogeneous financing costs. Money markets have become impaired, especially across national borders, and government bond yields have diverged significantly. Overall, there is increased evidence that country-specific effects have become more important in driving financial conditions (ECB, 2012). Part of this increase can be attributed to developments in public debt and contingent liabilities related to the banking sector (Gerlach et al., 2010). Iara and Wolff (2011) argue that fiscal governance has an impact on the government yield spreads by reducing the probability of default.

The underlying causes of the government yield spreads increase originate in the accumulation of fiscal, macroeconomic and financial imbalances in several countries prior to the crisis, fueled in particular by decreasing interest rates around the start of EMU and by inadequate national and European policy responses. When the crisis erupted, the unsustainable nature of these imbalances became evident. The rapid acceleration in government borrowing needs was boosted by the fiscal response to concerns about the possibility of a severe economic slump and the re-pricing of risks caused the real imbalances to spill over to financial developments.

This paper intends to investigate relationship between government bond yield spread and fiscal fundamentals in selected European Union member states in the period 1995-2012. The aim of the paper is to examine impact of GDP growth, budget balance, debt and the fiscal rules index on government bond yield spread.

2 Literature Review

There is no doubt that government bond prices are closely linked to real economic activity through a variety of channels. However the theory does not clearly identify the direction of the causal relationships between these two variables. Morck et al. (1990) identified main channels through which bond prices are linked to real economic activity. Their theory is supported by the fact that managers of big corporations make their investment decisions based on the information provided by stock markets and also argue that equity prices reflect the present value of dividends paid in the future. Figure 1 depicts the main linkages between the economy, the banking sector and government bond markets. Arrows indicate the channel through which deteriorating conditions in one area affect the other two areas.

Figure 1 Main Linkages between Economy, Banking Sector and Bond Market
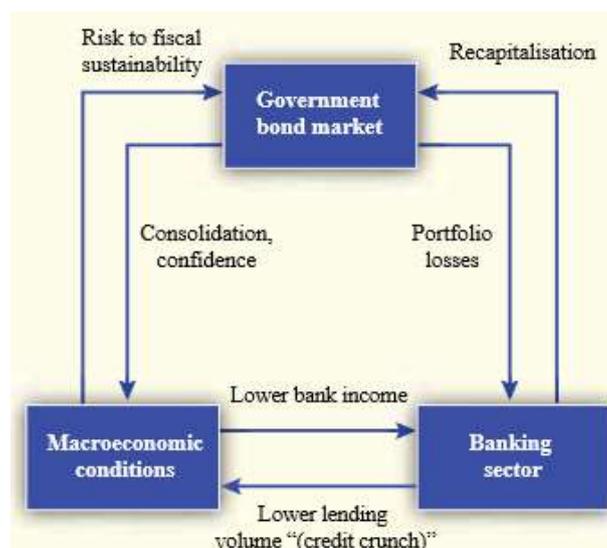
Source: ECB, 2012, p. 66

The aim of the paper is to find the main fiscal fundamentals affecting yield spreads of EU countries' government bonds. The literature has analyzed several determinants of yield spreads. This research is based on the yield spreads of bonds issued by European countries versus the German benchmark figures. Generally, yield spreads result from several reasons. Apart from default risk, the yield spreads are influenced by liquidity risk and market sentiments toward investments in risky bonds.

A wide range of literature deals with determinants of government bond yield spreads. Szarowská (2014) summarizes results of main studies focused on bond spreads in the EU countries. The results are rather heterogeneous, not only for different samples, but even for rather similar samples, such as the Eurozone countries, which a comparison of results from Lemmen and Goodhart (1999) with those of Bernoth et al. (2012), for example, shows. To some extent, these differences may be a result of different observation periods. Another reason could be that papers in the literature also differ considerably with respect to tested variables.

Studies on EU government bond yields, fall into two broad categories, respectively covering the period prior to and following the global financial crisis. Both groups of studies follow the literature on government bond yields modelling the latter on three main variables (Manganelli and Wolswijk, 2007):

- International risk factor capturing the level of perceived financial risk and its unit price. Typically, this is empirically approximated using indexes of US stock market implied volatility or the spread between the yields of US corporate bonds against US treasury bills captured by volatility indices and/or corporate rate spreads.

- Credit risk reflecting the probability of default on behalf of a borrower, approximated using indicators of past or projections of future fiscal performance. Existing evidence suggests that markets attach additional risks to the loosening of observed fiscal positions and shifts in fiscal policy expectations (Afonso et al., 2012).
- Liquidity risk refers to the size and depth of the government bonds market and captures the possibility of capital losses due to early liquidation or significant price reductions resulting from a small number of transactions. (Favero and Missale, 2012).

There is a growing literature focused on a crisis period. It is possible to identify two main findings. First, the observed widening in EMU spreads is largely driven by the increased global risk factor. Second, during the crisis period markets have been penalising fiscal and other macro-imbalance much more heavily than before (Schuknecht et al., 2010, Afonso et al., 2012, Maltritz, 2012 or Hvozdenská and Červinek, 2014). Although the most studies are focused on EMU, some authors analyze also Central and Eastern European countries. Alexopoulou et al. (2010) propose an empirical assessment of the determinants of borrowing costs of new European Union member countries. The results suggest that fundamentals still matter for market assessment of a country´s creditworthiness. In the context of heightened risk aversion, group of countries characterized by low fiscal discipline is more exposed to domestic sources of vulnerability as well as to swings in market perceptions of sovereign risk. Ebner (2009) studies the spread between 10 year Euro denominated Central and Eastern European (CEE) government bonds and their German counterpart. While higher ECB reference rate and market volatility increase bond spreads and turn out to be the main driving factors, there is no common pattern of macroeconomic fundamentals, pointing to strong heterogeneity within the CEE region. Overall, market variables are more significant than fundamentals during 1999 to 2007.

Aßmann and Boysen-Hogrefe (2009) investigate determinants of government bond spreads in the Euro area – in pre and also crisis period. They conclude that default risks measured via expected debt-to-GDP ratio explain a good stake of the variation of bond spreads in the Euro area at least between 2003 and the take-off of the financial crisis. During the financial crisis default risks or rather their evaluation increased but lost relative importance compared to liquidity risks.

One of the latest research is done by Paniagua et al. (2015) and it reports the importance of three groups of variables, namely, the fundamental variables of debtor economies, changes in risk-aversion and liquidity variables. In addition, their model includes unobserved components that are estimated through the Kalman filter, and show the importance of expectations, adding (or reducing) credibility to the future performance of debtor´s country, and also induce a time-varying behavior of steady-state estimates of the parameter.

Finally, it is possible to summarize that results of empirical studies are rather heterogeneous, i.e. different papers report different variables as the main drivers of spreads. This may be due to differences in used econometric models, country samples, observation periods and considered variables (for more details look at Szarowská 2013, 2014). Maltritz (2012) emphasizes the fact that there is no consensus about the key determinants of government yield spreads and it may be seen as indication for high uncertainty about the "true" empirical model.

3 Methodology and Data

Government bond yield spread is possible to analyze using many approaches and criteria. The aim of the paper is to examine impact of fiscal fundamentals such as GDP growth, budget balance, debt and the fiscal rules index on government bond yield spread in selected European countries in the period 1992-2012. It should be noted that the goal of this empirical analysis is not to find the ideal model describing the behavior illustrated by the variables, but a nature of relationships between government bond yield spread and

selected fiscal fundamentals in selected European Union member states. Paper uses unbalanced panel data and calculations are made in the program Eviews 8.

Following empirical analysis is based on annual panel data of the EU Member States in a period 1995–2012 (the newest available data are from 2012). The sample selection is limited by the availability of data. That´s why, the empirical examination is performed for 15 EU countries, namely Austria (AT), Belgium (BE), Finland (FI), France (FR), Germany (DE), Greece (GR), Ireland (IE), Italy (IT), Luxembourg (LU), Netherlands (NL), Portugal (PT), Spain (ES), Denmark (DK), Sweden (SE) and United Kingdom (UK).

The government bond spread is expressed as a difference to German data, which leaves a panel dataset of 14 countries. Germany is chosen as the benchmark country as the Bund is considered the benchmark bond in the respective bond market (for details see Dunne et al., 2007). Basic panel model identifiers are country i and time t. The dataset used in the analysis consists of annual data on government bond spreads (*spread*) represented by a difference between the members´ 10-year government yields and the German Bunds' interest, a GDP growth rate (*gdp*), a budget balance in percentage GDP (*balance*), debt as a percentage GDP (*debt*), and the fiscal rules index (*FRI)*. The sources of data are the Eurostat and OECD database.

Model Specification

We use panel data as panel data have both cross-sectional and time series dimensions and the application of regression models to fit econometric models are more complex than those for simple cross-sectional data sets. The analysis newly uses Generalized Method of Moments (Dynamic Panel Data). The basic model is defined in (1) and variables are explained above:

$$spread_{it} = a_i* + \beta1*GDP_{it} + \beta2*BALANCE_{it} + \beta3*DEBT_{it} + + \beta4*FRI_{it} + u_{it} \qquad (1)$$

The constants are specific to the i-th unit (country) at time t, at the same time but are constant. β' is the vector dimension *1xK* constants and *ai** is a constant representing the effects of those variables, which are characteristic of the i-th observation. Unit error component u_{it} represents non-significant effects of variables inherent in the i-team observations and a given time interval.

The GMM is a generic method for estimating parameters in statistical models. Usually it is applied in the context of semi parametric models, where the parameter of interest is finite-dimensional, whereas the full shape of the distribution function of the data may not be known. GMM is popular in estimating structural economic models, as it requires much less conditions on model disturbances than Maximum Likelihood. Another important advantage is that it is easy to obtain parameter estimates that are robust to heteroscedasticity of unknown form (Hansen, 1982). For a model specification, Dynamic Panel Data Model Wizard is applied. The wizard aids in specifying members of the class of dynamic panel data models with fixed effects. These models are designed for panels with a large number of cross-sections and a shorter time series (Arellano and Bond, 1991).

3 Results and Discussion

As Klepsch and Wollmershäuser (2011) point out, while the differentials between 10-year EMU government bond yields and German bond yields converged with the introduction of the euro in 1999, the spreads sharply diverged again at the beginning of the financial crisis in 2007. Recent studies analyzing the impact of the financial crisis on EMU government bonds have included additional variables in order to explain increasing yield spreads. Gerlach *et al.* (2010), for example, include a crisis dummy with a value of zero before the crisis and a value of one from the beginning of the crisis. They also use the total assets of the banking sector to find evidence of an emerging linkage between the financial sector and public budgets.

Figure 2 shows development of 10-year government bond yield in percentage per annum. The two decades preceding the crisis witnessed a substantial decline in nominal interest rates and financing costs in all EU countries. The completion of the Single Market in financial services and deeper financial integration were associated with a strong convergence in financial conditions across the EU and especially in EMU (Missio, 2012). With the financial crisis, market uncertainty and investors' risk aversion increased. As a consequence, investors reassessed their risk, concentrating especially on the credit risk of an asset. The fiscal variables, such as debt or deficit ratios, show a positive influence on yield spreads in many studies.

Figure 2 Long-Term Interest Rate (10-Year Government Bond Yield) in % p.a.
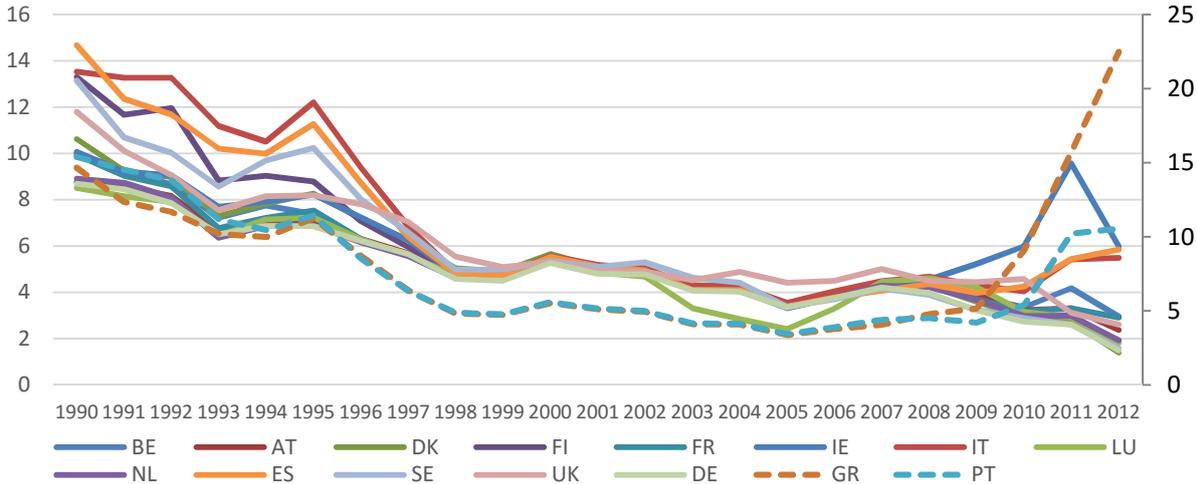
Note: GR, PT (right-hand scale)
Source: Based on data from Eurostat and Helgi database

Prior to the crisis, the convergence of financial conditions masked divergences in national policies and the accumulation of fiscal, macroeconomic and financial imbalances in several euro area countries. These imbalances were not adequately addressed, either at the national or the European level. They created vulnerabilities in these countries and paved the way for the sudden return of differentiated financial conditions when risks were repriced. Imbalances related, for example, to government financial positions in some countries. Following the start of EMU, government finances benefited from the easier access to financing that emanated from the elimination of exchange rate risk, and an under appreciation of risk by financial market participants. Progress towards sound and sustainable public finances was limited, owing partly to a loose and, over time, more relaxed interpretation of European budget rules. Market discipline was also weak, as reflected in very limited dispersion in interest rates on government bonds. As a result, in particular those governments that had experienced high interest rates before joining EMU witnessed a major relaxation of financial conditions (for details look at Szarowská, 2013).

The financial crisis that erupted in September 2008 with the default of Lehman Brothers, marked a halt in the trend towards more homogenous financial conditions. Secured and unsecured money markets became increasingly impaired, especially across national borders. Public finances deteriorated sharply on account of the crisis, against the background of persistently high debt ratios and substantial banking sector support, especially in countries with a very large banking sector in relation to GDP. Rapidly increasing public deficits, debt and contingent liabilities raised questions about the sustainability of public finances in some euro area countries, as reflected in higher government bond yields and a drying-up of liquidity in some markets. The government debt crisis that erupted in May 2010 was initially centered on adverse fiscal developments in Greece, but then spread to Ireland and Portugal; at a later stage, Spain and Italy also became the subject of intensified market scrutiny. The lack of confidence in governments' willingness to tackle the crisis, in combination with the lack of an effective

resolution mechanism, also spread to other governments. This phenomenon is referred to as "contagion" (ECB, 2012).

In line with public finance consolidation problems, governments have increasingly adopted numerical fiscal rules in last 20 years. The 75 numerical fiscal rules were in force in 2012 instead of 13 numerical fiscal rules in 1990 (OECD, 2014). Fiscal policy rules set numerical targets for budgetary aggregates and they are cumulatively expressed in fiscal rules index. They pose a permanent constraint on fiscal policy, expressed in terms of a summary indicator of fiscal outcomes, such as the government budget balance, debt, expenditure, or revenue developments. The primary objective of fiscal rules is to enhance budgetary discipline.

Impact of Fiscal Variables on Government Bond Yield Spread – Empirical Evidence

In order to test whether fiscal development matters for government bond yield spread, there are estimated econometric models expressed in a basic form in (1). Information criteria (Akaike criterion, Schwarz criterion and Hannan-Quinn criterion) identified as the optimal time lag 1 year. Split of time span into two periods allows deeper analysis of structural changes related to an impact of crises. Period was divided by the year 2008. Models 1 and 2 are focused on a whole period (1995, resp. 1996- 2012), model 3 on pre-crisis period (1995, resp. 1996- 2007) and model 3 on post-crisis period (2008- 2012). Table 2 presents the most appropriate specifications of models resulting from GMM.

Table 2: Panel Regression Estimations (GMM / Dynamic Panel Data)

Variable	Model 1	Model 2	Model 3	Model 4
SPREAD$_{(-1)}$	0.953*	0.538*	0.594*	0.169**
GDP	-0.072*	-0.166*	-0.058*	-0.930**
BALANCE	0.030*	-0.017	-0.039*	-0.099**
DEBT	0.027*	0.018*	-0.006	0.093*
FRI	0.305	0.093	-0.007	0.264
@LEV"1996"		0.821**	0.966*	
@LEV"1997"		-0.345**	-0.122	
@LEV"1998"		-0.496*	-0.242**	
@LEV "1999"		-0.234	-0.017	
@LEV"2000"		-0.079	0.152**	
@LEV"2001"		-0.052	0.242	
@LEV"2002"		0.006	0.251**	
@LEV"2003"		-0.594*	-0.286*	
@LEV"2004"		-0.420*	-0.048	
@LEV"2005"		-0.285	0.165	
@LEV"2006"		-0.562*	-0.036	
@LEV"2007"		-0.636*	-0.046	
@LEV"2008"		-0.691*		-0.533**
@LEV"2009"		-0.339		-0.184
@LEV"2010"		0.511**		0.790*
@LEV"2011"		-0.619*		-0.114*
@LEV"2012"		0.38**		0.68**
S.E. of reg.	0.675	1.019	0.475	1.387
S.D. depend. var	0.946	0.961	0.737	1.724
Observations	303	303	207	96

Symbols *, ** denote significance at the 1% and 5%, standard deviation are in parenthesis.
Source: Author´s calculations

As it is already noted, for models specification, Dynamic Panel Data Model Wizard is applied. The wizard aids in specifying members of the class of dynamic panel data

models with fixed effects. All models include cross-section fixed effects (orthogonal deviations) and constant added to instrument list. Models 2, 3 and 4 contain also period fixed effects as dummy variables for a better capture the impact of the crisis (there are labeled as @LEV "year"). Their adding increased a statistical quality of models.

The main results concerning the effect of fiscal variables on government bond yield spread indicate that impact is stronger for a post-crisis period. Table 2 shows that the estimated coefficients of *GDP* and *balance* are negative and statistically significant. This finding confirms that positive economic development expressed by GDP growth as well as increase of a budget balance contribute to the lower government bond yield spread. Contrary, it seems that increase of debt have a negative influence on government bond yield spread, as coefficients are positive and it means increase of government bond yield spread. Period fixed effects play important and statistically significant role, especially in a post-crisis period. Although increase of *FRI* expresses better fiscal discipline, results do not confirm expectation that *FRI* growth reduces the government bond spreads. The reason can be seen in a fact that the price of government bonds reflects market confidence in governments' commitment towards sustainable fiscal policies and only 48% numerical fiscal rules reflect development of central and general government. Moreover *FRI* is calculated ex-post and investors probably do not reflect its development.

The budget balance is significant determinant of government yield spreads found relevant also in several empirical studies above. The countries' budget balance plays the most prominent role in public discussions and is also named in the Maastricht Treaty as important stability criterion that EMU countries are required to fulfill. By the theory, a negative budget balance (deficit) is supposed to lead to higher market perception of default risk and to higher yield spreads. Total government debt reflects the hypothesis that higher indebtedness increases ceteris paribus the default risk and therefore yield spreads. For higher debt service payments the requirements on ability and willingness to pay are higher, and thus a default is more presumable, and government bond yield spreads are increased.

Findings in Model 4 report raising of importance fiscal variables for spread and GDP growth became a major determinant of government bond yield spreads, followed by the budget balance and debt development. It suggests that investors started to consider and valuate risks caused by the real economic imbalances to government bond yield spread.

4 Conclusions

The financial system is the primary channel through which monetary and fiscal policies affect the economy and prices. The price of government bonds should reflect among other market confidence in governments' commitment towards sustainable fiscal policies.

The aim of the paper was to examine impact of fiscal fundamentals such as GDP growth, budget balance, debt or the fiscal rules index on government bond yield spread in selected European Union member states in the period 1995-2012. First, paper summarizes main development of government bond prices and government bond yield spread. Data show that differentials between 10-year countries´ government bond yields and German bond yields converged and investors generally ignored bond risk factors in individual countries before the financial crisis, but the spreads sharply diverged from year 2008.

The following empirical evidence is based on unbalanced annual panel data of 15 EU countries (time span is divided into a pre-crisis and a post-crisis period). Explanatory variables are not examined in individual regressions, but the study uses Generalized Method of Moments. For a model specification, Dynamic Panel Data Model Wizard is applied. Results confirm statistically significant impact of fiscal fundamentals on government bond yield spread. In a post-crisis period, findings report raising of importance fiscal variables for spread and GDP growth became a major determinant of government bond yield spreads, followed by the budget balance and debt development. This is the common trend for all models and it confirms that fiscal unfavorable

development can supposed to higher market perception of default risk and to higher yield spreads and to the expectation that growing economies easier fulfill given payment obligations than for stagnating economies. The improvement of fiscal discipline, expressed by budget balance increasing, reduces government bond yield spreads. Contrary, rising debt raises the possibility of state bankruptcy and therefore debt´s increasing has negative impact on price of government bonds and spread. Surprisingly fiscal rules index have not statistically significant impact on spread.

Acknowledgments

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The Role of ECB as a Supervisory Authority within European Union

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Abstract: The aim of this study is to present the new role of European Central Bank in the European financial safety net. This role is connected with both macro- and micro-prudential financial supervision. It is the result of work towards strengthening pan-European safety net, where next to European Systemic Risk Board (which is responsible for macro-prudential supervision), micro- prudential supervisor, responsible for micro-prudential supervision should have been established. It is also very important that nowadays almost every central bank plays a significant role in modern safety net, especially in its lender of last resort function. It should also be mentioned that historically central banks were responsible for supervision and now the trend of returning to this model can be observed. These solutions that give ECB responsibility for supervision are the first to integrate financial supervision within EU. In this paper it will also be discussed what are the consequences of such model and how it affects the policy of ECB.

Keywords: European Central Bank, micro and micro financial supervision, Banking Union

JEL codes: E52, E58

1 Introduction

During global financial crisis a lot has been said about the need of strengthening financial safety nets and the need of providing financial stability to the financial system. One of the pillars of safety net is financial supervision, which plays a significant role before and during financial turmoils. Within European Union policymakers' attention has been focused on creating pan-European supervision, both in macro- and micro-prudential dimension. The first step was the establishment of European Systemic Risk Board in 2011. This institution has become responsible for macro-prudential oversight of the financial system within European Union. Next to macro-prudential supervision a micro-prudential supervisor was created. This role was entrusted to European Central Bank, which became an important institution within European financial safety net.

The aim of this article is to present the new role of European Central Bank in the European financial safety net with the emphasis on macro- and micro-prudential supervision that this institution fulfills.

2 Financial Safety Nets within European Union- Selected Issues

Government provision of a financial safety net for banks and other financial institutions has been a key element of the policy response to the current financial crisis. A proper financial safety net is necessary to reduce the risk of severe financial crises. Without an appropriate financial safety net, even simple rumours of problems regarding solvency or liquidity of a financial institution have the potential of becoming self-fulfilling and turn into a full-blown financial crisis. With an appropriate financial safety net in place, confidence tends to be greater and the onset of financial crises less likely than otherwise (Schich, 2008).

There is no generally accepted definition of the key elements of the financial safety net. A narrow definition is limited to deposit insurance and lender of last resort function, while a more widely accepted one includes at least three elements, adding the prudential regulatory and supervisory framework to the previous components (Schich, 2008).

In the Larosiere Report published in 2009 it was noted that there is a very important distinction between micro- and macro-prudential supervision. Micro-prudential

supervision has been the centre of attention of supervisors around the world. The main objective of this supervision is to supervise and limit the distress of individual financial institutions, thus protecting the costumers of the institution in question. The fact that the financial system as a whole may be exposed to some risk wasn't always acknowledged (de Larosiere Report, 2009). This situation has changed significantly in European Union during global financial crisis when European Systemic Risk Board (ESRB) was established in 2010. This institution is a part of European System of Financial Supervision (ESFS), which architecture is presented in Figure 1.

Figure 1 European System of Financial Supervision

Source: Finish Financial Supervisory Authority, 2014

The European system set up for the supervision of the financial sector is comprised of the three supervisory authorities: the European Securities and Markets Authority (ESMA), the European Banking Authority (EBA) and the European Insurance and Occupational Pensions Authority (EIOPA). The system also comprises the European Systemic Risk Board (ESRB) which co-operates with European Central Bank as well as the Joint Committee.

The main objectives of ESRB consists of:

- determining and collecting the relevant informations,
- identifying and prioritising systemic risks,
- issuing warning where such systemic risks are deemed to be significant and make those warnings public,
- co-operating closely with all other parties to the European System of Financial Supervision.

Up to now ESRB has issued eleven recommendations on selected factors that may cause systemic risk in the financial system (e.g. funding of financial institutions, lending in foreign currencies, money market funds). It is important that European Central Bank plays a significant role in ESRB functioning. It is responsible for running the Secretariat, which is responsible for the operational business of ESRB.

The objective of all authorities that comprise European System of Financial Supervision is to improve the functioning of the internal market by ensuring appropriate, efficient and harmonized European supervision. Special attention has been paid to providing an appropriate risk management. The administrative structures of the supervisory authorities have been harmonised. Each authority has a board of supervisors, management board, chairperson, executive director and board of appeal. The top-most decision-making powers are with the boards of supervisors, where the members with voting rights are the representatives from the head of the national supervisory authorities. The full-time chairman of the board of supervisors also heads the management board meetings. In addition to the chairman, the management board comprises six members, chosen from the members of the board of supervisors who have the right to vote. The management board is responsible for seeing that operations are undertaken in line with the decisions made by the board of supervisors (Finish Financial Supervisory Authority, 2014).

3 European Central Bank in a Modern Safety Net

It is important to notice that since the inception of the financial crisis in 2008, the European Commission has been active in putting forward new proposals to reform the banking system, as a follow-up to G-20 common resolutions and as necessary revisions of outdated legislative texts. However, a first set of guidelines on how to create a banking union was issued only at the end of June 2012, with the first 'Four Presidents' Report followed by a more detailed communication of the Commission in September. The communication was followed by a proposal for a single supervisor for European banks (via two regulations) and the idea to have a Single Resolution Mechanism (SRM) to complement common resolution procedures proposed earlier via directive (6 June 2012), as a follow up to a G-20 commitment on crisis management. A single resolution authority at the European level, however, was suggested only in December 2012, by the second 'Four Presidents' report, to be implemented "once the directive on resolution is approved". On 10 July 2013, the European Commission finally presented a proposal for the institution of Single Resolution Board (SRB), to govern the resolution of banks in EU member states that will take part in the Single Supervisory Mechanism (Valiante, 2014). The history of creating SSM is presented in table 1.

Table 1 The history of SSM

2012	- Euro area Heads of State or Government decide to assign supervisory tasks to the ECB within SSM - European Commission presents legislative proposals
2013	• ECB starts a "financial health check" of 130 banks
2014	• ECB publishes the list of significant credit institutions under its supervision

Source: ECB, 2014

This decision known as the Single Supervisory Mechanism is the direct outcome of a process that was launched by the European Commission, whose proposal was published on the 12th September 2012 and – under the pressure of the evolving financial crisis - discussed at great speed in the Council. During its meeting of 18-19 October 2012, the European Council confirmed its support for the ongoing work and indicated that for most of the pending questions a solution was likely to be found. According to the Treaty legal basis, introduced by the Maastricht Treaty of 1992, the procedure formally did not involve the European Parliament. As a consequence of the Lisbon Treaty of 2007 however, the Parliament has gained a larger voice in most legislative matters and therefore a consultation of the Parliament has been organised in the first months of 2013 using its leverage on the reform of the European Banking Authority regulation as an instrument to redraft some of the rules of the SSM. The Parliament got deeply involved and finally adopted an amended text on September 12, 2013, referring to the "opinion of

the European Parliament". The Council legally adopted the Regulation on 15 October 2013 (Wymeersch, 2014).

In November 2014 ECB became the prudential regulator for all the Eurozone banks under the Single Supervisory Mechanism (SSM). This mechanism is important pillar of banking union. The banking union was conceived to ensure that banks are stronger and better supervised and, when problems arise in the financial sector, they can be resolved more easily and without using taxpayers' money. It is made up of the Single Supervisory Mechanism (SSM) and the Single Resolution Mechanism (SRM), both of which are mandatory for all euro area Member States and open to all other countries in the EU (European Commission, 2015). The third element of banking union is connected with the deposit guarantee scheme (harmonized by a proper directive). The key elements of banking union are presented in figure 2.

**Figure 2** Key elements of banking union

Source: Allianz Global Investors, 2014

The choice for the ECB as the institution best placed for exercising the SSM function, although not uncontroversial, was not a surprise. On the one hand many of the national central banks are already in charge of prudential supervision in their own jurisdiction. The alternative, for example to put the European Banking Authority in charge of actual supervision was politically and legally objectionable: prudential supervision in the Eurozone could only be exercised by an Euro area supervisory body; more specifically on the basis of the Meroni doctrine, it was considered that supervisory tasks and responsibilities could be delegated to an agency under the prevailing reading of European Law. As a consequence no proper supervisory powers were entrusted to the EBA other than the coordination of existing national supervisory action. Some e.g. in the European Parliament have proposed the creation of a special body in charge of banking supervision, but for the same legal reasons, this would have required am amendment to the Treaty, which couldn't be realised in the short term. The only body that could intervene without a change of the law is the ECB, since the Treaty – as modified by the Maastricht Treaty - already contains a provision allowing the ECB to exercise prudential responsibilities. Moreover it was obviously preferable to rely on the strong reputation of the ECB rather than on the creation of a new body, a process that would have been time and energy consuming, triggering numerous rivalries and appetites, and might have had a negative impact on the financial markets. Coherence of financial policies, a strict necessity in these unstable times, calls for strong unitary leadership to avoid relying on weaker instruments of coordination such as the supervisory colleges, or the home-host division of competences (Wymeersch, 2014).

The role of ECB in the pan-European supervisory structure is presented in figure 3. This figure shows that ECB plays an important role both in macro- and micro-prudential supervision. It is responsible for systemic bank supervision within EU and co-operates closely with European Banking Authority. The SSM is involved in the EBA's work and contributes significantly to supervisory convergence by integrating supervision across jurisdictions (ECB, 2014).

Figure 3 The new supervisory structure in the Eurozone
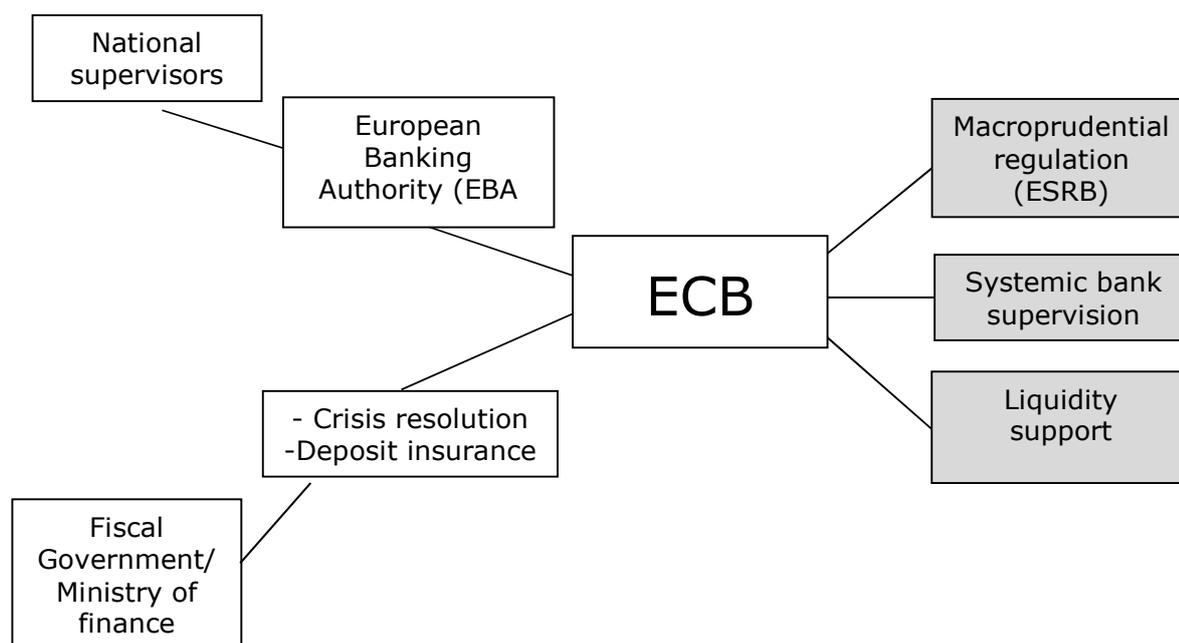
Source: CEPR's Policy Portal, 2012

The important question is which credit institutions are put under ECB's supervision. ECB is only responsible for systemic credit institutions within the Eurozone. A credit institution (individually or group wise) will be considered significant and hence be directly supervised by the ECB if whether (National Nank of Belgium), :

- its total assets exceed 30 billion euro;
- its ratio of total assets over the GDP in its participating state of establishment exceeds 20%;
- or it is identified pursuant to a notification by the national supervisor as being of significant relevance to the domestic economy.

The ECB should analyse the situation, on that basis confirming its significance. This process allows shifting significant institutions to the more comprehensive level of European prudential supervision.

The lists of tools an matters covered by ECB can be summarise as follows (Wymeersch, 2014):

- withdrawal of the authorisation of a bank, after consultation of the national supervisor,
- supervision, as home supervisor, of the opening of a branch or provision of services in a non-participating state,
- ensuring compliance with the core supervisory tools: own funds, securitisation, large exposure limits, liquidity, leverage, reporting and disclosure.
- governance including fit and proper, risk management, internal controls mechanisms, remuneration policies,
- supervisory reviews and stress tests
- consolidated supervision of banking groups, financial holding and mixed financial holding companies, whether as a single or lead supervisor or as a college member for groups
- acting as supervisor in banking recovery matters, excluding however resolution powers for which separate resolution authorities will be created at the national level, or may be set up for the entire euro area.

Impartial supervision at Union level under the SSM will make bank failures much less likely. When they do occur, however, the SRM will make it easier to deal with them. The SRM will cover banks overseen by the SSM/ECB. It is made up of a board, the Single Resolution Board (SRB) and a fund, the Single Resolution Fund (SRF). Once informed by the ECB that a bank is in trouble, the Board will be responsible for taking most decisions on the best course of action and will prepare for the resolution of the stricken bank. The fund, which will amount to € 55 billion within eight years, will be financed by all the banks in the banking union countries. For situations when the SRF is not sufficiently funded by the banking sector, an effective common backstop will be developed, which will facilitate borrowing by the SRF. The Eurozone banking sector will ultimately be liable for repayment by means of levies, including ex post. The Single Resolution Board, which has been operational since the beginning of 2015 and will be fully operational (with a complete set of resolution powers) from January 2016, is the final piece in the banking union jigsaw. So a single EU authority will have the powers and resources to protect taxpayers from banks' failures (European Commission, 2015).

4 Conclusions

The last financial crisis has changed the approach to financial supervision. More emphasis was put on supervision on a pan-European level. The role of European Central Bank is very important in this matter. It can now be said that ECB has gone beyond its traditional functions in a safety net, e.g. lender of last resort. It now plays significant role as a supervisor, both on micro- and macro-prudential level. Because of that ECB is an important pillar within banking union. From this point of view, crisis can be seen as a chance to strengthen the pan-European safety net. The change of role which ECB plays on a financial market is very important. The time will show if it's right, because now it's to early to judge if the entrusting of supervisory functions to ECB (especially micro-prudential) was a right decision.

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Augmented Gravity Model of International Trade: An Empirical Application to Poland's Trade Flows

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Abstract: *This paper applies the gravity model to Poland´s international trade with aim to assess the impact of exchange rate uncertainty of Polish zloty on the trade flows with its main trading partners. Basic gravity model shows trade volume between a pair of countries as an increasing function of their sizes (GDP) and a decreasing function of the distance between them. Additional factors included in extended model are population, common border and exchange rate volatility. The measure of exchange rate volatility is estimated by GARCH model. The analysis is provided by using quarterly data over the period 1999:1 – 2014:3. Analysis uses panel data regression for 10 sectors of Poland´s international trade based on SITC classification and six major trading partners (Czech Republic, Germany, France, Great Britain, Italy and Slovakia). The significant parameters obtained from panel regression demonstrate that bilateral exchange rate volatility leads to a decrease in Poland´s total trade. The same direction of relationship was confirmed for food and live animal, beverages and tobacco, crude materials, chemicals, manufactured goods, machinery and transport equipment and miscellaneous manufactured articles*

Keywords: exchange rate volatility, international trade, gravity model, sector analysis

JEL codes: C51, F14, F31

1 Introduction

The gravity model of trade derives from the law of universal in which the size of the gravitational interaction is proportional to the multiplication of the weight of the two interacting objects and is inversely proportional to the square of their distance. The idea for using the gravity models to analyze international trade date back to Tinbergen (1962), Pöyhönen (1963) and Linnemann (1966). Following their works the basic gravity model tries to explain the volume of trade between two countries or regions by their economic size and distance. The gravity model is a key tool for researchers interested in the effects of trade-related policies. It provides a convenient testing base on which to assess the trade impacts of different additional variables included in the model. Although the gravity model is seems to be an appropriate platform for applied international trade researchers, its use does not come without some potential pitfalls.

Following the initial works based more on the intuition, the theoretical foundations of gravity equations explaining international trade flows have been widely discussed and developed. These foundations mainly base on theories of international trade. Subsequent studies have shown that, far from being a purely econometric tool without a theoretical basis, gravity models can arise out of a range of trade theories. In particular, Bergstrand (1989) confirmed that a gravity model is in accordance of model of trade based on monopolistic competition. In this model, identical countries trade differentiated goods because consumers have a preference for variety. Models with monopolistic competition overcome the undesirable feature of Armington models whereby goods are differentiated by location of production by assumption. Firm location is endogenously determined and countries are specialized in the production of different sets of goods. Deardorff (1998) contributes that the gravity model can arise from a traditional factor-proportions explanation of trade. Eaton and Kortum (2002) derive a gravity-type equation from a Ricardian type of model, and Helpman et al. (2008) and Chaney (2008) obtained it from a theoretical model of international trade in differentiated goods with firm heterogeneity.

This paper applies the gravity model to Poland´s international trade with aim to assess the impact of exchange rate uncertainty of Polish zloty on the trade flows with its main trading partners. For this purpose we follow the recent trend in decomposition of foreign trade to specific sectors. The analysis is provided by using quarterly data over the period 1999:1 – 2014:3. Analysis uses panel data regression for 10 sectors of Poland´s international trade based on SITC classification and six major trading partners (Czech Republic, Germany, France, Great Britain, Italy and Slovakia).

2 Methodology and Data

To estimate the impact of exchange rate volatility on foreign trade in this paper is used a gravity model, which is a simple empirical model for analyzing bilateral trade flows. Despite this approach was often criticized for insufficient theoretical foundations, this drawback has been eliminated in the recent years. The considerations about theoretical foundations of the gravity model for analyzing international trade flows do not generate a proper and unique specification of the gravity equation used in empirical work. In the basic form of the gravity model, it is assumed that the amount of trade between two countries increases with their size measured by their national incomes and decreases with the cost of transport between them, measured by the distance between their economic centers (Tinbergen, 1962).

Linnemann (1966) included population as an additional variable for the size of the country and its economy in the gravity model. This model is sometimes called the augmented gravity model and can be formulated in equation (1):

$$X_{df} = \delta \frac{Y_d^{\beta_1} Y_f^{\beta_2} POP_d^{\beta_3} POP_f^{\beta_4}}{D_{df}^{\theta}} \tag{1}$$

where δ, $\beta_{1(2, 3, 4)}$ and θ are the parameters of the modified equation, X_{df} is the bilateral trade between domestic country d and its foreign partner f, $Y_{d(f)}$ is income of respective country and $POP_{d(f)}$ is its population. D_{df} is the distance between two analyzed countries.

We suppose the direct relationship between foreign trade and income as higher production increases the amount of exportable goods. Furthermore, high income in the importer country indicates higher level of import because higher income causes higher demand; therefore, the coefficient is expected to have a positive sign. The coefficient of population is supposed to be positive as well but some estimation can reveal theoretically justified indirect relationship with foreign trade. This is due the fact that big country can either export more than small countries due to economies of scale but either less when the absorption effect prevails and the country consumes what it produced resulting in fewer products to be exported (Martinez-Zarzoso, 2003).

The expected sign of the distance coefficient is negative as distance is a relatively good approximation of trade costs, the time elapsed during shipment, and various transaction and communication costs which are not easy to measure directly (Head, 2003). According to Arvas (2008), the distance can be a considered not only as a proxy for transport costs and an indicator of the time elapsed during shipment; it can be even correlated with the cost of searching for trading opportunities and considered as a proxy for culture differences connected to different consumer patterns.

The gravity equation is frequently extended to incorporate other factors that stimulate or reduce bilateral trade flows. Additional variables may be necessary depending on the purpose of the analysis. For the purpose of this paper, we incorporate exchange rate volatility and the existence of a common border into the model. Exchange rate is widely used as an explanatory variable, especially in panel analyses with long time periods.

There is no doubt about the theoretical explanation of relationship between exchange rate and trade turnover (see Clark, 1973; Hooper and Kolhagen, 1978), but as is evident from the review of the empirical research conducted in support of theoretical models', considerations provides ambiguous evidence on this issue. One can illustrate this lack of

consensus by the conclusions formulated in Taglioni (2002) or Ozturk (2006), which hold that if the presumed adverse effect of exchange rate volatility on trade flows exists, it is certainly not large. This finding is shared by Rajan (2004), but he discovered that the exchange rate volatility is more likely to reduce international trade if the research focuses on bilateral trade instead of aggregate trade.

Regarding methodology, we follow Tichý (2007) and Baldwin et al. (2005) and employ the following extended gravity equation (2):

$$lnX_{p,df} = \alpha + \beta_1 ln_{\ d} + \beta_2 Y_f + \beta_3 lnPOP_d + \beta_4 lnPOP_f + \beta_5 ln_{\ df} + \beta_6 lnV(ER)_f + \beta_6 lnCB_{df} + u_{ij} \tag{2}$$

where dummy variable CB_{df} represents a common border (it equals 1 if the trading partner shares a common border with a domestic country and 0 if not), $V(ER)_f$ is the exchange rate volatility, a and β_k are the unknown parameters of the model, and u_{ij} is the error term. X_p represents the total trade turnover between the pair of countries in an individual product group.

To measure the exchange rate volatility, we used GARCH model in following form (3):

$$\sigma_t^2 = \alpha_0 + \sum_{i=1}^{m} \alpha_i e_{t-i}^2 + \sum_{j=1}^{s} \beta_j \sigma_{t-j}^2 \tag{3}$$

where σ_t^2 is the conditional variance, parameter $\alpha_0 > 0$ and the constraints $\alpha_i \geq 0$, $\beta_j \geq 0$ are needed to ensure σ_t^2 is positive (Campbell et al., 1997). The variance of the disturbance term for each period is modelled as a function of the errors in the previous periods.

As Arvas (2008) states, standard gravity models usually employ cross-sectional data to estimate trade patterns in a given year, or averaged data. We employ a panel data regression to avoid the risk of choosing an unrepresentative year and to monitor unobservable individual effects between trading partners. This can provide additional insight into trading relationships. In addition, the use of panel data is particularly suggested for estimating the relationship between international trade and exchange rate volatility.

Time series used for estimation are on a quarterly frequency and cover the period from 1999:1 to 2014:3. The data of GDP, bilateral exchange rates, population, import and export flows were obtained from Eurostat. The data on the distance between Poland and its trading partners were taken from the GeoDist database. The bilateral distances are measured using city-level data. The capital city is considered to be the economic center in all trading countries included in the estimations. GDP of each respective country is set in index form to make it unit free (Bahmani-Oskooee, 1991).

The countries selection is based on the share of total international trade turnover. The shares of most important bilateral trading partners in analyzed period can be seen in Figure 1. As can be seen from this Figure 1, the majority of total Poland´s trade is realized in trade flows with Germany. Other significant shares belong to trade with Italy (IT), France (FR), Great Britain (GB), Czech Republic (CZ) and Slovakia (SK).
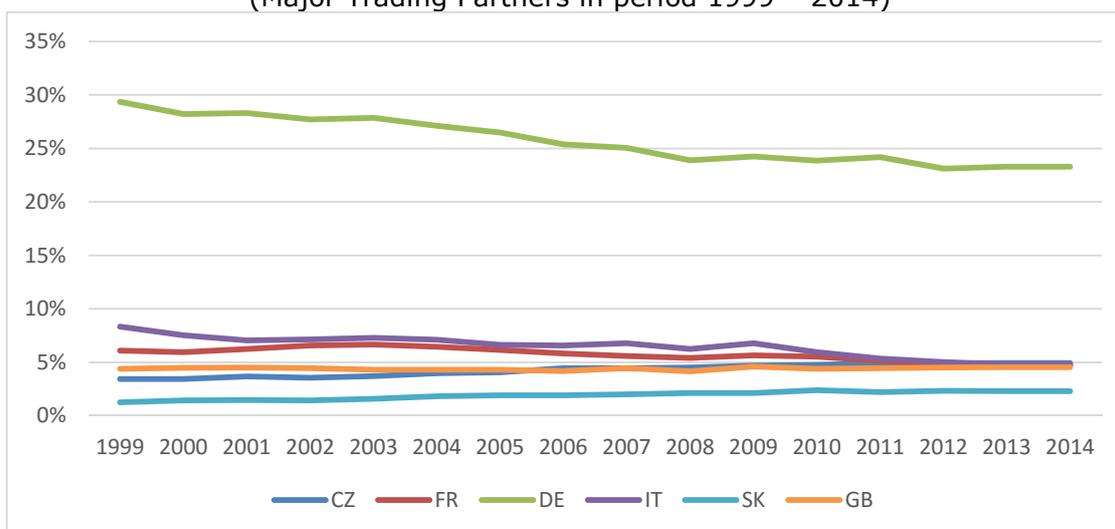
Source: Author´s calculation

The product groups used in estimations are determined on the basis of SITC classification:

- T0: Food and live animals;
- T1: Beverages and tobacco;
- T2: Crude materials, inedible, except fuels;
- T3: Mineral fuels, lubricants and related materials;
- T4: Animal and vegetable oils, fats and waxes;
- T5: Chemicals and related products;
- T6: Manufactured goods;
- T7: Machinery and transport equipment;
- T8: Miscellaneous manufactured articles;
- T9: Commodities and transactions not classified elsewhere in the SITC.

Figure 2 shows the average share of individual product categories on Poland's total international trade during the period 1999 - 2014. The highest share of total trade turnover falls into product categories machinery and transport equipment and manufactured goods. Their shares in sum represent more than 50% of total realized foreign trade.

Figure 2 Commodity Structure of Poland´s Foreign Trade (1999 – 2014)
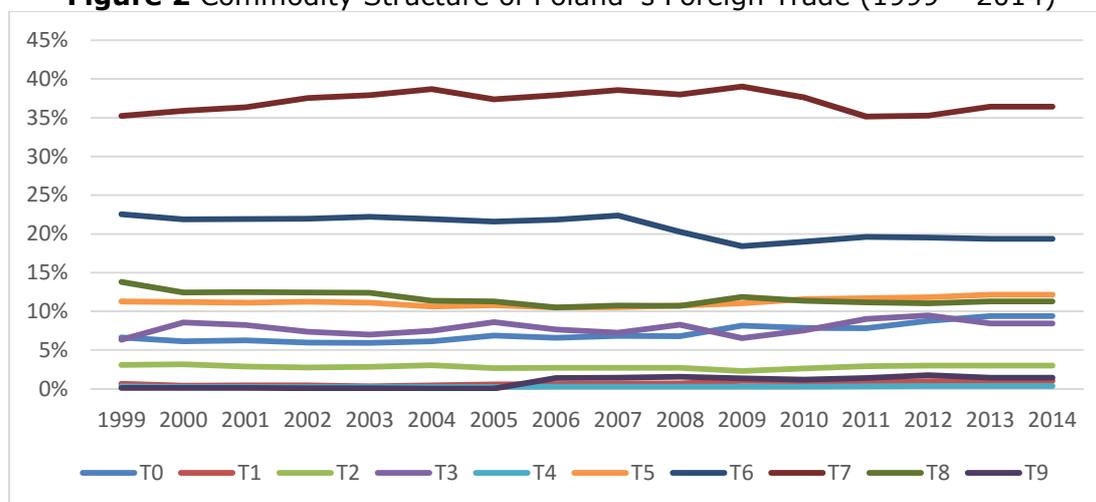
Source: Author´s calculation

3 Results and Discussion

In empirical testing was performed logarithmic transformation to reduce skeweness and heteroscedasticity and to stabilize variability. In this study is applied the least squares method for panel data in the extended gravity model estimation. The dependent variable in the model is the total trade turnover between Poland and its selected trading partners within individual product groups. We have included 6 cross-sections (trading partners) and 63 periods (quarterly data between 1999:1 and 2014:3). The results of the estimation are summarized in Table 1.

Table 1 Estimated Coefficients of Gravity Model for Poland

	TT	T0	T1	T2	T3	T4	T5	T6	T7	T8	T9
Y_d	0.51 ***	0.48 ***	1.25 ***	0.41 **	0.23 *	1.26 *	1.03 ***	1.26 ***	1.87 ***	1.01 *	0.23
Y_f	0.43 ***	0.30 ***	0.74 **	0.58 **	0.01 **	1.02	0.24 **	0.14 ***	0.41 ***	0.84 ***	-0.04 *
POP_d	2.31 **	1.25 **	-2.03 *	0.85 **	1.41 ***	0.15 *	0.94 *	0.54 ***	1.23 ***	1.15 **	-0.54
POP_f	1.81 **	2.54 ***	2.34 ***	1.43 **	0.24 *	1.25	-0.01 **	0.15 **	0.82 ***	1.37 **	-0.01 *
$V(ER)$	-0.52 **	-1.36 ***	-1.99 **	-0.54 **	0.01 **	0.15 **	-0.96 ***	-1.25 ***	-1.00 ***	-0.05 ***	-0.40 **
D_{df}	-0.45 *	-0.25 **	-0.10 ***	-0.05 **	0.10 **	0.01 ***	0.22 ***	-0.71 ***	-0.52 ***	-1.41 ***	-1.96 ***
CB_{df}	1.50 ***	0.96 **	1.52 ***	2.05 ***	3.01 ***	1.63 ***	1.22 **	-0.25 **	1.58 ***	1.42 ***	1.02

Note: ***, **, * denote significance level at the 1%, 5% and 10% level, respectively.

Source: Author´s calculation

Considering Poland´s total trade *TT* with its major partners, we can observe highly significant parameters which are in accordance with economic theory. Results are more ambiguous when we disaggregate data into particular sectors. Significant parameters of domestic and foreign income (except foreign income in T9 product group) revealed positive effect on foreign trade. Notably, the estimated influence of the domestic effect seems to be generally larger than the effect of foreign income.

The effects of population on particular trade turnovers are mostly positive. Negative coefficient was detected only for beverages and tobacco products and product category T9. Martinez-Zarzoso (2003) argues that bigger country can either export more than small countries due to economies of scale but either less when the absorption effect prevails and the country consumes what it produced resulting in fewer products to be exported. The significant direction of relationship between distances between economic centers does not confirm the supposed indirect effect of distance to realized foreign trade for mineral fuels, lubricants, animal and vegetable oils, fats, waxes, chemicals and related products. Common border does not promote trade of manufactured goods. These results can be probably caused by membership of Poland and its major trading partners in European Union, which eliminates trade barriers.

Our results suggest that increasing of exchange rate volatility in case of every estimated product category except mineral fuels, lubricants, animal and vegetable oils, fats and waxes leads to decrease of trade turnover.

4 Conclusions

This paper contributes to the economic literature on the impact of exchange rate volatility on Poland´s foreign trade. For this purpose we followed the recent trend in decomposition of foreign trade to specific sectors on one hand and used the extended gravity equation as a representation of an empirically stable relationship between the size of economies, distance between them and realized trade volume, on the other hand.

The volatility of bilateral exchange rates was incorporated into model as estimation of GARCH model.

Generally is assumed, that higher exchange rate volatility leads to higher transaction costs for traders and is followed by decrease of foreign trade. The significant parameters of estimation is in accordance to this statement and demonstrate that bilateral exchange rate volatility leads to a decrease in trade of food and live animal, beverages and tobacco, crude materials, chemicals, manufactured goods, machinery and transport equipment and miscellaneous manufactured articles. The sectors with direct relationship represent only less than 10% of the total Poland´s foreign trade.

Usually, international trade tends to be a driver of the economy in countries neighboring with economies with open trade regimes, with high presence of multinational companies and large volume of re-exports. Foreign trade is an integral part of the total development growth and national growth of an economy of Poland as well. In summary, the results based on disaggregated data clearly demonstrate that the increasing of exchange rate volatility reduces Poland´s foreign trade turnover. Therefore, economic instruments and active policy aimed at reducing exchange rate volatility of Polish zloty would stimulate improvement of Poland's trade.

Acknowledgments

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The Analysis of Market Concentration of Audit Services in the Czech Republic

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Abstract: The aim of this paper is to analyze the market concentration of audit services in the Czech Republic with a focus on relation between audit fees and non-audit fees. The analysis is based on 36 transparency reports for the year 2013. Auditors that in the reporting period carried out the statutory audit at any public interest entity are required to prepare and publish the transparency report. Among other information, auditors are required to specify their total turnover divided into audit fees and non-audit fees. Herfindahl-Hirschman index (HHI) is selected as an appropriate analytical tool. Globally recognized Herfindahl-Hirschman index (HHI) is complemented by indicators of market share (concentration ratios) and the Lorenz curve which graphically displays the unequal distribution of the turnover on the market of audit services. These data show that in the period under research the companies forming Big4 obtained 88% of total fees, 84% of audit fees and 92% of non-audit fees. As a major player on the Czech market of audit services can be regarded Ernst & Young (EY). The analysis clearly indicates a high level of market concentration of audit services in the Czech Republic.

Keywords: concentration of audit services, audit fees, non-audit fees, auditor´s independence

JEL codes: M42

1 Introduction

After the fall of the US energy giant Enron in January 2002 US government started to focus on the market of audit services. Crash of the Enron came unexpected as at the same time both investors and public were ensured by the Arthur Andersen that the company's books are in a good shape and that there are no potential risks involved. After the investigation it was disclosed that Enron paid to Arthur Andersen 25 mil USD for the audit services and 27 mil USD for the non-audit services during 2000. According to some authors (Healy and Palepu, 2003) the possibility of losing the non-audit fees lead to the approving of Enron's accounting policies. Similar accounting scandal appeared also in Europe namely fraud in the Italian food company Parmalat. After those events both US and European regulators started to focus on issues related to auditor's independence in relation to offering both audit and non-audit services and connected issues with market concentration of audit services. European Commission (2002) states that payment for non-audit services can threaten the independence of an auditor. Provision of audit services in the Czech Republic is regulated by Auditors Act (act no. 93/2009 Coll.), which covers European Parliament and Council Directive 2006/43/ES (European Commission, 2006). In contrary to EU Directive, the Czech Auditor's Act applies to both statutory audit and other assurance services provided by auditors.

Market concentration of audit services is a subject of many studies in the international context, while in the Czech Republic there was no such extensive research performed. Heß and Stefani (2012) mention an analysis of audit services in the Czech Republic however focusing only on 14 companies listed on Prague Stock Exchange. In the past scientists were unsure which indicator is the best to be used for the market concentration. Number of clients, total revenue or balance sheet of clients were used in the most cases. Marten and Schultze (1998) summarize the measurement of the concentration of the accounting services in several countries (UK, Germany, Denmark, Netherlands and Spain) during the period in which companies did not have the obligation to disclose fees paid for the audit services. Recent research suggests usage of the overall

fees paid for an audit services disclosed in the required detail as the best proxy of the market concentration of the audit services.

Beattie et al. (2003) analyzed market concentration of the audit services of companies listed on stock exchange in the United Kingdom in the period after which Arthur Andersen left the market. They conclude 96% of the market is controlled by 4 audit firms (Big4 – KPMG, PwC, Deloitte, EY). The strongest one (PwC) reached the market share of 37%. At the same time very thorough market research related to audit services was conducted in the USA (US-GAO, 2003). The study was based on data collected directly from the individual audit firms. The need to perform such a detailed analysis raised after the merges of audit firms during 80ties and 90ties of 20th century and after the crash of the Arthur Andersen company. One of the described reasons for the high market concentration of audit services was significant barrier of the entry to the audit services of listed companies. Significant entry barriers are prerequisites of the formation of the oligopoly market structure (Soukupová et al., 2011). Due to the major variances in accounting philosophy between UK/US and continental Europe there was a need to perform the research in the continental Europe as well. Bauer (2004) investigates the fees paid to the audit companies for their services provided to companies listed on the stock exchange in Germany, although his primary question was not the market concentration as such. His research is based on survey rather than on disclosures. Such data are not audited and can potentially be distorted or subjective from the respondents' point of view. Market concentration of audit services related to German listed companies on stock markets DAX30, MDAX, SDAX, TecDAX a GEX is also analyzed by Bigus and Zimmermann (2008). They conclude 87% of audit fees and 90% of total fees are collected by Big4. Further research of the market concentration of audit services was conducted in Switzerland (Stefani, 2006) or in Denmark (Thinggaard and Kiertzner, 2004). The second one investigates key attributes of the audit fees using the regression analysis and hypothesis of higher prices in case the audit was conducted by the Big4.

Former research concludes that there is a high concentration in the market of the audit services. This potentially results from the fact, that the audit market fulfils the prerequisites of establishment of the oligopoly market from the microeconomics point of view. Such prerequisites are for instance already mentioned entry barriers, relatively small number of companies and homogenous product (Soukupová et al., 2011). Market of the audit services of the public interest entities (definition in § 2 act no. 93/2009 Coll., on auditors) fulfils such prerequisites which lead me to the following hypothesis:

H1:   I expect higher concentration in the market of audit services in the Czech Republic measured by the Herfindahl-Hirschman index (HHI) and based on the actual audit fees received in comparison to values of HHI used in the European Union and US.

Additionally former research concludes that the significant market share is held by the Big4. This conclusion supports the fact that those audit firms operate worldwide and can serve the needs of the multinational companies. Such global companies tend to use one auditor for the Group. This auditor is usually selected by parent company, which has an impact on the cost and the quality of the audit services. (Carson et al., 2014).

H2:   I expect the market share of the Big4 higher than 75% in the Czech Republic.

2 Methodology and Data

Data

In the most cases global research uses the analysis of fees paid to the audit firms disclosed by the listed companies on the stock market (Bigus and Zimmermann, 2008 and Thinggaard and Kiertzner, 2004). There is an issue with the small number of listed companies on the stock market in the Czech Republic. This analysis therefore uses the data from publicly available reports related to transparency of the audit firms, which performed an audit in a public interest entity during 2013. Since neither the Chamber of Auditors of the Czech Republic nor the Public Oversight Board nor any other institution hold register of the audit firms providing audit services for the public interest entities, I

have used and analyzed data from the internet pages of the audit firms. European Commission (2006) defines public interest entity however EU members can extend this definition. According to FEE report there are 321 public interest entities in the Czech Republic fulfilling the definition based on the local law (§ 2 act no. 93/2009 Coll., on auditors). Report also states that the definition of the public interest entity in the Czech Republic is one of the widest in EU (FEE, 2014).

Audit firm performing an audit in the company classified as public interest entity has to prepare transparency report (European Commission, 2006) in which financial information is provided with the aim to assess the position of the audit firm in market of audit services. Audit firms provide their turnover split into audit and non-audit fees. Due to the fact that in the transparency report audit firms have to provide total turnover related to all carried out audits split into audit and non-audit fees (not only fees related to audit carried in the public interest entities) this data can be compared with the international research. In US, research was based on data received directly from the audit firms and published as study US-GAO (2003). Table 1 shows descriptive statistics related to the analyzed sample.

Table 1 Composition of auditor´s turnover of fees in 2013, n = 36, fees in million CZK

	Total fees	Audit fees	Non-audit fees
Mean	113,09	66,08	47,01
Median	9,00	6,39	2,12
Maximum	1663,32	668,75	994,57
Share of total turnover in %		58,43	41,57

Source: Own processing of Transparency Reports of relevant audit firms

Methodology

There are various indicators used for the measurement of the market concentration in the science papers, however the most popular ones are the concentration ratios (CR(g)) and Herfindahl-Hirschman index (HHI). Those two tools are complemented by the Lorenz curve (L) visually showing unequal distribution of the audit fees within the audit market.

Concentration ratio (CR(g)) is calculated as proportion of the selected quantity g-major companies to the total value of the quantity in the industry. Calculation of this statistical tool is shown in equation (1). International research uses the concentration ratio for the various numbers of companies. This research has mostly assessed the concentration ratio for 3 to 4 biggest companies. Interpretation of this indicator is described in the Table 2.

$$CR(g) = \frac{\sum_{i=1}^{g} x_i}{\sum_{i=1}^{n} x_i} \tag{1}$$

x: represents a turnover of auditor´s service – audit fee, non-audit fee or total fee
g: stands for the largest market participants (e.g. g = 4 means the largest four audit firms)
n: number of all audit firms

Table 2 Interpretation of Concentration ratio

Concentration ratio	Low market concentration	Medium market concentration	High market concentration
for 3 largest comp.	CR(3) < 10%	10% < CR(3) < 25%	25% < CR(3)
for 4 largest comp.	35% < CR(4) < 50%	50% < CR(4) < 65%	65% < CR(4)

Source: Bigus and Zimmermann (2008)

Herfindahl-Hirschman index (HHI) as a tool used for the measurement of the market concentration is calculated as the sum of the squares of the market shares of the individual companies (equation 2). This tool is often used for the assessment of the impact of merges on the market concentration e.g. in EU or US. Some authors (McIntosh and Hellmer, 2012) disagree with the usage of HHI for the measurement of the mergers impact. They argue that HHI only covers one aspect of the merge and ignoring the other aspects such as potential reduction of the price due to the economy of scale. On the other hand, HHI is a very good tool for my research since it provides the assessment if the audit market concentration exists or not. HHI is used in the two forms:

- Value of HHI is left as a decimal,
- Value of HHI is multiplied by 10 000.

Selection of the form does not impact any interpretation. Market concentration interpretation based on HHI differs in EU and in US. Table 3 shows those interpretations.

$$HHI = \sum_{i=1}^{n} \left(\frac{x_i}{\sum_{i=1}^{n} x_i} \right)^2 \tag{2}$$

x: represents an turnover of auditor´s service – audit fee, non-audit fee or total fee
n: number of all audit firms

Table 3 Interpretation of Herfindahl-Hirschman index

Herfindahl-Hirschman index	Low market concentration	Medium market concentration	High market concentration
EU[1]	HHI < 0,10	0,10 < HHI < 0,20	0,20 < HHI
US	HHI < 0,10	0,10 < HHI < 0,18	0,18 < HHI

[1] In the EU, in the context of merger assessment, a HHI between 0,10 and 0,20 is not viewed as problematic if a merger increases the HHI by less than 0,025 and a HHI of more than 0,2 is viewed as not problematic only if the merger increases the HHI by less than 0,015.

Source: Bigus and Zimmermann (2008) and European Commission (2004)

3 Results and Discussion

Market shares

Firstly we would focus on the market concentration of the biggest players in the market of audit services. Table 4 shows market shares and ranking of the individual audit firms.

Table 4 Market shares by auditor´s turnover of total, audit and non-audit fees

Category	Total turnover (in million CZK)	Market share and rank	
Total turnover	4071,15	1. EY (40,86%) 2. KPMG (19,55%) 3. PwC (16,85%)	4. Deloitte (10,37%) 5. BDO (2,30%) 6. Others (10,07%)
Turnover of audit fees	2378,90	1. EY (28,11%) 2. PwC (25,60%) 3. Deloitte (15,23%)	4. KPMG (14,46%) 5. BDO (3,37%) 6. Others (13,23%)
Turnover of non-audit fees	1692,25	1. EY (58,77%) 2. KPMG (26,71%) 3. PwC (4,55%)	4. Deloitte (2,13%) 5. Nexia AP (1,00%) 6. Others (6,84%)

Source: Own processing of Transparency Reports of relevant audit firms

EY is the strongest player in the Czech market of audit services. Big4 confirmed their dominance in all areas. None of the other companies managed to squeeze in those Big4s. The closest was Nexia AP in the area of non-audit services. As for the audit service fees the biggest market shares are attributable to EY and PwC with the market shares of 28.1% resp. 25.6%. They are followed by Deloitte and KPMG with the market shares of 15.2% resp. 14.5%. The area of audit fees can be also viewed as area, in which two audit firms dominate and then they are followed by other two audit firms from Big4 companies. In this area we can also see the biggest gap between the Big4 and their competition. It is obvious that the high market concentration exists here.

If I compare the Czech data with the German research, I find out that PwC is the main player in Germany and the strongest 4 audit firms are also those from the Big4. Similarly, comparison with the US study (US-GAO, 2003) and with the UK research (Beattie et al., 2003) is not surprising. While Deloitte is the strongest player in the USA, PwC is the strongest player in the UK. As audit firm BDO scored 5th in the Czech Republic as well as in Germany and UK and Grant Thornton reach the 5th place in the US, sometimes the international research includes BDO and Grant Thornton into the Big6, together with the remaining Big4s.

Concentration in the Czech audit market

After the analysis of the individual market shares let's review indicators of the audit market concentration. Table 5 displays calculated indicators of the audit market in the Czech Republic.

Table 5 Concentration measures for the audit market in the Czech Republic

	Turnover of total fees	Turnover of audit fees
CR(2)	0,60	0,54
CR(3)	0,77	0,70
CR(4)	0,87	0,84
Herfindahl-Hirschman index	0,24	0,19

Source: Own processing of Transparency Reports of relevant audit firms

If we look at the concentration ratios (CR(3) and CR(4)) related to the total fees and related to the audit fees we can see that the critical limits were reached in both cases. This suggests that there is a high concentration in the market of audit services. Big4 takes 87% of the market of audit services in the Czech Republic. This leads to a confirmation of the H2 hypothesis. Additionally, there is relatively high share of the two biggest companies on the total turnover.

Interpretation of the calculated values of Herfindahl-Hirschman index is not consistent. In case of the total turnover we can state that based on the EU and US rules there is a high concentration in the audit market. On the other hand if we look only at the turnover related to audit fees we can see that based on the US rules we can see a high market concentration while based on the EU rules the high market concentration is not present. In case of any potential mergers EU would evaluate the new value of the HHI. Based on the above analysis we can confirm the H1 hypothesis.

Table 6 shows the comparison of concentration of the audit services in the Czech Republic, Germany and UK. Based on the Table 6 we can state that the Czech market of audit services reached the similar values as the markets in Germany (Bigus and Zimmermann, 2008) and in the UK (Beattie et al., 2003). As for the concentration ratio measurement, values in the Czech Republic are slightly lower compared to those in Germany or in the UK. This could be explained by the fact that my study is based on the transparency reports while the German and UK studies are based on the disclosures of listed companies. Due to the complexity of those audits we would expect higher

concentration. Herfindahl-Hirschman Index in the Czech Republic is lower than that in Germany. UK and the Czech Republic have the same HHI values.

Table 6 Concentration measures for the audit market

	This study	Bigus and Zimmermann (2008)	Beattie et al. (2003)
Data basis	2013 turnover of audit fees	2005 audit fees	2002 audit fees
CR(2)	0,54	0,66	0,62
CR(3)	0,70	-	-
CR(4)	0,84	-	-
CR(6)	0,90	0,96	0,98
Herfindahl-Hirschman index	0,19	0,29	0,19[1]

[1] This indicator is based on total assets in contrary to audit fees.
Source: Own processing of Transparency Reports of relevant audit firms, Bigus and Zimmermann (2008), Beattie et al. (2003)

Visualization of the unequal distribution of the turnover of the audit fees is best demonstrated by the Lorenz curve. Figure 1 shows that the 10% of companies manage the 85% of the turnover of audit fees.

Figure 1 Lorenz Curve of turnover of audit fees
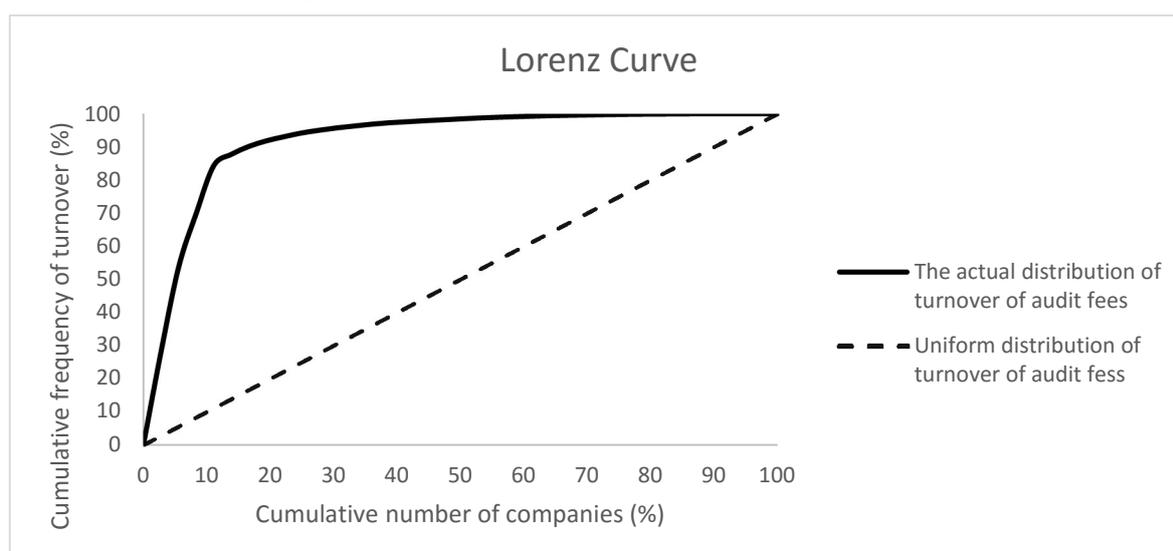
Source: Own processing of Transparency Reports of relevant audit firms

4 Conclusions

The paper analyses the market concentration in the area of an audit services in the Czech Republic. Selected indicators of the Czech market concentration are compared to those calculated as part of the international studies, mainly in Germany, UK and USA. Despite the fact, that those international studies are based on historical data, they still provide relevant information related to the audit market in the respective countries and can be compared to the Czech audit market. My analysis is based on the transparency reports where audit firms are obliged to disclose their total turnover from services split into audit and non-audit fees. Czech market of audit services is not very different from the audit markets of investigated countries. The most important findings which could be useful to focus on issues related to the Czech audit market are the following:

- The main player in the Czech audit market is EY company,
- The gap between the market share of the last Big4 firm and the following company is approx. 11%,

- Calculated values of the concentration ratio of 3 resp. 4 biggest firm are 0,70 resp. 0,84, which is much higher than the critical limits,
- Values of Herfindahl-Hirschman Index of 0,19 (for audit fees turnover) and 0,24 (for total fees turnover) suggest the high market concentration (based on the US rules) and is close to the critical limit of high market concentration based on the rules applicable in the European Union.

The paper confirms the fact, that there is a high concentration in the market of audit services in the Czech Republic. Such concentration can cause issues in a market operation, especially in the area of making use of oligopoly market structure by Big4 e.g. in form of higher prices for audit services. This situation should lead to an action of the regulators, Chamber of Auditors of the Czech Republic and Public Oversight Board. European Commission already issued a new regulation related to statutory audits of the public interest entities - Regulation No. 537/2014 (European Commission, 2014 (1)). This regulation strictly defines services which cannot be provided by the statutory auditors to their clients. Those are for example a tax advisory or provision of accounting services. Additionally, more requirements related to the disclosure of the audit firms performing audits in public interest entities would be part of the transparency reports. Also regular rotation of key partners and staff performing audit in a particular company is expected every seven years. European Committee also accepted the amendment of the directive related to statutory audit of year-end disclosures and consolidated disclosures (European Commission, 2014 (2)). All of those changes should contribute not only to the reduction of the potential threat of the auditor independence but also to the elimination of issues related to the oligopoly market of audit services.

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Monetary Aggregates and Consumer Price Inflation in the Euro Area

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Abstract: *In this paper we study the relationships between monetary aggregates M1, M2 and M3 and inflation (represented by HICP) using statistical analysis. We analyse the extent of correlations between money growth (M1, M2, and M3) and inflation at different frequencies and different points in time as well as the time-lag relationships between these variables. The analysis serves to verify the quantity theory of money for a transmission mechanism within the maximum period of 6 months. Our main focus is on correlations in the time interval from January 2010 until December 2014 which allows a meaningful and representative analysis. Our results indicate weak comovements between money growth and HICP inflation. Viewed from this perspective, money growth exhibited limited, if any, information for future inflationary developments in the euro area, which is in contrast to most of the previous literature using more conventional techniques. The evidence presented in this paper does not support the ECB's view on the importance of money growth for inflation and casts serious doubts concerning the rationale of monetary aggregates in the monetary strategy of the ECB.*

Key words: monetary aggregates, monetary policy, leading indicators, inflation

JEL codes: E41, E52, E58

1 Introduction

For over half a century the relationships between monetary aggregates and consumer price inflation have attracted a considerable amount of empirical work (Katafono, 2000) in both economic and statistics literature. Many studies (Drake and Mills, 2002, Neumann and Greiber, 2004, Cosgrove et al., 2008) have attempted to analyse the properties of monetary aggregates in the conduct of monetary policy. A number of procedures have been widely advanced as yielding evidence – pro or contra – regarding quantity theory relations between money growth and inflation. Nowadays there is a quite general opinion that in a long run there is a tight dependence between monetary aggregates and price inflation but in short run the correlation is obscured.

The Maastricht Treaty assigned the European Central Bank (ECB) the primary and overriding objective of maintaining price stability (Stoličná and Majerčáková, 2013) in the Eurozone, where price stability was to be defined in terms of a consumer price index. In October 1998, the Governing Council (GC) of the ECB announced the key elements of its price stability-oriented monetary policy strategy. Price stability was defined as a year-on-year increase in the Harmonised Index of Consumer Prices (HICP) for the Eurozone of less than, but close to 2 %, and the GC also stressed that price stability should be maintained over the medium term. Moreover (Scheller, 2006): "The ECB's monetary analysis relies on the fact that monetary growth and inflation are closely related in the medium to long run or that the relationship is stable." Further, "to signal its commitment to monetary analysis and provide a benchmark for the assessment of monetary developments, the ECB has announced a reference value for the growth of the broad monetary aggregate M3". The target for the rate of growth in M3 was set at 4.5 % per year in December 1998, and that has been confirmed in subsequent reviews. This

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suggests that the ECB incorporates the principles of the quantity theory of money in its analytical framework (Micallef, 2008).

But is inflation always a monetary phenomenon? The key question we analyse in this paper concerns the link between inflation and the growth rate of money. We estimate the correlation (coherency) as a measure of the extent of comovements between monetary aggregates and inflation at different points in time.

The rest of the paper is structured as follows. Section two provides a brief review of the data, section three presents the methodology used, section four the results while the last section concludes the paper.

2 Data

A graphical representation of the data is examined to provide a reference point for interpreting the relationships among the data that the statistical methods may uncover in the later section of the paper. Figures 1 to 3 depict the annual percent changes of inflation and the monetary aggregates.

The variables taken into account in our analysis are monetary aggregates M1, M2 and M3 and HICP from January 2010 until December 2014, either seasonally adjusted (suffix SA) or no seasonally adjusted (suffix NSA).

The HICP is the standard price index that EU member states must produce for comparisons across countries. It is used by the ECB for the conduct of the monetary policy in the euro area. The index represents urban and rural households in each country and excludes the component for owner-occupied housing costs. The HICP is compiled by Eurostat and the national statistical institutes in accordance with harmonised statistical methods.

Figure 1 HICP (2005 = 100) - monthly data (annual rate of change HICP (2005 = 100) - monthly data (annual rate of change))
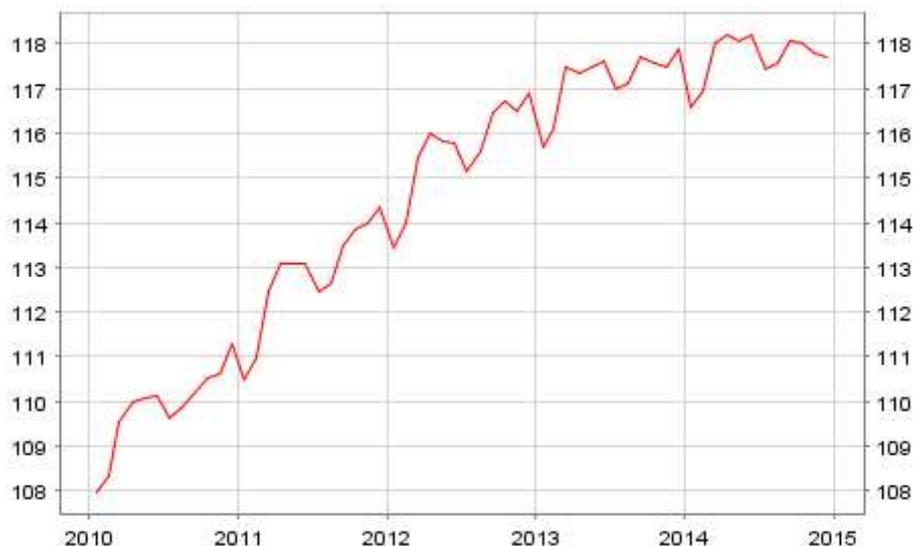
Source: European Central Bank, Eurostat

Figure 2 HICP annual average rate of change (%), no seasonally adjusted (HICPNSA)
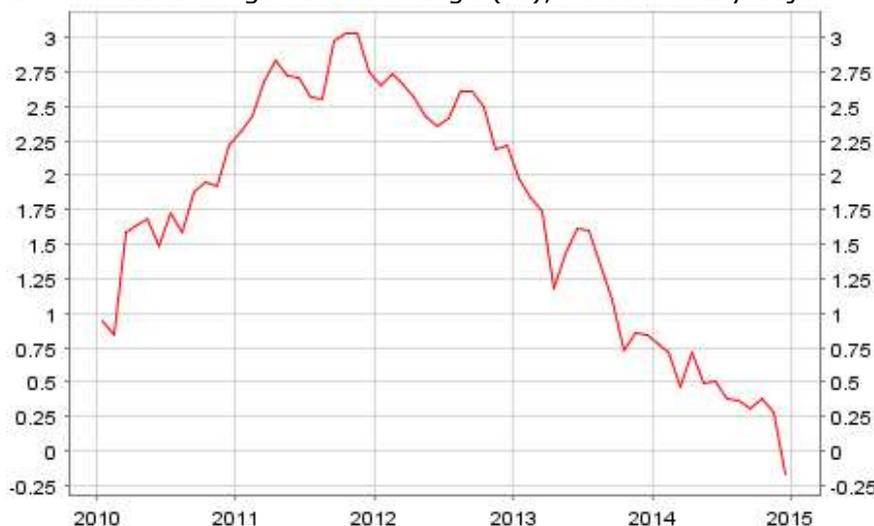
Source: European Central Bank, Eurostat

Monetary aggregate M1 (narrow money) consists of currency in circulation and overnight deposits, M2 (intermediate money) is composed from M1 plus deposits with an agreed maturity up to two years and deposits redeemable at a period of notice up to three months and M3 is equal to M2 plus repurchase agreements, money market fund shares/units, and debt securities with maturity up to two years. Assets included in M3 have a high degree of liquidity and price certainty.

Figure 3 Monetary aggregates in the Eurozone (yearly % change)
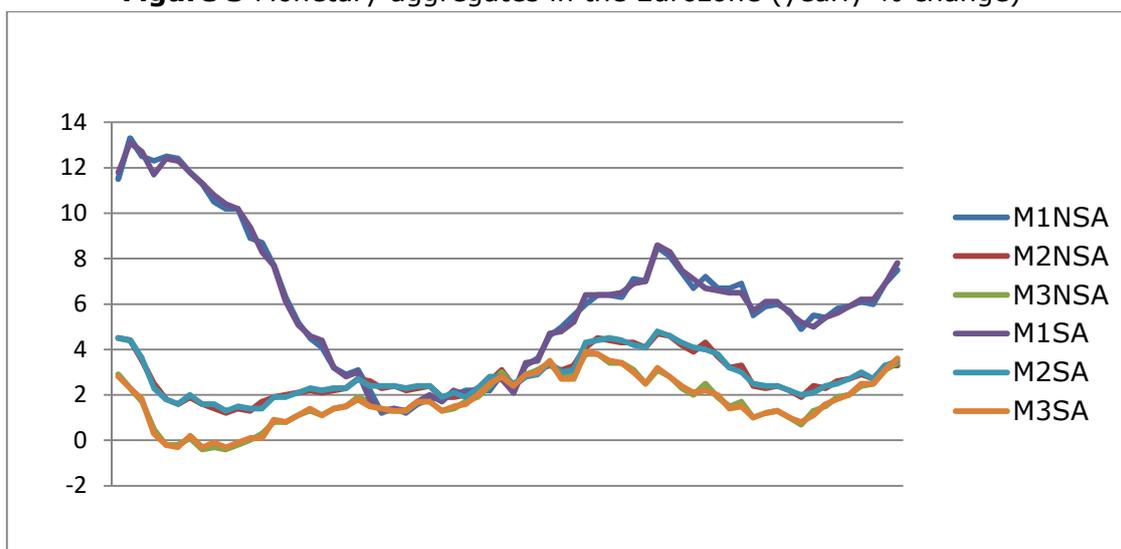
Source: European Central Bank, Eurostat

3 Methodology

For our calculations we used R which is an open source programming language (software package) and environment mainly for statistical data analysis. R can perform correlation with the cor() function. Built-in to the base distribution of the program are three routines; for Pearson, Kendal and Spearman Rank correlations. Pearson correlation is widely used in statistics to measure the degree of the relationship between linear related variables. For the Pearson correlation, both variables should be normally distributed. Other assumptions include linearity and homoscedasticity. Linearity assumes a straight line relationship between each of the variables in the analysis and homoscedasticity assumes that data is normally distributed about the regression line.

One common test for checking the normality is Shapiro-Wilk test. This test works well even for a small sample size. The null hypothesis of Shapiro-Wilk test is that the samples

are taken from a normal distribution. So, if the p value is less than 0.05, we should reject the hypothesis, and think that the samples are not taken from a normal distribution. In programming language R, one just need to use shapiro.test() function to do Shapiro-Wilk test.

Kendall rank correlation is a non-parametric test that measures the strength of dependence between two variables. Kendall coefficient of correlation can also be interpreted as a standard coefficient of correlation computed between two set of N (N −1) binary values where each set represents all the possible pairs obtained from N objects and assigning a value of 1 when a pair is present in the order an 0 if not.

Spearman rank correlation is a non-parametric test that is used to measure the degree of association between two variables. Spearman rank correlation test does not assume any assumptions about the distribution of the data and is the appropriate correlation analysis when the variables are measured on a scale that is at least ordinal.

4 Results

We started with an analysis of the correlation between money growth and price changes with zero time lag. It is immediately evident from the scatter diagram (Figure 4) that if time lag is equal to zero no correlation is observed between monetary aggregates and HICP.

Figure 4 Comparison of changes in monetary aggregates and HICP with zero time lag
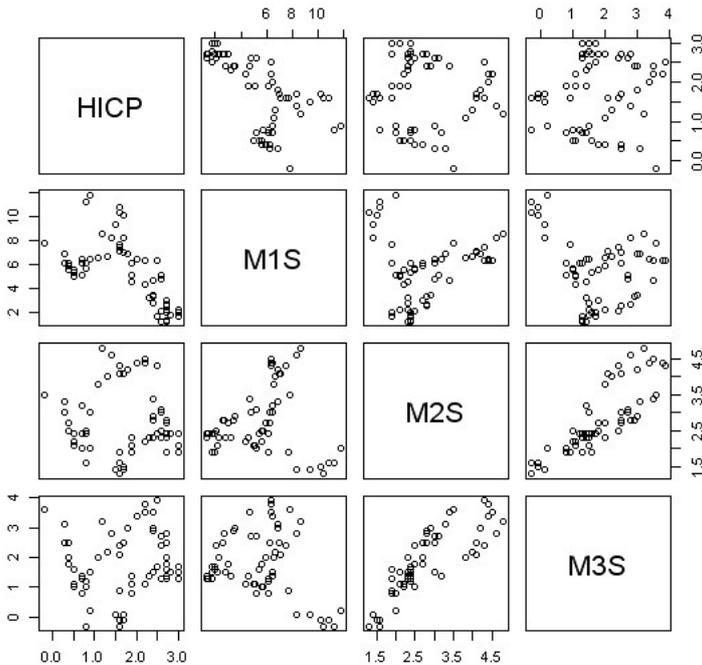
Source: Authors' calculations

As with the monetary policy transmission mechanism in general, the time it takes ECB actions to have an impact on the real economy is subject to uncertainties. The time lags may depend on factors such as the extent to which financial market participants foresaw the actions, how they interpret their impact on future economic prospects (Pilková et al., 2014) and their predictions of the ECB's future actions. Thus the time lags vary from one period to another and depend on the flexibility of transmission mechanisms.

Our contention is that while the static, contemporaneous correlation between monetary aggregates and HICP was not identified, it is not the case that the only time horizon at which relationship becomes significant is at the long run. Rather, inflation should be correlated with monetary growth of the immediately preceding time periods, even months. However, monetary policy changes do have an effect on real activity in the short to medium term. And though monetary policy is the dominant determinant of the price

level in the long run, there are many other potential influences on price level movements at shorter horizons. There are several links in the chain of causation running from monetary policy changes to their ultimate effects on the economy.

As a next step, the Shapiro-Wilk test was used in testing for normality (see Table 1) because of its good power properties as compared to a wide range of alternative tests.

Table 1 P-values from Shapiro-Wilk test of normality

	HICPNSA	M1NSA	M2NSA	M3NSA	M1SA	M2SA	M3SA
P-value	0.002409	0.05362	0.002883	0.1485	0.005055	0.000544	0.1595

Source: Authors' calculations

As we can see from Table 1, the test rejects the hypothesis of normality for HICPNSA, M2NSA, M1SA and M2SA. Therefore, Pearson correlation is not appropriate as a means to assess agreement between HICPNSA and monetary aggregates.

Figure 5 displays Kendall correlation between inflation and money growth. The maximum value (but only 0.1098 and 0.0934, respectively) of the correlation coefficient between HICPNSA and M3SA (respectively M3NSA) occurs when the time lag was two months. Even, correlation with monetary aggregates M1 and M2 was negative.

Figure 5 Kendall correlation between HICP and monetary aggregates
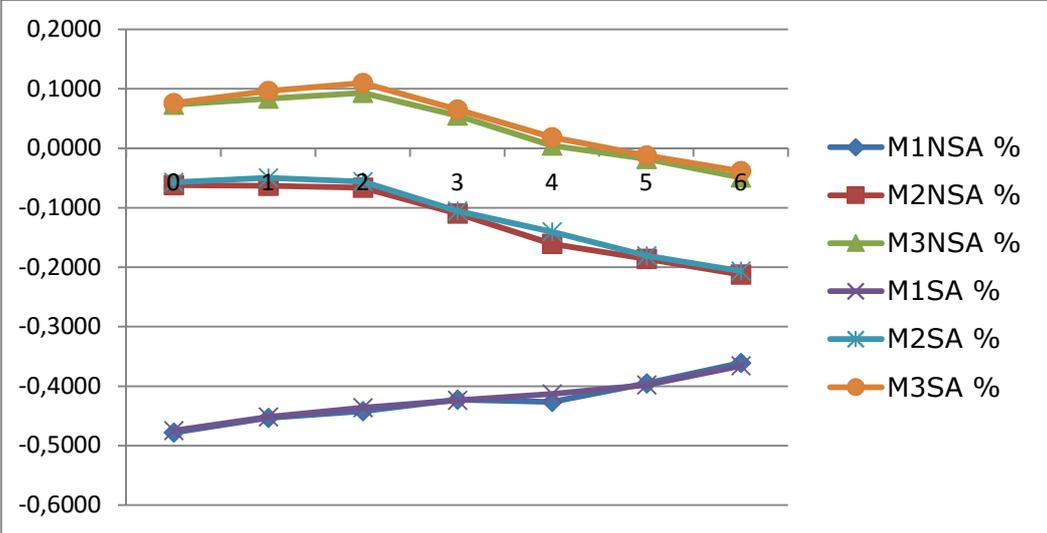
Source: Authors' calculations

Similar results have been obtained for Pearson (Figure 6) and Spearman (Figure 7) correlation.

Figure 6 Pearson correlation between HICP and monetary aggregates
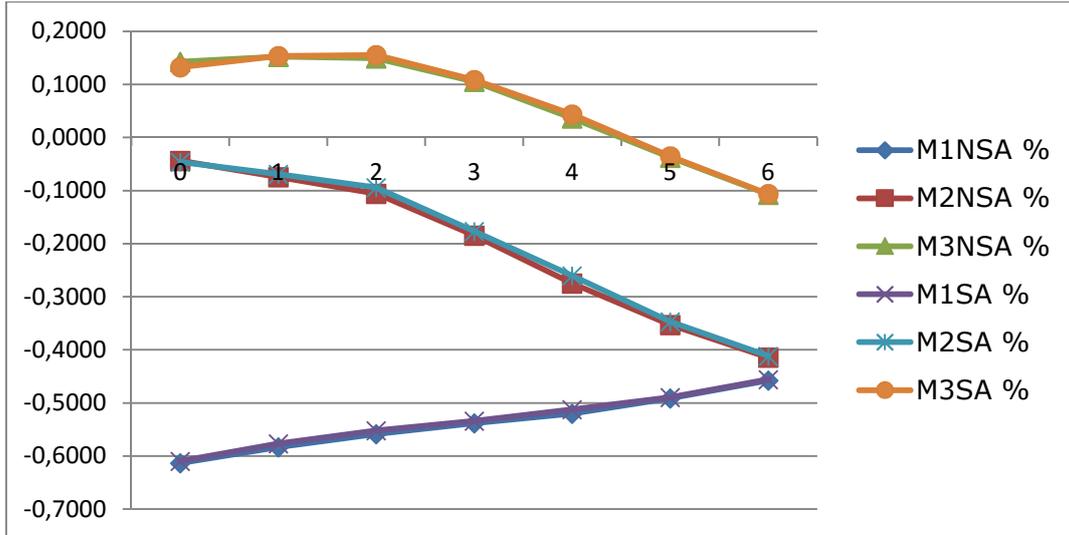
Source: Authors' calculations

Figure 7 Spearman correlation between HICP and monetary aggregates
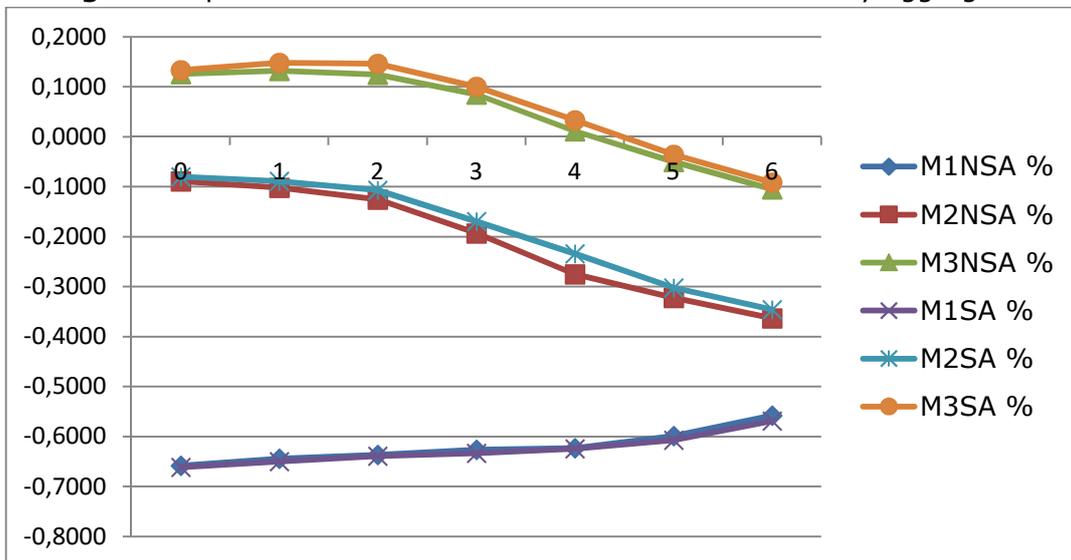
Source: Authors' calculations

5 Conclusions

As is well known, the ECB still continues to assign an important role to the growth rate of the monetary aggregates in its monetary policy strategy. Our results, however, indicate that there is no evidence for this strategy in environments with very low inflation, which is now a characteristic of most of the Eurozone-countries. In such a situation, money growth is not a useful signal of inflationary conditions (De Grauwe and Polan, 2005). It is unlikely that a single indicator is able to incorporate all the relevant information needed to forecast future inflation (Whelan, 2014).

If we also take into consideration that inflation has been much lower than two percent in many Eurozone countries for almost two years now and, according to market expectations, will not move above this level in the next future, there is good reason to question whether the ECB can fulfil its price stability mandate. In view of the fact that expectations are below the inflation target, there is, therefore, the risk of an extended period of very low inflation and possibly even deflation in the euro area.

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Relationships between Health Care Services and Health System Outcomes – Empirical Study on Health System Efficiency

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Abstract: The paper presents research concerning the assessment of health system effectiveness. The aim of the study is the analysis of relationships between the number of health benefits generated in the health system and the health state of the population. We have built an econometric model describing the impact of selected services on Life Expectancy (LE) for women aged 40 +, 60 +, 80 + and 65 +. The results suggest a positive relationship between the number of medical consultations and health state (with the exception of the oldest women) and a negative relationship between the average length and number of hospitalizations and health state. Research based on data coming from 32 OECD countries.

Keywords: efficiency, health outcomes, health services, health indicators

JEL codes: A13, H40, H51, I11

1 Introduction

The problem of the efficiency of the health sector is still the current subject of research. Growing costs of benefits and aging populations force to look for solutions that guarantee efficient management of scarce resources. The efficiency has become a field of international comparisons, allowing identification of good practices, the more so, because differentiation of countries in the field of health resources, spending and health status of the population is very significant. International comparisons of health systems can be implemented on many levels.

Figure1 Model of the efficiency analysis
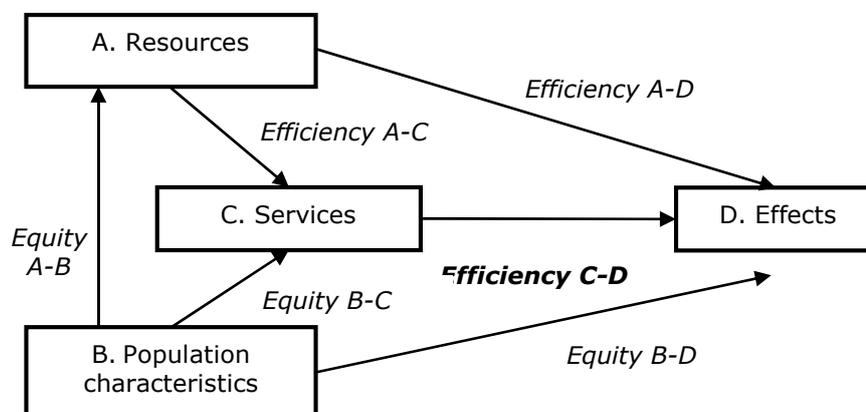
Source: Own study

Research concept bases on the model of efficiency's assessment developed by the authors (Figure 1). The study, which is a continuation of the earlier work (Bem, Ucieklak-Jeż, Prędkiewicz, 2014) relates to the CD relationship – "services -effects", and indicate the effectiveness and efficiency of health care in terms of the transformation from health care benefits to effects, such as, primarily, a better state of health.

The assumption of the research is based the presumption that the relationship between these values express, at least partly, the efficiency of a health system. We hypothesize, that different countries can potentially reach the same health indicators by adopting different structure of "produced" services.

The aim of the research is to analyse the relationship between the number of benefits provided by the health system and the state of health of women's population – overall, and for a number of groups: 40, 60, 65 and 80 years of age. The health state of a population is to be measured with Life Expectancy (LE) for each age category.

2 Literature Review

Most studies relate to the efficiency of the system as a whole or of particular subsystems (primary health care, mental health, hospital care) (Häkkinen, 2013), (Gavurová et al., 2014). Efficiency can be understood both as a "technical efficiency", that suppose the maximum level of results with determined resources or as obtaining determined effects while minimizing resources used. "Allocative efficiency" refers to a specific structure (mix) of resources or effects (Hollingsworth, Dawson and Maniadakis, 1999). If the definition of inputs (resources) is relatively simple - determining of the output parameters is more complex. Research carried out at the macro level, i.e. at the level of the entire health care system, suggest measurement of effects of using population health indicators, rather than an approach based on the "production of services". It is based on the assumption, that not all benefits contribute to the improvement of health state, and some may even cause its deterioration by the existence of side effects or medical errors (Cordero et all., 2015). We can't also forget the problem of financial efficiency of medical process in microscale – in individual hospitals as specific case of enterprise like entities (Bem and Michalski 2014), (Prędkiewicz, Prędkiewicz and Węgrzyn, 2014), (Bem et al., 2014a), (Bem et al., 2014b), (Bem, Ucieklak-Jeż and Prędkiewicz, 2014), (Prędkiewicz et al., 2014) (Šoltés and Gavurová, 2014), (Raisova et al., 2014), (Michalski, 2014), (Szczygiel et al., 2015).

Though indicators-based approach seems to be better, it must be taken into account that many factors affect health, apart from the health care system. The assessment is based on the assumption that activities of the health care system brings positive change, through changing morbidity and mortality rates (Bankauskaite and Dargent, 2007).

However, in the assessment of population health status, both positive indicators, first of all Life Expectancy – LE (Ryć and Skrzypczak, 2011) and Healthy Life Expectancy – HLE (Ucieklak-Jeż, 2012) may be applied as "output" measures, whereas negative indicators, especially morbidity and mortality, face significant constraints related to reliability of medical statistics.

Classic assessment of health system effectiveness usually analyses the number of benefits by dividing them into selected categories (e.g. inpatient and out-patient services) (Kontodimopoulos, Nanos and Niakas, 2006). The output values of the health system can be both expressed by the volume of health care services "produced" by the health system and by their results represented by health indicators of a population. In fact, produced benefits are usually treated as indirect effects that contribute to the achieved final results (Lagomasino et all., 2010). This suggests the possibility to study the relationship between the size and structure of health production and health state of a population. In existing research, data representing the number of services were, primarily, used to evaluate efficiency of hospitals, however, the relationship between the number of health services and the state of health of a population remains not fully explored (Aletras et all., 2007).

Women's health is an important field of research within the evaluation of the effectiveness of a health care system (Magistretti, Stewart and Brown, 2002). Effective and efficient health care brings significant benefits of social and economic nature (Bem, Ucieklak-Jeż, 2014), associated with maternity (Stenberg et all., 2014), taking and maintaining of employment (Thévenon, 2013) (O'Campo, Eaton and Muntaner, 2004), (Lundborg, Nilsson and Rooth, 2014) and later retirement (Disney, Emmerson & Wakefield, 2006), (Pit et all., 2010). Many studies confirmed differences in life expectancy between women and men. Several factors have an impact on LE: biology and genetics, health-related behaviour and lifestyle, social factors including economic wealth and levels of education, and utilization of healthcare services (Asiskovitch, 2010). Stenberg (et all., 2014) pointed out benefits, which are of particular importance from the point of view of women's health, such as: antenatal care, skilled birth attendance, integrated reproductive health care in the postnatal phase, postnatal care, and a range of services for adolescents and women. Asiskovitch (2010) proved, that healthcare systems can have a negligible effect on women and men's LE at birth, but for older women and men, healthcare systems play a salient role in increasing LE. What is also important, access to healthcare services seems to benefit men more than women. Terraneo (2015) claimed, that need is the key factor which influence utilization of health care services, therefore worse health status stimulate more intensive use of services. Older people are more likely to visit a GP and use hospital services than younger ones.

3 Methodology and Data

Research has an exploratory nature and that is why the hypotheses, haven't been formulated *a priori*. Authors adopted an assumption that health benefits are represented by 22 candidate variables, including those related strictly to women's state of health.

The first criterion of research sample's construction was availability of data. The data comes from the OECD database and initially included 32 member states. A set of potential explanatory variables has been reduced using methods of correlation's analysis (correlation coefficient matrix). As a result, promising data have been marked - mainly due to obtained collection of variables and data – which allowed to estimate the parameters of econometric model. Due to the type of data used, no risk of non-stationary or autocorrelation has occurred.

After the first stage of statistical modelling, as the potential explanatory variable female Life Expectancy (LEF_{it}) has been chosen. The following variables have been finally adopted as explanatory variables:

DCN_{it} – *Number* of *Doctors consultations,*
$ICAL_{it}$ – *Inpatient care average length of stay,*
CCD_{it} – *Curative care charges,*
DCP_{it} – *Day cases per100 000 population.*

Finally, the following research model has been adopted:

$$LEF_{it} = \alpha_0 + \alpha_1 DCN_{it} + \alpha_2 ICAL_{it} + \alpha_3 CCD_{it} + \alpha_4 DCP_{it} + \varepsilon_{it}$$

(1)

where:
LEF_{it} - *Life expectancy(female)in the country i in the period t,*
DCN_{it} – *Doctors consultations number in in the country i in the period t,*
$ICAL_{it}$ – *Inpatient care average length of stay in the country i in the period t,*
CCD_{it} – *Curative care discharges in the country i in the period t,*
DCP_{it} – *Daycasesper100 000population in the country i in the period t.*

The model has been prepared for five modifications of life expectances (Table 1):
- *overall life expectancy of women,*
- *life expectancy for women over the age of 40,*
- *life expectancy for women over the age of 60,*
- *life expectancy for women over the age of 65,*
- *life expectancy for women over 80 years old.*

Table 1 The results of unit root tests for levels and first difference (H0: δ = 0)

Variables	Estimator: Method:	Levels statistic	p-value	First difference statistic	p-value
LEF	Levin, Lin & Chu t*	-2.84656	0.0022	-3.72062	0.0001
	Im, Pesaran& Shin W- statistic	4.54630	1.0000	-4.54539	0.0000
	ADF - Fisher χ^2	22.6533	1.0000	116.412	0.0000
	PP - Fisher χ^2	67.3903	0.2391	346.734	0.0000
LEF40	Levin, Lin & Chu t*	-3.01932	0.0013	-3.59244	0.0002
	Im, Pesaran& Shin W- statistic	4.17265	1.0000	-4.43756	0.0000
	ADF - Fisher χ^2	18.6394	1.0000	99.8838	0.0000
	PP - Fisher χ^2	54.5823	0.3046	294.481	0.0000
LEF60	Levin, Lin & Chu t*	-1.63781	0.0507	-3.93459	0.0000
	Im, Pesaran& Shin W- statistic	4.34113	1.0000	-5.08210	0.0000
	ADF - Fisher χ^2	17.3113	1.0000	108.314	0.0000
	PP - Fisher χ^2	70.7005	0.0285	283.127	0.0000
LEF65	Levin, Lin & Chu t*	-1.10262	0.1351	-3.40136	0.0003
	Im, Pesaran& Shin W- statistic	4.40025	1.0000	-4.47265	0.0000
	ADF - Fisher χ^2	19.0768	1.0000	99.3374	0.0000
	PP - Fisher χ^2	58.6357	0.1883	269.604	0.0000
LEF80	Levin, Lin & Chu t*	0.16238	0.5645	-8.25523	0.0000
	Im, Pesaran& Shin W- statistic	3.90950	1.0000	-6.22763	0.0000
	ADF - Fisher χ^2	19.9098	1.0000	123.119	0.0000
	PP - Fisher χ^2	46.6077	0.6103	277.800	0.0000
DCL	Levin, Lin & Chu t*	-1.81821	0.0345	-2.77984	0.0027
	Im, Pesaran& Shin W- statistic	1.41629	0.9217	-3.06446	0.0011
	ADF - Fisher χ^2	35.8605	0.8590	76.4773	0.0009
	PP - Fisher χ^2	62.6564	0.0515	201.307	0.0000
ICAN	Levin, Lin & Chu t*	-0.43246	0.3327	-8.04730	0.0000
	Im, Pesaran& Shin W- statistic	3.19220	0.9993	-5.80086	0.0000
	ADF - Fisher χ^2	34.2781	0.9902	139.645	0.0000
	PP - Fisher χ^2	87.2981	0.0047	286.269	0.0000
CCD	Levin, Lin & Chu t*	-1.57784	0.0573	-6.69591	0.0000
	Im, Pesaran& Shin W- statistic	2.35139	0.9906	-3.58759	0.0002
	ADF - Fisher χ^2	45.6030	0.7850	97.6602	0.0001
	PP - Fisher χ^2	61.5763	0.2233	177.862	0.0000
DCP	Levin, Lin & Chu t*	-0.18254	0.4276	-5.56679	0.0000
	Im, Pesaran& Shin W- statistic	3.55481	0.9998	-1.67757	0.0467
	ADF - Fisher χ^2	34.7558	0.9501	75.7002	0.0038
	PP - Fisher χ^2	107.432	0.0000	127.836	0.0000

Source: Own calculation

During the next stage, convergence tests have been examined (Table 2 and Table 3).

In the case of the tested variables, according to obtained results, it can be assumed, that variables are integrated to the extent of 1, $X_t \sim I(1)$. A fortiori, results of all tests are consistent. Adopting the given level of integration - common to all variables – the existence of co-integration in the established system has been tested, i.e. the equation with LEF (or its modification) as a dependent variable and DCL, ICAN, CCD and DCP as explanatory variables.

The results of Pedroni's research, using Monte Carlo method (Pedroni, 2004), proved, that the application of the panel-v and group-rho tests gives the wrong results if the length of time series is less than 20 observations. That is why the application of group tests-ADF and Panel-ADF seem to be more appropriate. Results have confirmed the presence of the co-integration vector (Table 2 and Table 3).

Table 2 The results of co-integration test for Pedroni residuals in the model of LEF on DCL, ICAN, CCD and DCP variables –within dimension, panel statistics test

	Endogenous variable:	Test type:	Panel PP-Statistic	Panel ADF-Statistic
Alternative hypothesis: common AR coefficients (within-dimension)	LEF	statistic	-3.344899	-2.692750
		p-value	0.0004	0.0035
	LEF40	statistic	-3.851182	-2.933481
		p-value	0.0001	0.0017
	LEF60	statistic	-5.498138	-4.367175
		p-value	0.0000	0.0000
	LEF65	statistic	-5.268270	-4.397386
		p-value	0.0000	0.0000
	LEF80	statistic	-6.680815	-5.510654
		p-value	0.0000	0.0000

Source: Own calculation

Table 3 The results of co-integration test for Pedroni residuals in the model of LEF on DCL, ICAN, CCD and DCP variables – between dimension, group statistic test

	Endogenous variable:	Test type:	Group PP-Statistic	Group ADF-Statistic
Alternative hypothesis: individual AR coefficients (between-dimension)	LEF	statistic	-6.699250	-3.207020
		p-value	0.0000	0.0007
	LEF40	statistic	-7.205863	-3.356460
		p-value	0.0000	0.0004
	LEF60	statistic	-8.386996	-4.717981
		p-value	0.0000	0.0000
	LEF65	statistic	-6.372558	-3.187724
		p-value	0.0000	0.0007
	LEF80	statistic	-7.578176	-4.499456
		p-value	0.0000	0.0000

Source: Own calculation

To verify the hypotheses, concerning statistical significance of structural parameters α_I, t- student test has been applied. A null hypothesis, in the form of $H_0: \alpha_i \neq 0$, has been assumed, comparing to an alternative hypothesis $H_1: \alpha_i \neq 0$, and the value of the test statistics t_i was set on the basis of the formula:

$$t_i = \frac{\alpha_i}{S(\alpha_i)}.$$ (2)

4 Results and Discussion

During the next stage, five models have been estimated (Table 4). Only for women, aged 80 and over, the number of doctor's consultations *does not* affect significantly the further life span. For other age groups, this variable is statistically significant and has a strong positive impact on the further length of life. Its declining role, along with the age, seems to be noticeable (by decreasing value of estimated parameters). Similarly, in the case of the other variables – their impact tails off.

Table 4 Comparison of estimated parameters and testing statistics for statistical significance

	Endogenous parameter variable:	LEF	LEF40	LEF60	LEF65	LEF80
Constant	a_0	89.0839	49.5924	30.5169	26.2577	14.5645
	t_0	71.4477	44.2601	29.6097	25.9331	20.3293
DCN_{it}	a_1	0.3665	0.2929	0.2567	0.2376	-
	t_1	2.8002	2.4895	2.3724	2.2352	-
$ICAL_{it}$	a_2	-0.6510	-0.5949	-0.5338	-0.5265	-0.3969
	t_2	-7.6599	-7.7891	-7.5985	-7.6285	-8.4841
CCD_{it}	a_3	-0.0003	-0.0003	-0.0002	-0.0002	-0.0002
	t_3	-5.5096	-5.4521	-5.2083	-5.1547	-5.1715
DCP_{it}	a_4	0.0024	0.0021	0.0018	0.0018	0.0010
	t_4	8.3149	8.0433	7.6311	7.5327	5.4677

Source: Own calculation

For women of all age groups, average length of hospitalization significantly affects their life expectancy. In this case, a strong negative impact can be noticed. It has been observed, that along with aging, parameter value decreases, which proves lowering importance of the impact of the average length of hospitalization on average length of life for women aged 80+. The variable, having a similar impact, is the number of curative care discharges. For women of all age groups, this variable has a significant negative impact on life expectancy. Both variables relate to hospital care. The variable "day cases per 100.000 population" measures the number of "one day" hospitalizations. This variable has a positive influence on further life span – its role, declining with age, seems to be minimally noticeable.

Obtained results have indicated a different relationship – other than those identified in the literature. Asiskovitch pointed out, that from the point of view of the extending life expectancy in the case of older women, health system (access to benefits) is more important than it is in the case of young people. At the same time, this impact is lower for women than for men. Results have indicated the reverse relationship - the number of doctor's consultations does not affect life expectancy for the oldest women. A similar positive impact has a number of benefits provided in one-day mode. A large number of hospitalizations is negatively correlated with life expectancies, though this effect decreases with age.

Another interesting finding is, that the group of benefits that entered the model, does not include services related directly to women's health, as e.g. the number of Caesareans or mammography. The explanation might be the fact, that the research group covered women aged 40 years and more, for whose benefits related with motherhood have less or even no importance (for women aged: 60+, 65+ and 80+).

Based on the findings of Terraneo (2015), assuming that the number of provided benefits depends on reported needs, it can be concluded that a large number of services, particularly hospital services, are the result of poor state of health of a population, which might designate a different direction of tested relationships. On the other hand, a large number of hospitalizations is considered to be a variable related to low efficiency of primary health care. These reasons may explain the negative correlation between the number of hospital services and life expectancy for every examined age groups.

5 Conclusions

The presented analysis has several limitations. First of all, it is not possible to assess population health adopting an assumption that the health system does not exist. Additionally, analysed relationships cannot be treated, independently, as a basis for comprehensive assessment of a health system effectiveness. Estimated models present initial results, which create a base for further, more complex research - after the extension of the sample (panel sample).

The study is a significant contribution to the research. Particularly taking into consideration different results presented in the reference sources. The obtained results are also import ant in practical terms as they can be used in simulation analysis concerning the health policy. It allows a more effective allocation of limited financial resources in the health care system. Effective – that is allowing to reach the maximum possible outcomes.

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Nexus of Ruble Exchange Rate and Other Macroeconomic Factors in the Period of Recent Economic Instability

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Abstract: *Primary cause of recent Russian economic downturn was the decline in global oil prices, which led to currency crisis in Russia. But more factors need to be taken into consideration, specifically commodity prices, Russian interest rates, development of Russian stock market and development of the USD exchange rate. Existence of direct relationship between these individual factors and ruble exchange rate is likely. However, it is not sufficient to investigate only correlational relationships between these variables – causal relationships need to be identified as well. Correlation between variables may be obvious from data, tables or plots, but causalities between variables are not clear at first sight. Determination of these causalities was the aim of this paper. This task was fulfilled by usage of VAR approach, which is considered to be standard econometric tool to determine Granger causality in case of stationary time series. Two-way causality has been proven in case of changes in ruble exchange rate and changes in oil price, interest rate and gas price. Causality between changes in ruble exchange rate and changes in Russian stock index, EUR/USD exchange rate and price of gold has not been proven on the other hand.*

Keywords: ruble exchange rate, oil price, VAR, Granger causality, correlation

JEL codes: C30, C58, E40, G17

1 Introduction

Primary aim of this paper is to investigate possible influence of selected factors on nominal ruble exchange rate, as well as possible influence of ruble exchange rate on these factors. But to do so, we need to briefly pay attention to relevant economic theory at first.

Likely major factor behind ruble depreciation is the role of oil price dynamics. The Russian economy relies heavily on oil exports, which makes it very sensitive to any fluctuation of global oil price. Decline of oil price should lead to ruble depreciation and vice versa. For more intuition behind relationship between oil price and ruble exchange rate see Urbanovský (2015). However, it is also reasonable to suspect also reversed relationship. Global oil price is determined in USD, and is commonly known fact that if USD is appreciating, oil price is going down and vice versa. It means that depreciation of ruble will lead to appreciation of USD and this fact should lead to decrease of oil price and vice versa. Detailed examination of relationship between exchange rate and oil price can be found in Brahmasrene, Huang and Sissoko (2014).

Relationship between exchange rate and interest rate is a very controversial topic among macroeconomists. Higher interest rate should attract foreign capital in order to purchase domestic portfolio investments. This results in excessive demand for domestic currency and increased supply of foreign currencies. Final result is appreciation of domestic currency. Again, it is reasonable to suspect reversed relationship as well. When currency is appreciating, it becomes more attractive for investors. Consequently, demand for domestic currency is increasing and leads to increase in interest rate. This relationship was examined for example in Hacker, Karlsson and Månsson (2014).

Regarding the influence of stock market development on exchange rate, rise in the stock market should attract foreign capital and cause appreciation of ruble and vice versa. In contrast to previous paragraphs, there is no logical reason to suspect reversed

relationship in form of influence of exchange rate changes on stock market. For more information on this matter see Ho and Huang (2015).

Another factor taken into consideration is USD exchange rate expressed in form EUR/USD. Usage of cross rates suggests that if USD is appreciating, ruble should depreciate and vice versa. Reversed relationship is not clear for now. Ruble is not as important as USD or EUR in international scale, but it still belongs to most important world currencies and can influence USD and EUR as well.

Idea behind the influence of change of natural gas price on ruble exchange rate is similar to the idea of oil price. Russia relies on natural gas exports as well as on oil exports plus its price is also denominated in USD.

Last factor taken into consideration is price of gold. If the price of gold is increasing, gold becomes more attractive for investors, so they should get rid of the currency in order to purchase gold and cause currency depreciation and vice versa - see for example Pukthuanthong and Roll (2011). But because price of gold is denominated in USD, depreciation of ruble should make gold more expensive, therefore demand for gold should decrease as well as its price – existence of reversed relationship is also reasonable.

2 Methodology and Data

Analysis focuses on the period from 1st January 2013 to 25th February 2015. From this period, 556 daily observations of ruble exchange rate (values are available only for weekdays) have been collected. To perform analysis properly, it was necessary to have exactly this number of observations for all variables presenting potential factors behind ruble development. In some cases it was necessary to deal with missing values in order to ensure continuity of input variables. This was solved simply by adopting the value from the previous day (this adjustment is permissible because from the look of the variables development, two consecutive values differ only a little bit). Table 1 contains a short description of variables and their abbreviations used in the analysis (same table and approach were used in Urbanovský (2015)).

Table 1 Variables used in analysis

abbreviation of variable	variable characteristic
RUB	spot exchange rate of ruble expressed in form of RUB/USD
oil	price of oil BRENT expressed in USD per barrel
interest	Moscow Interbank Overnight Interest Rate
MIC	MICEX Index (cap-weighted composite index calculated based on prices of the 50 most liquid Russian stocks of the largest and dynamically developing Russian issuers presented on the Moscow Exchange)
EUR/USD	spot exchange rate of US dollar expressed in form of EUR/USD
gas	price of natural gas expressed in USD per MMBTI (million british thermal units which is equal to approximately 28,26 m^3)
gold	price of gold expressed in USD per troy ounce

Source: Author's own elaboration

Model Specification

In abstract declared VAR approach is based on stationary data, but level variables in form of time series often express non-stationary behavior. In order to deal with this inconvinience, it was decided to induce stationarity by taking differences of these level

variables. In particular, we take natural logs of each time series, then take differences of these logged series, then multiply them by 100. That implies that we are working with percentage changes in each variable, as is noted in Koop (2010).

VAR is a typical econometric tool to identify Granger causality in case of stationary time series. It is a system of regression equations, where the number of equations matches the number of variables under study. In each equation we have different dependent variable – it is always one of the variables under study. Each equation uses as its explanatory variables lags of all variables. Because it would be time and space consuming to find specific number of lags for each variable, it was decided to use the same lag length for every variable in every equation (note that this is a common practice in research papers). The resulting model will be known as a VAR(p) model with p indicating number of included lags. Extensive theoretical background on VAR approach can be found for example in Greene (2012).

The research process will have the following structure:

- finding appropriate number of lags,
- estimation of VAR(p) based on information received in previous step
- interpretation of results with respect to Granger causality
- comparison of discovered causality with correlation relationship
- estimation of regression model, which can explain changes in ruble exchange rate (with respect to results yielded by previously estimated VAR(p) model)
- verification of (in)validity of this model by way of forecasting

3 Results and Discussion

Because we want to perform VAR, which is based on stationary time series, confirmation of stationarity of all variables is necessary. Dickey-Fuller tests show that original level variables express stochastic trends, therefore are nonstationary. We deal with this inconvenience by using differences of variables (every nonstationary time series is stationary in its differences). The whole procedure of testing is not included in this paper in order to save space, but reader can find much more detailed approach in Urbanovský (2014), where author examined the same issue by means of cointegrating approach.

After proof of stationarity of selected variables, we are free to perform VAR. First step is to find appropriate number of lags for each variable. Including small number of lags can lead to invalid results and missing relationship between variables. On the other hand, it is highly unlikely that differences have long memory (it is the main issue of level variables), therefore inclusion of high number of lags is also not reasonable. From these reasons, highest number of lags is set at the level of 5. The decision of most appropriate number of lags is based on information criteria – Akaike criterion (AIC), Schwarz Bayesian criterion (BIC) and Hannah-Quinn criterion (HQC). The best value of each criterion is always the lowest one. Lag lengths 1 and 2 are rejected, because of the danger of missing potential relationship between variables (albeit BIC and HQC suggested lag 1 is the best option). The second best option appears to be option with 3 lags according to BIC and HQC, as shown in Table 2. Therefore the regression will take form of VAR(3).

Table 2 Lag length determination

	lags 1	lags 2	lags 3	lags 4	lags 5
AIC	22.7599	22.6561	22.4893	22.5038	**22.424**
BIC	23.1613	23.4602	**23.6954**	24.1166	24.4401
HQC	22.9172	22.9712	**22.9618**	23.1358	23.2141

Source: Gretl output based on data acquired via Bloomberg Database

Note that intercept turns out to be statistically insignificant, time trend component is either insignificant or has insignificant influence (its coefficient is very close to zero). For that reason they are not included in further analysis. Table 3 presents results from OLS estimation of a VAR(3). Since there are seven variables, there are seven equations to

estimate. Each equations regresses a dependent variable on three lags of all the variables in the VAR. To save space, only the OLS estimate of each coefficient is included in Table 3 (coefficients statistically significant on significance level 5 % are in bold).

Table 3 The VAR(3) using ΔRUB, Δoil, Δinterest, ΔMIC, ΔEUR/USD, Δgas and Δgold as dependent variables

	dependent variable						
	ΔRUB	Δoil	Δinterest	ΔMIC	ΔEUR/USD	Δgas	Δgold
ΔRUB_{t-1}	-0.037	0.011	-0.32	-0.067	-0.005	**0.159**	-0.013
ΔRUB_{t-2}	-0.005	**-0.169**	**0.891**	0.055	0.010	**-0.192**	-0.027
ΔRUB_{t-3}	0.080	**0.169**	**1.452**	0.016	0.031	**0.144**	0.021
Δoil_{t-1}	**-0.211**	-0.006	-0.431	0.076	**0.046**	0.192	-0.064
Δoil_{t-2}	**-0.314**	0.068	0.170	0.039	-0.026	-0.061	-0.026
Δoil_{t-3}	**-0.144**	0.062	-0.146	0.021	**-0.057**	0.081	0.014
$\Delta interest_{t-1}$	-0.007	**-0.024**	-0.022	0.013	0.002	**-0.038**	-0.004
$\Delta interest_{t-2}$	**-0.024**	0.009	-0.028	-0.006	-0.004	-0.019	-0.006
$\Delta interest_{t-3}$	**-0.043**	0.006	-0.057	-0.011	0.002	**-0.054**	0.001
ΔMIC_{t-1}	-0.021	0.033	-0.213	-0.035	0.029	0.018	0.012
ΔMIC_{t-2}	0.036	-0.022	**-0.309**	0.022	0.000	-0.034	0.009
ΔMIC_{t-3}	0.057	0.035	**0.347**	-0.044	**0.049**	-0.031	-0.071
$\Delta EUR/USD_{t-1}$	0.058	-0.049	-0.507	-0.123	**-0.145**	-0.284	0.178
$\Delta EUR/USD_{t-2}$	-0.117	0.185	-0.866	-0.041	0.049	-0.014	-0.053
$\Delta EUR/USD_{t-3}$	0.094	-0.161	**-1.142**	0.038	0.017	0.029	-0.173
Δgas_{t-1}	**0.080**	0.002	-0.014	0.005	0.003	-0.035	-0.011
Δgas_{t-2}	0.046	0.005	0.106	0.025	-0.003	0.009	-0.042
Δgas_{t-3}	0.029	0.053	0.161	-0.036	-0.004	**0.090**	-0.005
$\Delta gold_{t-1}$	0.008	-0.019	-0.013	0.046	-0.015	0.026	0.016
$\Delta gold_{t-2}$	-0.022	0.050	-0.104	-0.007	-0.004	-0.021	-0.026
$\Delta gold_{t-3}$	0.075	0.034	-0.133	0.001	-0.028	-0.054	0.020
R^2	0.150621	0.1146	0.242694	0.0284	0.095929	0.10326	0.0231
P-value (F)	2.89E-09	7.20E-06	9.96E-20	0.84411	0.000259	6.6E-05	0.9438
DW stat.	1.914847	2.00919	1.894951	1.99820	1.987158	1.97442	1.99220

Source: Gretl output based on data acquired via Bloomberg Database

First interesting result is that lags of dependent variable are statistically significant only in case of variables ΔEUR/USD and Δgas. In the rest of the cases they have no explanatory power. It means that current change in ruble exchange rate cannot be explained by previous change of this rate, current change in oil price cannot be explained by previous change of this price, etc. In case of dependent variables ΔMIC and Δgold, none of the explanantory variables are statistically significant, which results in low R^2 and high p-value of F-test.

Secondly, the results for these seven equations demonstrate some interesting patterns of Granger causality. In the equation with ΔRUB as the dependent variable, it is clear that past values of oil price, gas price and interest rate changes have explanatory power for ruble exchange rate changes – in other words, they Granger-cause ruble exchange rate changes. There is more of it – ΔRUB has explanatory power in equations with Δoil, Δinterest and Δgas as dependent variables. It means that Granger causality flows in both directions. These conclusions come from values in first column (ΔRUB) and first three

rows (ΔRUB_{t-1}, ΔRUB_{t-2}, ΔRUB_{t-3}) - note that only bold values are relevant for Granger causality detection.

In the rest of the cases, Granger causality flows in only one direction. For example changes in Russian stock index Granger-cause interest rates changes, but changes in interest rates do not Granger-cause changes in stock index. Or changes in oil price Granger-cause gas price changes, but changes in gas price do not Granger-cause changes oil price, and so forth. Results are summarized in Table 4.

Table 4 Granger causality

Granger causality - both direction	Granger causality - only one direction
Δoil ↔ ΔRUB	Δoil → ΔEUR/USD
Δinterest ↔ ΔRUB	Δoil → Δgas
Δgas ↔ ΔRUB	Δinterest → Δoil
	Δinterest → Δgas
	ΔMIC → Δinterest
	ΔMIC → ΔEUR/USD
	ΔEUR/USD → Δinterest

Source: Author's own elaboration

It could be also interesting to compare discovered causal relationships with correlation between variables. Findings from VAR(3) are incorporated in below stated correlation matrix in Table 5. Values in black boxes represent two-way Granger causality, bold values one-way Granger causality. Only these marked correlation coefficients have informational value –correlation really exists in these cases. Remaining coefficients are not explained in VAR(3), therefore the correlation in these cases is inconclusive – we can call it "spurious" or "false" correlation. We encountered indicator of this false correlation in our VAR(3) unconsciously. We are talking about too low values of R^2 – typical case is the regression with change in gold price as dependent variable. Correlation coefficients signal (relatively) significant relationship between Δgold and Δoil (0.1834) and between Δgold and ΔEUR/USD (-0.3272), but the explaining power of this regression is very small ($R^2 = 0.02311$).

Table 5 Correlation matrix

ΔRUB	Δoil	Δinterest	ΔMIC	ΔEUR/USD	Δgas	Δgold	
1.0000	-0.2731	-0.0715	-0.0873	0.0645	0.0162	-0.0724	**ΔRUB**
	1.0000	**0.0733**	0.0306	**-0.0396**	**0.0962**	0.1834	**Δoil**
		1.0000	**0.0196**	**0.1205**	**0.1487**	-0.0365	**Δinterest**
			1.0000	**0.0011**	0.0911	-0.0379	**ΔMIC**
				1.0000	-0.0343	-0.3272	**ΔEUR/USD**
					1.0000	-0.0286	**Δgas**
						1.0000	**Δgold**

Source: Gretl output based on data acquired via Bloomberg Database

Now it is time to compare our results with statements from introductory part of paper. We can see that sign of correlation coefficient between Δoil and ΔRUB is in compliance with our assumption – when price of oil is going down, ruble is depreciating and vice versa. And because of proven two-way Granger causality, depreciation of ruble leads to decline in oil price. Relationship between Δinterest and ΔRUB is also in compliance with previously stated assumption. When interest rate is going up, ruble appreciates and vice versa. And because of two-way Granger causality, appreciation of ruble leads to increase in interest rate. On the other hand, correlation coefficient between Δgas and ΔRUB has opposite sign than we expected. There is no logical explanation, why increase in gas price should lead to depreciation of ruble. Relationships between ruble exchange rate

changes and changes in Russian stock index, EUR/USD exchange rate and price of gold are inconclusive, because no causality has been proven.

Now we shift our attention back to ruble and its determinants. VAR analysis showed that not every selected variable is statistically significant in explaining changes in ruble exchange rate. In general, inclusion of insignificant variables decreases accuracy of OLS estimates. Logically, next step is removal of these irrelevant variables from regression - in particular we remove lags of ΔRUB, ΔMIC, ΔEUR/USD and Δgold. Resulting regression is depicted in Table 6.

Table 6 OLS regression with ΔRUB as dependent variable

	coefficient	std. error	t-ratio	p-value	
Δoil_{t-1}	-0.0205043	0.0549594	-3.7308	0.00021	***
Δoil_{t-2}	-0.295627	0.0551389	-5.3615	<0.00001	***
Δoil_{t-3}	-0.134573	0.0556034	-2.4202	0.011586	**
$\Delta\text{interest}_{t-1}$	-0.00101134	0.0107488	-0.0941	0.92508	
$\Delta\text{interest}_{t-2}$	-0.0253056	0.010694	-2.3663	0.01834	**
$\Delta\text{interest}_{t-3}$	-0.0428289	0.0105574	-4.0568	0.00006	***
Δgas_{t-1}	0.0672859	0.0356781	1.59	0.05987	*
R^2	0.129655				
P-value (F)	8.06E-13				
DW stat.	1.983131				

Source: Gretl output based on data acquired via Bloomberg Database

Statistical insignificance of variable $\Delta\text{interest}_{t-1}$ looks odd, especially when other lags of this variable are significant. There is no intuition behind this phenomenon, so it was decided to keep it in regression, despite its zero explanatory power. Joint test for statistical significance of explanatory variables (F-test) resulted in desirable low p-value and value of Durbin-Watson statistics is close to 2, which indicates no autocorrelation of residuals.

Because we are using differences of logarithms of level variables multiplied by 100, it means we are working with percentage changes in each variable (for example, a value of 1 implies a 1% change). Thus interpretation of coefficients is as following:

- 1% decline in variable Δoil_{t-2} leads to increase in ΔRUB about approximately 0.295627 % (ruble is depreciating) and vice versa, ceteris paribus.
- 1% decline in variable $\Delta\text{interest}_{t-3}$ leads to increase in ΔRUB about approximately 0.0428289 % (ruble is depreciating) and vice versa, ceteris paribus.
- etc.

In order to test validity of this model, it was decided to try to forecast future values of ΔRUB. Analysis, as well as results, was based on data from the period 2013-01-01 to 2014-12-31 so far. The forecast focuses on estimating values of ΔRUB in period 2015-01-01 to 2015-02-25 – therefore we will get 39 estimated values. Results of forecast are stated below in Figure 1. Just for completeness, it was decided to illustrate also 50 observations from period instantly preceding forecasted period. Shaded area represents 95% confidence intervals, which reflect the level of uncertainty about the coefficient estimate. In other words, there is 95% probability that true value of ΔRUB will realize within the shaded area.

Figure 1 Forecast of variable ΔRUB in period 2015-01-01 to 2015-02-25 (%)
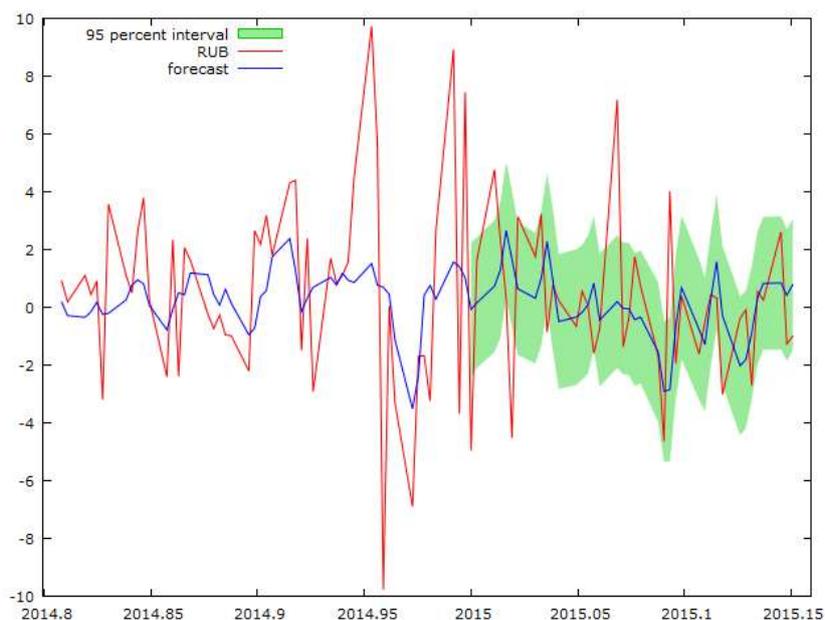
Source: Gretl output based on data acquired via Bloomberg Database

Unfortunately, accuracy of forecast is not entirely obvious from above mentioned figure. In order to asses forecasting quality of our model, need of quantitative formulation arose. According to figures in Table 7, our model is unable to reliably forecast magnitude of changes of variable ΔRUB. On the other side, model is quite reliable in case of forecasting direction of change - it can predict, whether the ΔRUB will be positive or negative. Model successfully predicted 29 cases from total number of 39, which means success rate nearly 75 % (successfully predicted sign of change is marked with dot in the table).

Table 7 Forecast of variable ΔRUB in period 2015-01-01 to 2015-02-25

date	ΔRUB	forecast	hit	date	ΔRUB	forecast	hit
2015-01-02	1.62712	0.158062	•	2015-01-30	0.72005	-0.335244	
2015-01-05	4.76434	0.735897	•	2015-02-02	-1.66	-1.549372	•
2015-01-06	2.36547	1.281690	•	2015-02-03	-4.6382	-2.904436	•
2015-01-07	0.30431	2.660903	•	2015-02-04	4.01717	-2.847067	
2015-01-08	-4.5179	1.666913		2015-02-05	-1.9413	-0.673603	•
2015-01-09	3.14005	0.646742	•	2015-02-06	0.39325	0.683302	•
2015-01-12	1.76038	0.317995	•	2015-02-09	-1.6164	-0.760791	•
2015-01-13	3.22394	1.006501	•	2015-02-10	-0.4917	-1.288489	•
2015-01-14	-0.8588	2.282600		2015-02-11	0.43785	0.284093	•
2015-01-15	0.76625	0.932648	•	2015-02-12	0.32077	1.582096	•
2015-01-16	0.23978	-0.491608		2015-02-13	-3.0182	-0.282382	•
2015-01-19	-0.6548	-0.337974	•	2015-02-16	-0.3808	-2.019098	•
2015-01-20	0.55978	-0.174096		2015-02-17	-0.0911	-1.805868	•
2015-01-21	0.067	0.092344	•	2015-02-18	-2.7133	-0.886309	•
2015-01-22	-1.5846	0.840804		2015-02-19	0.5509	0.337281	•
2015-01-23	-0.7346	-0.439596	•	2015-02-20	0.25088	0.833606	•
2015-01-26	7.18808	0.199458	•	2015-02-23	2.61455	0.846550	•
2015-01-27	-1.3697	-0.035406	•	2015-02-24	-1.2669	0.420700	
2015-01-28	-0.3578	-0.049436	•	2015-02-25	-0.996	0.787662	
2015-01-29	1.76115	-0.423744					

success rate = 0.7435897 = 74.35897 %

Source: Author's own elaboration based on data acquired via Bloomberg Database

4 Conclusions

Possible factors behind the recent ruble depreciation were investigated in the presented paper. After brief theoretical insight into this issue, data and the methodology used in subsequent analysis were introduced. Several facts have been found in the empirical part of the paper. According to outputs of used VAR(3), it has been proven that there exists two-way Granger causality between changes in ruble exchange rate and changes in oil prices, interest rate and gas price. In particular, declines in oil price and Russian interest rates lead to depreciation of ruble, decline in gas price surprisingly leads to its appreciation. Relationship between changes in ruble exchange rate and changes in Russian stock index, EUR/USD exchange rate and price of gold were inconclusive on the other hand. Correlation alone turned out to be insufficient in order to determine relationship between variables, because it can be falsely positive. OLS regression with changes in ruble exchange rate as dependent variable and changes in oil price, interest rate and gas price as explanatory variables turned out to be unable to successfully predict magnitude of changes of ruble exchange rate, but it allowed us to predict direction of change with success rate nearly 75 %.

Acknowledgements

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The Possibilities of Modern Simulation Modeling of Electronic Banking in Cyberspace of Information Society

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Abstract: *In this paper, based on the tasks at specific research at ESF MU, systemically express new modern modeling and simulation on a computer environment for possible applications of intelligent cashless payment system as a cybernetic model. To inform mainly experts on the possible use of that modeling environment of electronic banking also redesigned cyberspace (cyberspace) information and gradually formed also the knowledge society. It also briefly expresses methodology of the research work of a team of researchers at the using of the methods applied cybernetics and modern simulation modeling and all with regard to the expected and necessary system approach to integration processes hierarchical structures in the areas of electronic banking background world of information and communication technologies (ICT), especially considering the current electronic banking and business. The contribution is expressed in terms of the application of systems theory, cybernetics and artificial intelligence from the other side, then from the perspective of the expected practical applications in the new economy of the world and especially in the new emerging integrated economic cybernetics.*

Keywords: economic cybernetics, simulation, electronic banking, system integration, cyberspace

JEL codes: 032, F15

1 Introduction

Solving of the partial and very interesting tasks in research part of important scientific and research institutions and universities is concentrated in the contribution of **creation of system models and system defining areas** of possible environment for **mathematical modeling and simulation**.

Information literacy (Jankova and Dvorak, 2014a), (Jankova and Dvorak, 2013) of the current population and the rapid development of technology and system technology for the processing and communication of information leads to the gradual transition to the **information society and knowledge-based environment**, especially **in the economy area**.

The excellent global systemically integrated company (Dvorak and Suchanek, 2012) is now the **information society** based on the development and use of new high-modern tools of **information and communication technology (ICT)**.

The information society is newly **created on established principles of cybernetics** as an area of "*control and communication in living and inanimate organisms*" (Norbert Wiener, 1946). Therefore, in these new studies is used the new space for the anticipated

application of modern methodology of science and research in system-defined cybernetic space (**cyberspace**). Therefore the contribution which is introduced during the conference has phrase "**cyberspace information society**" in its title. Thus we prefer the new information and then certainly the knowledge society – as environment cybernetic systems and environment relationship as "social and technical environment." The environment **creates an appropriate cyber interface of systems**, before known as a relationship "*man - machine*".

The interface due to the very fast processes (in the dynamics of the world) in all areas of civil and cultural environment is rapidly shrinking (it is getting closer mutually, it is becoming the optimal environment between defined systems – technical, social and cybernetic mentioned human homeostasis). More and more the world of science and research in the **new economy of the world** must deal with social intelligence system increasing, as well as raising of adequate technical intelligence environment of information systems (already introduced into practice intelligent communication tools-eg. smartphones, smart computers etc.)

To set the systematic definition and integration of these environments is essential (Jankova and Dvorak, 2014b) to deal with the **system definition area for the model**: in this contribution it is the banking system and the modern concept of suitable electronic banking sector (in the future it will be realized in the optoelectronic environment or in the bionic environment), especially in the new electronic economy of the information-integrated world.

For modern solution of problems of favorable current needs it is used **modeling on created model** and simulating of the real environment will be possible to obtain important initiatives. Especially project documentation, implementation and using of the new concept of electronic banking in cyberspace: current cyberwar, cyberattacks, cybersecurity, cyberbullying, cybercrime and others. The documents obtained by modeling and simulations based on modes will be possible to use for a systematic crisis and also the possibility of environment adaptation i.e. increasing the intelligence of the entire socio-technical environment using Artificial Intelligence Theory (formation of neural network of the training and learning systems, etc.). From the systematic point of view of the dynamically developing segment of the civilized world is solved also our research task – with name "Possibilities of modern **simulation modeling of electronic banking** in cyberspace of **information society**" in the contribution.

The initial stimulus (Jankova and Dvorak, 2012) to solving of the specific research tasks was our analysis of information resources of the world: classical approaches to solving systemic conceived economic environment are defined by classical methods of creating of states with statistical process of mathematical modeling to interpolate and extrapolate possible or expected target behavior of these systems. Mentioned cybernetic approach is based on the new concept of the real environments and with existing modern ICT and new concepts of work with state spaces, data bases. Of course with also expected bases with knowledge of the new using of cyberspace in the expected dynamic systemically integrated cyber systems represented in the new **economic cybernetics also characterized the dynamics of financial markets.**

Figure 7 The possibilities of modeling and simulation of electronic banking in cyberspace of information company
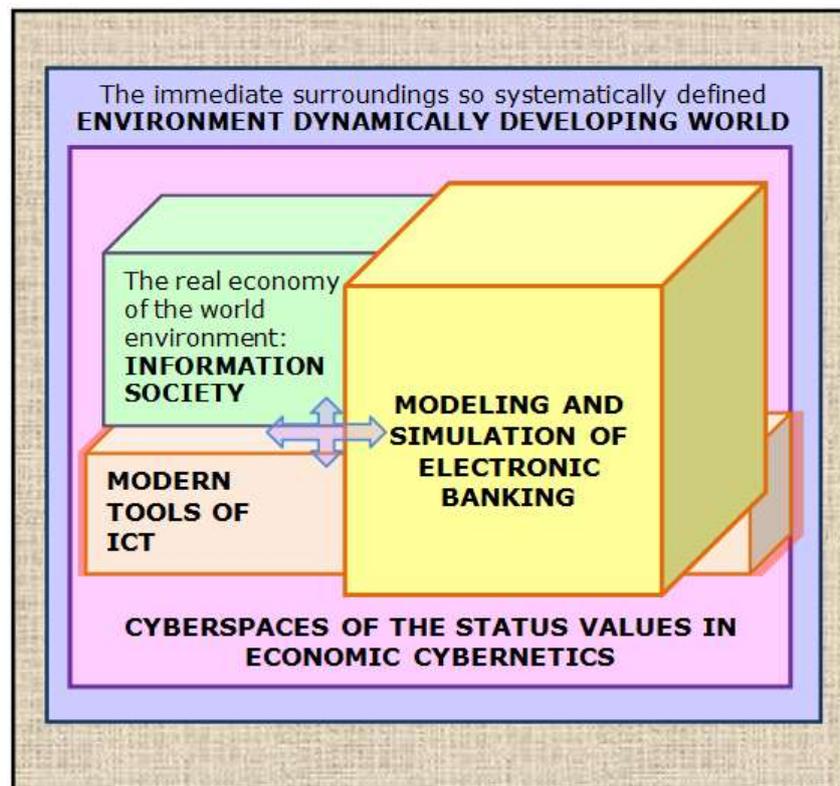
Source: Own sources

2 Methodology and Data

The possibilities of using of modern research methodologies in the new Applied Cybernetics and Cyberspace Information Society in the research are focused on the system using of the simulation principles (Figure 2).

In our specific research it is especially during **identification of the real system S** with the target behavior **Ys** of the real system S. Basic principle of **simulation modeling** is therefore replacement (identification) of the original system **S** with another more accurate, safe, describable and thus adaptable new system through modeling based on modern principle with so-called simulation model and its reverse transformation **Ω** to the real system **S**.

It is all about a possible experimentation on a simulation model and feedback **Δ** application of knowledge from simulation model of the original system **S**. It is also the modeling of the **real-time environment**, expressed as a dynamic system modeling. Simulation is generally used to:

- rational specification of the mathematical model **M** researched system **S** and verifying its accuracy and usability (also the accuracy of the created model M and an optimum number of elements involved in modeling during expressing the required level of resolution of real S system with regard to the power of the modeling environment ICT)
- comparison of the target behavior **Ys** and the behavior **M** expressed by the variable **Ym** processed as feedback of the modeling of cybernetic environment by gaining of feedback of cybernetic modeling by gaining variable **(= minΔ Ys - Ym)** in an application of cybernetic principle K of simulation modeling,

- imitation (simulation) of **limit states** with the real system **S** or unpredictable or even dangerous situations or creation of conditions that may occur during emergency situations with the real system **S** etc.

Gained knowledge from simulation modeling **K** we apply retroactively (given deviation **Δ** and possible integration process caused by the results of simulations of models of subsystems simulation model **M** in the process **Ω**. change process of Ω and identification are continuous processes in "*cybernetic principle K of simulation modeling*."

Figure 8 Systemically expressed cybernetic principles of simulation modeling of real system in defined cyberspace
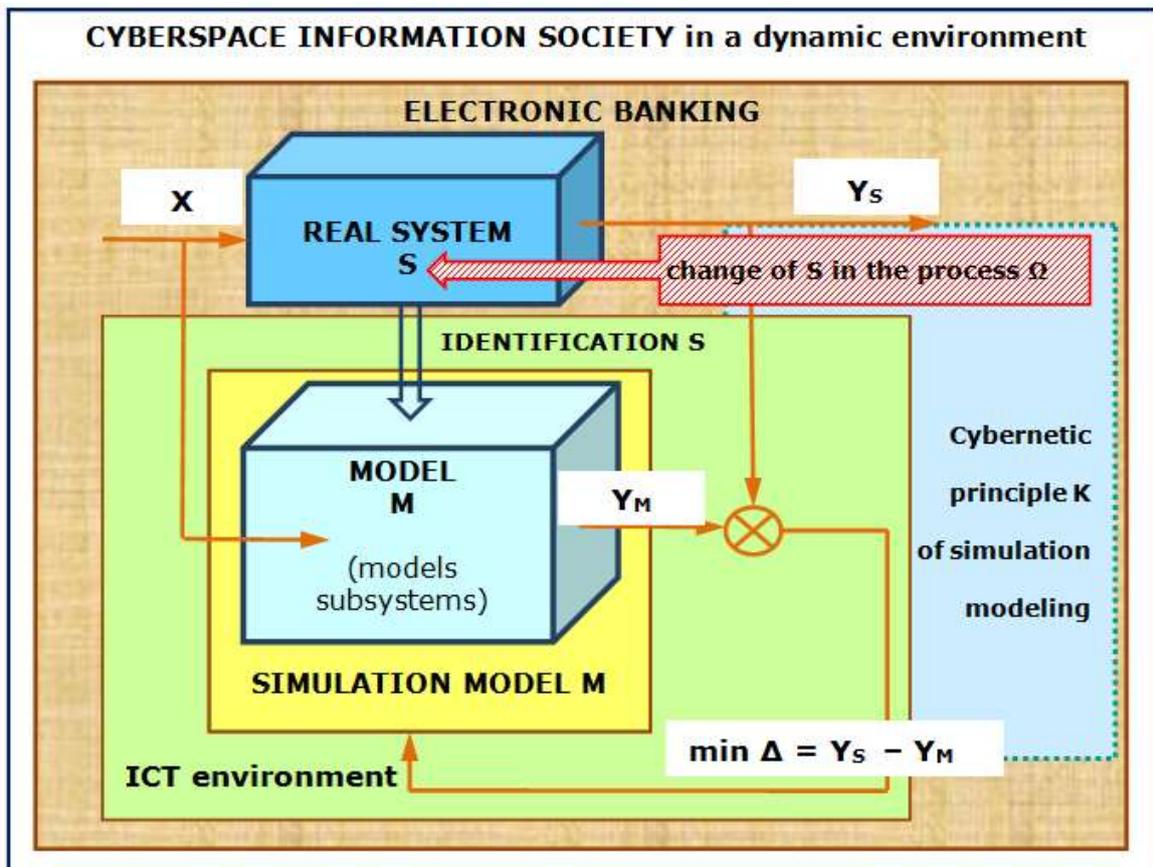
Source: Own sources

Using selected methods of identification we are creating a mathematical description of the system **S** of selected characteristic **models of subsystems M** (Fig.2) and express these subsystems such as software modules of a computer – in defined ICT environment.

The technical literature describes in detail the advantages of using simulation models such as **software modules** written in programming languages block-oriented (SIMULINK) or mathematically (MATLAB) and a large variety of other programming languages. Due to model subsystems can be in modules programs experimentally verified and test conditions as well as those that actually do not exist yet: as emergency situations, extreme dynamic conditions in the period before its actual implementation etc.

The possibilities of modern tools for modelling

In terms of mathematical theory it is about **isomorphic system** where we emphasize that the corresponding elements and their connection to particular level of real S and model **M** clearly correspond i.e. the system is transformed into a model **S → M** with aim **M ≡ S.** Vector inputs **X** to the system **S** and adaptable model **M** must converge so that **Ys ≡ Y$_M$** in model cyber environment on condition **min Δ.**

Cybernetic methods can be applied to the study of complex systems. Block (graphic) Schemes (mentioned pictures) Method comes from graphical representation of the system. This method is one of the most widely used, and its advantage is the clarity. Another Black Box Method - this method is usually used as the first in the beginning of study – it is not usually clear and there is no universal strategy how to use it. Next method is a Modeling and Simulation Method, whose essence lies in the fact that we replace the examined object with his model and we do experiments with the model with aim to get a more complete and accurate information about the investigated object.

3 Results and Discussion

The possibilities of mathematical modeling and simulation in cyberspace

The set of input values **X** (of discrete state-space of electronic banking Fig. 2) is a part of the real dynamic system S and also input values of simulation dynamic model **M** (of program **modules** generated by **identification of system S** with the ICT environment).

Transmission of the **G** system **S** is determined by the ratio Laplace image of output values **Ys** in the image of the input variables **X**

$$\mathbf{G} = \frac{\mathbf{Ys}}{\mathbf{X}} \tag{1}$$

In the process of modeling we transform (by identification of the real system **S**: represented cybernetic system with managing and managed subsystems by spatially hierarchically arranged profile of segment of electronic banking) into the model **M**. Variables **X** and **Ys** we transform (Krupka, 2009) from discrete to continuous variables with a time scale in real time **T$_\varepsilon$** in selected interval:

$$T_\varepsilon = \{t_1, t_2, \ldots, t_n\} \tag{2}$$

where: t is the real discrete time in interval Tε.

The cybernetic principle K of simulation modeling (Figure 2) we express by the mathematical model of finding a minimum deviation of the regulator:

$$\Delta = \min \{Y_S - Y_M\} \tag{3}$$

For whole interval $T_\varepsilon = \{t_1, t_2, \ldots, t_n\}$

With change of the structure of the real system S:

in the process of the simulation modeling solutions created Ω:

on condition Δ processes realized in Fig. 2:

- o by change of the structure of the real system,
- o by change of program modules subsystems in the simulation model M.

Interpretation of partial results of the modeling is the expected result of the relation, "*the accuracy of modeling*" on the "*number of basic model elements of the original real system S expressed by cyber subsystems selected profile of electronic banking*".

From the point of view of mathematical theories it is about isomorphic system in which is given the requirement that all elements and their relation of both systems –real and model – must correspond. Vectors inputs of one system must therefore correspond to vectors of inputs of the second.

Graph 1 The expected result for "*elementary subsystems K*" and "*elementary modules of simulation modeling*" in cybernetic principle of simulation modeling in cyberspace

Transmissions expressed by **Δ** [in% of selected state system stability S]

selected **Δ**

OPTIMAL number of elements in **S**

The number of elementary elements in **S** [pieces]
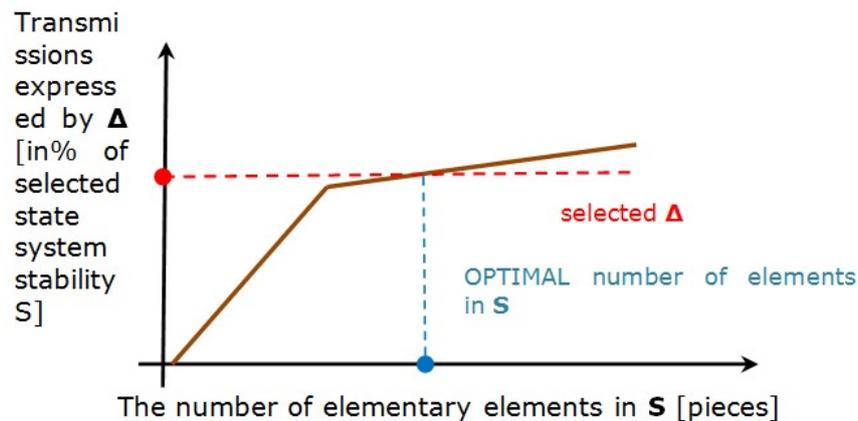
Source: Own

4 Conclusions

The content of this contribution we expressed systematically new modern modeling and simulation possibilities due to the computer environment of possible model application of chosen segment of the real system. Furthermore we focused on possible future intelligent cashless dynamic and adaptable payment systems as generally conceived cybernetic models developed and dynamically changing according to state of the real environment.

This process was expressed in a newly conceived cybernetic space (cyberspace) of information and gradually formed knowledge society. Moreover, we briefly expressed use of applied cybernetics methods: newly applied simulation modeling in the areas of electronic world background and possible applications of information and communication technologies (ICT).

The contribution was shortly expressed in terms of the application of System Theory, cybernetics and Artificial Intelligence and from the perspective of a highly expected new dynamic economy of the world, especially the new developing integrated economic cybernetics.

The benefit of specific research is strict systematic definition of cyberspaces and modeling of mentioned environment with a new method of simulation modeling and expected possibilities systemically integrated and intelligent environments of e-economy.

Acknowledgments

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Impact of Mergers of Czech Companies on their Value Added

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Abstract: *The aim of this paper is to assess whether mergers of companies in the Czech Republic meet the expected goals as regards an increasing efficiency of business activities, specifically in the field of the increasing value added of the merged companies. The performed analysis is based on a sample of 312 companies merging in the Czech Republic in 2001–2010. The development of the value added of the merging companies as of the merger day was compared with the situation three years after. A statistical analysis examined whether the change in the value added in consequence of the merger was significant and what direction the change took. The analysis was performed separately for all the companies included in the sample and separately for the companies divided into groups of small, medium and large companies based on the value of their total assets (balance sheet total).*

Keywords: Mergers, value added, effects of mergers, statistical tests

JEL Codes: G34

1 Introduction

Especially at the time of crisis, from the economic point of view, business entities endeavour to make their activities as efficient as possible. One of the ways leading to this objective is combining business entities by means of mergers. A frequently declared main economic goal of mergers is an increase in efficiency of the merging companies, in consequence of the 'synergic effect'. The other expected goals of mergers are increases in profitability, cost-effectiveness and production efficiency of a merged company after the merger. The issue of the economic evaluation of a merger success has been studied in many papers and analyses, the most significant of them being (Lang, 2003, Weech-Maldonado, 2002); similarly, there are studies on the evaluation of factors affecting the merger success (see especially Dorata, 2012, Komlenovic and Mamun and Mishra, 2011, Marks, 1997, Vu and Shi and Hanby, 2009). As regards the efficiency of mergers in the Czech Republic, similar studies have not been performed so we cannot reliably state whether the mergers conducted between business entities in the area of the Czech Republic have met their main economic goals. This paper provides an initial result of an evaluation of results and impacts of mergers of business entities in the Czech Republic, focusing on the effect of mergers on the development of the value added of merging before and merged companies after the merger. The study results have been gained within the project of the Czech Science Foundation no. P403/11/0447 - The Analysis of Taxation and Accounting Practices during Mergers implemented in the Department of Finance, the Faculty of Economics and Administration, Masaryk University in Brno, Czech Republic. The development and economic impact of mergers have been a topic of several publications within the above mentioned project as well as by other Czech authors (especially Hýblová and Sedláček and Křížová, 2012; Sedláček and Valouch and Hýblová, 2012; Sedláček and Valouch and Konečný, 2011; Skálová and Tumpach, 2010; Špatná, 2010). However, as regards specific economic impacts, only the effect of mergers of

Czech companies on the value of their assets after the merger has been explored (Valouch and Králová 2012).

2 Aim and Methodology

The aim of this paper is to evaluate the effect of mergers of business entities conducted in the area of the Czech Republic in 2001–2010 on their value added in the three years after the merger (or after the decisive day of merger) in relation to the sum of the value added of the merging companies as of the decisive day. The period of three years after a merger is chosen as the influence of some accounting methods has diminished at that time and we expect that the three-year time is sufficiently long to exclude short-term effects of mergers in the form of new adjustments of company processes in the merged company that take place after the merger and can essentially affect the evaluation of economic parameters of the merger during its preparation and immediately after its implementation. The analysis examined 312 merged companies selected from a set of 2396 mergers conducted in the Czech Republic in the monitored period. The sample consists of the companies that properly published their financial statements at the moment of the merger and in the three years after the merger in the collection of documents of the Trade Register of the Czech Republic, as stipulated in Act no. 563/1991 Coll., on accounting. The discrepancy in the numbers indicates that nearly 87% of the merging or merged companies did not meet their legal obligation at least in one of the accounting periods regarding the publishing of financial statements.

The indicator of the value added, which is analysed in this paper, is based on the profit and loss account, which business entities are obligated to publish as a part of their financial statements, and which represents the outputs including the trade margin (the difference between the selling price of an item and the purchase price of an item sold) less the production consumption. The value added in accounting is thus a sum of the margin, revenues of sales of the company's own products and services, the change in the company stocks of its own production, and activation, after deduction of the production consumption (consumption of materials, energies, and services). This indicator thus measures the ability of companies to produce their own products in the sense of goods, products and services, and to sell them in the market for prices that are higher than the costs of their production.

The actual statistical evaluation of the influence of mergers on the value added of merged companies proceeded in three steps. In the first step, we tried to answer the question whether a merger influences the value added of a merged company three years after the merger regardless of its size. As the second step, we examined whether the merger influence on the value added of a merged company three years after the merger is affected by the size of the merged company. In the third step, we investigated whether a merger influenced the value added of a merged company three years after the merger based on its size. For these purposes, we divided the merged companies into three categories: *small* companies – with the value of total assets up to 100 mil. Czk, *medium* companies – with the value of total assets over 100 million Czk but up to 500 million Czk, and *large* companies – with the value of total assets over 500 million Czk. All statistical tests were conducted at the statistical significance level α = 5%.

3 Results (Effect of Mergers on Value Added of Merged Companies)

First, the merger influence on the value added three years after the merger regardless of the company size of company was evaluated. For this analysis, the following pair of hypotheses have been formulated:

H_0: The merger has no influence on the value added of the merged company three years after the merger.

H_1: The value added of a merged company three years after the merger is higher than the sum of value added of the merging companies as of the merger day.

To verify the hypotheses, the sign test of medians was used for the reason of the asymmetric histogram of the variable Value Added, as is shown in the following figure.

Figure 1 Histogram of the difference Value Added 3 years after the merger – Value Added as of the merger day
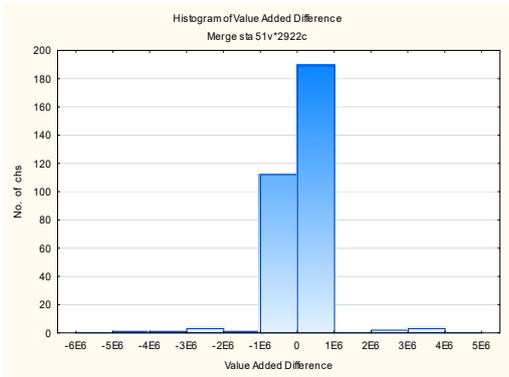
Source: Authors´own work

Table 1 The results of the sign test for Value Added

| Pair of Variables | Sign Test (Merge.sta) Marked tests are significant at p <,05000 | | | |
	No. of Non-ties	Percent v < V	Z	p-value
Value Added Difference	312	37,82051	4,246039	0,000022

Source: Authors´calculations

The sign test shows that the p-value for the two-tailed alternative is 0.000022, which means that the merger has a statistically significant effect on the value added of a merged company three years after the merger. Evaluating the one-tailed alternative, we reach the p-value of 0.000011, meaning that the increase in the value added of a merged company three years after the merger when compared with the sum of value added of the merging companies as of the merger day was statistically significant. We can conclude that mergers of the investigated sample of companies contributed to an increase in their ability to create value added, which is a favourable finding, and provided that the criterion of the value added increase was the main aim of a merger, we could recommend companies to merge.

The second part of the analysis explored the question whether the merger influence on the value added is affected by the size of the merged company. Due to the non-symmetric shape of histograms, the non-parametric Kruskal-Wallis test needed to be used instead of parametric tests.

Figure 2 The histogram of the Value Added difference three years after the merger – Value Added as of the merger day in categories based on the size of merged companies
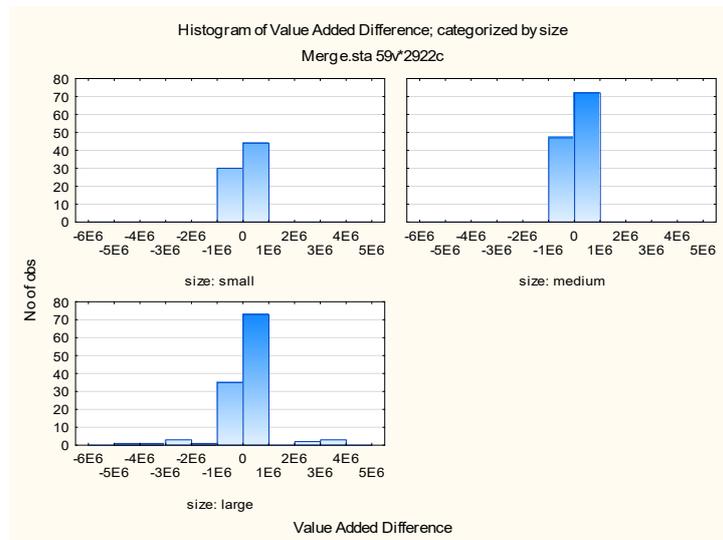
Source: Authors´own work

The following pair of hypotheses were formulated:

H0   The size of the merged company does not affect the merger influence on the value added.

H1   The size of the merged company affects the merger influence on the value added.

The following two box plots show that the highest variability of medians and means of value added differences is in large companies; by contrast, the lowest variability is achieved by small companies.

Figure 3 Box plots of medians and means of the value added differences of merged companies three years after mergers and merging companies as of the merger day
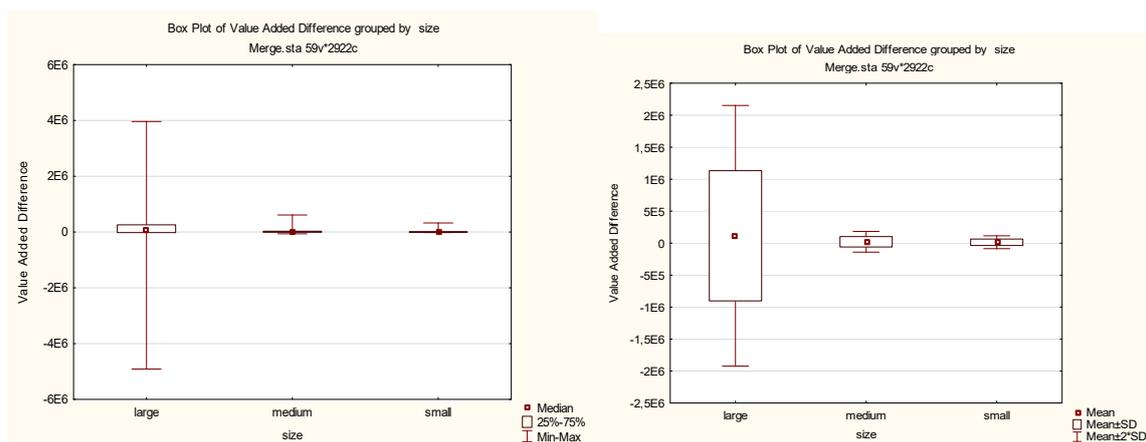
Source: Authors´own work

To evaluate the effect of the company size on the merger influence on the value added of merged companies, we used the Kruskal-Wallis test. The results are presented in the following table:

Table 2 The results of the Kruskal-Wallis test

Depend.: Value Added Difference	Kruskal-Wallis ANOVA by Ranks; Value Added Difference (Merge.st Independent (grouping) variable: size Kruskal-Wallis test: H (2, N= 312) =13,21461 p =,0014			
	Code	Valid N	Sum of Ranks	Mean Rank
small	1	74	10310,00	139,3243
medium	2	119	17092,00	143,6303
large	3	119	21426,00	180,0504

Source: Authors´calculations

The p-value of the Kruskal-Wallis test equals 0.0014. This means that the Kruskal-Wallis test at the significance level of ɑ = 5% proved an effect of the size of merged companies on the merger influence on value added.

Third, the merger influence on the value added of merged companies, separately for the particular size categories, was evaluated. The following pair of hypotheses were formulated, for each size category of merged companies.

H_0: The merger has no influence on the value added of a merged company (of the appropriate size category) three years after the merger.

H_1: The value added of a merged company (of the appropriate size category) three years after the merger is higher than the sum of value added of merging companies as of the merger day.

This influence was evaluated using the sign test. The results are presented in the following tables:

Table 3 The results of the sign test for Value Added of large companies

Pair of Variables	size=large Sign Test (Merge.sta) Marked tests are significant at p <,05000			
	No. of Non-ties	Percent v < V	Z	p-value
Value Added Difference	119	34,45378	3,300115	0,000966

Source: Authors´calculations

Table 4 The results of the sign test for Value Added of medium companies

Pair of Variables	size=medium Sign Test (Merge.sta) Marked tests are significant at p <,05000			
	No. of Non-ties	Percent v < V	Z	p-value
Value Added Difference	119	39,49580	2,200076	0,027801

Source: Authors´calculations

Table 5 The results of the sign test for Value Added of small companies

Pair of Variables	size=small Sign Test (Merge.sta) Marked tests are significant at p <,05000			
	No. of Non-ties	Percent v < V	Z	p-value
Value Added Difference	74	40,54054	1,511219	0,130733

Source: Authors´calculations

The results of the sign test show that the influence of mergers on the value added of merged companies is statistically significant for the categories of large and medium companies. Similarly, we can state that mergers in large and medium companies

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contributed to an increase in the value added of the merged companies three years after the merger, when the p-value of these tests is a half compared with the tables and thus confirms the statistical significance of the merger influence on an increase in the value added of merged companies. In the case of small companies, the merger influence on the value added of merged companies could not be proved by the sign test at the significance level α = 5%. We can conclude that there was an increase in the value added of small merged companies three years after the merger but the increase was not statistically significant at the level of α = 5%.

4 Conclusion

One of the important motives for mergers is the effort to make the company processes more efficient and to enhance the company performance. Based on the analysis of 312 companies headquartered in the area of the Czech Republic which implemented a merger in 2001–2010, statistical tests proved that their value added increased in the period of three years after the merger. This means that these companies were able to implement the mergers so that one of the basic economic goals was met – the mergers contributed to an increase in one of the most significant economic indicators of the companies. Seeing the issue from the perspective of individual size categories separately, we can state this for large and medium companies. The increase in the value added of merged companies in three years after the merger was not statistically significant for the category of small companies. In the context with the other analyses of the authors' team, the presented results are interesting findings. The authors' team also analysed the merger influence on the value of EBIT of merged companies three years after the merger. The results of that analysis showed that the merger influence on the value of EBIT was not significant in any of the groups of merged companies (small, medium, large) neither in the entire sample of the analysed companies. It means that mergers contribute to an increasing value added of companies but a similar effect has not been verified for the EBIT. It seems that mergers increase the company efficiency at the level of the value added (i.e. the margin and outputs after deduction of the production consumption) but do not have a comparable effect from the perspective of the total profits before the deduction of interests and taxes. We can hypothesize that mergers of the monitored Czech companies did not contribute to a reduction of other operational and financial costs (or even raised them), which had finally an ambiguous impact on the merger influence on the EBIT value. The found discrepancies between the value added and the EBIT of companies with headquarters in the area of the Czech Republic merging in 2001–2010 represent an area where other opportunities to make the merger process more efficient can be found. The merging and mainly the merged companies will need to focus on other revenue and cost items in the profit and loss account, especially at the level of other operational and financial revenues and costs to be able to transfer the positive results found within the value added to the level of the total economic results. As regards small companies, neither the value added increased significantly in consequence of mergers. The focus of these companies concerning the merger efficiency increase needs to be aimed at the very level of company outputs and production consumption (in trading companies at the level of trade margins) with the aim to improve the development of the value added in the period of three years after mergers.

Acknowledgments

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Insurance Solutions of Covering Agricultural Risks: The Case of the Czech Republic

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Abstract: *The aim of this paper is to analyze the possibility of eliminating risks of agricultural production and to analyze the current forms of covering the risks associated with agricultural production on the commercial insurance market in the Czech Republic. Insurance is a factor limiting and reducing uncertainty in the agriculture business. It helps to mitigate and eliminate risks, and it regulates the severity of risk occurrence and allows the business continuity in the event of total loss of production. The analysis shows the importance of a functioning system of agricultural insurance in the Czech Republic.*

Key words: risk, risk management, insurance subsidies, commercial insurance company, crop insurance, livestock insurance

JEL codes: G22, G18, Q14

1 Introduction

Agricultural insurance is a stabilization tool in the agricultural business. It diversifies the level of risk, which would be borne by the agricultural producers themselves, had not there been the insurance coverage, which allows them to continually carry on with their business even in the case of failure of production. Especially for these functions and features the agricultural insurance scheme is to be promoted and developed for the good of the whole economics of a state. When catastrophic events related to the risk realization occur, a standard solution is ready to be used if there is a functioning system of agricultural insurance and no additional ways to solve the problem need to be found. In some cases, the additional ad hoc assistance fails to help and may be exploitable.

The aim of this paper is to analyze the possibility of eliminating risks of agricultural production and to analyze the current forms of covering the risks associated with agricultural production on the commercial insurance market in the Czech Republic. Insurance is a factor limiting and reducing uncertainty in the agriculture business. It helps to mitigate and eliminate risks, and it regulates the severity of risk occurrence and allows the business continuity in the event of total loss of production. The analysis shows the importance of a functioning system of agricultural insurance in the Czech Republic.

2 Methodology and Data

Agricultural production is by nature one of the productions with the highest level of risk which primarily results from existing natural hazards. Risks arising from market volatility, liability for damage caused by agricultural activities to the environment or damage caused by other sectors with impact into agriculture are also serious. The creation of an adequate system of protection against major forms of risk which would help to minimize the economic impacts of adverse climate, weather and other influences on business entities in agriculture is a crucial task. The aim of this system is that entrepreneurs will not give up their agricultural activities after realization of adverse events and thus fulfill an important role in the development of rural areas.

The risk is understood as the possibility of an event resulting in an outcome diverging from the original objective and this possibility is quantified by certain probability. Objective risk is independent to humans and human activity, it occurs on the basis of objective factors such as a natural disaster. Subjective risk depends on the activity of people. Characteristics of risk are given by the timing of risk realization, its occurrence

and extent (Ducháčková, 2009). Risk realization leads to damage. The size of the risk is the result of two characteristics - frequency of risk realization and severity of damage. View of the risk size is relative. A winding-serious risk for small businesses may be negligible for a large business entity.

Merits of the insurance of agricultural production could be explained by the rules for business insurance on the basis of the risk management principles, according to Vaughan and Vaughan (2008). Large business risks should be insured along the lines of risk management. In the case of major damage the businesses may be jeopardized by existential problems. Low risks are usually not insured. In the category of medium risks, whether to purchase insurance or not is a difficult decision. The incidence of a number of moderately severe damage in a relatively short period of time may again cause existential problems to the business entity. Techniques to reduce and eliminate business risk can be according to Vaughan and Vaughan (2008) divided into two basic groups of procedures aimed at removing or eliminating the causes of risks and those aimed at reducing the adverse consequences of realized risks. For entities doing business in agriculture, which are mainly threatened by the realization of natural hazards, a partitioning of risk, insurance of risk and diversification of production structure are useful. Other ways to reduce business risks in agriculture cannot be considered in a larger extent.

Core risks that determine decision-making and management of a business entity operating in agriculture are stipulated by Vávrová (2005). The most serious and also the best way covered by the insurance, there are the risks related to climate and production. These risks are manifested in two basic production activities: in crop production as the risks associated with crop production, and in livestock production as the risks associated with damage to livestock. Insurability / non-insurability of risk is determined by the availability of statistical data on the occurrence and extent of risks at national or even better at European level, the vulnerability of the risks and the possibility of determination of incurred damages. Risks are deemed uninsurable if their premium rate reflecting the probability of risk cannot be calculated due to the lack of statistical data, if they may be influenced positively or negatively by insured subjects and if the damages incurred cannot be specified sufficiently (e.g. drought). Out of the range of risks associated with agricultural production in the Czech Republic, the natural losses are insurable - hail, fire, floods, inundations, gales, spring frost, winter freezing injury etc. In livestock production, the insurance covers the risk of disease, i.e. infectious diseases, and other collective and individual livestock damages - accidents, non-infectious diseases, natural losses, etc.

Methodological foundation of this paper is presented by studying of published studies and documents available in the investigated area, out of which using the comparative analysis, inductions and synthesis of knowledge possible connections and differences in current forms of covering risks associated with agricultural production on the commercial insurance market in the Czech Republic in relation to risk profile were identified and discussed.

Among of indicators used to determine the level of the insurance market and determinants of insurance industry development (see Brokešová, Pastoráková, and Ondruška, 2014), primarily the insurance indicators evaluating the performance of insurers and insurance market development are used in the paper, including written premium, insurance benefits, claim performance (loss frequency / loss ratio), and the number of commercial insurers. Insurance penetration (insuredness) belongs to the basic insurance indicators, which represents the proportion of the insured crop area on total area in hectares and percentage of the insured livestock on their total number in the Czech Republic.

Relationship used for claim performance which is also known in the practice of commercial insurers as loss frequency or loss ratio is according to Cipra (2006):

*claim performance = total insurance benefits in the respective year / total premiums written in the respective year * 100*

3 Results and Discussion

Development of the number of insurance companies in the Czech Republic after the demonopolisation of the Czech insurance market in 1991 is shown in Table 1, along with the number of insurance companies offering agricultural insurance.

Table 1 Development of the number of commercial insurance companies in the Czech Republic in years 1991-2013, including insurance companies offering coverage of agricultural risks

Year	Total number of commercial insurance companies	Insurance companies offering agricultural insurance
1991	3	1
1992	12	1
1993	20	1
1994	27	1
1995	35	4
1996	35	10
1997	40	10
1998	41	10
1999	43	9
2000	41	9
2001	43	8
2002	42	8
2003	42	8
2004	40	7
2005	45	7
2006	49	4
2007	52	5
2008	53	5
2009	53	5
2010	53	4
2011	54	5
2012	53	7
2013	52	7

Source: Author's elaborate based on the annual reports of the Czech Insurance Association (ČAP, 1994-2013), Czech National Bank

In 2013, the following insurers provided crop and livestock insurance to farming enterprises: Allianz pojišťovna, a. s., Česká pojišťovna a. s., ČSOB Pojišťovna, a. s., člen holdingu ČSOB, Generali Pojišťovna a. s., Hasičská vzájemná pojišťovna, a. s., Kooperativa pojišťovna, a. s., Vienna Insurance Group, and Agra pojišťovna, a subsidiary of the Austrian insurance company Die Österreichische Hagelversicherung VVaG. This parent insurance company has been providing insurance protection for farmers in Austria for more than 65 years. Its legal form is a mutual insurance association; therefore it does not strive to maximize its profits, but to offer a reliable and permanent insurance protection for farmers. It insures currently more than 85% of agricultural land in Austria.

Extent of crop insurance and livestock insurance in the Czech Republic in the years 2004-2013 measured by premiums written in thousands CZK is stated in Figure 1.

Figure 1 Development of the agricultural insurance in the Czech Republic in years 2004-2013 (in thousands CZK)
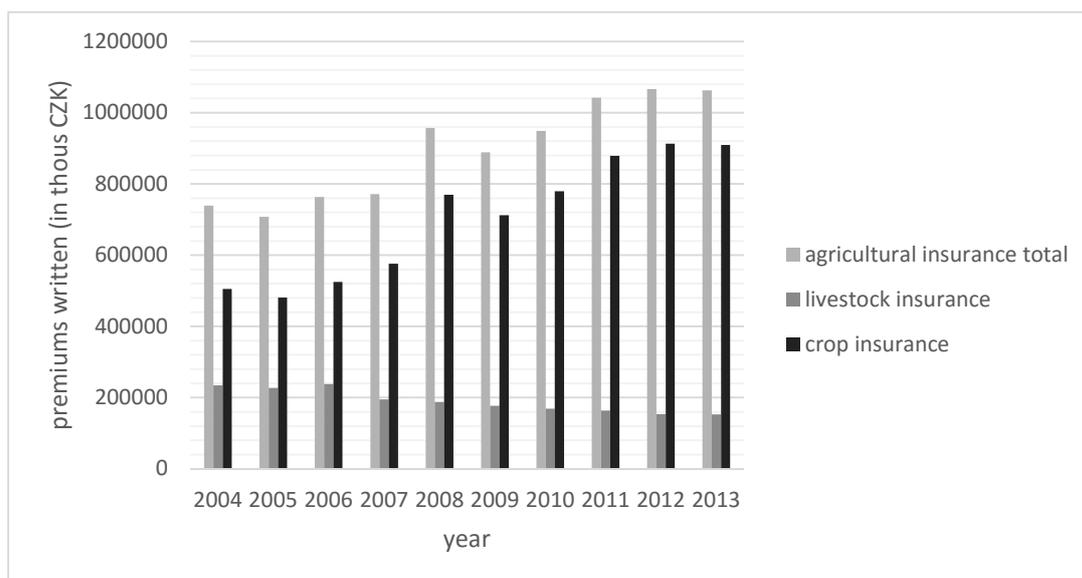
Source: Author's elaborate based on data of the PGRLF (2004-2013)

The stipulated commercial insurance companies, except Agra insurance company, which began to assert itself on the insurance market in the Czech Republic in October 2006, operate within the frame of Czech Insurance Association (ČAP). All above named insurance institutions offered insurance products and their combinations for crop production and livestock production commodities according to their specific insurance conditions given in insurance policies that cover most of the climate risks and infection risks occurring in the Czech Republic. Uninsurable risks in the Czech Republic, especially drought, remain out of insurance coverage.

The insurance indicator insurance penetration (insuredness) represents the proportion of the insured crop area on total area (in hectares) and percentage of the insured livestock on their total number in the Czech Republic. Insurance penetration in the Czech Republic in the years 2004-2013 in per cent is stated in Figure 2.

Figure 2 Insurance penetration in the Czech Republic in years 2004-2013 (in per cent)
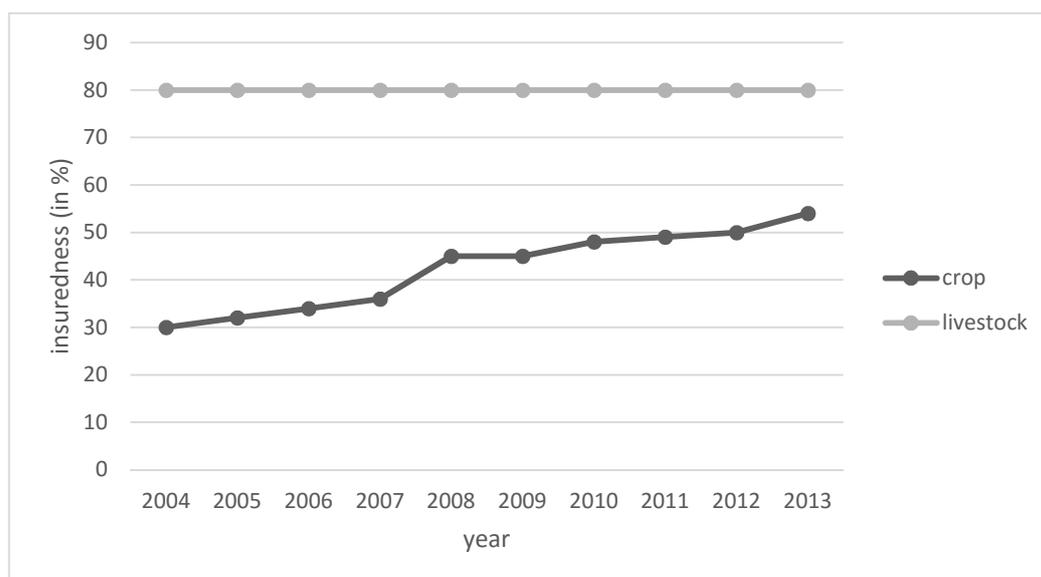


Source: Author's elaborate based on data of the PGRLF (2004-2013)

Claim performance of the agriculture insurance market in the Czech Republic in years 2004-2013 is calculated by the author based on data of total insurance benefits of the agriculture insurance in the respective year and total premiums written of the agriculture insurance in the respective year, and processed graphically, as seen in Figure 3.

Figure 3 Claim performance of the agriculture insurance market in the Czech Republic in years 2004 - 2013
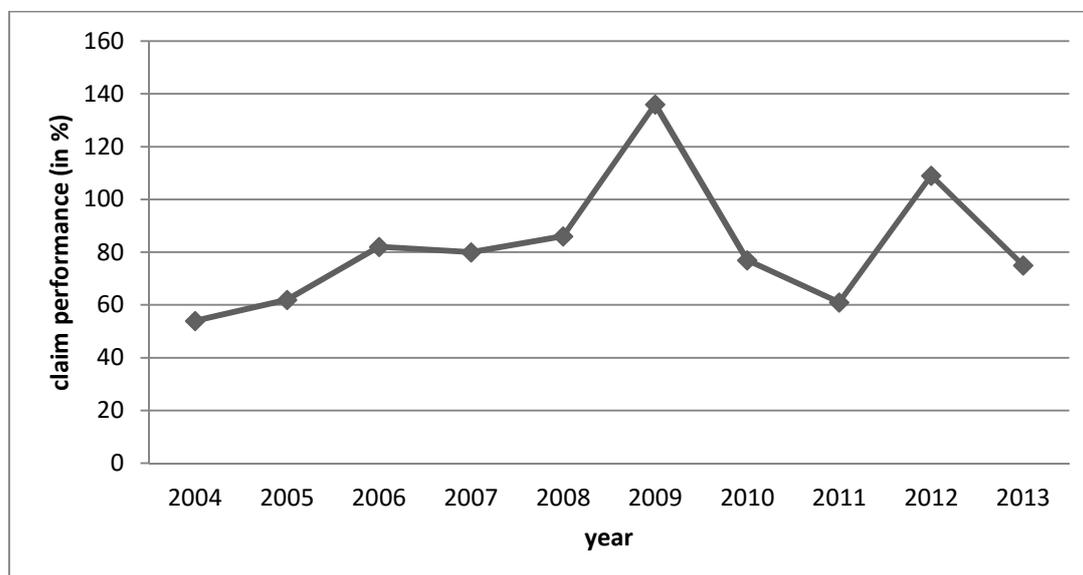
Source: Author's calculation and graphical processing

Ministry of Agriculture of the Czech Republic provides a state aid for some of the proven cost paid for the insurance premiums of enterprises in agriculture through the Support and Guarantee Agricultural and Forestry Fund (PGRLF). For 2013, the state aid from PGRLF programs amounted to 18% of paid premiums for crop insurance, 50% for insurance of selected special crops, 50% of paid premiums for livestock insurance and 30% for insurance of growing forest seedlings. The positive effect of aid from PGRLF programs was proved by insurance penetration/insuredness of Czech farmers, as seen in Figure 2. Yet almost a half of crop production still remains uninsured.

In 2013, the agricultural enterprises and entrepreneurs in agriculture were provided with the aid amounting up to 18% of proven reimbursed crop insurance costs, up to 50% of insurance costs for selected special crops and up to 50% of proven reimbursed cost of livestock insurance against infections and other mass diseases within the aid programs under the Support and Guarantee Agricultural and Forestry Fund (PGRLF). The agricultural insurance support system had to adapt to the Directives of the European Commission (cf. Špička, Boudný, Janotová; 2009); therefore, since 2007, state support of insurance only applies to small and medium enterprises and cannot be granted to companies engaged in agricultural products processing. The ratio of state support of crop and livestock commodities insurance has been regularly granted year by year since 2004, as evident from the time series in Table 2.

Table 2 Percent of state aid for reimbursed insurance costs in the Czech Republic in years 2004-2013 (in per cent)

	2004	2005	2006	2007	2008
Livestock insurance	15	15	20	20	20
Crop insurance	30	30	35	35	35
Special crop insurance			50	50	50
Insurance of growing forest trees					

	2009	2010	2011	2012	2013
Livestock insurance	50	50	47	40	50
Crop insurance	50	50	47	17	18
Special crop insurance	50	50	50	50	50
Insurance of growing forest trees	30	30	30	30	30

Source: Author's elaborate based on the annual reports of PGRLF (2004-2013)

Agreements with the Support and Guarantee Agricultural and Forestry Fund to promote and cover the cost of premiums were concluded by all the aforementioned insurance institutions in 2013.

The insurance penetration / insuredness of livestock has remained at about 80% in the long term, as seen in Figure 2. The area of land insured increased. Insuredness of crops reached 54% in 2013, which means a regular annual increase (cf. Figure 2).This positive trend of insurance extent is influenced primarily in the crop insurance by concerns of the entrepreneurs in agriculture about fluctuations in weather and climate change, and in particular insurance subsidies. Agra insurance company, whose primary and sole business is the agricultural insurance, offers products that influence the insurance market in a positive way. Its activities in the Czech Republic started in October 2006. It has also been active in Slovak Republic since 2008 and in the Hungarian insurance market since the beginning of 2009. Despite the above mentioned facts, insuredness of crops in the Czech Republic has not yet achieved the level of insurance penetration (insuredness) of crops in most European Union countries.

The system of agricultural insurance compatible with EU rules and the WTO would include establishing a fund for uninsurable risks, which would substantially reduce the need for one-off state aid in the event of catastrophic natural disasters, has failed to be realized in spite of all initiatives by specialized insurers, mainly due to administrative and legislative demands within this process. However, it was included in the approved "Concept of Agrarian Policy for a period following accession to the European Union (2004-2013)".

4 Conclusions

Insurance as a factor limiting and reducing uncertainty in the business of agriculture is economically justified. It helps to mitigate, remove and split risks among entities. Insurance usually covers only a part of the damage that occurs to the insured business entity. Insurance is an active and viable tool for business stability, regulates and corrects the severity of risk occurrence and allows the business continuity in the event of total loss of production. Especially for these functions and features the agricultural insurance scheme is to be promoted and developed for the good of the whole society.

The insurance market in the Czech Republic regarding the agricultural insurance has undergone quite a difficult period over the past more than twenty years; several insurance companies ceased their activities on crop insurance and livestock insurance, as evidenced by the results of this paper. The reason was and still remains the economic situation of agriculture production, which creates no prerequisites for the significant increase of insuredness, and disappointing results in crop insurance in relation to manifestations of climate change associated with more frequent extreme weather events, in particular, frequent occurrence of severe hail and floods in recent years. Insurance market was at the same time negatively affected by a substantial increase in reinsurance premium prices.

Agricultural insurance systems are a rational, comprehensive and systematic way to control risks associated with agricultural production and they are an integral part of an agricultural enterprise in developed countries. Agricultural insurance falls into the non-life insurance branch; it is a part of property insurance and shifts risk from the insured entity to insurers for a fee, i.e. for premium, which represents mainly the cost of compensation

for possible damages. Businesses in agriculture pay an adequate amount as premiums and the payment of premiums is included in their costs.

Insurance introduces an objective system of loss compensations in agriculture because insurance systems ensure rapid, guaranteed in advance and contractually agreed compensation for farmers for the potential realization of risks from sources of commercial insurance companies. Neither state support for agricultural insurance affects the principles of competition; it is not directly linked to the volume of agricultural production and is in line with agricultural state policy.

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The Long-term Assets Reporting in the Czech State Administration Organizations

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Abstract: This paper deals with the long-term assets reporting in the area of the Czech state administration organizations. The long-term assets represent a significant part of the total assets of the public sector entities generally therefore they also require substantial amounts of budget resources. The paper describes the current state of the long-term assets reporting in the Czech state administration organization and analyses the long-term assets figures and their trends. Thanks to the proceeding public finance reform the long-term assets data are prepared under the accrual basis from 2011 in the whole Czech public sector. Moreover these data are revealed to external users obligatorily which both increase their information capability and transparency. On the other hand preliminary findings suggest that these data still are not used for decision-making purposes sufficiently. The main aim of the paper is to summarize findings concerning the long-term assets reporting in the Czech state administration entities and to determine some developmental trends and coherences. As main data sources the paper uses an informational portal of the Ministry of Finance of the Czech Republic, relating legal regulations and scientific papers.

Keywords: long-term assets, reporting, state administration, financial statements, accrual principle

JEL codes: H83, M48, M41

1 Introduction

Traditionally the public sector organizations prepared accounting data under the cash basis and the same state prevailed in the budget area. This situation started to change at the end of 80th of the last century in connection with the new public management implementation. Hood (1991) for example characterized this process among the first as an attempt to introduce performance indicators to the public sector, to decrease expenses of the public sector activities and to improve its financial control. In this connection a barrier of insufficient data sources has arisen because information about past events was rather limited. Under the cash basis mostly budget incomes and outcomes (expenditures) were recorded. As a consequence some expenses, liabilities and long-term assets data were missing.

Therefore from 90th of the last century majority of developed countries have decided to transfer from the cash to the accrual basis of accounting in the public sector. In essence it meant to implement a business accounting methodology to the area of the public sector. This process was methodically supported by OECD, International Federation of Accountants or later by European Commission and it had both supporters and opponents from the very beginning. Among the supporters may be mentioned for example Pina and Torres (2002) who advocate the accrual basis and possible advantages of accrued accounting information they see in improved management, control and analytical process. Lüder and Jones (2003) then support theoretically European reforming process and compare it in single countries.

Carlin (2005) on the other hand summarizes main arguments of the accrual accounting opponents. Mainly they lie in an argument that both business and the public sector have significantly different aims, markets and nature of sources. Further there exist some remarks to possible distortions in the case of an application business accounting

appraisal methods to the public sector area, a weak link between data transparency and real performance improvement or better budget sources allocation.

Nevertheless the above mentioned arguments the accrual basis was implemented gradually to financial accounting of practically all developed countries till present days which improved information capability of accounting data provably. On the other hand the cash basis still remains in the area of the budget process setting which makes budget planning harder (Vodáková, 2012).

The Czech Republic similarly as other developed countries has decided to implement the accrual basis to the public sector accounting in 2005 when an intention of the integrated state finance system creation was announced for the first time officially. Till 2010 then a basic legislative framework of the accounting reform was set which encompasses amendments of the Act No. 563/1991 Coll. on Accounting, several executive decrees and concurrently created accounting standards. In 2011 financial statements of the public sector units were prepared under the accrual basis for period of 2010 for the first time (Hrůza and Valouch, 2014). Moreover these data were revealed to the public via the internet which increased their transparency positively. More than 18 000 accounting units from the area of the state and the local administration have inserted financial statements to this integrated system and they used the same accounting methodology which enabled analysis and mutual comparison. From 2011 the system is supplemented by new accounting and other (especially budgeting) data and it is at various external users disposal.

It can be stated that thanks to the accounting reform, the information capability of accounting data increases evidently. Accrued long-term assets data are modified through depreciation process at present and depreciations are included to expenses. The question remains whether these data are used for managerial purposes of the state administration decision-makers, i.e. mainly in the budget planning process or for performance evaluation purposes.

2 Methodology and Data

This paper deals with the long-term assets reporting in the area of the public sector, more precisely in the state administration units. Its content is divided into four chapters. The first chapter introduces a brief review of a historic development of financial accounting and reporting in the public sector. The second chapter describes the aim of the paper, used scientific methods, limiting conditions and main data sources. The third chapter summarizes main findings of the paper and comments some questionable points. Principal conclusions are formulated in the fourth chapter finally.

The aim of the paper is to find out a real situation in financial reporting of the long-term assets in the state administration organizations and in utilization of the long-term assets data for managerial purposes. Two main research questions are following:

- What is a structure and a content of accounting data relating to the long-term assets and reported in financial statements of the state administration organizations?
- What are current trends of the long-term assets development and their utilization for managerial purposes?

Description, analysis, comparison and synthesis were used as basic scientific methods in the paper. With respect to a considerable extent of the public sector the paper is limited to the state administration observation only. There are several reasons for this decision. The first one lies in importance of the state administration as a significant user and redistributor of budgetary sources. The second one is connected with our former research orientation and findings in this area which enables us a possibility of time comparison. For purposes of the second research question the paper is further limited to the specific ministries as representative sample of the state administration organizations. Utilization of the long-term assets data for managerial purposes is considered from the point of

view of budget distributor, i.e. from the point of view of allocation efficiency improvement.

As main data sources mainly scientific papers relating to financial reporting of the public sector were used for review of historical development. Further relating legal regulations and the Ministry of Finance of the Czech Republic data were gathered, analyzed and summarized for the purposes of the third chapter.

3 Results and Discussion

This chapter summarizes main finding concerning the long-term assets reporting in financial statements of the state administration units. The first part of the chapter describes the structure and the content of reported data. The second part of chapter introduces some long-term assets actual trends and main findings concerning the long-term assets data utilization.

The Structure and the Content of Reported Long-term Assets Data

From 2011 the state administration units prepare financial statements under the accrual basis that encompass a set of following statements:

- Statement of financial position,
- Statement of financial performance,
- Notes,
- Statement of cash flow,
- Statement of changes in owners' equity.

Unlike businesses all above mentioned statements are prepared compulsorily. Basic information concerning the long-term assets amounts and their structure can be found at the statement of financial position as usual. In this statement the total long-term assets are classified in accordance with an amended Decree No. 410/2009 Coll. to intangible, tangible and financial assets. Unlike the businesses further the long-term receivables are included into the long-term assets too. The long-term receivables contain long-term loans provided, long-term prepayments provided and others. Decisive utilization period for categorization an asset as the long-term is one year as usual. The obligatory form of the statement of financial position is specified in Annex 1 to the above commented decree.

Values of the log-term assets are presented for the present accounting period and the past accounting period which enables mutual time comparison. Values for the present accounting period are introduced in the gross values (acquisition cost) and net values (book value) too. Also their difference (provisions) is presented in a separate column. Obligatory pricing methods are given mainly in the Act No. 563/1991 Coll. on Accounting and generally they respect the historical cost convention. Purchased intangible and tangible assets should be evaluated at their cost including all costs related with their acquisition. Also purchased receivables and financial assets should be evaluated in cost related with their acquisition. Intangible and tangible assets capitalized are evaluated in cost expended. Receivables except for purchased are stated at nominal value. In other cases realizable value should be used.

In comparison with businesses moreover a fictive price of 1 Czech Crown could be used for evaluation of so called heritage assets. These assets include historic monuments, art collections, collectors' items, religious buildings, natural heritage and others and their real value is very difficultly detectable. While till 2010 these assets were not registered in majority of the state administration units at all from 2011 they should be evaluated either at their cost (if possible) or at the fictive price 1 Czech Crown and recorded in financial statements. The aim of this practice is to monitor all the state administration assets. On the other hand it is evident that a fictive price may differ from a real value of an asset significantly which may be misleading. Fictive price utilization should be described in notes naturally.

Further data concerning the long-term assets can be found in the statement of financial performance. The mandatory form of this statement is revealed in Annex 2 to Decree No. 410/2009 Coll. Unlike the businesses only one form of the statement is authorized and it comes out from generic classification of revenues and expenses. Revenues and expenses are presented separately in it. In expenses information concerning cost of the long-term assets capitalized can be find. This is a significant difference from businesses where this item is recorded in revenue. Also maintenance, real estate tax, book value of the long-term assets sold and a consumption of the low-value assets can be found in expenses.

One of the most important information related to the long-term assets utilization represent depreciations. They are also included in the statement of financial performance and of course in the statement in financial position (provisions column) and the statement of cash flow. Basic rules regulating depreciation process in the state administration units are set in the Czech Accounting Standard No. 708. This standard admits three depreciation methods, i.e. the straight-line method, composite method and the units-of-production depreciation method, or their combination. According to the notes analysis and other accessible materials it seems that vast majority of the state administration units use the straight-line depreciation. The standard No. 708 further classifies assets into seven depreciation groups and sets useful life of assets generally which oscillates between 5 and 80 years. Depreciations figures can be find in financial statement from 2011 and they contribute to fairness of statements provably. It seems that thanks to utilization of the same depreciation method and obeying similar useful lives they also enable comparison among various units of the state administration.

In the statement of financial performance provisions related to the long-term assets and differences coming out from revaluation of the long-term assets are also included. In revenues then income from hire and sale of the long-term assets can be found. Form of the statement of cash flow is obligatory too for the state administration units and it is published in Annex 3 to Decree No. 410/2009 Coll. Besides depreciations amount and net income from the sale of the long-term assets, mainly part B (cash flow from investing activities) is devoted to the long-term assets. Obligatory form of the statement of changes in owners' equity is published in Annex 4 to Decree No. 410/2009 Coll. and especially its part III (transfers to the long-term assets acquisition) belongs to observed group of assets. It classifies according to their sources. Finally the notes (Annex 5 to Decree No. 410/2009 Coll.) supplement required information. Unlike businesses also the form of the notes is obligatory and it can offer information concerning a detailed structure of land, buildings and low-value assets, contingent liabilities and assets relating to the long-term assets, transfers to investing area, revaluation of the long-term assets sold and others.

To summarize it can be stated that thanks to transfer to the accrual basis the range of reported long-term assets data enlarges and their information capability increases. Also data transparency improves and thanks to methodology harmonization enables time and sectoral comparison. The Czech accounting regulations for the public sector entities seem to follow recommended international generally accepted principles surprisingly more faithfully than in the case of businesses in some aspects, i.e. reporting of the long-term assets capitalized or the long-term receivables. Financial statements of the state administration units are presented electronically to external users via the Ministry of the Finance of the Czech Republic web portal and they are supplemented by other (mostly budgetary) data. The system offers also some analysis. Unfortunately a web structure has changed recently which may be more user-friendly but the notes are not published anymore.

The Long-term Assets Current Data and their Utilization

Table 1 shows the long-term assets data reported by particular ministries from 2010 to 2014. Data are presented at net values. As the table implies the total long-term assets recorded by all 14 ministries represent more than 1 155 billion Czech Crowns in 2014. Surprisingly, this figure decreased by 138 billion Czech Crowns in comparison with 2010 only though depreciations were launched in this period of time for the first time. This

contradicts some transition countries experience how Ellwood (2002) suggests. In the United Kingdom for example net value of the long-term assets decreased by almost 50 % mostly for the reason of depreciation implementation. The situation may have more reasons and it would be worth of a further survey. The lowest value the long-term assets was recorded in 2012 (an influence of depreciations) and then it started to increase again. However the situation differs among particular ministries of course. The values of the long-term assets decreased markedly in the Ministry of Defence, the Ministry of Agriculture, the Ministry of Interior or the Ministry of Justice. On the other hand in the Ministry of Finance higher decrease was not recorded probably thanks to evidence of the financial assets.

As given figures suggest the highest values of the long-term assets are recorded by the Ministry of Transportation (469.7 billion Czech Crowns, i.e. 40.7 % of the total long-term assets), the Ministry of Finance (279.1 billion Czech Crowns, i.e. 24.2 %) and the Ministry of Defence (113.8 billion Czech Crowns, i.e. 9.9 %). These three ministries together control 74.8 % of the total long-term assets. On the other hand the lowest values of the long-term assets were reported by the Ministry of Regional Development (1.5 billion Czech Crowns). As for the structure of the long-term assets the most important items in the case of the Ministry of Transportation are buildings and infrastructure (including those under construction), in the case of the Ministry of Finance other long-term financial assets and receivables and in the case of the Ministry of Defence buildings, vehicles and military systems. Similarly depreciations data and data concerning purchase and sale of the long-term assets are at disposal for five year time period. With respect to limited extent of the paper however it is not possible to present them all.

Table 1 The long-term assets of particular Czech ministries in mil. Czech Crowns

Ministry	2010	2011	2012	2013	2014
Ministry of Foreign Affairs (MoFA)	18.284	13.922	13.355	13.145	13.121
Ministry of Defence (MoD)	205.927	125.545	126.979	120.904	113.828
Ministry of Finance (MoF)	273.981	288.203	236.283	257.385	279.082
Ministry of Labour and Social Affairs (MoLaSA)	29.746	19.574	14.551	14.350	14.113
Ministry of Interior (MoI)	78.143	51.295	48.009	46.421	44.067
Ministry of Environment (MoE)	11.170	10.965	10.945	20.121	42.315
Ministry of Regional Development (MoRD)	1.533	985	1.024	1.031	1.493
Ministry of Industry and Trade (MoIaT)	15.512	16.692	18.283	18.153	18.817
Ministry of Transportation (MoT)	521.358	452.115	463.397	467.720	469.691
Ministry of Agriculture (MoA)	23.806	7.892	6.664	32.809	31.476
Ministry of Education, Youth and Sports (MoEYaS)	9.399	10.607	44.197	39.211	32.937
Ministry of Culture (MoC)	14.775	15.418	15.728	16.069	16.982
Ministry of Health (MoH)	58.067	57.675	56.987	57.111	57.176
Ministry of Justice (MoJ)	31.480	20.683	20.613	20.422	20.106
Total long-term assets	1.293.181	1.091.571	1.077.015	1.124.852	1.155.204

Source: Own, based on the Ministry of Finance of the Czech Republic data (2015)

As former data suggest the Government and the Parliament of the Czech Republic may dispose by relatively wide long-term assets database from 2011. The question is whether these data are used for managerial purposes sufficiently. According to accessible information it seems that the Government intends to use accrual accounting data for

several purposes (MoF, 2013). The first one is monitoring and control of the state administration performance. The second purpose is standards setting and the third one is utilization of accrual data within the budget planning process.

For these reasons the Government of the Czech Republic has introduced three so called key analytical indicators for performance evaluation of the state administration units in 2013 (MoF, 2013). In fact these indicators represent simple financial ratios coming out from accounting data. It is evident that their intention is to compare and control important kinds of expenses and assets. One of indicators refers to the long-term assets directly. It is designed as a ratio of "selected controllable operational expenses" to the tangible and intangible long-term assets in acquisition cost, i.e. gross value. In 2013 the construction of the indicator has got through some methodical changes which may limit possible time comparison. As selected controllable expenses are identified energy consumption, maintenance, the long-term assets capitalized and shortages at present which means an important change from 2013 when also material cost, other services and operational expenses were applied. The indicator is computed as a percentage.

It seems that key analytical indicators may be used comfortably for above given purposes because they are simple, come out from relevant database and enable time and mutual comparison. However they cannot evaluate performance of ministries, but their expenses at the most. Performance is understood as an output of activities therefore it can be monitored through efficiency indicators only. Expenses and their ratios can refer to inputs only. For that reason it would be desirable to supplement a system of existing indicators by those relating to outputs; even if they were only descriptive or qualitative.

In the case of standards setting indicators may be used successfully for the field of expenses. However it would be needed to collect longer time-series and exclude an influence of changes in indicators construction. Standards could be adjusted separately for specific ministries or further modified inside of ministries. Creation of homogenous groups of units seems slightly debatable in the case of ministries thanks to unique character of their activities.

The third possible utilization of indicators lies in a budget creation process. The Ministry of Finance of the Czech Republic states that indicators were used for this purpose in 2015 firstly with no other closer comment. It seems that possible utilization of indicators in the process of budget creation may be complicated by diverse methodology used for preparation of accounting and budgeting data. While accounting data used for indicators calculation are prepared under the accrual basis, budget data are still prepared under the cash basis though some partial cross-walk list is created. The second problem is we still talk about expense indicators and the budget should be planned according to main aims and tasks of units (planned outputs) and not according to their past expenses.

Ratio of selected controllable operational expenses to the tangible and intangible long-term assets in acquisition costs is probably the worst comparable of all three above mentioned indicators. The reason lies in unique activities of particular ministries that prove probably also a specific demand for long-term assets endowment. But still time comparison, comparison with a standard or the median may be beneficial. Budget decision-making process may be also supported by other accessible data (such as capital expenditures). Figure 1 illustrates development of the ratio of selected controllable operational expenses to the long-term assets in acquisition costs in particular ministries. Median of the ratio reaches 1.185 % in 2014 and it means a mild decrease in comparison with 2013 (1.84 %). The lowest value of median occurred in 2012 (1.775 %) however recorded differences seem to be immaterial.

The highest values of the ratio were recorded in the Ministry of Justice (3.16 %), the Ministry of Culture (3.15 %) and the Ministry of Health (3.04 %) in 2014. The lowest values occurred in the case of the Ministry of Agriculture (1.02 %), the Ministry of Environment (1.16 %), the Ministry of Industry and Trade (1.2 %) or the Ministry of Foreign Affairs (1.28 %) in 2014. Values of the ratio and its trends are influenced by the total amount of tangible and intangible long-term assets and of course sources that were

spent on energies, maintenance, work capitalized and shortages. It seems that in comparison with 2013 energy consumption slightly decreased in majority ministries. Highest values were recorded in the Ministry of Health, the Ministry of Interior, the Ministry of Defence and the Ministry of Justice. Work capitalized and shortages are negligible in majority cases, the highest values of maintenance were reported in the Ministry of Transportation, the Ministry of Defence and the Ministry of Health that recorded also the highest values of shortages.

Figure 1 Ratio of selected controllable operational expenses to the long-term assets (%)
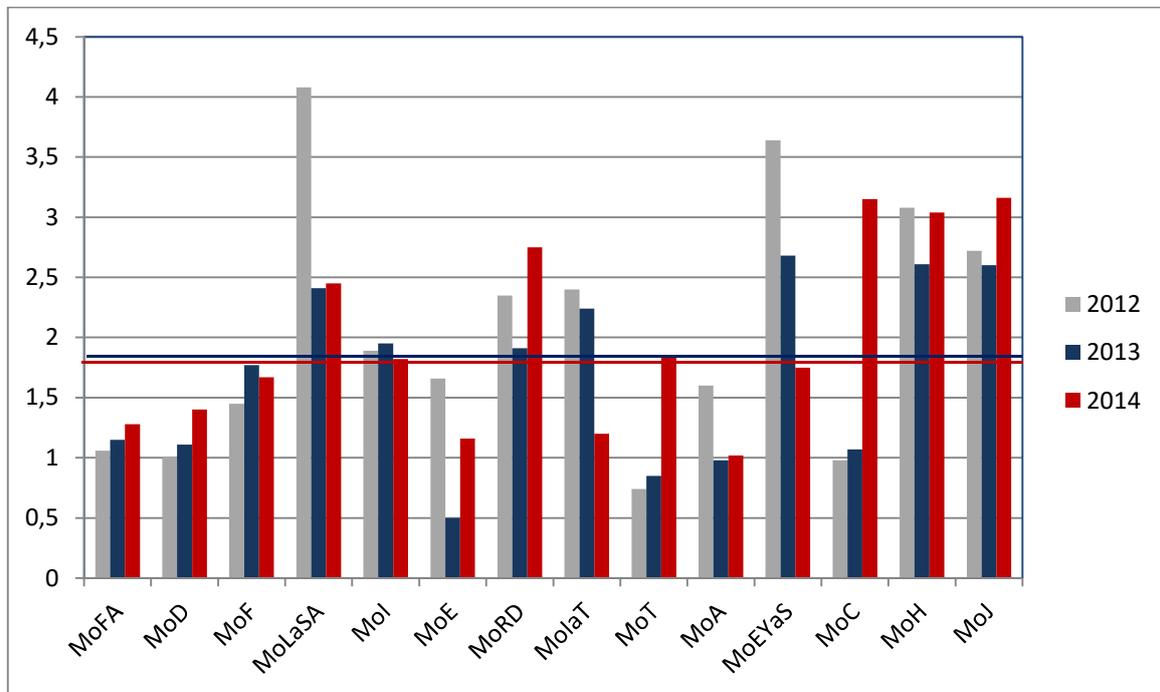
Source: Own, based on the Ministry of Finance of the Czech Republic data (2015)

Time trends of the ratio vary among particular ministries and for the reason of changes in its construction it is difficult to deduce any comments. Longer time series would be needed for closer analysis and standard setting. The highest differences in time values of the ratio were reported by the Ministry of Culture, the Ministry of Education, Youth and Sports and others.

4 Conclusions

The paper deals with the long-term assets reporting in the state administration units. The long-term assets constitute an important part of the total assets, they require significant budget resources and significant expenses are connected with their utilization too. From 2011 the long-term assets data are prepared under the accrual basis and they are revealed to external users annually. Their information capability increases and the range of data disclosed enlarge. Thanks to methodology harmonization and standardized content of the financial statements comparative possibilities increase too.

In 2013 an intention of accrued accounting data utilization was announced for the first time when the Government of the Czech Republic chose three key analytical indicators. These indicators are meant to monitor and control the state administration units, to evaluate their performance and to serve within the budget planning process. One of indicators refers to the long-term assets directly and though some its applications may be debatable it can still be used for analytical or standard setting purposes.

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What is the Future of Public Expenditure in the European Countries?

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Abstract: The 20th century experienced major changes in the structure and conception of the welfare state, mainly as a result of demographic, economic and social changes. This was accompanied by a multiple increase in public expenditure in the social sector and the welfare state has found itself in a crisis since the 1990's. Given the fiscal unsustainability of the present social systems, measures and reforms addressing the fiscal crisis of the welfare state are being introduced. The European Union introduces some measures at the central level; however, the social systems in the individual countries are unique and historically shaped. The current keynote is to narrow down the role of the state to the provider of basic social protection and encourage the general public towards more responsible behaviour. The objective of this paper is to assess the current social expenditure of the EU member countries (compared to the OECD) and identify their fiscal trend, including the assessment of social expenditure in selected countries.

Keywords: welfare state, public expenditure, financing, crisis of welfare state, social reform

JEL codes: H53, I39

1 Introduction

Since the past century, the European countries have gone through major social reforms. At the end of the 19th century, Europe was one of the most dynamically developing continents in terms of social risk protection. The European welfare state started evolving. Approaches to the social state definition differ amongst the authors. German economist and social scientist Manfred Spieker (1996) understands the welfare state as "*a state endeavouring to provide its citizens with protection from direct risks originating from sickness, disability, old age and unemployment*". In a broader sense of the word, a „*state endeavouring to provide not only social security but also social justice, social integration and social freedom.*"

British economist Nicolas Barr (2004) in his book Economics of the Welfare state explains the mission of the welfare state. "*Social state exists to improve the welfare of people who are weak and vulnerable, by providing social benefits, and to those who are not weak and vulnerable it provides social and health insurance and organises school education.*"*(Baar, 2004)*

American social scientist Harold L. Wilensky (Večeřa, 2001) defines the substance of welfare state as "*a government-protected minimum level of income, subsistence, health, housing and education for each citizen as a political right, not as a charitable allowance* ". This definition is related to the welfare state expenditures which include all government outlays on social matters, education, health, and expenditure on housing and social infrastructure. (Kubátová, 2011)

Leading personalities in the process of the welfare state formation and development were Otto von Bismarck in Germany and Lord William Henry Beveridge, who established a comprehensive, well-functioning social security system in Great Britain and laid philosophical foundations of the welfare state as well as the term "welfare state" itself.

Over a hundred years, the welfare state went through several stages, starting from the first insurance company systems through the "golden era" of the 1960's to the current welfare state crisis. Evolution of the social systems in the individual countries differed to a large extent with respect to the voluntariness, i.e. insurance cover obligation related to various losses. The oldest compulsory insurance concerned occupational accidents and was introduced in several European countries before the end of the 19th century. On the contrary, unemployment insurance was often voluntary and in most cases became compulsory after WWI. Compared to the European countries it must be stressed that liberal countries such as the USA and Canada established and developed the welfare state with a delay of several decades. (Večeřa, 2001)

The period of social expansion (1962 – 1973), sometimes also called "the golden era of welfare state", is characterised by growing productivity and related rising standard of living of all social classes and high employment rate, in some Western countries up to almost full employment rate. Thanks to sufficient funds, the number of social benefits increased along with the amounts as well as the share of social expenses in the GDP. (Smutek, 2005)

During the 1970's, the welfare states started gradually stagnating with the main reason being the oil crisis which brought about an economic crisis and major increase in the unemployment rate. While some countries reached up to 5 % annual GDP increase in the previous decades, the economic growth in mid-70's slumped to negative figures. The GDP drop was followed by a major increase in unemployment rate and higher inflation rate. The governments came up against great pressures of rising social expenditure related mainly to unemployment and other benefits. Given the setup of the social systems in the past and the very limited possibilities of limiting some of the public expenditure, i.e. in health system, education, social services, the increasing public expenditure share was accompanied by public debt. As a result of these as well as other factors such as the commencing population changes and population aging, the welfare states started struggling with the crisis which principally persists to date. (Smutek, 2005)

Although there are common features in the evolution of the welfare state in the individual countries, for example the growing role of the state in social policy, rate of redistribution and provision of social services, there are also many differences between them. The scope of social services differs depending on the economic conditions of the state, traditions, values and historic development. Currently, there are several welfare state typologies, literature most often quotes Danish social and political scientist Esping-Andersen, who divides welfare states based on the conception of solidarity amongst the citizens into three basic model: social – democratic, liberal and conservative- corporatist. British social scientist Titmuss divides the welfare state according to the criteria into residual, institutional and performance types. Mishra's typology is based on the criteria of the rate of coordination of economic and social policy and distinguishes between two types of welfare state: integrated and desintegrated. (Musil, 1996) Another typology is specified by Czech social scientist Jan Keller, who divides welfare states into four groups: continental, Scandinavian, residual and rudimentary. (Keller, 2009)

The objective of the welfare state and the reason for its establishment was to protect families and individuals against social risks in the society. Traditionally, this concerns adequate income to cover basic needs at the time of sickness, old age, unemployment etc. Besides these traditional social risks, new risks started being discussed in the 1980's, associated with the onset of post-industrial society and globalisation. The most significant problems appear to be demographic changes, changes in the labour market, changing substance of the family and, first and foremost, lack of funds to operate all types of the welfare state related with all other risks.

The original welfare state was built upon three main pillars and the new social risks appear in all those three areas:

- Well-functioning labour market,
- Coherent and stable family

- Provision of social income in case of need.

The European social model is a topic to be discussed amongst experts on social and mainly fiscal policy. Most experts agree that given the demographic indicators and fiscal crisis of economy it is necessary to change the view of the welfare state in Europe. Discussion over the welfare state phenomenon does not concern its existence as such but rather how it should work: to what extent, in what arrangement, and how efficient it should be in the long run (Wildmannová, 2013). All this has an effect on financing and exercises a pressure on the fiscal budgets.

2 Methodology and Data

The objective of this paper is to assess the dynamics of the current social expenditure of the EU member countries and identify their fiscal trend, including the consideration of budgetary expenditure in selected countries. To assess the trend, France and Great Britain were selected. The reason for selecting these countries is based on the premise that these are countries with a traditional social policy.

The assessment of the current fiscal trends requires an analysis of social expenditure in a time series in the individual countries of Europe. We mainly draw upon the Eurostat and OECD databases. First and foremost, we also need to identify the main directions affecting the fiscal pressures in European social policies.

The paper is mainly centred around the opinions of leading European experts on welfare states, EU strategic documents and Eurostat and OECD statistics.

3 Results and Discussion

It is also necessary to identify the main changes affecting the transformation and requirements of the welfare state:

- Globalisation and economy of services: flexibilisation of labour brings yet another burden for the welfare state, they become dependant on social benefits and do not adequately contribute to the insurance system used to finance the benefits (Keller, 2009). Globalisation creates pressure to reduce wages, tax revenues, labour and capital outflow to countries with a lower level of regulation and tax burden (Alber and Standing 2000: Hay 2006). In the mid and long run, the European social model is in between these opposite tendencies. On the one hand, there is the pressure of liberalisation, deregulation as a result of globalisation, and on the other hand the EU increases pressure on higher guarantees for social rights and social expenditure increase. (European social model, 2014)
- Demographic changes. Aging population along with other social risks create factors of the social insurance system unsustainability with the old-age pension being the most critical area.
- Drop in solidarity: drop in solidarity occurs in all areas of the welfare state, some authors (Krebs:2010, Keller:2009) speak about its crisis.
- Long-term unemployment: this mainly concerns persisting unemployment and the resulting early retirement trend. Unemployment is the most serious issue at the pre-retirement age.
- Rising cost trend of the welfare state

Population aging is one of the reasons of changing opinions on the role of the state in the field of social policies. The existing state has been understood as a "generous provider and social policy funder". Currently, the opinions are shifting towards the state transformation guaranteeing social protection and encouraging independent social behaviour (client – provider).

Figure 1 Public social expenditure as a percentage of GDP, 2007, peak level after 2007, and 2014
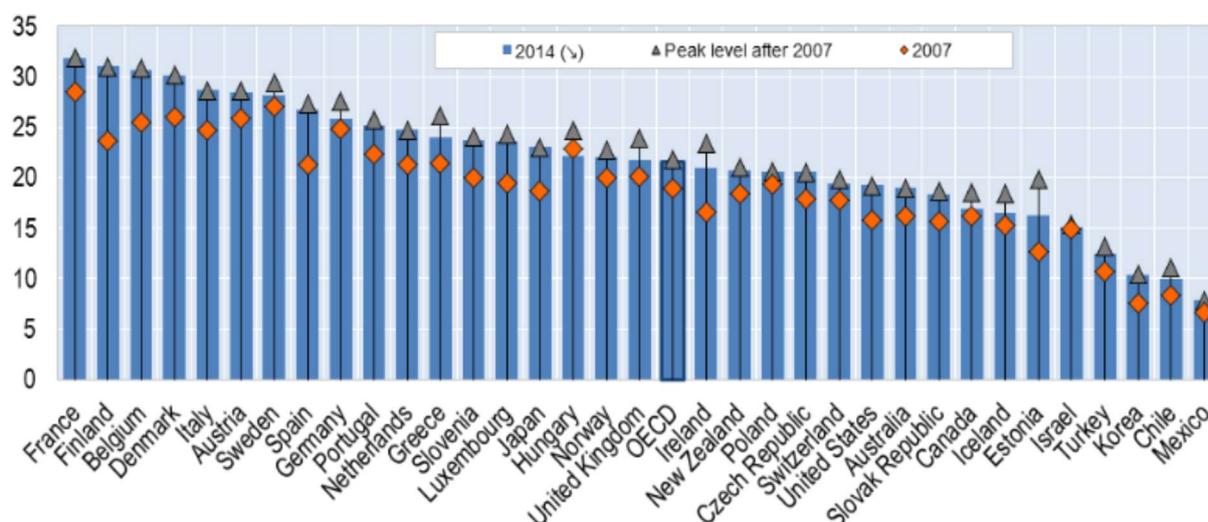
Source: OECD(2014). Social expenditure update: Social spending is dropping in some countries, but in many others it remains at historically high levels.

According to the latest OECD data, the social policy expenditure reaches 22% of the GDP in the OECD countries. Traditionally, Europe, led by France with close to 32% social expenditure to the GDP ranks amongst the top ones. France, Finland, Belgium, Denmark, Italy, Austria, Sweden, Spain and Germany spend over one fourth of their GDP on social protection expenditure. On the contrary, non-European countries such as Turkey, Korea, Chile and Mexico spend less than 15 % of their GDP on their social policy. The level of expenditure in these countries is currently at a level similar to Europe in the 1960's (see Graph No. 1).

Table 1 Total social expenditure as a percentage of GDP

Country	1995	2007	2008	2009	2010	2011	2012
EU 27	.	.	26.7	29.6	29.4	29.0	29.5
EU 28	.		26.7	29.5	29.4	29.0	29.5
OECD		18.9	19.7	21.9	21.7	21.4	21.6
Eurozone (EA-18)	.	26.8	27.5	30.3	30.3	30.0	30.4
included:							
Belgium	27.3	26.9	28.3	30.6	30.1	30.4	30.8
Bulgaria	.	14.1	15.5	17.2	18.1	17.7	17.4
Czech Republic	16.7	18.0	18.0	20.3	20.2	20.4	20.8
Denmark	31.9	30.7	30.7	34.7	34.3	34.3	34.6
Estonia	.	12.1	14.9	19.0	18.0	16.1	15.4
Finland	31.4	25.4	26.2	30.4	30.6	30.0	31.2
France	30.3	30.9	31.3	33.6	33.7	33.4	34.2
Ireland	18.6	18.0	21.2	26.2	29.0	30.2	32.5
Italy	24.3	26.6	27.7	29.9	29.9	29.7	30.3
Cyprus	.	18.2	19.5	21.1	22.1	22.8	23.1
Lithuania	.	14.4	16.1	21.2	19.1	17.0	16.5

Country	1995	2007	2008	2009	2010	2011	2012
Latvia	.	11.3	12.7	16.9	17.8	15.1	14.0
Luxembourg	20.7	19.3	21.4	24.3	23.1	22.5	23.3
Hungary	.	22.7	22.9	23.4	23.1	22.1	21.8
Malta	15.6	17.7	18.1	19.6	19.1	18.7	19.4
Germany	28.3	27.7	28.0	31.5	30.6	29.4	29.5
Netherlands	30.6	28.3	28.5	31.6	32.1	32.3	33.3
Poland	.	18.5	19.4	20.6	20.0	19.1	18.1
Portugal	20.4	23.9	24.3	26.8	26.8	26.5	26.9
Austria	28.8	27.9	28.5	30.7	30.6	29.8	30.2
United States	.	15.8	16.4	18.5	19.3	19.0	18.7
Greece	22.3	24.8	26.2	28.0	29.1	30.2	31.2
Slovakia	18.5	16.1	16.1	18.8	18.7	18.3	18.4
Slovenia	.	21.3	21.4	24.2	25.0	25.0	25.4
United Kingdom	27.1	24.7	25.6	28.3	27.9	28.0	28.8
Spain	21.6	20.8	22.0	25.2	25.5	26.0	25.9
Sweden	33.5	29.2	29.5	32.0	30.4	29.7	30.5

Source: Retrieved from:

http://www.oecd-ilibrary.org/social-issues-migration-health/data/social-expenditure/aggregated-data_data-00166-en?isPartOf=/content/datacollection/els-socx-data-en

http://ec.europa.eu/eurostat/statistics-explained/images/4/48/Expenditure_on_social_protection%2C_2002%E2%80%9312_%28%25_of_GDP%29_YB15.png

If we focus strictly on the EU and Eurozone countries, Eurostat data (see table No. 1 below) indicate the same conclusions as the OECD – long-term increase in the social protection expenditure. A rapid increase occurred at the time of the outbreak of the financial crisis between 2008 – 2009 and a slight increase continued in the following years. However, the rise in the social protection expenditure in the EU and in the Eurozone was relatively mild, in particular in comparison with the average in the OECD countries and the USA. In total, in the period of 2007-2011, the public social expenditure rose by around 20% in the USA, 12% in the OECD, 7% in the Eurozone and 8% in the EU 27. It must be noted that these differences were not due to major changes in the prices or the GDP trend as in the period of 2007-2011 the changes in the prices were similar and the GDP level in 2011 was similar to the GDP in various areas in 2007. (Publication Office of the European Union, 2013)

The different trend in the social expenditure evolution during the crisis in the European Union and the OECD (mainly the USA) reflects the different structural composition of social protection expenditure and indicates that in 2010, and even more significantly in 2011, the social protection expenditure growth took a different path in Europe and the OECD countries.

An example of this is France and Great Britain. France and Great Britain are two countries with various social systems and different expenditures in this area. Social expenditure in France amounts to 34.2% of the GDP, in Great Britain it is 28.8% of the GDP (in 2012). Compared to France, Great Britain is one of the countries with low expenditure in terms of public social policy. Nevertheless, the total social expenditure there is the second highest in the world. This difference in expenditure is related to a

high share of private social expenditure which is, in the case of Great Britain, a very important component of the policy expenditure and amounts to ca. 5.7% of the GDP. In total, including health care expenses, which amount to ca. 8% and with the value of revenues lost in tax reliefs from health insurance, the total social expenditure on health care totals 14% of the GDP, which is 4 percentage points higher than in France, which is the country with the second highest expenditure in this area in all OECD countries. (Social Expenditure Update,2014). On the contrary, France is one of four OECD countries whose expenditure in the social sector is more than 30% (specifically, 32%) of the total expenditure, which is by 10% more than the average in the OECD countries. Such expenditures are mainly directed at unemployment and sickness benefits. Unlike Great Britain, there is a substantially higher share of private social expenditure, and the resulting share of public expenditure on social policy in the GDP. France is one of the countries where benefits provided to people in the event of sickness absence and incapacity for work –disability - are amongst the highest in Europe. This is also the case of Germany, Austria and Switzerland where these benefits total ca. 1% of the GDP. As regards the structure of social policy expenditure, France is identical with other European countries. Again, the largest share is old-age pension expenditure as it has a large share of senior citizens to the total population. In 2010, this expenditure totalled 14.4% of the GDP in France. The second highest item burdening the social budget is health care expenditure. The highest of these expenses (in 2010 - 8.7% of the GDP) are payments for social care and social benefits during incapability for work. Expenditure on unemployment benefits and allowances paid to people living in poverty are also on the rise.

Based on the gross public old-age insurance in dependence on the GDP in the individual countries Eurostat predicts the trends in social policy expenditures in the European countries over the next 50 years. The average in EU 27 should reach ca. 12.9% of the GDP in 2060, with a rate of increase of ca. 1.6%. The greatest increase is expected in Luxemburg (more than double – from 9.2% to 18.6%). As regards France, a growth by 0.5% is expected and in Great Britain by up to 1.5%. The expected rise in the pension policy expenditure in the CR is 2.7%. (Pension expenditure protection, 2014)

4 Conclusions

The current social policy expenditures in the European countries have been kept at a high level for a long time. Only some of the countries have managed to reduce the share of social policy expenditure in their GDP: Canada, Estonia, Germany, Greece, Hungary, Island, Ireland and Great Britain. In most European countries, in particular the western ones, the expenditure exceeds 25% of the GDP, i.e. more than one-fourth of their economies.

Alber, J (2010) mentions significant heterogeneity of the EU member countries and states that the EU counties are, in terms of the social aspects, to a great extent heterogeneous. One of the reasons for the increased EU heterogeneity is the EU expansion to the east. He gives several examples:

- GDP in wealthier countries such as Luxemburg is almost seven times higher than the GDP of Bulgaria.
- The rate of social expenditure in Sweden is 30%, whereas in Lithuania only 16%
- The rate of collective bargaining in Lithuania is 15%, while in Austria and Slovenia 90%
- The rate of poverty measured according to the income reaches 4% in Denmark and 16% in Slovakia.

Europe diverges in social aspects not only because of the economic development of the individual countries but also as a result of various approaches to the social matters. There is a model pursued by the English-speaking countries which prefer lower public expenditure on social policy and lower rate of regulation and, on the contrary, a Scandinavian model, which features a highly developed social policy and high public expenditure. Alber (2010) adds that the EU member countries tend to be divided into

groups based on the recognition and practicing of a different social expenditure philosophy and this is one of the reasons why the EU fails to achieve a single direction.

Given the fact that not only Europe, but the entire world, keeps struggling with the continuing economic crisis, the measures taken during this crisis will continue being applied also in the coming years in all areas. The social policy is one of the policies which is directly involved in warding off the impacts of the crisis while also tying to treat them in the form of various social benefits and allowances for families facing social problems.

European countries usually face identical problems and are subjected to the same trends, they only differ from one another in terms of the intensity of the seriousness of the relevant problem. It is also obvious that the application of the same regulation tools may result in different impacts in various countries and the measures are not so successful, to such an extent, as in other countries. An example of this is the general progressive effect in Lithuania and Spain and, on the contrary, a different effect of the regressive model in Estonia where the pension benefits indexation was changed, while there was a change in the GDP in Lithuania.

Another burden for the social systems in the European countries may also be the burden for the EU countries represented by the EU legislation even if the social systems of the respective countries are unique. This is mainly understood as the costs of social services where the condition of the services of general economic interest must be observed. It is this very institute that may exercise pressure on public expenditure in the social sphere (Průša, Wildmannová, 2014).

As emphasised by ILO expert, Daniel Vaughan-Whitehead, the European social model played a key role in shaping up the European society after the war by encouraging inclusive economic growth, high standard of living and decent working conditions. In some of the European countries the key elements of the European social model have been transformed in response to the crisis even though they definitely were not the reason for the crisis or the budget deficits. As a result of the crisis it has turned out that the current form of the European social model is not sustainable. The European Commission as well as ILO have come to realize that certain elements of the European social model need to be transformed in light of such challenges such as increased competitiveness in the globalised markets and European society aging (Vaughan-Whitehead,D., 2015).

The European social model is about to face yet another threat which it will have to be addressed as soon as possible, which is the threat of growing xenophobia. Recent terrorist attacks by radical Islamists in various places in Europe may result in increased xenophobia and discriminatory behaviour of the society towards other nationalities and migrants.

Therefore, it is presently necessary for the European Union to make a decision crucial to keep the European social model which has played a key role in stabilising economies and maintaining social contract.

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The Conflict between the Frequency of the Polish Firms' Liquidity Problems and the Polish Bankruptcy Law Interpretation

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Abstract: The purpose of the paper was to present the conflict between business practice in Poland and the common court interpretation of the Polish Bankruptcy Act. Court interpretation states that if a company has got two unpaid in time invoices it should file for bankruptcy (however, under certain circumstances the judge can dismiss the case). Most practitioners do not follow this interpretation and wait much longer before they file for bankruptcy. Consequently, if a company finally goes bankrupt the managers are charged with negligence for waiting too long with starting bankruptcy proceedings. The paper presents data for 100 randomly chosen companies from the Lesser Poland (Małopolska) region to show that having 2 unpaid in time invoices is very common in Poland and such companies do not file for bankruptcy (even if they should). The paper ends with a proposal of the policy changes where filing for bankruptcy based on cash flow insolvency requires additional conditions such as certain minimum amount of delayed debt or the number of debtors whom a company failed to pay back obligations in time.

Keywords: insolvency, liquidity, corporate finance, Polish Bankruptcy Law

JEL codes: G30, G32, G33

1 Introduction

According to the Polish bankruptcy law [Knowski, 2014], the grounds of bankruptcy proceedings (bankruptcies with assets liquidation, bankruptcies open for arrangement) is the (cash flow or balance-sheet) insolvency of the company. Polish Bankruptcy Law dictates that a company becomes insolvent if it cannot meet its obligations or the value of assets exceeds the value of liabilities (practical interpretation of the balance sheet insolvency is based on market values of debt and assets not the book values as it uses the fact that the Bankruptcy Act does not specify which value – market or book value should be taken into account).

In Poland inability to meet obligations means that the debtor cannot pay its debts (any part of it) in due time [Bannock, Manser, 2002, Krzemińska 2002], however, the court may dismiss a bankruptcy petition if the time delay in the completion of commitments does not exceed three months and the sum of executory obligations does not exceed 10% of the carrying value of the debtor's business (Polish Bankruptcy Act, paragraph 11, [Jerzemowska 2004, Wędzki 2003]). Nowhere in the Bankruptcy Act, however, this provision relieves the entrepreneur from filing for bankruptcy if the business has got (any) liquidity problems. This requirement still holds even if there are only as few as two unpaid in time invoices [Szulikowski, 2014].

The purpose of the paper is to analyze the conflict between above mentioned interpretation of the bankruptcy law (which interpretation is widely used in courts) and the business practice, where two unpaid in time invoices seem to be very common and they are not considered by entrepreneurs to be the reason for filing for bankruptcy. The paper uses the results of the questionnaire which was run on 100 randomly chosen companies from the Małopolskie voivodship.

2 Review of Previous Research

Unpaid Obligations as a Cause of Insolvency

According to the European Commission judicial database [EC, 2015] all member states of the European Union have similar bankruptcy regulations, namely, filing for bankruptcy is obligatory either when a company can no longer meet its obligations or the market value of assets is lower than the company's liabilities (over-indebtness). However, the exact definition and interpretation of when a company cannot meet its obligations are different [Guzman, 2000]. For instance, in some countries the inability to meet obligations can be defined as a minimum amount of debt which additionally has to be liquidated (Ireland). The bankruptcy law can also specify the exact number of days of delay after which if a company did not pay for the obligations then the management has obligatorily file for bankruptcy (for instance, in Hungary it is 90 days [Gray et al, 2000]). In some other countries (for instance, in Latvia) there is no specific timeframe, but the company must have "failed to pay for its obligations for a long time" [Brewerton, LeMaster, 2011] to file for bankruptcy. Compared to these countries, the law in Poland is more stringent as it requires filing for bankruptcy by the management if a company is late with the payment for as little as any 2 due invoices (and this is the interpretation used in courts).

How Companies Can Avoid Liquidity Problems

On one side, the law in Poland (and some other countries as Germany or Austria which also have very harsh bankruptcy law [Kowalski et al, 2003]), may seem to be very quick in making companies file for bankruptcy, but one should remember that it is not unavoidable for a company to fail on its obligations. To the contrary, there are many ways of securing enough of financial resources to keep liquidity at the adequate level. [Tirole 2001, pp. 289-295]

The first and quite obvious solution is to avoid long-term receivables and payables, buy and sell only for cash or with very short payment times. However, this would mean that if a company did not manage to generate adequate revenues it could not make any purchases and soon it would run of resources necessary for its operations. Therefore, it seems that one can use some safer solutions such as: a bank loan, credit line or issuance of market instruments (that can dilute the existing investors but provide adequate funding of operations) [Brunnermeier and Lasse Heje Pedersen, 2009 pp. 2208]. If this solution is unavailable or expensive, a company may try to renegotiate existing claims [Tirole, p. 290]. Other recommended solutions include: an appropriate system of risk management, matching the duration of assets and liabilities (which includes matching of the maturity times of receivables and payables) and generally planning ahead future cash-flows [Sierpińska, Jachna 2007, pp. 56-76]. Finally, liquidity problems arising from unexpected losses can be minimized by insurance [Strupczewski 2014, s. 70].

Appropriate liquidity management also requires caution and special actions in times when the economic situation of the country deteriorates [Wyrobek et al, 2012, Wyrobek, Stańczyk, 2013]. If the market freezes, the availability of financial resources deteriorates and delays in invoice payments escalate. Therefore, in such times firms should introduce a tighter trade policy to avoid the accumulation of bad debts. Quite obvious is also the determination of an appropriate level of liquidity reserves necessary to pay for unexpected expenditures and appropriate pooling of various accounts [Aghion et al, 2004, p. 332] and writing-down of unsellable inventories and uncollectible receivables. Finally, according to the majority of bankruptcy regulations in various countries, if a company has liquidity problems it should refrain from incurring of new obligations.

Multidimensional Analysis of Receivables' Collection Times in Poland

Having analyzed the ways the companies can make all their payments in time and avoid delays, Tables 1 – 4 show how the obligations payment situation currently looks in Poland. According to D&B research (Table 1), only 23,7% of the invoices in Poland were paid in time (without delays). 58,5% of the invoices were paid with the time delay, but shorter than 30 days. Another 7,7% of the invoices were paid with a time delay between

30 and 60 days, 5% of invoices were paid within 60 to 90 days after their due date, 4,4% of the invoices were paid with the time delay between 90-120 days and finally, 6,8% invoices were paid with time delays exceeding 120 days. Only Portugal from the countries listed in Table 1 had longer delays in invoice payments than Poland. This shows a dichotomy between strict regulations concerning due invoices and the real situation in the economy.

Table 1 Distribution of Invoice Payment Delays in Selected Countries of the World, year 2012 [% of total invoices]

time delay of payment	Europe	Denmark	Germany	Mexico	Turkey	USA	Netherlands	Finland	Belgium	Italy	Hungary	Spain	Slovakia	China	France	Czech Rep.	United Kingdom	Poland	Portugal
in time	39.1	83.3	78.8	52.9	52.7	50.6	50.3	45.5	44.9	44.3	43.5	41.6	39.8	32.5	31.9	30.9	30.2	**23.7**	17.6
below 30 days	51.3	16.3	20.1	44.9	30.4	38	45.8	53.6	48.9	45.2	49.2	44.2	52.1	50.8	62.3	64.2	60.4	**57.8**	58.5
30 to 60 days	3.9	0.1	0.5	1.2	7.9	2.9	2	0.4	3.3	4.9	3.5	3.6	4.6	6.1	3	2.7	4.2	**3.6**	7.7
60 – 90 days	2.4	0.1	0.2	0.5	2.9	2.2	1	0.2	1.8	2.9	1.5	2.3	1.5	2.9	1.3	1	3.2	**2.4**	5
90 – 120 days	1.5	0.1	0.1	0.3	5.8	2	0.7	0.1	0.9	1.7	1.2	2.2	2	2.5	0.7	0.7	1.2	**2.4**	4.4
above 120 days	1.8	0.1	0.3	0.2	0.2	4.3	0.2	0.2	0.2	1	1.1	6.1	0	5.2	0.8	0.5	0.8	**10.1**	6.8

Source: D&B Reports *Barometr Płatności na Świecie 2013* (Europe, Asia, Americas)

The abovementioned problem does not seem to be improving over time. As it can be seen in Table 2, the situation in recent years in Poland got worse, as the percentage of invoices paid in time dropped from 47% in 2008 to 23,8% in 2012. This could, however, be partially attributed to the delayed effects of the last global crisis.

Table 2 Changes in the Distribution of Delays in Payment of Due Invoices in Poland, years 2008, 2011 i 2012 [% of total invoices]

year	in time	below 30 days	30 – 60 days	60-90 days	90 – 120 days	above 120 days
2008	47	40.1	3.3	2.4	1.6	5.6
2011	34.5	49.8	2.9	2	2.2	8.6
2012	23.7	57.8	3.6	2.4	2.4	10.1

Source: D&B Reports *Barometr Płatności na Świecie 2013* (Europe)

Time delays discussed above spread across micro, small, medium and big companies (Table 3), but they were the most significant for micro and small companies. Big companies paid almost all of their obligations either in time or 30 days after the due time. For micro companies this ratio was only 78%.

Table 3 Invoice Payment Delays by the Firm Size, Polish Companies, year 2012 [% of total invoices]

firm size	no delay	> 30 days	30-60 days	60-90 days	90-120 days	> 120 days
mikro	25.6	52.8	4	2.8	3.1	11.7
small	23.2	59	3.6	2.3	1.9	10
medium	20	68.2	2.5	1.4	1.3	6.6
big	16	77	1.6	1	1	3.4

Source: D&B Reports *Barometr Płatności na Świecie 2013* (Europe)

Liquidity problems (Table 4) concerned all types of economic activities, but the worst delays took place in the heavily subsidized mining industry. The second worst industry was transport.

Table 4 Timeliness of Paying Invoices by the Type of Economic Activity, Poland, year 2012

time delay	agriculture	Mining	Construction	manufacturing	transport	wholesale	retail sales	Financial services	other services
in time	21.4	29.5	31.5	20.1	19.7	22.5	22.4	21	20.4
< 30 days	51.9	39.9	44.5	63.5	49.7	62.1	67.5	63.1	63.5
30-60 days	5.8	2.8	3.7	3.9	4.5	3.3	2.5	3.3	3.8
60–90 days	3.8	1.9	2.6	2.2	3.7	2	1.7	2.5	2.3
90–120 days	4.6	2.4	2.9	2.3	4.3	1.8	1.3	2.2	2.6
>120 days	12.5	23.5	14.8	8	18.1	8.3	4.6	7.9	7.4

Source: D&B Reports *Barometr Płatności na Świecie 2013* (Europe)

Since presented statistics show only the probability of Polish firms fulfilling the cash flow insolvency condition as described earlier, the authors of the article run a questionnaire on 100 randomly chosen firms to see more precisely how common is this problem among companies.

3 Methodology, Results and Discussion

The purpose of the questionnaire was to investigate several issues. First of all, we wanted to know how common was among surveyed firms having 2 delayed invoices. Secondly, we were interested what actions companies took when they run out of money (to avoid delays in the payment of obligations), finally whether (or not) they also fulfilled the balance-sheet insolvency condition and whether (or not) they filed for bankruptcy. The questions concerned the current year (2012) and (a separate set of questions) previous years. Research was carried in the year 2012 on 100 Polish companies that operated in the region of the Lesser Poland (Małopolska).

Tables 5 -7 present brief characteristics of these companies. Most of them were small and medium sized, their median age was 8 years, in almost equal proportions companies represented 3 major types of economic activities: trade, production and services.

Table 5 Respondents' Economic Activity Type

Specification	answers	[%]
Trade	40	40%
Production	29	29%
Services	31	31%
Other	0	0%

Source: Own research

Table 6 Company's Age

Specification	answers	[%]
from 2 to 3 years	19	19%
from 4 to 6 years	25	25%
from 7 to 9 years	29	29%
from 10 to 14 years	16	16%
from 15 to 20 years	11	11%

Source: Own research

Table 7 Employment Size

Specification	answers	[%]
self-employed	12	12%
up to 9 employees	55	55%
10-49 employees	17	17%
50-149 empl.	9	9%
150-249 empl	5	5%
> 250 employees	2	2%

Source: Own research

As it is shown in Table 8, the majority of firms were privately owned, only 7 out of 100 were state – owned. One company in the current year (2012) filed for bankruptcy, the rest of the firms never filed for bankruptcy (Table 9). In the current year 55% (11 firms) of examined companies did not pay some of the invoices in time and had delays: 29% experienced such problems a couple of times in a year, 9% one a month and 7% several times in a month.

Table 8 Ownership Type

Specification	answers	[%]
State-owned	7	7%
Private	93	93%

Source: Own research

Table 9 Has the Company in the Current Year Filed for Bankruptcy (current year)

Specification	answers	[%]
yes	1	1%
not	99	99%

Source: Own research

Table 10 How Often Take Place Delays in Paying of Invoices (current year)

Specification	answers	[%]
Never	55	55%
A couple of times in a year	29	29%
Once a month	9	9%
A couple of times in a month	7	7%

Source: Own research

Tables 11 and 12 present average time delays in the payment of obligations and estimated percentage of all invoices that surveyed companies paid after their due time. According to the provided answers, one company paid some of its invoices after 6 months of delay, 5 companies paid some of their invoices with a quarter of a year delay, 15% managed to pay overdue liabilities within a month, 24% within a week and 55% paid everything in time (Table 11). Only 1 company had 50% of their invoices paid later than their due time, the rest paid at least 90% of their obligations in time (Table 12).

Table 11 How Long Were the Time Delays in the Payment of Invoices (current year)

Specification	answers	[%]
All invoices were paid in time	55	55%
No longer than one week	24	24%
No longer than one month	15	15%
No longer than one quarter of a year	5	5%
No longer than 6 months	1	1%
No longer than 1 year	0	0%
Longer than 1 year	0	0%

Source: Own research

Table 12 What Percentage of Invoices Were Paid in Time (current year)

Specification	answers	[%]
100%	55	55%
99%	6	6%
98%	9	9%
95%	16	16%
90%	13	13%
50%	1	1%

Source: Own research

Table 13 presents the biggest number of overdue invoices that a company recorded in the year 2012. From the provided answers it seems that 24% of respondents had at least once in a year two or more unpaid invoices which theoretically should made them file for bankruptcy (but in fact, only one company did file for bankruptcy). Around 21% of respondents happened to have one overdue invoice at a time, and 55% paid all their invoices in time. To make sure that the respondents did not fulfill the second bankruptcy condition (excessive debt) we tested for this possibility in Tables 14 and 15 – according to respondents only one company had its book and market value of assets higher than the value of liabilities (and this company filed for bankruptcy in 2012).

Table 13 What Was the Biggest Number of Overdue Invoices a Firm Had at the Same Moment of Time (current year)

Specification	answers	[%]
all invoices were paid in time	55	55%
only 1	21	21%
between 2 and 3	17	17%
between 4 and 5	5	5%
more than 5	2	2%

Source: Own research

Table 14 Was the Book Value of Assets Higher Than the Value of Liabilities (current year)

Specification	answers	[%]
Yes	99	99%
No	1	1%

Source: Own research

Tables 16 and 17 analyze a different type of a company's commitments which are wages and salaries which also should be paid in time. According to the respondents 9% of analyzed firms (9 companies) had time delays with the payment of wages and salaries. In one company the time delay lasted around one month, in 3 cases it lasted for around 2 weeks and in 5 other firms the time delay was not longer than one week.

Table 15 Was the Estimated Market Value of Assets Higher than the Value of Liabilities (current year)

Specification	answers	[%]
yes	99	99%
no	1	1%

Source: Own research

Table 16 Untimely Payment of Wages and Salaries (current year)

Specification	answers	[%]
Did not take place	91	91%
Took place	9	9%

Source: Own research

Table 17 How Long Were the Delays with the Payment of Wages and Salaries

Specification	answers	[%]
up to 1 month	1	1%
up to 2 weeks	3	3%
up to 1 week	5	5%
all wages and salaries were paid in time	91	91%

Source: Own research

Table 18 presents the number of the lawsuits resulting from the current year (2012) delays in payment of the invoices. The lack of the lawsuits suggests that overdue invoices are considered by practitioners in Poland to be quite common as no of the creditors sued any of the respondents.

Question (Table) 19 begins the next part of the questionnaire questions, which investigates liquidity problems that analyzed companies may have had in the past. As it can be seen in Table 19, around 56% (56 firms out of 100) of respondents used to have overdue invoices in the past, and 38% of the previous group used to have them several times in a year.

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Table 18 Lawsuits for Non-Payment of Invoices (current year)

Specification	answers	[%]
did take place	0	0%
did not take place	100	100%

Source: Own research

Table 19 Overdue Invoices in the Past (in the past years)

Specification	answers	[%]
There were invoices that were not paid in time	56	56%
All invoices were always paid in time	44	44%

Source: Own research

Table 20 If There Were Overdue Invoices in the Past, How Often They Took Place

Specification	answers	[%]
Once a year	35	62%
A couple of times in a year	21	38%
Once a month	0	0%
More often than once a month	0	0%

Source: Own research

Table 21 shows that the longest payment delay the respondents had in the past was one year, but it happened only in the case of one company, which in 2012 filed for bankruptcy. Remaining respondents' time delays were no longer than 3 months, with the average number of delayed invoices not exceeding 5 at one time (Table 22).

Table 21 What Were the Longest Time Delays in the Payment of Invoices

Specification	answers	[%]
up to one week	21	38%
up to one month	25	47%
up to one quarter of a year	9	16%
up to one year	0	0%
longer than 1 year	1	0%

Source: Own research

Table 22 What Was the Biggest Number of Invoices that Were Not Paid at the Same Moment of Time

Specification	answers	[%]
all invoices were paid in time	44	44%
only 1	24	24%
between 2 and 3	25	25%
between 4 and 5	5	5%
more than 5	2	2%

Source: Own research

Tables 23 and 24 confirm that the researched firms (except for one company that went bankrupt in 2012) did not have the excessive debt levels, which according to the Polish Bankruptcy Law, would immediately qualify them for insolvency proceedings. Table 25 shows that never in the past any of the respondents were sued to the court for untimely payment of their creditors.

Table 1 Has it ever Happened in the Past that the Book Value of Assets was Higher than Liabilities?

Specification	answers	[%]
Yes	1	1%
No	99	99%

Source: Own research

Table 24 Has it ever Happened in the Past that the Estimated Market Value of Assets was Higher than Liabilities?

Specification	answers	[%]
yes	1	1%
no	99	99%

Source: Own research

Table 25 Lawsuits for Non-Payment of Invoices (in the past)

Specification	answers	[%]
Never happened	100	100%
They took place	0	0%

Source: Own research

The next part of the questionnaire investigated actions that surveyed companies took to deal with liquidity problems. Tables 26 and 27 ask about two common solutions when a company is dealing with liquidity problems, which are short-term and long-term loans. Provided answers show that only a part of liquidity constrained firms used short-term loans: out of 44 companies that admitted to having liquidity problems only 17 of them (37% of the entire sample) took revolving loans. Only one company admitted to taking the long-term loan to pay for its overdue liabilities.

Table 26 In the Situation of Liquidity Problems the Company Took the Revolving (Short-Term) Loan

Specification	answers	[%]
Yes	17	17%
Not	29	29%
does not apply (we did not have liquidity problems)	54	54%

Source: Own research

Table 27 In the Situation of Liquidity Problems the Company Took the Investment (Long-Term) Loan

Specification	answers	[%]
Yes	1	1%
No	45	45%
does not apply (we did not have liquidity problems)	54	54%

Source: Own research

Tables 28 – 32 present other than bank loans ways of dealing with liquidity problems: sale of assets, reorganization proceedings, informing banks and other creditors about liquidity constraints, (purposeful) avoidance of incurring any new obligations.

As it can be seen, the respondents' answers show that 24 out of 44 liquidity stricken firms sold unnecessary assets, 15 began reorganization proceedings, 16 informed banks and creditors about their problems, and 9 companies put a hold on new commitments.

Table 28 In the Situation of Liquidity Problems the Company Sold its Assets for Cash

Specification	answers	[%]
yes	24	24%
no	22	22%
does not apply (we did not have liquidity problems)	54	54%

Source: Own research

Table 29 In the Situation of Liquidity Problems the Company Started the Reorganization Plan

Specification	answers	[%]
yes	15	15%
no	31	31%
does not apply (we did not have liquidity problems)	54	54%

Source: Own research

Table 30 In the Situation of Liquidity Problems the Company Informed its Bank

Specification	answers	[%]
Yes	16	16%
No	30	30%
does not apply (we did not have liquidity problems)	54	54%

Source: Own research

Table 31 In the Situation of Liquidity Problems the Company Ceased to Incur New Obligations

Specification	answers	[%]
Yes	9	9%
No	37	37%
does not apply (we did not have liquidity problems)	54	54%

Source: Own research

Table 32 In the Situation of Liquidity Problems the Company Informed Its Creditors

Specification	answers	[%]
Yes	16	16%
No	30	30%
does not apply (we did not have liquidity problems)	54	54%

Source: Own research

4 Conclusions

Presented questionnaire results provide evidence that liquidity problems are not uncommon among Polish firms and that the majority of troubled companies do not fill for bankruptcy when they have 2 unpaid in time invoices, which is required by the court interpretation of the Bankruptcy Law.

Only one company out of 45 that had liquidity problems in the current year (2012) filled for bankruptcy and informed its creditors about the situation – the reason for doing so was negative equity and many unpaid obligations. The remaining liquidity stricken firms sold their assets, took bank loans, delayed salaries and wages, delayed payment of invoices but they did not file for bankruptcy even though according to the Polish law, they should.

If we take for granted the interpretation of the Polish Bankruptcy Law that two overdue invoices should make a firm file for bankruptcy (and one should, because it is used in the courts by the judges), the abovementioned companies with liquidity problems took a great risk with refraining from filing for bankruptcy. Should they go bankrupt, the management of these companies would be charged with the lack of professional diligence.

Even though a sample of 100 companies cannot be treated as a proper representation of all the companies operating in Poland, yet the observed gap between the legal regulations and the business practice seems to call for a wider research and possible policy changes. It seems that the Polish bankruptcy law should be more straightforward as to when a company should file for bankruptcy (use book values of assets and debt and specify what it exactly means to fail on the obligations) and more realistic (compared to the business conditions in Poland).

One could consider making the Bankruptcy law rely on book values of assets and obligations for a balance-sheet insolvency condition and on a certain specified total value of delayed invoices regarding the cash-flow insolvency condition. This solution is used in other countries and seems to be safer and more straightforward than the Polish regulations.

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Socio-economic Situation of the Countries and their Public Debt: Perspective 2015

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Abstract: The study deals with the problems of the theory and methodology of social, political and economic processes risks in different countries with relative indicators of the socio-economic development level, as well as the size and condition of the public debt. Developed by the authors the method of determining the risks of social, political and economic processes of public policy around the world revealed the close relationship between socio-economic situation of the countries and their public debt. The countries, which found themselves at the top of the list are the countries, where state policy proved its effectiveness, leading to social, political and economic processes data improvement, where social, political and economic status key figures are at comparatively high level, despite of serious debt load. High birth and life expectancy rates are interconnected with low death rate and high GDP per capita. These facts lead us to the conclusion, that the degree of effectiveness of debt management by the country is really what matters most, not the actual amount of the debt itself, and if the country has a goal of improving their social and economic status.

Key words: socio-economic position, public debt, standardization, integrated standardized index, rating

JEL codes: I38, H5, H63, H74

1 Introduction

The uniqueness of the modern condition of the world economy management is in the ambiguousness and high-level risk of implications of the events occurred and decisions made at different government levels, which can be explained by the globalization processes (Gribova, 2005). Each state chooses its own path of development and implementation of its policy, however, any actions of the government, taking into account the global economic, political, cultural integration and unification, affect not only the socio-economic position of the particular country but have an indirect effect on other countries as well. (Ivanter et al., 2013). In the future economics will become increasingly interdisciplinary (Kolodko, 2014). Today, one of the most acutely discussed problems in the world is the public debt management and its effect on the socio-economic position of countries because, in addition to tax revenues, the most important supplementary source of financial resources for most countries is public borrowing which can become the basis for the future socio-economic growth of the country.

It is important to note that all countries, even the most developed ones, have public debt. Moreover, no tendency towards its full redemption was identified in any country. This is associated with the fact that the governments do not see public debt as a negative phenomenon; quite the contrary, public debt is often called a "substitute" for the tax burden.

Studying the theoretical and methodological aspects of the debt policy of the countries is devoted to many works of scientists around the world for the past decades. It is necessary to turn the focus to the main researches on this subject, which contain in relevant theoretical and empirical literature:

- the correct definition and measurement of government debt (Barro, 1979; De Haan, 1987);

- the mounting debt burden of developing countries, so the increasing amounts of loans and their hardening terms have in many cases led to external debt servicing problems of alarming magnitudes (Garg, 1977);
- the effectiveness of various approaches to public debt management (Hamilton & Flavin, 1986);
- the identification of the relationship between the duty of countries and economic growth (Modigliani, 1961; Diamond, 1965; Saint-Paul, 1992).

Nowadays many authors develop new theoretical models of endogenous growth, update empirical estimations and present new empirical evidence as regards the relation between public debt and economic growth (Greiner & Fincke, 2015; Herndon et al., 2014; Panizza & Presbitero, 2013; Smyth & Hsing, 1995).

The concept of "debt" has negative overtones but this category is closely related with the "economic growth" which cannot be achieved without securing relevant conditions and resources. If debt growth rates are lower than those of GDP, the debt is not bad. The economic growth ensures the replenishment of the income part of the budget, which is used to pay interest on debt. With low economic growth rates, public debt becomes a serious macroeconomic problem for the country associated with high risks of the policy conducted.

Public debt envisages the economic stability in the country, which is one of the most important goals of any government. Debt is a tool in the hands of the government using which it implements the socio-economic policy. For instance, by providing public loans to developing enterprises and guarantees on loans and credits the government can contribute to the acceleration of the socio-economic development of the country. Public borrowing is considered a non-inflationary source of financing the government budget deficit; therefore, formation of additional financial resources within the framework of government authorities does not result in a change in the total demand but only changes its structure. Individuals and legal entities purchase government securities thereby transferring the demand to the executive government authorities. Through budgetary expenditure the demand can be expressed in some other place and by some other business entities and individuals.

Public debt becomes inevitable. The progress of the modern state administration, conditions of the world economic management and scientific research of public finance all do not downgrade the necessity to use public borrowing. The most prosperous countries are in need of public borrowing as bad as emerging countries, despite the significant difference in their requirements and conditions of existence.

The analysis of the indicators currently applied to assess the effectiveness of public debt management shows that the composition of indicators used for these purposes is not complete, that such indicators are often disengaged and fragmentary and, hence, unable to provide a complex assessment of both the general effectiveness of public debt transactions and the effectiveness of managing public debt with regard to the socio-economic development of countries (Myslyaeva, 2007). It is feasible to examine the issue of borders of public debt (and its impact on the economy) not only on the basis of absolute data (such as the total debt, budgetary deficit, etc.) and relative indicators of the public debt, but also, where possible, in conjunction with other macroeconomic indicators of the condition of the country economy, i.e. indicators characterizing the socio-economic position of the country.

Approaches to evaluation of socio-economic development of the countries are scarce and unstructured at best. In the absence of well-defined requirements many researchers have utilized various indicators that have been rather arbitrarily chosen. In order to overcome these obstacles, the development of countries should be observed as a multi-dimensional concept (Milenkovic et al., 2014; Cracolici et al., 2010; Werner et al., 2006).

Reasonable and timely examination of the current socio-economic position of the country taking into account its debt obligations is possible only if a scientifically justified multi-criteria approach to the assessment is used. The result should be as transparent as

possible, i.e. it should be unambiguous, informative, both in terms of assessment of the general condition and in terms of analysis of its component parts. It will become a necessary base for successful and effective adjustments of the policy strategy implemented by the country. The goal of this survey is to develop a method for calculating an integrated standardized indicator on the basis of multi-criteria approach taking into account the specially created system of relative indicators. It unambiguously allows to determine the socio-economic situation of a particular country in the global arena with regard to its public debt.

2 Methodology and Data

The question of research and development of methodological approaches to the conduct of a complex assessment of the socio-economic position of countries with regard to their public debt and on the basis of a specially developed system of indicators, which takes into account the disputable and oppositely directed nature of interaction of the society, policy and economy, is an acute one.

The method should meet the requirement for convenience of application associated with the availability and accuracy of source information that is why in performing the task of assessment we used official statistical data of the World Bank Group Data Base and the American Agency for financial and economic information Bloomberg.

The result of performance of the set task should constitute an aggregate, unambiguous, strict measure — an index whose value could be used to list the variety of examined countries by the socio-economic position taking into account the public debt — to rate them.

Thus, the key task of this study is to develop a method for calculating an integrated standardized index (ratio) based on the system of social, economic (debt and risk-related) indicators unambiguously characterizing the socio-economic situation in a certain country in the global scale.

In this paper the following principles based on the theoretical concept of the balanced score card (BSC) (Kaplan, Norton, 2001; Best practices Benchmarking Report, 1999), were used:

- the data accuracy principle,
- the data sufficiency principle (few dozens of indicators),
- the data significance principle: use of indicators directly related with the socio-economic position and public debt,
- the principle of multidimensionality of the sample: the selected indicators should describe the situation from various angles in order to avoid a "one-sided" analysis,
- the principle of unambiguousness: the selected data, or simple combinations thereof, should be unambiguous, i.e. the useful effect should change monotonously along with the indicator value.

Based on the above principles of sample creation we developed two groups of coefficients characterizing the socio-economic position of countries taking into account their public debt.

The first group characterizes the social position of the country and includes the following indicators: birth to mortality ratio, life expectancy rate, mortality rate, birth rate, workforce rate, retirement age coefficient for men and women, unemployment rate, health index and life quality index.

The second group characterizes the economic position of the country and includes subgroups of debt indicators (external debt as percentage to GDP, internal debt as percentage to GDP, total debt as percentage to GDP and debt burden per capita) and risk-related economic indicators (export as percentage to GDP, import as percentage to GDP, investment to the national economy as percentage to GDP, total foreign investment

as percentage to GDP, gold and currency reserves as percentage to GDP, GDP to workforce ratio and inflation rate).

Model Specification

The assessment of the socio-economic position of countries taking into account the public debt is characterized by the following: different dimensions of indicators of countries, different significance of indicators, different order of values. The requirement for a complex assessment of countries by a combination of indicators results in the necessity to bring them to a non-dimensional form, to a common reference point, to a single measurement interval, therefore, the standardization mechanism is applied (Yashina et al., 2015). Based on the above tasks the method of their performance is proposed based on a linear transformation of the input indicators, resulting in values of standardized indicators lying in a set interval from 0 to 1.

For the purpose of standardization, indicators are classified into two groups by the semantic content in Table 1 (impact on the complex assessment of the country's position): increase in some indicators leads to the worsening of the situation ("oppositely directed" — the less the rate, the better) while increase in others — to the improvement ("co-directed", the higher the rate, the better).

Table 1 Grouping of indicators by the direction of the impact on the complex assessment of a country

Indicator group/indicators	
1 Group "Oppositely directed indicators"	**2 Group "Co-directed indicators"**
External debt, as % to GDP	Export, as % to GDP
Total foreign investment, as % to GDP	Investment in national economy, as % to GDP
Total debt, as % to GDP	Internal debt, as % to GDP
Import, as % to GDP	Gold and currency reserves, as % to GDP
Debt burden per capita, $/person	GDP/workforce, $
Mortality rate	Birth/mortality ratio
Retirement age coefficient for men	Life expectancy rate
Retirement age coefficient for women	Birth rate
Inflation rate, %	Workforce rate
Unemployment rate, %	Health index
	Life-quality index

Source: Compiled by the authors using Bloomberg and World Bank database

The standardized indicators are calculated using the following formulas:

- 1 Group

$$K_{ij}^* = \frac{K_{ij} - K_{i\,min}}{K_{i\,max} - K_{i\,min}}, 0 \le K_{ij}^* \le 1, \tag{1}$$

- 2 Group

$$K_{ij}^* = \frac{K_{i\,max} - K_{ij}}{K_{i\,max} - K_{i\,min}}, 0 \le K_{ij}^* \le 1, \tag{2}$$

where K_{ij} — estimated value of the i-th rate in the system of indicators the socio-economic position taking into account the public debt in the j-th country, K_{ij}^* — standardized value of the i-th rate in the system of indicators the socio-economic condition taking into account the public debt in the j-th country, $K_{i\,max}$ — the highest estimated value of the i-th rate, $K_{i\,min}$ — the lowest estimated value of i-th rate.

The actual value of indicators can be used for comparison of the socio-economic position taking into account debt obligations of countries in dynamics and for comparison of a particular condition of the country with corresponding indicators of other countries. These rates can be used as normative rates.

A complex condition of a country is determined by the value of the integrated

standardized index, calculated as a sum of values of private normalized indicators of the system of assessment of the socio-economic position of countries taking into account public debt (formula 3) and compared with the corresponding value of the integrated standardized index, reflecting the normative value for countries attributed to a group of effective and ineffective management of public debt. Establishment of threshold normative values of indicators for nominally benchmark countries is carried out using an expert method taking into consideration the most and the least successfully developing countries and the variance of rates within a set of countries.

$$K_{int.j}^{sep} = \sum K_{ij}^*, \tag{3}$$

where $K_{int.j}^{sep}$ — integrated standardized index of the socio-economic position of the j-th country taking into account the public debt.

The less a country's integrated standardized index of the socio-economic position taking into account the public debt, the better the socio-economic position of the country and the more effectively it manages its public debt.

Calculation of $K_{int.}^{sep}$ is initially based on the fact that all indicators in the system have the same projection weight in the integrated index, however, this assumption is inappropriate and may lead to inadequate estimates of the situation. Therefore, in order to increase the accuracy and closeness of the assessment results to the real position of countries in the world arena it is proposed to take into account different significance of indicators in the integrated ratio. Here we use the method of expert ranking of indicators in order of descending significance — the Fishburn's point estimation rule:

$$w_i^N = \frac{2(N-i+1)}{N(N+1)}, \tag{4}$$

where w_i^N- weight of the i-th group of indicators, $\sum_{i=1}^{N} w_i^N = 1$, N — the number of groups of indicators in the system of assessment of the socio-economic position of a country taking into account the public debt, N=2, i — the sequence number of the indicator group.

Then, the integrated standardized index taking into account the significance of indicator groups of the system of assessment of the socio-economic position of a country taking into account public debt constitutes an average weighted value of relevant total standardized indicators by groups taking into account their significance (K_{int}^{*sep}).

According the expert estimates, the most important group of indicators under the current conditions of the financial and economic development is a group of indicators characterizing the social position of the country, this is why it is the first by significance (K_{int}^{*sp}) with a weight coefficient of $w_1 = 0.67$, hence, the group of indicators of the economic position is the second by significance (K_{int}^{*ep}) with a weight coefficient of $w_2 = 0.33$.

K_{int}^{*sep} is calculated using the formula:

$$K_{int}^{*sep} = \left(w_1 * K_{int}^{*sp} + w_2 * K_{int}^{*ep}\right). \tag{5}$$

The less the K_{int}^{*sep}, the better the socio-economic position of the country and the more effective its public debt management. The results of the method used allow to build a rating of countries by K_{int}^{*sep} with regard to the "cut-off" by nominally benchmark countries of groups described by the socio-economic position of the country with effective and ineffective management of public debt.

3 Results and Discussion

The method for complex assessment of the socio-economic position of countries taking into account public debt was tested on a sample of 45 countries for 2012-2013. Table 2

shows a comparative rating of countries for 2012-2013 in accordance with the complex assessment of their socio-economic position taking into account their debt obligations using the developed system of indicators with regard to the significance of the criteria groups.

Table 2 Rating of countries based on the results of the method testing for 2012-2013

Country	2012		2013	
	Integrated standardized index taking into account the significance of groups K_{int}^{*sep}	Rating 2012	Integrated standardized index taking into account the significance of groups K_{int}^{*sep}	Rating 2013
South Korea	3.33	1	6.3	3
UAE	7.6	2	3.64	1
Australia	8.62	3	8.6	4
New Zealand	8.63	4	8.96	5
Canada	12.61	5	14.27	8
China	14.4	6	5.02	2
Estonia	14.87	7	28.8	32
United States	16.28	8	17.26	11
Austria	17.24	9	20.92	16
Slovenia	17.58	10	26.74	29
Norway	17.94	11	18.95	14
Netherlands	18.21	12	20.22	15
Sweden	18.91	13	18.93	13
Switzerland	19.33	14	13.9	7
Italy	19.69	15	27.29	30
Russia	19.73	16	21.07	18
Czech Republic	19.96	17	15.02	9
Spain	19.97	18	22.96	20
France	20.61	19	23.25	21
Montenegro	20.73	20	25.78	26
Denmark	22.35	21	25.98	27
Belgium	23.23	22	23.26	22
Great Britain	23.24	23	22.22	19
Poland	23.38	24	24.03	24
Japan	23.44	25	30.28	34
Slovakia	24.93	26	18.33	12
Iran	25.07	27	20.99	17
Romania	25.08	28	24.71	25
Macedonia	27.12	29	31.46	37
Germany	27.97	30	26.29	28
Portugal	28.03	31	34.63	44
Croatia	28.09	32	32.37	38
Ireland	28.25	33	12.6	6
Greece	28.35	34	36.63	45
Belarus	28.61	35	15.72	10
Hungary	29.73	36	30.68	35
Serbia	31.46	37	33.43	43
Bulgaria	31.76	38	28.12	31
India	31.8	39	29.43	33
Finland	31.97	40	32.97	42
Bosnia & Herzegovina	32.1	41	32.79	41
Lithuania	34.34	42	24.02	23

Ukraine	35.03	43	32.39	39
Moldavia	36.4	44	32.42	40
Latvia	37.03	45	31.37	36

Source: The authors' own calculations using Bloomberg and World Bank database.

The table shows the rating of countries demonstrating that the leading positions are occupied by countries in which public policy is the most effective and resulted in better values of the indicators of the socio-economic position taking into account debt obligations. The rating leaders are the countries in which, despite the high level of debt burden on both citizens and the state, indicators of the socio-economic condition are at a high level: high birth and life expectancy rates match with the low mortality and high GDP per capita.

It is obvious that what matters is not the size of the public debt but how effectively the country manages it and whether it commits to the improvement of all indicators and to the satisfaction of the society's needs. Often, the richer the country and the higher the life quality in it (education, healthcare, life expectancy, birth rates) is, the larger its public debt. Implementation of social programs requires additional finances which go beyond budget limits and can be raised only in the debt market. For instance, the public debt of Norway, Unites States and Japan is high but the debt/GDP ratio of these countries is leveled out by the relatively strong economy, high socio-economic position, wealth of the population and effective mechanisms for managing financial resources. All decisions made must be aimed to increase the life quality of the population and, first of all, oriented towards the increase of people's wealth and development. The development of society is impossible without increasing the life quality and providing the population with necessary material and non-material benefits.

4 Conclusions

The deviation of a certain indicator does not, per se, means a threat to the socio-economic position of the country in general. However, monitoring organization, complex review of the system of indicators, detailed analysis of certain economic entities and processes in case of deviation of the criteria dynamics from the normal route should be thoroughly controlled by the competent government authorities.

The analysis of the results of testing the developed method allows to conclude its general solvency. The real socio-economic condition of countries for the examined period corresponds to the final rating of countries by the complex assessment of their socio-economic position taking into account their debt obligations, with regard to the significance of indicator groups in 2012-2013, reflecting correctly the dynamics and tendencies of the economic development of countries and the condition of the social sphere. Hence, the proposed system of indicators largely characterizes the development of countries and their social and economic position in the world arena.

The structure and functioning of the world around us is less and less clear: it becomes more and more illogical and, hence, uncertain (Grinberg, 2011; Bondarenko, 2011). The world development is characterized by complexity, non-linearity, chaos, cycles and crises. The effective political-economic systems form flexible institutional structures (North, 1997) that are able to survive shocks and changes and constitute an element of successful development.

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Financial Literacy: An International Comparison between Germany and the Czech Republic

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Abstract: *The paper analyzes the financial decision making of students from Germany and from the Czech Republic. The countries have different financial education strategies to improve financial literacy. This has impacts on students' financial decision making. In comparison, German students favor traditional financial products like call money, saving books, life insurance, and funds. Students from Czech Republic invest more than the average in real estates and in capital market products like stocks, corporate bonds, and government bonds.*

Keywords: financial literacy, financial education, decision making, Germany, Czech Republic

JEL codes: A2, I2, I21, I23

1 Introduction

Finance is an essential life skill and a part of everyday life. In each stage of life, consumers have to make consequential financial decisions for their further life: In many countries students have to finance their studies, young employees need insurance against occupational disability, everybody needs retirement arrangements and so on. Countries, but also companies, have implemented financial education programs to improve consumers' financial knowledge in the past (Lusardi & Mitchell, 2014).

The PISA 2012 financial literacy assessment (*PISA 2012 Results: Students and Money: Financial Literacy Skills for the 21st Century*, 2014) is the first international and most known assessment of financial literacy for young people. The results show that there are wide differences between the OECD countries. In general, just a small number of students, around 10 %, from the participating countries is able to handle the hardest financial literacy tasks like transaction costs or tax issues. A bigger number of students, around 15 %, is not able to make decisions about an invoice or apply single and basic numerical operations.

The Czech Republic belongs to the countries where the participants perform well in financial literacy. (*PISA 2012 Results: Students and Money: Financial Literacy Skills for the 21st Century*, 2014) Figure 1 gives an overview how countries deal with a national strategy for financial education. The performance depends on the governmental decisions in the Czech Republic. Financial education is part of the school curriculum. The state wants to improve the financial literacy of children and young adults with several financial education programs. (Csikósová & Antošová, 2014) In Germany the level of financial literacy is moderate (Bucher-Koenen & Lusardi, 2011). In contrast to Germany, the Czech government has started a national strategy for financial education in 2010. The federal government structure of Germany prevents such a strategy. Each federal state has to develop its own strategy. (OECD, 2013b)

Figure 1 National Strategies for Financial Education as of September 2013
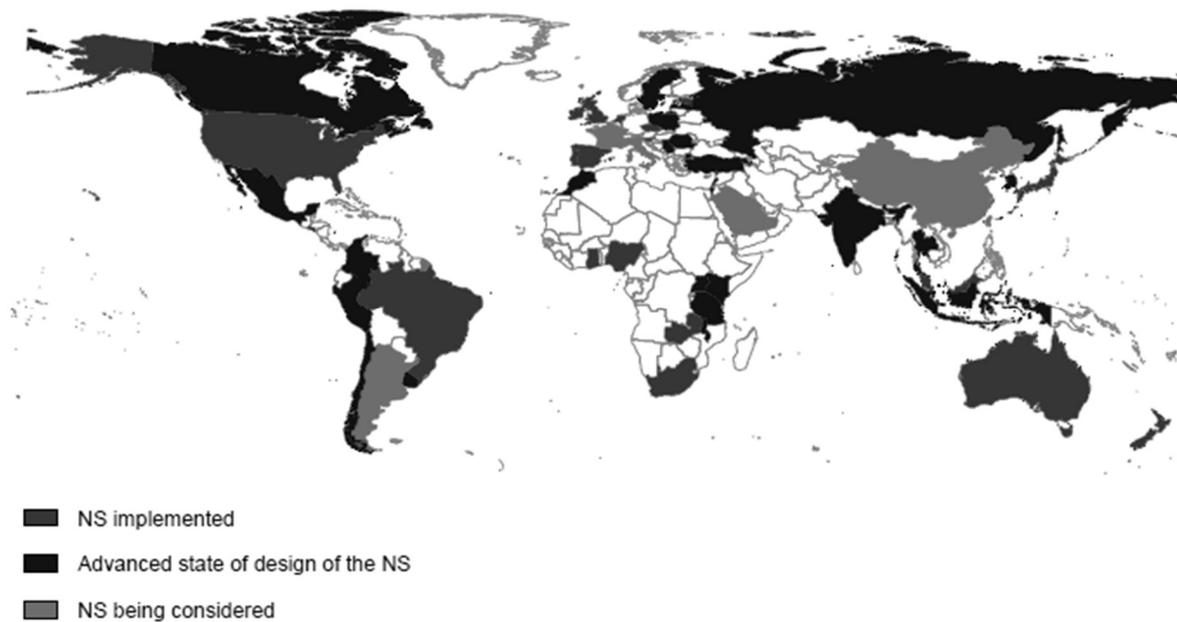
Source: OECD, 2013a

In context of different financial educational backgrounds, it is the aim of this paper to analyze the investment behavior of German and Czech students. Furthermore, it is to investigate how the students decide on financial matters and how they estimate their own knowledge.

2 Methodology and Data

The analysis is based on an online as well as paper pencil survey with students from Germany and from the Czech Republic. The final dataset consists of 672 questionnaires from both countries. 514 students from Germany and 189 students from the Czech Republic take part on the survey. 472 of 672 participants are males and 200 are females. The participants are 25 years old on average, while the youngest participant is 18 years old and the oldest 35. 56 % of the participants are singles and 44 % live in a relationship. Nobody is married.

3 Results and Discussion

The participants represent an important group of people due to the financial education discussion. After finishing their studies, the participants have to make important financial decisions for their future life. They have to take insurances against unemployment or they have to plan their retirements. All decisions depend on the individual preferences (e.g. risk aversion) of a consumer and it has to fit to his individual life cycle optimization process. Furthermore, the economic environment (e.g. common level of interests) as well as the social safety net benefits are important. (Lusardi & Mitchell, 2014)

(Jappelli & Padula, 2013) point out that the investment behavior is different in countries with generous social security benefits and without. In countries with generous social security benefits there are fewer incentives for saving and this has impacts on the financial literacy.

(Bucher-Koenen & Lusardi, 2011) show that the level of financial literacy is moderate in Germany. (Lührmann, Serra-Garcia, & Winter, 2012) confirm this general statement also for younger people. They describe mixed results where students are able to identify risky financial products but they are not able to deal with daily financial tasks, e.g. contracts

for smartphones. (*PISA 2012 Results: Students and Money: Financial Literacy Skills for the 21st Century*, 2014) shows that the Czech students perform well in financial literacy.

Figure 1 summarizes the self-estimation of the participating students. The original questionnaire includes six options for an answer due to the school grade system (grades 1 to 6). In figure 1, grades 1 and 2 are combined in "Good", grades 3 and 4 in "Average", and grades 5 and 6 in "Bad". The results demonstrate that the participants estimate their own financial knowledge as overly good. With around 4 % there are less participants estimating their financial knowledge bad.

Figure 2 Subjective financial knowledge
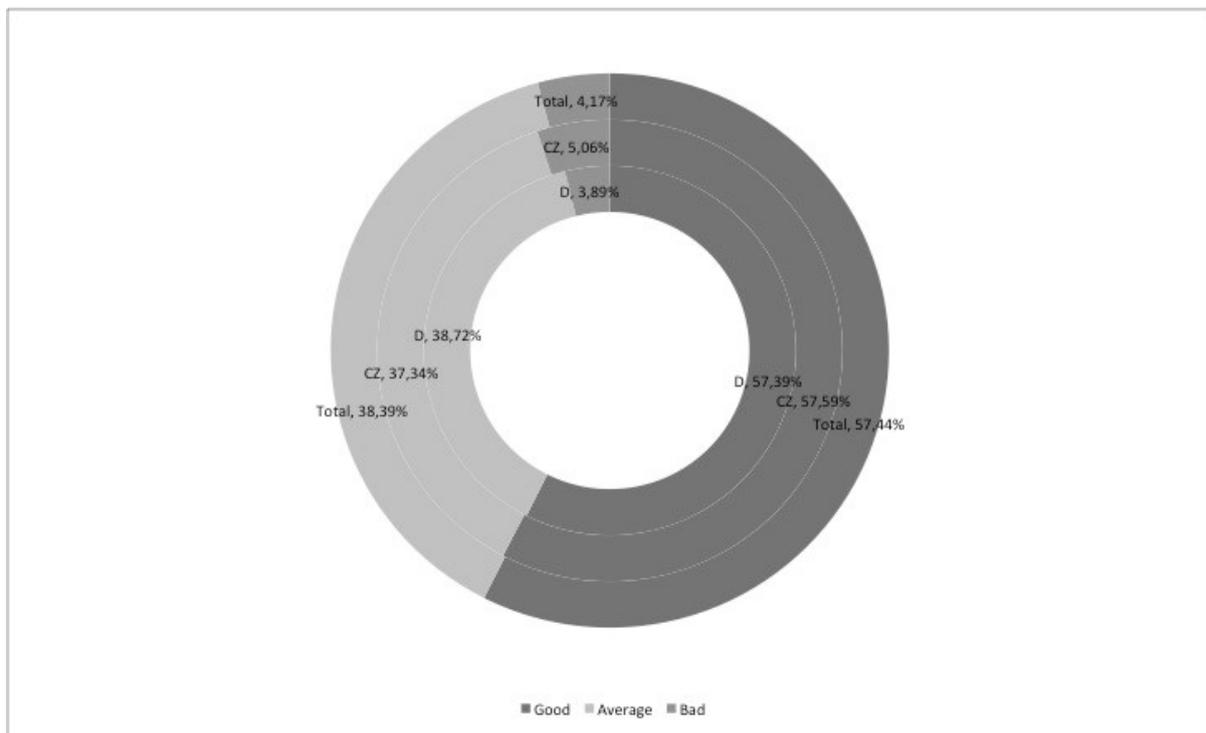
Source: Own calculation

The advisor in financial matters has an important role in the context of financial literacy. Advisors influence the process of learning. If households make financial decisions with the help of a financial advisor, these households do not improve their own financial knowledge. Own decisions are replaced by the suggestion of the financial advisor. (Calcagno & Monticone, 2015) There are two problems that occur due to financial advisors. The first one, if the advisor acts as a seller, he might concentrate on his own profits and not on customers' profits. (Bolton, Freixas, & Shapiro, 2007; Inderst & Ottaviani, 2009; Stoughton, Wu, & Zechner, 2011) The second one, the suggestions of the advisor do not improve portfolio's performance. (Shapira & Venezia, 2001)

The results show that financial advisors are not as important for young academics as for older people. In contrast to older people, 57,29 % of younger people decide on financial matters without an advisor. Figure 2 shows that there are fewer differences between Germany and the Czech Republic. Just a smaller group of the participants (29,91 %) stays in contact to an advisor for financial decisions. 19,05 % of the respondents meet the financial advisor personally in the bank, 9,82 % get in contact with an independent financial advisor, and 1,08 % get in contact with the financial advisor telephonically. The detailed results for Germany and the Czech Republic are included in figure 2. Generally, there are fewer differences between both countries.

Whether an advisor supports a consumer by his financial decisions or not, a high level of financial literacy reduces the probability of delegating financial decisions partly or

completely to the advisor. Illiterate people follow the suggestions of the advisor and do not reflect these suggestions. This can have negative impacts on one person's wealth.

Figure 3 Advisor in financial matters
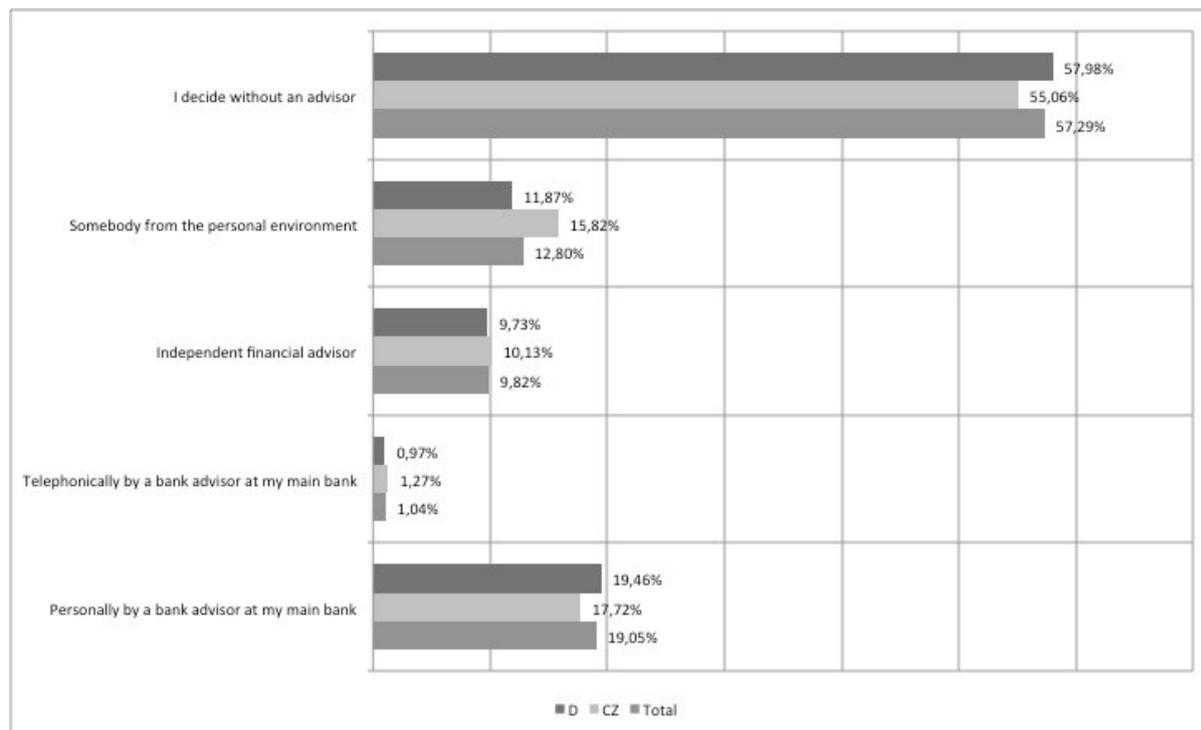
Source: Own calculation

Empirical investigations show that there are differences between more or less financially illiterate households. Less financially illiterate households have a commonly low participation in the stock market. If they have a portfolio, it is not diversified. Moreover, they manage their portfolios inactively and do not match it with the general economic situation. (Guiso & Jappelli, 2008; Kimball & Shumway, 2010)

The results show that Germans prefer traditional investment products like call money, savings books, and life insurances. In contrast, the Czechs prefer real estates and capital market products like stocks, corporate bonds, and government bonds. There are lesser invested in traditional financial products like the Germans.

In contrast to Germany, the Czech government has started a national strategy for financial education, which is valid for the whole country. Because of the federal structure in Germany, such a strategy does not exist there. In the Czech strategy components are included that strengthen the active participation in financial markets of the Czechs. (OECD, 2013b)

The German government has no strategy for financial education. The lack of a financial strategy has impacts on the investment behavior and consequences for the people due to current market developments. (Börsch-Supan & Eymann, 2000) have shown more than 15 years ago that Germans do not invest in risky assets. Regarding to the common economic situation in these times, it was not a problem because safety assets also generated positive returns above the inflation rate. The German investment behavior has not changed for more than 15 years.

The results of this investigation and the investigation of (Börsch-Supan & Eymann, 2000) are the same. Also today, Germans prefer safety financial products like life insurance and they are fewer invested in stocks and real estates. There is no adaption in Germans' investment behavior to current personal finance challenges. These developments can have negative impacts on the personal financial situation of the Germans in the future.

Figure 4 Financial Products
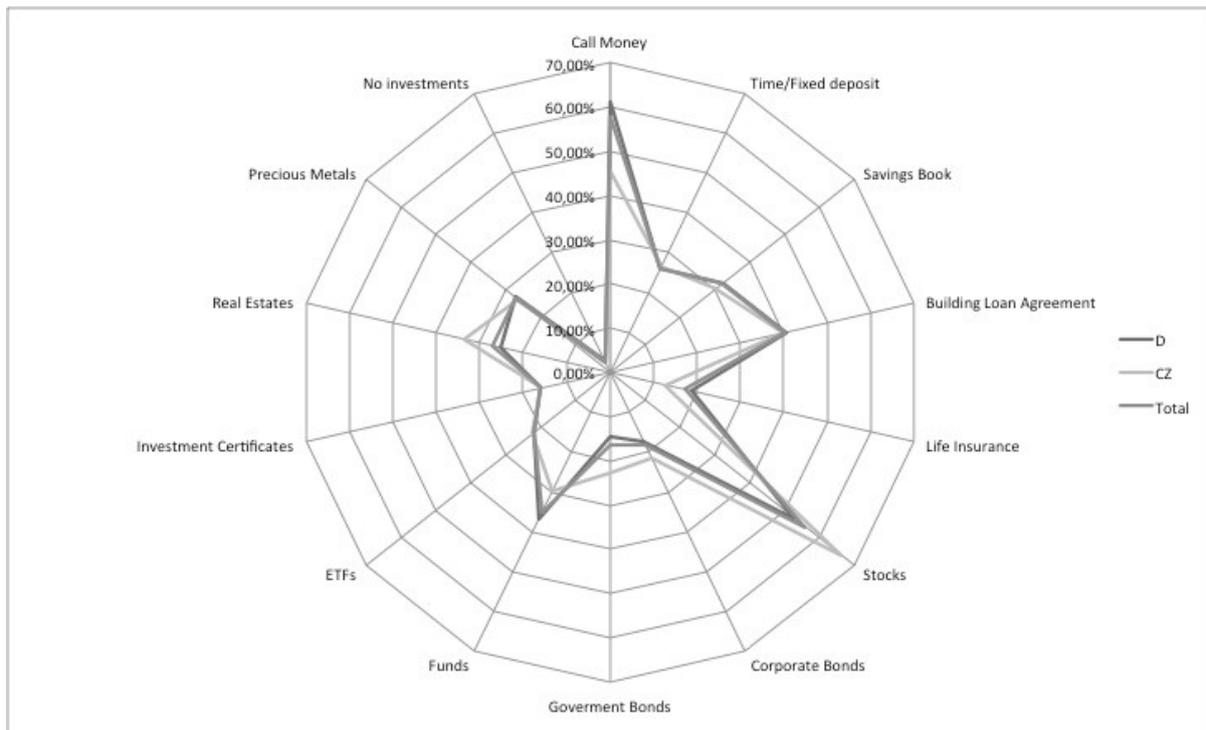
Source: Own calculation

4 Conclusions

Comparing both countries, it seems that the Czech national strategy for financial education lead to more active participation in the financial market. Additionally, the Czechs concentrate more on real values than the average. They are more invested in stocks and in real estate. The Germans are invested in traditional financial products and it seems that there are no changes in their investment behavior. Generally, the Czechs have adapted their investment behavior to current challenges in personal finance. Germans have not adapted their strategy and they invest in the same financial products like more than 15 years ago.

Finally, a strategy for financial education is important for tackling current challenges. On the one hand there are economic challenges like the low-interest phase and on the other hand there are political decisions like changes in the pension scheme, which have influences on personal finance. For people it is important that they are able to deal with these challenges. A national strategy for financial education can support this.

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