Masaryk University
Faculty of Economics and Administration
Department of Finance
and
Institute for Financial Market

European Financial Systems 2013

Proceedings
of the 10th International
Scientific Conference

10-11 June 2013
Telč, Czech Republic

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PREFACE

Dear readers,

It is my pleasure to introduce you a collection of papers from the 10th International Scientific Conference European Financial Systems 2013, organized annually by the Department of Finance at the Faculty of Economics and Administration, Masaryk University. We can now say that our conference has a long history starting in 2003 in Brno, Czech Republic and thereafter continuing as an annual event. To celebrate our first anniversary the conference was organized at a very distinctive and special place – the city of Telč, a UNESCO World Heritage Site.

This year's conference was focused on the current issues related to the financial crisis in the European Union, specifically in financial markets, banking and insurance industries and corporate finance. Because the collection of papers presents the latest scientific knowledge in this area, I believe you will get a number of new insights useful for your scientific enquires as well as your educational or practical activities.

I would also like to express my conviction that we meet each other again in occasion of the 11th year of the conference to be held in 2014.

I wish you a pleasant reading!

Petr Valouch

Chairman of the Program Committee

CONTENTS

The System Solution of Uninsurable Risks
with Focus on Floods in the Czech Republic

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Abstract: *Uninsurable risks influence negatively lives and value of property. Flood risk and risk realization have broad impact on public and private finance with the most significant consequences in the riskiest flood zones. Current trend in the insurance industry is to make exceptions from insurance protection. Our research is focused on multi-source system and on a definition of the role of each participant in the fund. This solution is based on insurance pool creation. Gross premium calculation constitutes an integral part of paper and supports increased interest in extension of insurance protection due to profitable solution of uninsurable risks. Our approach is based on real data of the Czech insurance market and our estimations and calculations.*

Keywords: flood, gross premium calculation, insurance pool, uninsurable risk

JEL codes: G22, G28, P11, R11

1 Introduction

Insurance services play an important role within a meaning of branch of economy and a part of financial market. Insurance protects our lives, property and ensure sustainable economic processes. The role of insurance is strengthened by changing economic conditions, globalization of financial markets, modernization, intensive industrial production, technological improvement and last but not least by rational society with different social fabric. Effective insurance protection is based on needs satisfaction and new desires in order to provide commercial services in high quality. Significance of insurance is enhanced by ensuring constant security, economic support and finally by enterprise promotion.

Contemporary insurance trends are influenced by economic conditions in the light of actual financial and debt crises, which have impact on development of total premiums written. Global economy recovering influences positively demand for commercial insurance products, especially for life insurance products. Non - life insurance segment is influenced negatively by increasing number of natural catastrophes and enormous losses. High costs of non - life risk realization have significant impact on value of equity, requirements of the state interventions and lead to extra public expenses.

Non - life risks and especially natural catastrophes cause high amount of private and public expenditures. Generally the highest losses caused by natural catastrophes in the Czech Republic are consequences of floods, deluges and overflows. Flood risks influence significantly value of property in flood zones. Recent flood occurrence in the Czech Republic highlighted insufficiency of prevention, protection and loss solution of commercial insurance. Flood claims adjustment means at present high losses of insurance industry, which weaken the role of risk protecting institution and its risk taking authority. All these reasons participate in trend of uninsurable risks definition.

Uninsurable risks and avoidance of insurance protection influence negatively importance of commercial insurance solution such as an effective and efficient tool, which is possible to reduce costs and eliminate consequences of flood risks. Our research is focused on uninsurable risks. We pay attention to flood risks and suggest a solution, which should be possible to cover uninsurable flood risk in the Czech Republic. Our solution is based on commercial insurance pool and on multi-source funding system.

The first part of this paper is focused on system description with putting emphasis on major roles of each fund participant. The second part is dealt with gross premium calculation, which is mainly based on our calculations and estimations due to lack of flood data.

2 The System Solution of Uninsurable Flood Risks

2.1 Insurance Pool

Membership in the insurance pool becomes automatically in case of providing domestic property and household contents insurance.

Participation in the pool is based on compulsory entry fee, which is defined in the level of 10 million CZK. These costs represent a kind of fee, which ensures to insurer to take a part in a new market segment - flood zones. About 30 thousand real estates were built in high risk zone in according to last research. We estimate that number of uninsurable buildings is higher (approximately 100 thousand addresses) because of extension of flood zones.

2.2 Members of Multi-Fund System

Intermediary Network

Our system uses internal and external network of intermediaries. Using insurers´ own distribution channels has neutral impact on premiums, because provision and cost schemes are common and strictly predetermined. Calculated premium includes also administrative costs, which are specified as a percentage limit.

Claims Adjustment

System is based on using a service of own network of claims adjusters. This arrangement contributes to costs reduction and simultaneously to prevent from insurance payments manipulation and to make loss settlement faster. Each of insurers also shares risk costs of his own insurance policy. A compulsory financial participation in loss removing is estimated on the level of 10 % of each insured event, because of quick loss removal.

Adjustment service is provided by insurer, who manages insurance policy. Staff adjusters settle insurance claims of estates, which risks are covered by insurer. Settlement costs are paid by the Fund.

State Authority

The state position is designed as independent without interventions into pool operations. Opposed to classic approach of reinsurance markets the state doesn´t participate in risk settlement of any loss. The state reinsurance approach corresponds to the surplus, but all claims developments seem as one claim. Debit account is formed up to 100 % of current status of reserves. The main role of the state is concentrated in covering of claims development and simultaneously authority doesn´t participate in each risk and individual loss.

Our suggested system is closed to reinsurance model of loss excessiveness CATXL (CATastrophe eXcess of Loss cover), which is devoted to reinsure cumulative claims.

A ceding insurer doesn´t pay any premiums to the state authority, because these payments are hidden in cash flows into the reserve fund. Excessive damages are substituted by direct deposits on flood fund account. Instead of deposits it is possible to issue flood obligations, which are ready for the same risk development. Emissions of flood obligations play a major role in case of flood fund reserves overdrafts.

Currently institutions of the insurance markets use a mix of incremental and radical innovations with focus on consistency of public and private solutions and on the insurance markets positive stimulation by investment instruments (e.g. insurance-linked securities). Traditional flood obligations should be substituted by "weather bonds"

(known as catastrophe bonds, which interest payments depend on risk realization), insurance futures or event-linked derivatives.

Pool Supervisor

Model doesn´t expect a risk transfer to the reinsurance markets. A participation of the Czech National Bank in conditions of the insurance fund is fundamental and this authority supervises over the fund. The Czech National Bank as the integrated financial authority takes a responsibility for smooth fund running, creation of reserves, entrance and controlled fund leaving of pool members.

The Czech financial system authority also determines fluctuations and flood loading, declares amounts of calculated costs connected with an insurance product and especially controls and takes part in profit redistribution into pool members and fund reserves in case of positive claims development. Redistribution of fund profit shares should be very sporadic. We expect that free reserves and profit will be used in process of anti-flood barriers building to avoid of future repeated catastrophic losses. One of system´s aims is a prevention and to eliminate compensation payments. Profit should mitigate negative effects caused by floods, deluges and overflows and expenditures on prevention should decrease future fund and pool requirements for policy coverage. Redistributed profit flows to insurers´ accounts in according to their pool participation, concretely to risk premiums paid to the fund. These profit flows are supposed to support regions with the highest flood, deluge and overflow risks. Profit transfer is closed to the fact that insurers are participated in costs coverage and it is in their interest to build anti-flood barriers and to finance anti-flood protection in concrete regions.

3 Coverage of Uninsurable Risks and Premium

Calculation

Assumed flood risk is implemented at least in annual frequency of 1 % of realties. Degree of loss (in according to Table 1) is 10.05 % taking into account distribution of loss frequency and loss amount. Average loss corresponds to claims development of last 16 years in the Czech Republic (it is considered average insurance penetration and personal property and no business property).

Determination of net risk premium is based on specified degree of loss. Loss participation is set as percentage in order to improve motivation to quick loss adjustment. Nevertheless loss adjustment is limited by the lowest amount of 10 thousand CZK, which should decrease a number of administrative difficult minor losses.

Our main aim is to focus on contingency losses. Supposed function of franchise is to influence positively adjustment of claims.

Table 1 Insurance event - 1 % of realties is affected by loss in 1 year (in CZK)

Average sum insured	Individual insurance payment	Amount of losses	Total insurance payment	Insurance payment after participation of 10 % (min. 10 K)
2 000 000	50 000	800	40 000 000	32 000 000
	400 000	110	44 000 000	39 600 000
	600 000	20	12 000 000	10 800 000
	1 000 000	35	35 000 000	31 500 000
	2 000 000	35	70 000 000	63 000 000
Total		1000	201 000 000	176 900 000

Source: Cipra (2006) and our calculations

Specified Degree of Loss

Evaluation of specified degree of loss (q_2) respects relative frequency of individual degree of loss or partial loss. Final specified degree of loss is described in Table 2.

Table 2 Specified degree of loss

z	T_z	t_z	Y_z	b_z	G_z
0.10	800	0.80	0.04	0.80	0.0400
0.25	110	0.11	0.01	0.91	0.0538
0.50	20	0.02	0.01	0.93	0.0613
0.75	35	0.04	0.02	0.97	0.0831
1.00	35	0.04	0.03	1.00	**0.1138**
	1 000	1.00	0.11		

Source: Cipra (2006) and our calculations

Calculation of specified degree of loss is determined by real data and by hypothetical 1 % of flood affected real estates.

- z - interval degree of loss
- T_z - amount of loss in loss interval
- t_z - relative frequency in loss interval
- Y_z - wage degree of loss in loss interval
- b_z - cumulative and relative frequency of loss in loss interval
- G_z - wage amount of losses in loss interval
- i - middle interval

$$q_2 = \Sigma\, t_z * (z - i) = \Sigma\, Y_z = G_{1.00} \tag{1}$$
$$G_z = Y_{0.10} + Y_{0.25} + Y_{0.50} + Y_{0.75} + Y_{1.00} \tag{2}$$

Expression of specified degree of loss is summed by interval degree of loss. Specified degree of loss (q_2) within available information is determined on the level of 11.38 %.

Net Premium Calculation

We search for an amount of premium that is enough to all claims adjustment generated during a calendar year. This process is based on principle of equivalence and full value insurance.

Non-Participating Net Premium

Calculation of non-participating net premium in our model is based on technical rate of interest in amount of 2 %, which expresses estimated current interest level in market conditions of the Czech Republic. Amount of non-participating net premium is 2 253 CZK.

$$^{S}P_{(h)}{}^{H} = v * q_1 * q_2 * S \tag{3}$$

- P - net premium
- S - sum insured
- H - insurance value (We expect, that h = H for the purpose of full value insurance.)
- h - ratio of insurance value and actual value
- v - discount rate (0.990)
- q_1 - loss frequency

Excess Participation

In case of excess participation on the level of 10 % (at least 10 thousand CZK) net premium is equalled to 1 422 CZK ($^{S}_{EP}P_{(h)}{}^{H}$). It follows rate calculation of net premium with excess participation in amount of 0.0711 ‰. Calculation is shortened due to assumption of correct sum insured adjustment in according to insured value.

$$^S_{EP}P_{(h)}{}^H = v * q_1 * [G_1 + (1 - b_1) * s - G_{0,1} - (1 - b_{0,1}) * x_0] * H \qquad (4)$$

- s - full value insurance
- x_0 - ratio of contracted sum insured and insurance value

Gross Premium Calculation

Net premium with excess participation in amount of 1 422 CZK is correct in case of steady and calm claims development. In case of claims deterioration it is necessary to calculate fluctuation reserve, which serves to unexpected increase in insurance events (in the Czech conditions it means fifty-year and hundred-year floods). Fluctuation reserve and net premium create risk premium rate, which takes into account fluctuation in loss distribution and sudden events.

Gross premium consists of net premium, safety loading, administration costs and profit calculation of insurer.

Safety Loading

Assessment of safety loading as a part of gross premium calculation is mentioned in Table 3.

Table 3 Calculation of safety loading

z^2	z	T_z	$z^2 * T_z$
0.0025	0.0500	800.00	2.00
0.0156	0.1250	110.00	1.72
0.1406	0.3750	20.00	2.81
0.3906	0.6250	35.00	13.67
0.7656	0.8750	35.00	26.80
1.3150		1 000.00	47.00

Source: Cipra (2006) and our calculations

Risk Premium Rate

Essential risk premium is extended by fluctuation loading in according to cover fluctuations in long term. Risk loading calculation considers 30 thousand uninsurable units and models real fluctuations in recent years in the Czech Republic. In order to high probability of risk realization out of current loss interval, we complemented risk premium rate additionally by safety loading of the fourth flood zone.

Calculation of risk loading is essentially stricter, because model is based on the highest risk units. We benefit from the presumption that 10 % of estates are affected by insurance event of total loss (2 million CZK) once per fifty years. In order to cover these fluctuations it is necessary to collect net premium in the amount of 5.4 billion CZK during 50 years (after deduction of participation amounting to 10 %, which means 5 400 CZK of loading for estate in value of 2 million CZK).

$$RP = (1+\lambda_1) * P + \lambda * s + \lambda_3 * s^2 \qquad (5)$$

- RP - risk premium
- $\lambda_{1,3}$ - non-negative coefficients which equal to 0 due to principle of standard deviation ($RP = \lambda * s$)
- s - estimated standard deviation

$$s = \sqrt{\frac{1}{N} * \sum_{i=1}^{N} (z_i * S - p * S)\text{^}2}$$

$$(6)$$

- N - estimated amount of insurance contracts
- p - annual net premium calculated by sum insured per unit

$$RP = P + 4/N * H * z_i^2 \tag{7}$$

$$RP = 1\,421.64 + [(4/30\,000 * \sqrt{1.3150} + 0.0018) * 2\,000\,000] = 5\,327.436 \tag{8}$$

Importance of risk loading is overvalued through integration of higher than average sum insured. Risk premium is amounting to 5 327 CZK, which is accorded with selected value of estates (2 million CZK). Risk premium included margin of safety in the form of flood loading, which is estimated on the level of 73.3 %.

Final amount of premium is 5 327 CZK and insurance risk premium rate is calculated in the amount of 2.66 ‰.

Administration costs

Our model defines administration costs purposely as a minimum of gross premium. We estimate, that the highest administration costs should be acquisition. Other kinds of these costs are mostly joined with claims adjustment. Administrative burden should be minimized due to the fact, that our insurance product is designed as additional insurance to existing products.

We can distinguish independent and dependent administration costs. Independent costs are indifferent to the amount of sum insured. We estimate these costs at the level of 0.5 %. Dependent costs are described in the Table 4.

Table 4 Dependent administrative costs

Type of cost	Space of time	Amount and origin of cost	Loading for management expenses
Acquisition	1 year	5.0 % of rate	0.193 ‰
Own administrative	permanent	0.1 % of rate	0.004 ‰
Organization	permanent	0.025 % of rate	0.010 ‰
Collection	permanent	0.75 % of rate	0.029 ‰
Cancellation	1 year	0.10 % of rate	0.004 ‰
Adjustment	1 year	2.00 % of the fund	0.077 ‰
Other	permanent	1.00 % of rate	0.039 ‰
Calculation of profit	permanent	0.50 % of rate	0.019 ‰

Source: Cipra (2006) and our calculations

It is necessary to limit administration and other costs in order to ensure that insurer doesn´t hide profit into increased administrative costs. Fixed amount of administrative costs in primary rate is reliable protection against increasing insurance costs.

$$B = \frac{rp * 1,005}{1 - (0,01 + 0,0025 + 0,01 + 0,015 + 0,01 + 0,015) - 0,05} \tag{9}$$

- b - gross premium rate at risk premium rate "rp" per unit sum insured

Model's gross premium rate is calculated in the amount of 3.016 ‰. Finally annual total gross premium equals to 6 032 CZK in case of sum insured of 2 000 000 CZK.

4 Conclusions

Commercial solution of uninsurable risks with focus on floods, deluges and overflows especially in the conditions of the Czech insurance market is based on pool approach, which should ensure full insurance protection to all participating members and insurance users. Non - life flood risks have significant impact on private and public finance and claims development influences negatively thousands of the Czech residents and value of their property. Our research highlights the importance of uninsurable risks solution in order to protect final consumers of commercial insurance and also to prevent from high losses and devastating consequences of flood risk realization.

Model of multi-source system solution is used on our assumptions and available data. Relevant data access is the main factor, which participates in final version of our model. Gross premium calculations are based on public data, which are published by the interest association of commercial insurance companies ČAP. All data are also conformed to the real market development in the Czech Republic. Our calculations and presumptions are related to the lack of high quality input information of the Czech insurance market, which are followed by our estimations of risk development. Final model version depends on a high extent to factors mentioned above.

System solution of uninsurable flood risks meets requirement to solve exceptions of insurance protection made by commercial insurance companies. Key parts of our model are represented by commercial insurance companies joined to the flood pool, the state authority, fund supervisor, insurance intermediary network and claims adjusters. All functions of system members are strictly predetermined. System is supposed to be profitable. This aim is used to increasing demand for proper commercial insurance product.

Our solution is able to cover enormous flood risk development and total losses caused at least by fifty-year flood. In case of excessive risk development the fund reserves cover 10 % of total losses. Calculated risk premium is based on percentage participation of particular insurer. We assume involvement in claims adjustment and immediate loss compensation. Each consumer of flood insurance pays calculated annual gross premium per unit of his property. Insurer payments are provided by pool reserves, which subsequently flow to policyholders in the form of insurance payments in case of claims development. Due to this purpose the insurance pool consists of main parts - risk premium, reserves creation, insurance payments, preventive measures and participation in profits. In case of moderate claims development pool reserves support areas negatively influenced by floods in the past. It should be in insurers own interest to finance anti-flood protection in concrete regions and to avoid of next enormous flood losses. System also makes conditions to quick claims adjustment with minimum extra costs. We assumes own network of claims adjusters as well as own insurance intermediary network with contributions of external intermediaries. On the top of system there is the independent state authority with supervisor who represents the integrated financial authority supervising over the fund.

Total gross premium is set at the level of 6 032 CZK in case of sum insured of 2 million CZK, which is closed to the fact of current value of particular unit insured. System solution is designed to conditions of the Czech insurance market and takes into account special domestic factors. In according to our presumptions this solution is possible to be adopted within any insurance market in case of using relevant data and particular risk factors.

Acknowledgments

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Verification of a linear dependence between the risk premium and the systematic risk: Empirical testing based on data from PSE

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Abstract: *In our article we focus on an empirical research of the Capital Asset Pricing Model. The equilibrium model is tested on the data from the Prague Stock Exchange. Our research is focused on the relationship of a systematic risk with an individual market premium. We verify, whether it is possible to identify an explanatory power of the market beta on an excessive return. We are dealing with the hypothesis whether it is possible to use a non-diversifiable risk as a crucial part of the explanatory factor for investment decisions. For the study the Black-Jensen-Scholes methodology will be used. We apply only the one factor model and its modified version. The conditions for the modification will depend on the nature of the market risk premium. Our analysis is applied to the period before the financial crisis, during the crisis and post-crisis. We believe that the analysis across the turbulent development enhances the credibility of our results. Although it is necessary to take into account the nature of the investigated market, especially its size and liquidity, the findings of our research confirm the explanatory power of the conditional CAPM to the return on investigated risk assets. In contrast, the results of the unconditional model could not be verified. While there are numerous studies dealing with the empirical testing of unconditional and conditional CAPM, according to our findings, there is no similar study with respect to the processing and application. The results of our research can be practically applied for active traders on the Prague Stock Exchange and similar markets.*

Keywords: Risk premium, systematic risk, linearity, CAPM

JEL codes: G11, G12, C12

1 Introduction

On the basis of Mean-Variance model (Markowitz, 1952) formed mutually independent study investigating the Capital Asset Pricing Model - CAPM (Treynor, 1961, Sharpe, 1964, Lintner, 1965, Mossing, 1966), which is widely used in making an investment decision or in estimating the cost of capital. Despite that, the validity of the model is difficult to prove empirically. Some authors, such as Roll (1977), this model completely repudiate because of the fact that this model can only test the efficiency of market portfolio and the market portfolio is unknown. Because of that, only estimates are used for testing. Thus, the model is generating inaccuracies. The model is also criticized for unrealistic assumptions (Goetzmann & Kumar, 2008, Chae & Yang, 2008). The confirmation of CAPM validity is difficult on established capital markets, where a certain level of efficiency exists. The situation is even worse on emerging markets that are typical of a higher degree of excess yield in comparison to developed capital markets. But there is also present a greater likelihood of achieving loss. Considerable growth phases are accompanied by more rapid declines. Just in the period of decline it is difficult to prove the validity of the model, since it contradicts the theory. In graphical illustration the Security Market Line will be declining. With cyclical phases of growth and decline deals the modified version of CAPM, introduced by Pettengill et al. (1995). His approach assumes distinguish phases of growth and correction. This conditional model should therefore be particularly suitable for testing in emerging markets which also include the Czech Republic.

The Czech Republic in accordance to the classification of Standard & Poor's is one of the emerging markets. These markets are characterized by its rapid economic growth and industrialization. This was characterized in the past for the Czech Republic as well. Today, however, recession of EU strongly reflects on the Czech economy. In the emerging markets investors can reach higher returns than they would have been able to reach in developed countries. The possibility of greater expected return is accompanied by higher risk (Chiaku Chukwuogor, 2008). The Czech Republic belongs to transitive economies, which is typical for the transition from a centrally planned economy to a market economy. That could be one of the reasons why the capital market in the Czech Republic is not sufficiently developed in comparison with advanced financial markets. The emergence of modern Prague Stock Exchange dates back to the 1992. Currently there are fifteen companies traded on the main market (SPAD), which is the most liquid. The market capitalization of the Prague Stock Exchange is 53.244 million USD and trading volumes for the year 2011 were 19,526 million USD. The market is characterized by lower liquidity relative to developed markets.

2 Methodology and Data

Our paper is focused on the testing of the Capital Asset Pricing Model. The analyzed data are obtained from the Prague Stock Exchange (PSE). The investigated period was from 2005 to 2013. In total we analyzed eight companies (CETV, CEZ, ERSTE Group Bank, Komercni banka, ORCO, Philip Morris CR, Telefonica O2 C.R., Unipetrol). The selection of stocks was motivated by the trading continuity throughout the whole period. However these companies do not constitute the entire market of the PSE we believe that the nature of the investigated market will be through those stocks authentically displayed. The weights of all stock in the index are shown in the following table.

Table 1 The Composition of PX

Issue	ISIN	Reduced number of securities	Reduced market capitalization [CZKm]	Weight [%]
ERSTE GROUP BANK	AT0000652011	392,389,160	152,247.0	19.68
ČEZ	CZ0005112300	194,059,129	146,902.8	18.99
KOMERČNÍ BANKA	CZ0008019106	38,009,852	142,536.9	18.43
TELEFÓNICA C.R.	CZ0009093209	322,089,890	133,667.3	17.28
UNIPETROL	CZ0009091500	181,334,764	30,382.6	3.93
PHILIP MORRIS ČR	CS0008418869	1,913,698	21,909.9	2.83
CETV	BMG200452024	56,846,176	6,209.9	0.80
ORCO	LU0122624777	17,053,866	906.8	0.12
VIG	AT0000908504	128,000,000	104,934.4	13.57
NWR	GB00B42CTW68	264,380,983	23,001.1	2.97
FORTUNA	NL0009604859	52,000,000	4,710.7	0.61
PEGAS NONWOVENS	LU0275164910	9,229,400	4,153.2	0.54
AAA	NL0006033375	67,757,875	1,388.4	0.18
KITD	US4824702009	8,248,496	507.3	0.07
Total			773,458.3	100.00

Source: Fact Book 2012 Prague Stock Exchange

The table 1 shows that the researched stock represents 80 % of weight in the index. In addition, these stocks have the largest trading volumes.

The investigated period is characterized by a turbulent development. It is caused by the financial crisis that hits the PSE in 2008. The development of the market shows the following chart.

The index PX indicates a volatile market and shows a significant drop in stock prices in the wake of the financial crisis. To better describe the market condition and capture the dynamic evaluation of beta, we divided the whole examined period in three sub periods (2005-2007, 2007-2009, 2009-2013).

Figure 1. Development of the PX (2005 – 2013)
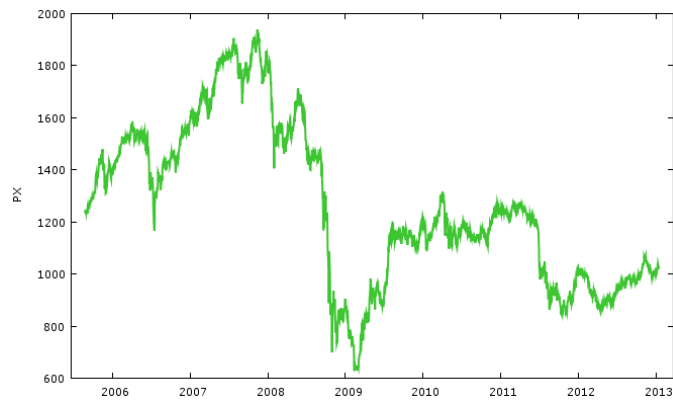
Source: Database of PatriaPlus

The tests are based on the day to day return and by the stock prices we reflect the number of trading days. The return of the whole market is represented by the index PX on the next figure.

Figure 2 Return of PX (2005 – 2013)
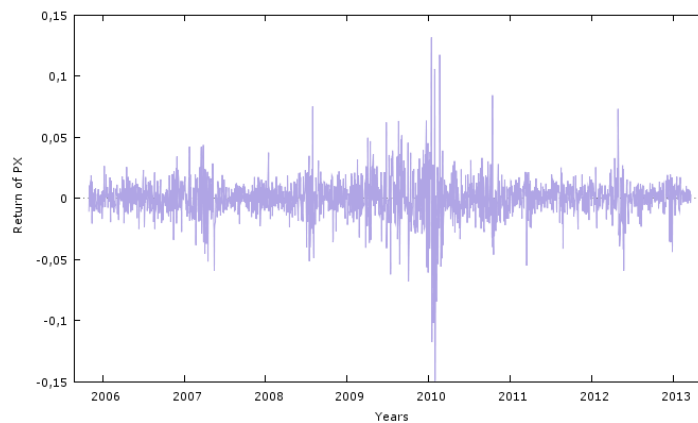
Table 2 Summary statistic of PX (1928 observations)

Mean	4,09E-05
Median	0,000403
Minimum	-0,14944
Maximum	0,13161
Standard Deviation	0,016666
C.V.	407,35
Skewness	-0,14406
Ex. Kurtosis	12,365

Source: Database of PatriaPlus

Model Specification

<u>Rate of return</u>
For the day to day return on the stock and market the following formula will be used:

$$R_i = \frac{P_t - P_{(t-1)}}{P_{(t-1)}} \tag{1}$$

R_i ………………....…is the return of a stock,
P_t ………………...is the closing price of a stock,
$P_{(t-1)}$ ………………..is the closing price of a stock in the previous day.

No dividend payment will be taken in to the account.

Risk free interest rate
As the risk-free asset we have used the government bonds of the Czech Republic. Two-years bonds issued in 2005 and 2007 were chosen for the first two periods. For the third period we use an interest rate of a three-year bond, which was issued in 2009. The interest rates of considered bonds are 2.599%, 3.368% and 4.149%. Since the interest rates are expressed as an annual percentage, we will make appropriate corrections, which give the rate per day.

Individual risk premium and market premium
$$r_i = Ri - Rf \tag{2}$$

r_i ……………………is the individual risk premium,
R_f…………………………is the risk-free interest rate.
$$r_m = Rm - Rf \tag{3}$$
r_m……………………is the market premium,
Rm ………………..is the market return.

Unconditional CAPM model
Step 1 – estimating the beta coefficient from OLS, for the estimation we used rolling window and lag three months.
$$r_i = \alpha_i + \beta_i {}^*r_m + \varepsilon it \tag{4}$$
α_i , β_i……………estimated parameters,
εit……………………..is random error.
Step 2 – in the second regression beta is used as an parameter.
$$r_i = \gamma_0 + \gamma_1 * \widehat{\beta_i} + \mu_i \tag{5}$$
γ_0 , γ_1 ……………estimated parameters,
μ_i…………………. is random error.
Verifying the hypothesis:

H_0: $\gamma_0 = 0$

H_1: $\gamma_0 \neq 0$

H_0: $\gamma_1 = r_m$

H_1: $\gamma_1 \neq r_m$

Conditional CAPM model
1. Step – the first step is identical to the previous model
2. Step – the beta is again used as an parameter, in addition to the first model a dummy variable will be incorporated to distinguish between the situation of positive (up-market) and negative (down-market) market premium
$$r_i = \hat{\gamma}_0 + \hat{\gamma}_{1t} * \delta * \beta_i + \hat{\gamma}_{2t} * (1-\delta) * \beta_i + \varrho t, \tag{6}$$
$\delta = 1$ if $(Rmt - Rft) > 0$ ("*up-market*"),
$\delta = 0$ if $(Rmt - Rft) < 0$ ("*down-market*"),
ϱt ……………is random error.
To meet the requirements of the conditional CAPM, the following must be true

H_0: $\gamma_0 = 0$, $\gamma_1 > 0$ and $\gamma_2 < 0$.

H_1: otherwise

3 Findings

As seen in the first model with the unconditional CAPM, which is the situation where no distinction between positive and negative market premium is provided, it was not possible to confirm the validity of the model in any of the observed periods.

Table 3 Results of the second regression in each period – unconditional model

	2005 - 2007			2007 - 2009			2009 - 2013		
	$\gamma 0$	$\gamma 1$	R^2	$\gamma 0$	$\gamma 1$	R^2	$\gamma 0$	$\gamma 1$	R^2
CETV	0,000421	0,000976	0,000511	0,006592	-0,0121	0,00455	0,000558	-0,0004	0,000024
CEZ	-0,00016	0,001367	0,000641	-0,00333	0,001923	0,000223	0,000245	-0,00066	0,000108
ERSTE BANK	0,000278	-0,00028	0,000024	-0,01208	0,005201	0,001579	-0,00733 *	0,004888	0,004293
KOMERCNI BANKA	0,002362	-0,00204	0,00111	0,000373	-0,0026	0,000309	-0,00592 *	0,005998	0,004363
ORCO	0,000768	-0,00546	0,01061	-0,00869 **	-0,0013	0,000052	-0,00012	0,001602	0,000736
PHILIP MORRIS	-0,00125	-0,00189	0,001816	-0,00095	0,000388	0,000011	1,41E-05	0,002047	0,001159
TELEFONICA	0,000314	0,00056	0,000007	-0,00189	-0,01556	0,010641	-0,00027	0,000792	0,000155
UNIPETROL	0,001067	9,98E-05	0,000004	-0,00571	0,003017	0,000621	-0,00029	0,001371	0,001104

Table 4 Results of the second regression – first period, conditional model

	2005 - 2007			
	$\gamma 0$	$\gamma 1$	$\gamma 2$	R^2
CETV	0,000741	0,007054 **	-0,00808 **	0,087884
CEZ	0,001329	0,007762 ***	-0,00926 ***	0,339802
ERSTE BANK	-0,00027	0,007288 **	-0,00817 **	0,234911
KOMERCNI BANKA	0,001587	0,006632 **	-0,01061 ***	0,259911
ORCO	0,000751	0,001464	-0,01439 ***	0,032585
PHILIP MORRIS	-0,00114	0,003634	-0,00887 **	0,02319
TELEFONICA	0,000357	0,00921 *	-0,01099 *	0,01707
UNIPETROL	0,00375	0,005936 **	-0,01327 ***	0,233717

Table 5 Results of the second regression – second period, conditional model

	2007 - 2009			
	$\gamma 0$	$\gamma 1$	$\gamma 2$	R^2
CETV	0,010389	0,037671 **	-0,01175	0,232111
CEZ	-0,00233	0,017335 **	-0,02482 **	0,299182
ERSTE BANK	-0,01091	0,010386	-0,02384 **	0,322862
KOMERCNI BANKA	-0,00346	0,014696 *	-0,02208 **	0,286763
ORCO	-0,00791	0,017522	-0,01502	0,01304
PHILIP MORRIS	-0,00105	0,012834	-0,0186 *	0,069105
TELEFONICA	-0,00148	0,039424 **	-0,01499	0,048243
UNIPETROL	-0,00209	0,019771 **	-0,02273 **	0,267015

Table 6 Results of the second regression – third period, conditional model

	2009 - 1013			
	$\gamma 0$	$\gamma 1$	$\gamma 2$	R^2
CETV	-0,00023	0,010609 ***	-0,01025 ***	0,171578
CEZ	-0,00051	0,009994 ***	-0,00917 ***	0,257918
ERSTE BANK	-0,00468	0,013877 ***	-0,00754 **	0,401218
KOMERCNI BANKA	-0,00325	0,013678 ***	-0,00684 **	0,304226
ORCO	-0,00029	0,00803 **	-0,00481	0,012969
PHILIP MORRIS	-1,17E-05	0,011298 ***	-0,00756 **	0,063089
TELEFONICA	-0,00019	0,009474 **	-0,00694 **	0,018993
UNIPETROL	-0,00048	0,014578 ***	-0,01112 ***	0,247607

On the other hand, in the second model, the results were much more encouraging. In the first period, only two stocks could not confirmed the validity of the model in the up-market situation. In the case of negative market premium the result of all stocks were significant. This confirmed the hypothesis of leverage effect (Porras, 2012). In the next period, which was characterized by the crisis, the validity of the model was lower and only by five stocks the results are significant. In the last period the model demonstrated again a greater force. In six cases, the up-market at the significant level of 99 % confirmed the hypothesis about the significance of the parameter gamma_2. Except, Orco, the results wer also significant for the negative market premium. The conditional model shows considerable improvement in the indicator of R^2.

4 Conclusions

In our paper we investigated the equilibrium model CAPM and its modified version the conditional CAPM first time introduced by Pettengil et. all. (1995). In our analyses we focused on the Prague Stock Exchange. This market belongs to emerging markets. Since, the market showed turbulent development, we divided the examined data into three periods (2005-2007, 2007-2009, 2009-2013). The first period was not influenced by the financial crisis and growth in the market can be observed in contrast to the next period, where it was possible to notice more instability in the market and downturn. Moreover, in our investigation we confirmed that the beta, which reflects the systematic risk on an asset, exhibits a considerably dynamic development. We tried to verify the CAPM using empirical tests.

We tested first the unconditional CAPM. This model is constantly used in practical investment decisions, although it was developed nearly half a century ago. To verify the Capital Asset Pricing Model, we employed the data from the Prague Stock Exchange, especially Czech government bond prices and the index PX.

The validation of the model consisted of two parts. First we created a regression analysis using the Ordinary Least Squares (OLS). From the regression we estimated the betas, which we used in the second regression as a parameter. The results from our analyses showed that the null hypothesis of a direct proportion between the individual risk premium and the market risk premium could not be confirmed.

Assumptions were not met as measured by the results of the model. According to the t-statistic we came to the conclusion that the unconditional CAPM cannot be used to explain the behavior of investors in the PSE. In addition, the explanatory power of the regression was very low.

Subsequently, we conducted a test of the conditional model. The procedure coincided with the initial test, with the difference being that we incorporated the different market conditions. Data were processed with regard to whether the market premium was positive or negative. The results of the conditional model were significantly better in the sense of validation the model. The explanatory power of the regression was stronger as well.

The empirical analysis showed that the chosen methodology and the period have an impact on the validity of the model. However we divided the whole period into three parts, we could not validate the unconditional CAPM.

The result of our study confirms the validity of a linear dependence of an individual risk premium and a systematic risk only if the conditional CAPM model is applied. The finding could be eminent in respect of the extensive use of the CAPM in an investment decisions or by capital valuation.

Acknowledgments

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Efficiency in the Slovak banking industry:
a DEA application of the profit approach

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Abstract: The paper investigates into the efficiency of the Slovak banking industry over the years 2000 – 2011 through the prism of the profit approach to the perception of efficiency of commercial banks. The aim of the paper is to benchmark individual commercial banks with respect to their efficiency status under the profit definition of efficiency. To this end, the non-parametric method of evaluation is employed based on the slack-based measure (SBM) model of data envelopment analysis. During the period of 12 years examined, Slovenská sporiteľňa maintained comparatively high SBM technical efficiency and other Slovak banks were subject to positive or negative changes in their comparative efficiency profile.

Keywords: efficiency, the Slovak banking industry, SBM model, the profit approach.

JEL codes:G21, C44.

1 Introduction

Over recent years, the topic of measuring efficiency of commercial banks has experienced massive upheaval. Three principal approaches have been developed (to say nothing of their modifications) and are used intensively in evaluating efficiency of commercial banks. Out of these approaches, viz. the service-oriented approach, the intermediation approach and the profit approach, exclusive attention in the paper is given to the profit approach as the basal "commercial" standpoint under which Slovak banks operate striving after a high profit margin for their owners. The task of efficiency evaluation necessitates the assumption of the existence of a production function in the banking industry (which links the inputs and outputs of banks and determines the shape of the production frontier) and efficiency calculations then often base on measuring the distance of individual commercial banks from the production frontier embodied in the production function. The framework under which the production function is specified can be either parametric, non-parametric or semi-parametric. Whereas the parametric method restricts the production function to a certain parametric form which is then estimated, the non-parametric method avoids the formulation of a parametric production function and constructs on some well-understood economic principles the production possibility set. One of these principles is expressed in the technical scalability of operations, to wit, in the specification of the character of returns to scale under which the banking industry operates.

In the paper, the non-parametric slack-based measure (SBM) model is applied with the profit approach of interpreting bank's efficiency to a data set of eleven organisational units[1] of the Slovak banking industry for the period of the years 2000 – 2011. During this period, the Slovak banking sector has gone through some changes as to its structure, competitiveness and regulation. Nonetheless, three periodization landmarks were identified and catalogued, between which it is assumed that the production function did

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[1] Note that the term „organisational unit" is more appropriate here as some of the banks fused or merged during the evaluated period.

not change and remained intact, i.e. was invariant with respect to a time shift. These landmarks divided the entire period of twelve years into three sub-periods, over which the data on individual organizational units of the Slovak banking industry were pooled for their joint evaluation. In each sub-period, individual organisational units were evaluated and their efficiency was determined by the slack-based measure. This procedure permits to fulfil the aim of the paper, which is to benchmark individual Slovak commercial banks with respect to their efficiency status under the profit approach.

The paper is organized in 5 sections, the first of which is introductory and the last is concluding. The second section explains the profit approach for measuring efficiency of commercial banks and provides, in a condensed way, an overview of some relevant studies on the topic. The third methodological section is accompanied by the fourth section which presents the results and includes their interpretation.

2 Conceptual issues and an overview of the literature

Conceptual views of efficiency of commercial banks differ. Individual theoretical concepts concur that commercial banks are agents of a transformation process and that during this process they transmute a set of inputs into a set of outputs. These inputs and outputs are linked in operations of commercial banks through a production function, which specifies the maximum attainable outputs at the given level of inputs. On the one hand, there is an explicit or implicit agreement that such a functional relationship exists; on the other hand, there is no general agreement on the production function of commercial banks which would reflect the aims that commercial banks seek to pursue.

So far three main approaches have been developed and used both in theory and practice, and these are the intermediation approach, the service-oriented approach and the profit approach. The primary source of difference between them is the treatment of deposits, which have both input and output characteristics. Only the newest of these approaches, the profit approach, is clarified in the next paragraph since only this approach is topical for the paper.

The profit approach was introduced by Berger and Mester (2003). They investigated cost and profit productivity of the US banking industry. They found out that during the period from 1991 to 1997 cost productivity worsened whereas profit productivity improved substantially. They concluded that banks had been offering wider range of financial services providing additional convenience, which may have raised costs but also raised revenues by more than the cost increased. Since this approach is relatively new, there is no consensus as to whether these positions hold. Studies which would account for possible impact of the financial crisis on efficiency of commercial banks prepared under this approach were not published yet. The foregoing research of the profit approach was the value-added approach, which considers that both liability and assets categories possess some output characteristics. Only those categories which contribute to a substantial value added are treated as outputs whilst the others are treated as either inputs or intermediate products depending on the specific attributes of each category. This approach was promoted by Berger, Hanweck, and Humphrey (1987), and Berger and Humphrey (1997).

The most commonly used approach in the banking industry is probably the intermediation approach but this approach does not account for the strong profit orientation that is present and perceptible in commercial operations of the Slovak banking sector. The negligence of other approaches in empirical research leaves some room for a thorough application of the profit approach and even calls for it.

There has been intensive research on measuring efficiency of commercial banks and their benchmarking. It is probably not possible to give an exhaustive overview of the relevant literature on this topic. In consequence of this, the scope of the presentation here is limited only to the research that focused on the so-called Visegrad Group countries (the Czech Republic, Poland, Hungary and the Slovak Republic, in the alphabetical order) and utilized the non-parametric approach of the data envelopment analysis (DEA). Table 1

summarizes empirical studies that are germane to this topic and lists especially those studies that have applied the non-parametric approach based on a DEA model. The list of research works is structured into two categories: cross-country studies (which investigated the efficiency of commercial banks across several countries for the purpose of comparison) and single market studies (which focused on the efficiency of commercial banks in one country only).

Table 1 Empirical studies grouped by the Visegrad Group coverage
(in the alphabetical order)

Cross-country studies	DEA methodology
Grigorian and Manole (2002)	CCR, BCC
Kenjegalieva et al (2009)	BCC
Stavárek (2006)	CCR, BCC
Tomova (2006)	BCC
Vincova (2006)	CCR, BCC

Single market studies	DEA methodology
Stavárek, Řepková (2012)	CCR, BCC
Wozniewska (2008)	CCR, BCC
Zemanová (2007)	CCR

Although the majority of the studies (amongst the cited authors: Grigorian and Manole, 2002; Tomova, 2006; Řepková and Stavárek, 2012; Kenjegalieva et al., 2009) fell back upon both nonparametric and parametric techniques to evaluate the bank performance in terms of efficiency, all of the studies that are listed in Table 1 utilized in their quest only basic and rudimentary DEA models, the model by Charnes, Cooper and Rhodes addressed conventionally as the CCR model and the model by Banker, Charnes and Cooper addressed conventionally as the BCC model. In this paper, the model by Tone, a more advanced DEA model, is utilized and this model is usually called the SBM (slack-based measure) model.

3 Methodology

In order to determine the technical efficiency of organizational units of the Slovak banking sector under the profit approach, the SBM analysis was applied on the panel data of eleven organizational units of the Slovak banking sector during the period from 2000 to 2011. (This data span is chosen in regard to the data availability and currency for the needs of this analysis.) The methodological procedure stands on several characteristic points or assumptions that underlie and shape the line of research and they are summarized and explained in brief in the following text.

The assumption of the production frontier time invariance during three identified phases of the Slovak banking sector development

Every sensible and interpretable application of the DEA rests on the explicit assumption of the existence of a production frontier that delimits the set of all disposable inputs and attainable outputs. The optimization task of a chosen DEA model then constructs in a non-parametric fashion the production frontier and measures in an appropriate way the distance of individual production units from the production frontier and captures it in the form of a score (used in assessing the relative efficiency of a given production unit and in the benchmarking). However, it often happens that the production frontier changes over time (even this change is required for the theory of economic growth to be valid and hold). However, in some consecutive periods the production frontier due to the inertia of the economic environment may remain invariant, that is invariant with respect to a time shift. This view is applied in the paper and it is believed that there are some phases in the evolution of the Slovak banking sector during which its production frontier remained

intact and free of shift. During the period from 2000 to 2011, three sub-periods can be identified and justified: 2000 – 2003, 2004 – 2008, 2009 – 2011.

- The first phase (2000 to 2003) reflects the last quivers of the restructuralization of major banks and of the privatization of selected banks in Slovakia that commenced in the 1990s. Whereas political decisions on the transfer of illiquid assets into a specialized state institution were taken in the second half of the 1990's and the transfer itself took place especially in the years 1998 and 1999, the cleaning-up of balance sheets of the Slovak major banks ended only at the beginning of the 2000s. The privatization of banks in Slovakia that was started by an entry of the Austrian group Erste Bank into Slovenská sporiteľňa in January 2001 and continued by other acquisitions resulted in the integration of the Slovak banking sector into the global banking system due to its property relations with the European largest banking groups. This phase was also accompanied by final stages of the transformation process of the Slovak economy.

- The second phase (2004 – 2008) begins by the accession of Slovakia into the European Union and terminates by the entry of Slovakia into the euro area. Slovak banks during this period implemented a new system of corporate governance, moved to the communication with targeted client segments and towards electronic banking services. There were significant changes in balance sheet and off-balance sheet operations, in the structure of services and in the orientation on investment banking, mortgage banking as well as asset management. In the years 2006 – 2008 Slovak banks were intensively engaged in the preparations for the entry of Slovakia into the euro area as of 1 January 2009.

- The third phase (2009 – 2011) is marked by the successful adaptation of the Slovak banking sector to the euro environment and by the manifestations of the economic crisis in the Slovak economy. Thanks to commercial banks as well, the process of the euro-conversion was smooth and trouble-free. On the other hand, of impact on the Slovak banking sector was the global economic crises that brought about a dramatic fall in the economic growth of Slovakia. Small Slovak banks faced existence problems.

The selection of organizational units of the Slovak banking sector and the selection of a particular set of inputs and outputs with each approach

The dataset comprises the data on 11 organizational units (commercial banks) operating in the Slovak Republic and it covers the great majority of Slovak banking structures (as the total of included banks exceeds 90 percent of the Slovak banking assets). The organizational units considered in the paper are listed in Table 2. In order to assure consistency of the analysis, building societies and special financial institutions are subject to exclusion. The source of the data is TREND Holding, s.r.o., Bratislava.

Table 2 Organizational units of the Slovak banking sector subjected to the analysis

Organizational unit	
Citibank Europe plc, foreign bank subsidiary (before 2009 Citibank (Slovakia), a. s.)	
Československá obchodná banka, a. s. (in 2009 merged with Istrobanka, a. s.)	
Prima banka Slovensko, a. s. (before 2011: Dexia banka Slovensko, a. s.)	
Privatbanka, a.s. (before 2005 Banka Slovakia, a. s.)	
OTP Banka Slovensko, a. s.	Poštová banka, a.s.
Slovenská sporiteľňa, a. s.	Tatra banka, a.s.
VOLKSBANK Slovensko, a. s. (since 2013 Sberbank Slovensko, a. s.)	
Všeobecná úverová banka, a. s.	
UniCredit Bank Slovakia, a. s. (a 2007 merger of UniBanka, a. s. & HVB Bank Slovakia, a. s.)	

The data used in the empirical analysis are the yearly data of balance-sheet items disclosed by the eleven organizational units of the Slovak banking sector during the period 2000 – 2011. During the period some of the organizational units underwent a

merger or a takeover, it was therefore necessary to operate with totals on the banks which changed its legal and economic status. The data on these banks were aggregated as a total and only the merger or the acquisitor is considered. The hypothesis on the time-invariance of the production function permitted the pooling of individual organizational units in the identified phases and resulted in "bank-years". Only the data for 4 bank-years were not complete (ČSOB / Istrobanka 2007 & Citibank 2009, 2010, 2011). In consequence, the first phase was represented by $11 \times 4 = 44$ bank-years, the second phase included $11 \times 5 - 1 = 54$ bank-years, and finally, the third phase was formed by $11 \times 4 - 3 = 41$ available bank-years. The data are evaluated within the framework of the DEA separately; in other words, the DEA was conducted for each of the three phases independently.

Only one input and only one output are recognized in the study. The input selected under the profit approach is total operating expenses and the output to be maximized is represented by net interest income.

The pooling of the data from different years necessitated their deflation for a proper analysis. Individual data were deflated to the prices of 2000 by the GDP deflator provided by Eurostat.

The employment of the SBM model

In this paper, the assumption of variable returns to scale is formed (which, of course includes a specific case of constant returns to scale) and combined with a non-oriented SBM model in evaluating the organizational units of the Slovak banking sector on a comparative basis. Note that the studies enumerated earlier used in their analysis the rudimentary CCR or BCC model. This study thus goes farther.

In the exact formulation of the SBM model, it is assumed that the data on n production units are available, where any production unit o, $o \in \{1, ..., n\}$, produces s desirable outputs out of m inputs. The values of inputs of production unit o are represented by vector $\mathbf{x}_o = (x_{o1}, ..., x_{om})'$ and the values of outputs by vector $\mathbf{y}_o = (y_{o1}, ..., y_{os})'$. The elements of both vectors are positive. Individual inputs and outputs have corresponding vectors of potential slacks $\mathbf{s}^{\mathbf{x}}_o = (s^{\mathbf{x}}_{o1}, ..., s^{\mathbf{x}}_{om})'$ and $\mathbf{s}^{\mathbf{y}}_o = (s^{\mathbf{y}}_{o1}, ..., s^{\mathbf{y}}_{os})'$, which states how individual inputs and outputs must be improved in order that production unit o become efficient (whereas vector of inputs $\mathbf{x}_o$ need be reduced by $\mathbf{s}^{\mathbf{x}}_o$ and vector of outputs $\mathbf{y}_o$ need be increased by $\mathbf{s}^{\mathbf{y}}_o$). These slacks are to be identified by the DEA and serve as an exclusive basis of efficiency calculation for respective production unit o.

For each production unit o, $o \in \{1, ..., n\}$, it is necessary to solve the following task of linear programming of the non-oriented SBM model under the assumption of variable returns to scale,

$$\rho_o\left(\lambda, \mathbf{s}^{\mathbf{x}}, \mathbf{s}^{\mathbf{y}}\right) = \frac{1 - \frac{1}{m}\sum_{i=1}^{i=m} s^{\mathbf{x}}_{oi}/x_{oi}}{1 + \frac{1}{s}\sum_{j=1}^{j=s} s^{\mathbf{y}}_{oj}/y_{oj}} = ! \min \quad \text{with respect to} \quad \begin{array}{l} \mathbf{s}^{\mathbf{x}} = \mathbf{x}_o - \sum_{i=1}^{i=n}\{\lambda\}_i \mathbf{x}_i \geq \mathbf{0} \\[2mm] \mathbf{s}^{\mathbf{y}} = \mathbf{y}_o - \sum_{i=1}^{i=n}\{\lambda\}_i \mathbf{y}_i \geq \mathbf{0} \\[2mm] \sum_{i=1}^{i=n}\{\lambda\}_i = 1, \lambda \geq \mathbf{0} \end{array} \quad (1)$$

The symbol „$\geq$" denotes at a vector that respective elements of this vector are non-negative and at least one element is non-zero.

The restrictions of the optimization task constructs the production possibility set with respect to n production units and their observed inputs $\mathbf{x}_1, ..., \mathbf{x}_n$ and outputs $\mathbf{y}_1, ..., \mathbf{y}_n$ as well as their convex linear combinations in $\mathfrak{R}^m$ and $\mathfrak{R}^s$ respectively. The coefficient ρ takes values at interval $[0, 1]$ and it is the SBM score of technical efficiency (in this case of production unit o whose task (1) is subject to optimization. If for some production unit $\rho = 1$ happens to be the case, this production unit is called SBM-efficient, which means that it is technically efficient in the sample of n production units to be evaluated.

In the paper, the role of production units is undertook by individual organizational units in the Slovak banking sector in the three phases of its development. Three runs of the

SBM analysis were made with (the number of inputs) $m = 1$ and (the number of outputs) $s = 1$, one for each phase. In the first phase, the number of decision making units was $n = 44$, in the second phase, $n = 54$, whilst in the third phase, $n = 30$.

4 Results

All computations were performed in program R (R Development Core Team, 2013) by means of functionalities included in package nonparaeff (Oh and Suh, 2013). The results are displayed compactly in Table 3; which presents the information on the achieved SBM score for each organizational unit of the Slovak banking sector in each phase. The (simplifying if understandable) designations of individual organizational units indicated in the table are also used in the interpretations.

Table 3 Results of the application of the SBM model in the individual phases

FIRST PHASE		SECOND PHASE		THIRD PHASE		FIRST PHASE		SECOND PHASE		THIRD PHASE	
YEAR	SCORE	YEAR	SCORE	YEAR	SCORE	YEAR	SCORE	YEAR	SCORE	YEAR	SCORE
Citibank						ČSOB / Istrobanka					
2000	0.694	2004	0.778	2009	NA	2000	0.929	2004	0.744	2009	0.602
2001	0.848	2005	0.596	2010	NA	2001	0.755	2005	0.452	2010	0.512
2002	0.907	2006	0.552	2011	NA	2002	0.655	2006	0.623	2011	0.467
2003	0.687	2007	0.669	---	---	2003	0.886	2007	0.769	---	---
---	---	2008	0.856	---	---	---	---	2008	NA	---	---
OTP Banka Slovensko						Poštová banka					
2000	0.151	2004	0.594	2009	0.483	2000	0.357	2004	0.656	2009	0.628
2001	0.475	2005	0.644	2010	0.486	2001	0.379	2005	0.462	2010	0.74
2002	0.41	2006	0.727	2011	0.468	2002	0.665	2006	0.671	2011	1
2003	0.496	2007	0.723	---	---	2003	0.533	2007	0.776	---	---
---	---	2008	0.768	---	---	---	---	2008	0.841	---	---
Prima banka						Privat banka					
2000	0.889	2004	0.808	2009	0.341	2000	0.931	2004	1	2009	1
2001	0.836	2005	0.626	2010	0.357	2001	0.767	2005	0.752	2010	0.674
2002	1	2006	0.882	2011	0.384	2002	1	2006	0.966	2011	0.727
2003	0.85	2007	0.853	---	---	2003	0.918	2007	0.869	---	---
---	---	2008	0.817	---	---	---	---	2008	1	---	---
Slovenská sporiteľňa						Tatra banka					
2000	0.826	2004	0.798	2009	0.797	2000	1	2004	0.817	2009	0.573
2001	0.829	2005	0.77	2010	0.988	2001	0.79	2005	0.754	2010	0.617
2002	1	2006	0.871	2011	1	2002	1	2006	0.744	2011	0.673
2003	0.939	2007	0.979	---	---	2003	0.735	2007	0.681	---	---
---	---	2008	1	---	---	---	---	2008	0.708	---	---
UniCredit Bank						VOLKSBANK Slovensko					
2000	0.744	2004	0.749	2009	0.401	2000	0.705	2004	0.649	2009	0.351
2001	0.7	2005	0.622	2010	0.401	2001	0.633	2005	0.654	2010	0.398
2002	0.967	2006	0.878	2011	0.452	2002	0.687	2006	0.711	2011	0.388
2003	0.657	2007	0.873	---	---	2003	0.685	2007	0.653	---	---
---	---	2008	0.894	---	---	---	---	2008	0.714	---	---
Všeobecná úverová banka											
		2000	0.704	2004	0.878	2009	0.853				
		2001	0.831	2005	0.849	2010	0.901				
		2002	0.799	2006	0.848	2011	0.94				
		2003	0.855	2007	0.931	---	---				
		---	---	2008	1	---	---				

Each sub-period subjected to the analysis represents a structurally different quality of the economic environment, in which commercial banks pursue their goals and undertake their business activities. This fact is entertained in the subsequent economic interpretations of the results obtained. Whilst the first sub-period (2000 to 2003) is the ending phase in the restructuralization and privatization of the Slovak banking sector and is marked with the introduction of the foreign corporate governance in the area of

banking, the second sub-period (2004 – 2008) is heavily influenced with the accession of the Slovak Republic to the European Union in 2004 and is characteristic of a dynamic economic growth as well as an increasing offer of banking services. Eventually, the third sub-period (2009 – 2011) delimits itself with the onset of the financial crisis and goes into an economic downturn.

The results of SBM technical efficiency scores for individual sub-periods are reproduced for convenience graphically in Figure 1. Individual scores are marked with red asterisks and their arithmetic average for each sub-period and for each of eleven organizational units of the Slovak banking sector are displayed by the black triangle.

Figure 1 SBM technical efficiency scores for individual banks in the three sub-periods
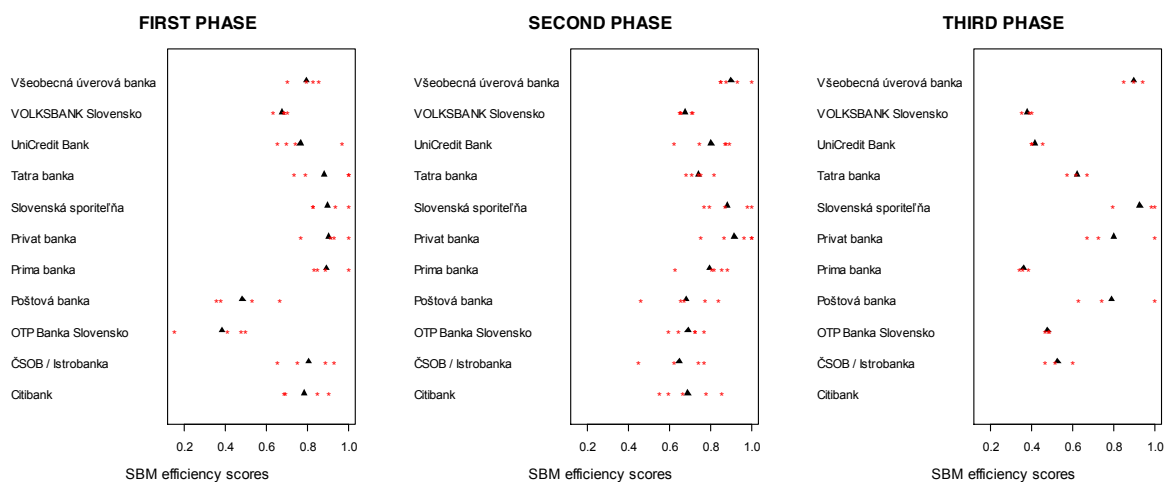
Source: the authors

The application of the SBM model in league with the profit concept of banking efficiency resulted in the knowledge that the number of full technically efficient organizational units of the Slovak banking sector relatively oscilated over the identified three phases. Whilst in the first sub-period, a total of four banks were found technically efficient in any year of the given sub-period (i. e. Prima banka, Privat banka, Slovenská sporiteľňa and twice Tatra banka), only three banks were found technically efficient for the second sub-period (twice Privat banka, Slovenská sporiteľňa and Všeobecná úverová banka) as well as for the third sub-period (Poštová banka, Privat banka and Slovenská sporiteľňa). The pattern of technical efficiency in individual sub-periods is aptly captured by Figure 1.

– In the first sub-period of 2000 – 2003, Poštová banka and OTP banka Slovensko were clearly least technically efficient in the Slovak banking sector, of course, on a comparative basis and with respect to the profit approach of efficiency. Both of these banks are retail banks. On the other hand, comparatively most efficient banks are obviously two wholesale banks Slovenská sporiteľňa and Tatra banka, and two retail banks Prima banka and Privat banka. Another wholesale banka, Všeobecná úverová banka, in the first sub-period can be classified as a mediocre banks with respect to its profit efficiency. The largest Slovak commercial bank, Slovenská sporiteľňa, attained technical efficiency in 2002, a year after the government cleared the last remains of illiquid assets off its portfolio. Tatra banka manifested technical efficiency in two years, 2000 and 2002, even without governmental assistance. The comparative efficiency of privatized commercial banks may be attributed to new corporate governance and to the promising economic growth of the Slovak economy.

– The second sub-period of 2004 – 2008 brought about some changes in the efficiency pattern of the Slovak banking sector. SBM efficiency scores are seemingly somewhat higher than in the previous sub-period (nonetheless, this can by no means be interpreted as an improvement in the overall efficiency). Three organizational units

are comparatively more efficient during this second phase of the development of the Slovak banking sector, two of them are wholesale banks (Všeobecná úverová banka, Slovenská sporiteľňa) and one of them is a retail bank (Privat banka). In plain words, Slovenská sporiteľňa and Privat banka retained in the second sub-period the status of benchmark in technical efficiency. None of the organizational units manifested considerably lower SBM efficiency scores and individual banks form a coherent group in terms when comparing their operating expenses and interest income. This can be possibly attributed to the fact that – during this sub-period – the real Slovak economy underwent a dynamic growth path and commercial banks started to extend the supply of their services especially with asset management, leasing, structural products. This is consistent with their ambitions of profit maximization in the good times of the Slovak economy.

– Obviously, a most heterogeneous distribution of efficiency in the Slovak banking sector is found with the third sub-period of 2009 – 2011. During this stage, two organizational units (i.e., Privat banka and Poštová banka) may have had attained full technical efficiency in one year, but their average efficiency performance is ordinary on a comparative footing. A high efficiency profile was maintained by two wholesale banks (Slovenská sporiteľňa and Všeobecná úverová banka) and this contrasts with other three small banks (VOLKSBANK Slovensko, Prima banka, UniCredit bank) whose efficiency scores were uniformly low during the sub-period under the evaluation. All of these three organizational units were, during this sub-period or later, subject to changes in ownership relationships. Another aspect of the changes between the two consecutive sub-periods is that the comparative efficiency status of Privat banka slightly worsened and this bank no longer exhibited a high efficiency profile held in the previous two sub-periods. Similar is true e. g. for UniCredit Bank, and the reverse holds e. g. for Poštová banka. It is also of interest that the technical efficiency of Prima banka rapidly declined during the identified three sub-periods, and Tatra banka is characteristic of a gradual decline in its efficiency status.

5 Conclusions

This paper represents a case study, in which organizational units of the Slovak banking sector over the years 2000 – 2011 are evaluated in terms of technical efficiency that they exhibit in their operations from the standpoint of the profit approach. In the evaluation, a non-parametric SBM model was applied under two crucial assumptions. The assumption of variable returns to scale is one of classical assumptions made in such analyses, and this assumption is supplemented here by the requirement that the production frontier remain constant in three identified sub-periods (phases) in the evolution of the Slovak banking sector: 2000 – 2003, 2004 – 2008 and 2009 – 2011. In each of these sub-periods, organizational units of the Slovak banking sector were pooled in one data frame, from which the information on the shape of the production frontier (constant in individual sub-periods and common to all organizational units in the given sub-period) was extracted by the SBM model in the form of SBM technical efficiency scores. During the entire period of 12 years, on a comparative basis, Slovenská sporiteľňa was able to preserve high SBM technical efficiency scores. Some banks indicated improvements (Poštová banka) and others manifested gradual declines (such as UniCredit Bank, Tatra banka) during the entire period. Privat banka worsened comparatively in the final sub-period.

Acknowledgments

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Is the asset-liability approach a significant change to revenue recognition?

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Abstract: *In November 2011, the exposure draft of a new common standard regarding the revenue recognition from contracts with customers was published. The main objective is to unify the principles for revenue recognition and the possibility of its consistent application across sectors. This paper is focused on the identification of areas where we can assume that there will be the most significant differences in reported revenue compared to the current treatment. The aim of the research is the evaluation of its impact on the reported amounts of revenues and their course over time. The greatest difference was considered in accounting for performance obligations at the time of contract inception. Some differences arise in determining transaction price, it can lead to earlier recognition of revenue compared to the current treatment under U.S. GAAP and IFRS. Research conclusions may contribute to the preparers or users of financial statements. It is intended especially for the purpose of introducing them into practice while respecting the information needs of users of financial statements of those companies that are affected by change in methodology*.

Keywords: revenues, asset-liability approach, contracts with customers

JEL code: M41

1 Introduction

Difference in national accounting systems imposes additional costs on companies that prepare financial statements based on multiple reporting models in order to raise capital in different capital markets. According to Svoboda, Bohušová (2013) financial reporting as a result of application of accounting treatments should become a comprehensible source of information for users from different countries. The way out of this situation is a global harmonization of financial reporting. Over 100 countries have recently moved to IFRS reporting or decided to require the use of these standards. On the other hand, there are US Generally Accepted Accounting Principles (US GAAP) which were the only reporting system, which was accepted by financial and capital markets in the USA. These two systems could be suitable to be a global system of financial reporting. Convergence of U.S. GAAP and IFRS is an important stepping stone on the journey to a global, high quality set of financial reporting standards development.

The two most significant organizations in the field of financial reporting regulation setters in the world - The Financial Accounting Standard Board (FASB) and International Accounting Standards Board (IASB) begun significantly cooperate in the development of common principles based standards in 2002. In September 2002 in American Norwalk was published an agreement Memorandum of Understanding (MoU). In this agreement FASB and IASB have committed to the approach of convergence of accounting standards (IAS/IFRS and US GAAP), so as to be acceptable by the world's capital markets. The process of convergence of US GAAP and IFRS has been realized through a series of sub-projects aimed at short-term or long-term period. These are the projects where the unification of accounting rules was expected no later than at the end of 2008. Defined target had not been fulfilled and the supposed completion date was postponed to 2014.

In 2012 the IASB and FASB published a joint progress report. The IASB and FASB remain committed to completing the remaining three convergence projects - financial

instruments, revenue recognition and leases. Currently, these projects represent priority areas of convergence.

2 Methodology and Data

The paper focuses on the convergence of financial reporting systems (IFRS and U.S. GAAP) in the area of revenue reporting. The main aim of this paper is to analyse and evaluate effect of application of the published Exposure Draft and Re-exposure Draft of Revenue from Contracts with Customers on financial statements of reporting entity. The designed approach to revenue recognition is based on the requirement that this area should be consistently regulated by a single universal standard. There are identified areas in which we can assume the most important differences from the current approach to revenue recognition and reporting in the paper. A prerequisite for fulfilling the main aim is comparison of current approach to revenue recognition under IFRS and US GAAP and the Draft of the new standard. The result of the comparison is used for identification of areas where the most significant differences are supposed to arise. The overall impact on the reported amounts of revenues and their progress over time is evaluated.

There are used standard methods of scientific work in this paper. The method of description is used to describe the development in the area of IAS/IFRS and US GAAP convergence. Then, the comparative analysis is used to discuss the differences in revenue recognition and measurement under IAS/IFRS and US GAAP. The OIBDA (operating income before depreciation and amortization) indicator is used for demonstration of effects of a new methodology. At the end, the methods of synthesis, deduction and induction are used.

3 Results

Revenue is a crucial number to users of financial statements in assessing a company performance and prospects. However, revenue recognition requirements in US GAAP differ from IFRS revenue recognition principles, and both sets of requirements are considered to be need of improvement (Preliminary Views, 2008). FASB and IASB initiated their joint project on revenue recognition in 2002. The preparation of a new common standard on revenue recognition is the main aim of this project. The publication of Discussion Paper - Preliminary Views on Revenue Recognition in Contracts with Customers was the first joint project output. The boards received more than 220 comment letters on their discussion paper. The majority comments were from preparers and some from users or user representative organizations. The idea of a single revenue recognition model was strongly supported. The Exposure Draft of Revenue from Contracts with Customers was issued on June, 24th, 2010. It was significantly affected by the reaction of the professional public in the form of Comment Letters. The proposal provoked an extensive public consultation and Boards received 986 letters (comment letters) from the business entities, users of financial statements, auditors, regulators, professional associations, consultants and others. Most of the responses came from areas that were supposed to be significantly affected by a new methodology – engineering, construction, auditing, insurance and technology companies. On the basis of these reactions IASB and FASB have made the conclusion – to postpone publication of the final standard and re-issue a revised exposure draft for a new public discussion. The re-exposure draft – ED/2011/6 "Revenue from contracts with customers" was issued on 24 November 2011. In addition to ED/2011/6 Basis for Conclusions (BC) was issued. The process of the ED development and alternative views on selected issues were described in BC. By March 2012 stakeholders were given the opportunity to comment the newly issued draft. During this period the Boards received more than 300 letters. Application of standard in its current form would, in the opinion of Boards, improve comparability, reduce the need for interpretative guidance for specific types of transactions and improved disclosure. Issue of a final standard is expected for the first half of 2013.

Revenue Recognition and Recording under US GAAP

Before the FASB Accounting Standards Codification took place, there were over 100 pieces of treatment concerning revenue recognition in U.S. GAAP. Although the revenue recognition accounting literature, except for industry special guidance, is generally arranged and organized into a single topic in the Codification (Topic 600 Revenue, ASC 605, Revenue Recognition), the volume of the accounting literature and its complexity has not changed.

Two criteria must be met for revenue recognition. Revenue recognition criteria are defined in the FASB Concepts Statement No. 5 Recognition and Measurement in Financial Statements of Business Enterprises. Criteria require that revenue must be realized or realizable and must be earned. Revenues are not recognized until earned. Revenues are considered to have been earned when the entity has substantially accomplished what it must to do to be entitled to the benefits represented by the revenues (CON5). The application of the earning process for revenue recognition seems not to be consistent for application in different industries.

There is the SEC Staff Accounting Bulletin (SAB) No. 104 for revenue recognition (Topic 13) and more than 100 industry-specific pieces of guidance which can serve conflicting results for economically similar transactions because an earning process is not precisely defined. The existence of different requirements for economically similar transaction reduces the comparability of revenues across entities and industries. The detailed rules often contain exceptions for particular types of transactions.

Revenue Recognition under IAS/IFRS

The incomes and expenses are defined in the conceptual framework of IAS/IFRS. The definition of income encompasses both revenues and gains. There are two IAS standards for revenue recording (IAS 18 – Revenue, IAS 11 – Construction Contracts). Revenue is recognized when it is probable that future economic benefits will flow to the enterprise and they can be measured reliably. Revenue is recorded in fair value. The revenue relating to long-time contracts recording is the special area of revenue recording in IAS/IFRS. Revenue and costs associated with construction contracts are determined in IAS 11 Construction Contracts.

Table 1 Problems with recognition under US GAAP and IFRS

US GAAP	IFRS
• More than 100 standards on revenue could produce conflicting results for economically similar transaction, • There is not any general approach for all kinds of revenue recognition, • Application of earning process could lead to misrepresentation of an entity´s contractual rights and obligation in financial statements.	• The criteria for revenue recognition under IAS 18 and IAS 11 are not compatible. • Entities could recognize amount of revenue in the financial statements that do not faithfully represent economic phenomena (revenue recognition for sale of goods depends on when the risk and rewards of ownership are transferred), • Lack of guidance for multiple-elements arrangement.

Source: based on IASB and FASB information

Based on the comparative analysis, the authors came to the conclusion that although the definitions of the moment of revenue recognition in the two systems differ, revenue recognition can be expected at the same time in the case of most ordinary transactions. An exception may be represented by transactions where the price is contingent for the future and it is uncertain enforcement of the claim (Boček, 2012). The fixed price U.S. GAAP requirement may cause delay of recognition of revenues in comparison with the IFRS requirement for reliable measurement.

There are no significant differences in revenues from the sale of goods recording and reporting in the IFRS and U.S. GAAP. Recognition of revenues is deferred until the moment when substantially all the risks and rewards of ownership are transferred to the customer for a defined price. Some differences in accounting for revenue associated with the sale of goods can be seen in the details of specific transactions in U.S. GAAP, while such detailed regulations do not exist in IAS/IFRS.

The approach to revenue from the rendering of services recognition is different in the two existing models. Recognition of revenue from services rendering is based on to the condition that the outcome from the transaction must be reliably measurable, U.S. GAAP requires extra reliable evidence that the services were provided. Significantly different rules relate to the recognition of revenue arising from long-term contracts. It does not exist any authoritative literature for the choice between the proportional and the finished performance method, so the choice is up to the entity in the U.S. GAAP. When using the proportional performance method, the entity should use methods based on output or recognize the revenue evenly over the service period. Using the percentage of completion method is not permitted other than for long-term construction contracts and software development. U.S. GAAP, however, offers a similar proportional performance method for other services. IFRS does not allow the use of method of completed performance under U.S. GAAP on the other hand, there is no analogy to the zero-profit method used in IFRS.

Possible approaches to Revenue Recognition

There are two possible approaches to revenue recognition. The earning process model is used in US GAAP. According to FASB CON 5 the revenue is recognized when payment is realized or realizable and the earning process is complete. This model attempts to account for revenue directly without considering how assets and liabilities arise and change throughout the exchange with the customer. Because assets and liabilities are ignored, deferred debits and credits sometimes arise that do not meet the definition of assets and liabilities. An asset and liability model is the second possible approach to the revenue recognition. This model is consistent with the existing definitions of revenue under the IFRS and US GAAP. The model focuses on the changes in assets and liabilities themselves to determine how much revenue to be recognized, because the revenue itself is not measured directly. Under this model deferred debits and credits that do not meet the definitions of assets and liabilities are not recognized. In opinions of IASB (2008) and FASB this model leads to more faithful and more consistent depiction of the underlying economics of transactions than the earning process model. There is a problem in the asset and liability model application – which assets and liabilities affect revenue. The existing definitions of revenue provide few clues in this area. There is no conceptually right or wrong answer about which assets or liabilities should affect revenue. It depends on the point of view and on the industry.

ED/2011/6 uses the asset and liability approach when revenue arises through recognizing and measuring increases in specified assets and decreases in specified liabilities. It means that all contracts with customers (with the possible exception of contracts for financial instruments, insurance and leases) would be analyzed into contract´s assets (the right to receive payment) and contract´s liabilities (the obligation to perform under the contract) and the amount of revenue to be recognized is determined by considering how much specified assets and liabilities change in a period. A contract with customers is defined by the IASB and FASB (2008) as an agreement between two or more parties that creates enforceable obligations. The combination of the rights and obligations in the contract gives rise to a net contract position. The net contract position could be contract asset, contract liability or nil. In this approach, revenue is recognized when a contract asset increases or contract liability decreases by an entity's performance. The key change from the earning process model is that revenues are based on the changes in contract´s assets and liabilities.

In Hepp´s and Brady´s (2011) opinion, in using this approach a two-step process is applied. It starts with effective recognition of the contract assets and performance

obligations arising from an executory contract and ends with derecognition of the performance obligation. Differences between the current approach to revenue recognition and the approach in the ED may lead to a number of differences from existing accounting method and may result in incorrect presentation which could cause complications in the capital markets (Mesa Maziano, 2005). On the other hand, the new approach is fully supported by the FASB and IASB(2008). The use of it leads to the unification of approaches to the recognition of revenue for all types of transactions. In the opinion of the IASB (2008) and FASB, application of this model leads to more faithful presentation of nature of operations than the earnings process model.

The main difference compared to the current treatment is the fact that the revenue from the sale of goods and rendering services are viewed in the same way. The ED is based on the revenue recognition by a reporting entity in the way to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which entity expects to be entitled in exchange for the provided goods or services (ED, paragraph 3 (2011)). To achieve this principle can be reached by the realization of the following steps:

(a) identify the contract with a customer;
(b) identify the separate performance obligations in the contract;
(c) determine the transaction price;
(d) allocate the transaction price to the separate performance obligations in the contract;
(e) recognize revenue when (or as) the entity satisfies a performance obligation.

Identification of the contract with customer

The contract must have commercial substance for the purposes of recognizing revenue in accordance with the ED, moreover the parties have approved the contract and are committed to perform their respective obligations, the entity can identify each party's rights regarding the goods or services to be transferred, and the entity can identify the payment terms for the goods or services. Requirements must be applied to individual contracts with customers. There are specifically defined requirements for contracts combination and vice versa for the segmentation of the contract showing independent of each transaction - the sale of goods and rendering services into separate sub-units, which can lead to different results than using existing methods in the ED. According to Boček (2012) the current IFRS and U.S. GAAP is interested in details of contractual modifications in construction contracts, both systems provide guidance on the special kinds of long-term contracts. The substance of construction contracts leads to conclusions that the contracting parties are aware of the fact that the contract will not be carried out exactly according to the original plan, estimate and budget (CL # 47, Engineering & Construction Companies). It is necessary to clearly specify contractual modifications. The ED is not as specific as the current treatment and according to authors it may result in inconsistent practice. Compared to current practice, it is also expected delay of the moment of accounting for modifications, which arises from the difference in treatment - while the existing arrangements (IAS 11 and ASC605) make the recognition of contractual modifications when its approval is likely, the ED requires recognition only at the moment of its approval.

Separate performance obligations identification

A reporting entity that contractually commits to provide more than one item of goods or services should consider each such an item as a separate performance obligation only if they are different, which, according to the ED occurs when:

- unit or other units selling the same or similar product or service separately,

- the unit may sell a product or service separately because the product or service has a distinct function and distinct profit margin.

This approach represents a significant change for entities that sell goods and services together under the bundled transaction, which is the case of mobile operators and

providers of IT services. In these cases, it is necessary to establish the extent to which it are currently recorded individual elements of contracts and what extent it would be by using reporting according to the ED.

Transaction price determination

According to the ED (2011) the transaction price is the amount of consideration to which an entity expects to be entitled in exchange for transferring promised goods or services to a customer, excluding amounts collected on behalf of third parties (e.g. sales taxes, VAT or excises). The transaction price does not include the effects of the customer's credit risk. On the other hand, the transaction price is adjusted for the effects of variable performance, the time value of money and non-monetary performance payable to customers.

The transaction price is estimated by the reporting entity at each reporting date due to discounts, bonuses or performance incentives for customers in variable amount. In this context, the ED uses the concept of a reasonable estimate of the performance. If the entity cannot use a reasonable estimate of the performance, there is no recognition of revenues or transaction prices and revenues are recognized only at the amount in which revenue can be reasonably estimated. This is the difference between the current approach and the ED. According to the current approach, the entity recognizes revenue only in case that the amount of revenue can be reliably measured. The ED requires revenue recognition only to the portion of the goods or service for which there is a transfer of control over the performance to the customer and it might be reasonably estimated. If an entity is not reasonably assured to be entitled to the amount of the transaction price allocated to satisfied performance obligations, the cumulative amount of revenue recognized as of the reporting date is limited to the amount of the transaction price to which the entity is reasonably assured to be entitled.

According to the ED entity has an obligation to assess the customer's ability to meet its obligations. The entity shall adjust the amount of performance with respect to credit risk of the customer in determining the transaction price. Subsequent changes no longer affect the amount of revenue. There is not requirement of fixed or ascertainable price paid by customer in comparison to the current approach. It could lead to earlier recognition of revenue. If the variable compensation is likely, but not sufficiently secured, the new model can result in earlier recognition of revenue in the initial phase of the transaction. Possibility of revenue measurement in expected value in connection with the reporting of revenue from long-term contracts over time, however, makes an opportunity for transaction designed to premature recognition of revenue and thereby improvement of the performance of the reporting unit, which could according to the American Accounting Association (CL 94) lead to similar problems, as was the Enron case, where the future profits were recognized early on the basis of discounted expected present values. It is similar case like the use of the revaluation model with artificial overvaluation of assets, even though according to Valouch, Sedláček (2009) their proper use should lead to faithfully representation of reality.

The ED differs from the existing arrangements in U.S. GAAP - SEC Topic 13 significantly and allows earlier recognition of revenue. Any difference between the valuation of an contract receivable and revenue reported according to the ED would be presented in the income statement in a separate line adjacent to the line of reported revenue. Unlike the current practice it will probably lead to earlier recognition of revenue with an uncertain enforceability, and uncollectible receivables will be recognized in the income statement close to revenues. Entity, in accordance with the ED should adjust the value of income to reflect the time value of money in cases where there is a significant difference between the moment of the transfer of goods or services and the moment of payment. To adjust the promised amount of consideration to reflect the time value of money, an entity shall use the discount rate that would be reflected in a separate financing transaction between the entity and its customer at the contract inception. That rate would reflect the credit characteristics of the party receiving financing in the contract as well as any collateral or security provided by the customer or the entity, which might include assets transferred in

the contract. To take into account the time value of money revenue is reported in the amount that would match the selling price that would be paid in cash at the time of transfer of goods or services.

Effect of financing would be in accordance with ED reported separately from revenues from the sale of goods and services. In the case that the customer promises consideration in a form other than cash, it must be measured at fair value. Compared to the current approach the ED does not contain specific cases of non-cash considerations, such as fees for the classification of goods in the supply of chain store and advertising barter transactions.

Transaction price allocation

For a contract that has more than one separate performance obligation, the reporting entity shall allocate the transaction price to each separate performance obligation in an amount that depicts the amount of consideration to which the entity expects to be entitled in exchange for satisfying each separate performance obligation. If there is not a separate selling price directly observable, the entity should make estimation.

Recognition of revenue when the entity satisfies a performance obligation

Revenue is recognized when the performance obligation has been satisfied and the goods or services have been transferred to the customer and the customer obtains control of that asset. If all conditions for revenue recognition are met, the entity shall recognize revenue in an amount corresponding to the transaction price appropriate for the commitment to provide goods or services. According to Boček (2012), the concept of control differs from the current approach. The transfer of significant risks and rewards may cause that revenue from some transactions may be recognized in a different time. The main differences arise for transactions such as the sale of goods by the distributor/dealer who has the right to return the goods, if it does not sell (e.g. consigned). In the current approach the seller retains significant risks associated with the sale, the revenue from sale can be deferred until the moment the dealer sells the goods to the next customer. Under the ED, the transaction should be split into two performance obligations – sale of goods to dealer and the subsequent right to return the goods. Revenue from the first performance obligation (sales less cost of goods expected returns) may be recognized at the time of the initial sale, it means earlier than at present. The OIBDA indicator is appropriate to use for demonstration of the impact of introducing a new model of revenue recognition in the field of telecommunications. It is the case of one of the most common transactions - the sale of discounted device as an incentive to sign long-term contracts. Providing discounted device can no longer be regarded as a marketing strategy and must be considered in the context of the entire contract as a single performance obligation, if there are no technical or other barriers to its use. In accordance with current practices in IFRS and U.S. GAAP there are no differences in the values of this indicator in the case of direct or indirect sale of bundled device and services. In both cases, at the time of signing the contract the loss from the sale of device is recognized and profits are recognized over the following months during the contract. The impacts of both kinds of sale on OIBDA indicator are different. Commission is considered as incremental costs in this case and it must be capitalized and amortized over the contract period. In case of indirect sales no initial loss is recognized at the time of contract inception. Using the new methodology leads to revenue recognition acceleration - this effect is called front-loading.

4 Conclusions

The main aim of the ED development is preparation of a uniform approach to the recognition, measurement, accounting and reporting of revenue from contracts with customers. It can be said that the ED fulfills this aim. On the other hand, it is too general in a current form. The authors believe that if it were adopted in its current form, it would be necessary to specify methodological procedures such as interpretations in certain areas. The greatest difference from the current approach can be considered accounting

for performance obligations at the time of contract inception. Also, it can be assumed some difference of determining transaction prices, which can lead in many cases to earlier recognition of revenue compared to the current treatment under U.S. GAAP and IFRS. Revenues could be recognized in different values due to tighter requirements respecting the time value of money.

On the basis of responses to the revised ED it can be assumed the most significant impact in the field of telecommunications and IT services, compared with the original ED issued in 2009, where the most critical reactions came from the construction industry due to the original ED was revised to its current form. In the affected areas can be expected to deepen the differences between the information requirements of users of financial statements and the information provided by financial statements. Despite the fact it can be said that the ED corresponds to the specified aim, because according to Procházka (2011) the ED defines the principles for revenue recognition on a general basis and will ensure consistency of accounting policies and comparability of financial statements of different enterprises.

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Performance of Hungarian Mutual Funds and the Financial Crisis

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Abstract: We investigate the performance and time varying risk behavior of Hungarian equity mutual funds by applying the modified version of the four-factor model using the Central Eastern European index as a market proxy. We classify the funds according to their target markets (Hungary, Central and Eastern Europe, developed markets) and separate bullish and bearish periods. We find no significant excess returns for any circumstances, however market betas can be significantly different for bullish and bearish periods as well as the explanatory power of book-to-market ratio and market capitalization. After taking into account the daily percentage changes in the number of shares outstanding we find investors' relation to risk to be different in bearish and bullish periods.

1 Introduction

We investigate the performance and time varying risk behavior of Hungarian equity mutual fund returns for the period of January 2001 and February 2013. Based on the global market returns we separate bullish and bearish periods, and examine the modified version of Carhart (1997) equilibrium model whether the estimated risk parameters are constant or the return generating process is different in periods of crisis. We also investigate performance and the risk in a regional manner as the 30 mutual funds in our analysis invest in equities of Hungarian, or Central and Eastern European or developed capital markets. Furthermore we extend our model with an addition variable of the percentage change of the number of shares outstanding to capture the reactions of market investors to increasing or decreasing market changes.

The performance of mutual funds are examined for the decades in the financial literature as a test for market efficiency and the general conclusion is that funds can not outperform the market on average (Jensen 1968, Malkiel 1995, Gruber 1996). Grinblatt et al. (1995) find that funds investing in past winner stocks providing higher returns than others. Gruber (1996) shows that the return of new investors to be better than average return for all investors and cash in and outflows can be predicted. Kosowski (2011) argues that average underperformance of mutual funds is appropriate only for expansion periods but not during recessions. Another avenue of research is related to the performance of investors with local knowledge and the results show that market analysts (Bae et al. 2008), hedge funds in Asia Teo (2009) or mutual funds in Europe (Banegas et al. 2013) with local presence outperform others.

2 Data and methodology

To examine the time varying performance and risk of Hungarian publicly offered open-ended mutual funds investing in equities we collect 30 different mutual fund share prices. These funds invest in three different regions: Hungary (6), Central and Eastern Europe (11), and developed markets (13). The source of the data is the Association of Hungarian Investment Fund and Asset Management Companies. Daily returns of funds and the local and regional indices are calculated in USD terms using WM/Reuters closing spot rates. The source of the factors for the Fama-French (1992, 1993, 1996) model and momentum factor is the Center for Research in Securities Prices from Kenneth French's website.

We apply different equilibrium models to capture the difference in excess returns and in risk before and after the financial crises. To do so we collect returns from the bullish (increasing market prices) and bearish (decreasing market prices) periods from January 2001 to February 2013. We run ordinary least squares regressions with different set of explanatory variables. Table 1 shows the coefficients of determination (R^2) for different models. The average results are presented for our full sample (30 funds) and for the different regions these funds are investing in (Hungary, Central and Eastern Europe, developed markets). According to our estimates a one-factor model using the CETOP20 regional index has better explanatory power than a model using the CRSP market proxy (Mkt-Rf) not only for the Hungarian and CEE funds but for the funds investing in developed markets as well, which seems to be surprising in a globalized capital market; however verify the hypothesis of Errunza and Losq (1985).

Table 1 Explanatory power of models with different set of parameters

	□	Mkt	C20	SMB	HML	MOM	Full sample	HUN	CEE region	Developed markets
CAPM	x	x					0.132	0.101	0.116	0.161
CAPM - CEE	x		x				0.484	0.525	0.651	0.323
FF 3-factor	x	x		x	x		0.143	0.110	0.130	0.170
Carhart 4-factor	x	x		x	x	x	0.145	0.112	0.131	0.173
FF for CEE	x		x	x	x		0.490	0.532	0.654	0.331
Carhart for CEE	x		x	x	x	x	0.494	0.534	0.656	0.338
FF + C20	x	x	x	x	x		0.516	0.534	0.656	0.389
Carhart + CEE	x	x	x	x	x	x	0.518	0.536	0.657	0.391

Notes: This table shows the variables of the applied regression models and the average R^2 values of the estimations for the whole sample and the regional breakdown of the funds.

From the models presented we have chosen the modified version of the Carhart (1997) four-factor model, using CETOP20 index as a market proxy instead of Mkt-Rf.

3 Performance analyses

If we look at the explaining power of the chosen model for the three set of funds separated geographically and for the whole examined period and then separated bullish and bearish periods as well the first result worth to mention is that the model has higher coefficient of determination for both the bullish (0.556) and bearish periods (0.554) than for the whole period (0.494). We have obtained opposing results for the funds investing in Hungary and in the CEE region as in the former case the model has a better explaining power in the bullish period (0.707 vs. 0.558 in the bearish period) while in the latter case the model fitted better for the bearish period (0.732 vs. 0.655 in the bullish period). For the funds investing in developed countries there was no such difference between bullish and bearish periods (0.403 and 0.401 respectively); however the R^2s are still higher than for the full sample.

For the whole period we have measured significant excess return only at 10% level for one fund, for the bullish period there are four cases with significant (and positive) Jensen (1968) alphas (2 only at 10% and 1 only at 5% level) and in the bearish period there are four significant (negative) alphas (at 10% significance). The statistically non-significant results of excess returns are also interesting from an economist's point of view. We find 25 funds in the bullish period with positive excess returns and 24 funds in the bearish period with negative excess return. This result shows that the portfolio managers exaggerate and somehow amplify the market circumstances.

CETOP20 index is significant as a market proxy for all the funds and periods, however there are substantial differences in the betas in different periods which sign depends on the geographic focus of the funds. For all the funds investing in the CEE region and for most (8 of the 13) funds investing in developed markets the betas in the bearish period were significantly higher. 4 out of the 6 the funds investing in Hungary (and tracking the Hungarian market index) show higher beta in the bullish period. This opposing result for

the Hungarian market suggests that when the market is falling fund managers reduce the exposure of the funds to equities and invest more in bonds, which is confirmed by the high R^2 results for the regressions containing the CMAX index as a variable.

Table 2 Carhart four-factor model with C20 market proxy for the 30 funds

Fund	const	C20	SMB	HML	MOM	R^2
CE1	0.0002	0.7840***	0.0003	0.0015***	0.0002	0.77
CE2	0.0000	0.8030***	0.0005**	0.0013***	0.0003**	0.83
CE3	0.0001	0.9389***	0.0007**	0.0006*	-0.0002	0.92
CE4	0.0000	0.6965***	-0.0002	0.0010***	0.0006***	0.69
CE5	0.0000	0.7229***	0.0007***	0.0010***	0.0006***	0.80
CE6	0.0001	0.4527***	0.0023***	0.0016***	0.0012***	0.36
CE7	0.0002	0.3141***	0.0013***	0.0012***	0.0005**	0.21
CE8	0.0001	0.7890***	0.0000	-0.0002	-0.0001	0.89
CE9	0.0000	0.8349***	0.0007***	0.0018***	0.0002	0.80
CE10	0.0000	0.6960***	0.0007**	0.0017***	0.0007***	0.67
CE11	0.0001	0.3745***	0.0013***	0.0009**	0.0006***	0.27
Dev1	-0.0002	0.4594***	0.0008**	0.0008***	-0.0024***	0.47
Dev2	-0.0001	0.5502***	0.0006*	0.0021***	-0.0014***	0.57
Dev3	0.0000	0.3621***	0.0020***	0.0032***	-0.0031***	0.35
Dev4	-0.0002	0.4745***	0.0007**	0.0001	-0.0006***	0.51
Dev5	-0.0001	0.3946***	0.0004	0.0003	0.0007***	0.23
Dev6	-0.0003	0.3222***	0.0028***	0.0018***	0.0008***	0.15
Dev7	-0.0001	0.3702***	0.0008*	0.0016***	0.0009***	0.19
Dev8	-0.0002	0.2873***	0.0025***	0.0009*	0.0005**	0.12
Dev9	0.0001	0.6025***	0.0000	-0.0011	0.0004	0.65
Dev10	-0.0001	0.4147***	0.0018***	0.0014***	0.0003	0.32
Dev11	0.0000	0.4390***	-0.0003	0.0019***	-0.0004*	0.31
Dev12	-0.0001	0.3765***	-0.0006	0.0013***	-0.0008***	0.25
Dev13	-0.0001	0.3987***	0.0005	0.0000	0.0009***	0.26
HU1	-0.0002	0.9871***	0.0016***	0.0017***	0.0002	0.77
HU2	0.0003*	0.6715***	0.0006**	0.0015***	0.0000	0.71
HU3	0.0001	0.7053***	0.0034***	0.0016***	0.0017***	0.63
HU4	0.0000	0.4332***	0.0011	-0.0016**	-0.0003	0.19
HU5	0.0001	0.4959***	0.0034***	0.0021***	0.0014***	0.26
HU6	0.0000	0.7237***	0.0015***	0.0011***	0.0007***	0.66
Average R^2 for the full sample						0.49
Average R^2 for funds investing in Hungary						0.53
Average R^2 for funds investing in CEE region						0.66
Average R^2 for funds investing in developed markets						0.34

Notes: This table shows the results of the modified Carhart (1997) four-factor model, using CETOP20 as a market proxy for the full sample period of January 2001 and February 2013. *, **, *** denote significance levels of 10%, 5% and 1% respectively.

The results for the funds investing in Hungarian shares are surprising (see Table 2) especially given the fact that these are index-linked funds. The C20 betas are far from being equal to one, their average value for the full investigated period is only 0.67. Comparing the market beta for the bullish and bearish markets (see Table 3 □C20) we find 20% difference in absolute terms and find that altogether the market betas are decreasing with 7% in average. This result suggests that when the market is falling these funds invest in other, lower risk assets as well. To verify this hypothesis we run a simple regression for the fund returns explaining with C20 and CMAX (Hungarian government bond benchmark) index. In this setting we get an even higher explanatory (0.596 for the full period) than for the Carhart (1997) four-factor CEE model.

The HML factor is significant for 25 funds for the whole period, 25 for the bullish period and only 7 for the bearish period (at 10% significance, at 1% the results are 21, 21 and 2 respectively). So it seems that during a recession the book-to-market equity ratio behind the HML factor has no explaining power.

Table 3 Carhart four-factor model with C20 market proxy for the 30 funds for bullish and bearish periods

	Bull						Bear						
	const	C20	SMB	HML	MOM	R²	const	C20	SMB	HML	MOM	R²	ΔC20
CE1	0.0003*	0.7217***	0.0008***	0.0021***	0.0000	0.69	0.0003	0.8911***	0.0006	0.0000	-0.0001	0.91	-23%
CE2	0.0000	0.7681***	0.0005*	0.0017***	0.0001	0.77	0.0001	0.8702***	0.0014***	0.0007	0.0004*	0.94	-13%
CE3	0.0001	0.9353***	0.0002	0.0007	-0.0002	0.91	0.0001	0.9513***	0.0014***	0.0006	-0.0001	0.94	-2%
CE4	0.0000	0.6430***	0.0005	0.0019***	0.0002	0.63	-0.0003	0.7810***	-0.0004	-0.0008	0.0006	0.82	-21%
CE5	0.0000	0.7075***	0.0005**	0.0014***	0.0004**	0.75	-0.0001	0.7564***	0.0017***	0.0005	0.0008***	0.91	-7%
CE6	0.0003	0.5226***	0.0006	0.0020***	0.0006**	0.41	-0.0011	0.3505***	0.0048***	0.0025**	0.0025***	0.29	33%
CE7	0.0005**	0.3198***	0.0001	0.0015***	-0.0001	0.21	-0.0014*	0.3280***	0.0045***	0.0030**	0.0023***	0.24	-3%
CE8	0.0002	0.7518***	-0.0001	0.0002	-0.0001	0.86	-0.0001	0.8407***	0.0009**	-0.0004	0.0000	0.94	-12%
CE9	0.0001	0.7889***	0.0008***	0.0022***	0.0000	0.73	0.0000	0.9210***	0.0017***	0.0008	0.0000	0.93	-17%
CE10	0.0002	0.6819***	0.0006	0.0022***	0.0004*	0.62	-0.0007	0.7226***	0.0014**	0.0014*	0.0010**	0.77	-6%
CE11	0.0004*	0.3622***	-0.0001	0.0011***	0.0002	0.24	-0.0011	0.4314***	0.0056***	0.0022*	0.0021***	0.36	-19%
Dev1	-0.0001	0.4241***	0.0013***	0.0006*	-0.0024***	0.42	-0.0003	0.5168***	0.0003	0.0016	-0.0020***	0.57	-22%
Dev2	0.0000	0.5098***	0.0013***	0.0024***	-0.0014***	0.53	-0.0001	0.6098***	-0.0004	0.0012	-0.0018***	0.65	-20%
Dev3	0.0000	0.3262***	0.0036***	0.0035***	-0.0026***	0.33	-0.0002	0.3831***	-0.0010	0.0013	-0.0044***	0.40	-17%
Dev4	-0.0003	0.4438***	0.0012***	0.0007**	-0.0009***	0.45	0.0000	0.5202***	0.0002	-0.0010	-0.0005	0.66	-17%
Dev5	0.0000	0.3787***	-0.0003	0.0007	0.0001	0.20	-0.0009	0.4388***	0.0026**	0.0016	0.0022***	0.32	-16%
Dev6	-0.0002	0.3457***	0.0027***	0.0035***	0.0002	0.21	-0.0013	0.2617***	0.0019	-0.0021	0.0000	0.08	24%
Dev7	0.0000	0.4091***	0.0010**	0.0025***	0.0002	0.25	-0.0014	0.2788***	-0.0009	0.0012	0.0017*	0.11	32%
Dev8	0.0000	0.3238***	0.0005	0.0021***	-0.0002	0.16	-0.0017*	0.2547***	0.0070***	-0.0005	0.0012	0.10	21%
Dev9	0.0000	0.6074***	0.0002	-0.0011	0.0003	0.65	0.0003	0.5703***	-0.0034*	0.0011	0.0037**	0.68	6%
Dev10	0.0000	0.4276***	0.0005	0.0015***	-0.0004	0.33	-0.0008	0.4245***	0.0054***	0.0047***	0.0031***	0.33	1%
Dev11	0.0001	0.3751***	0.0000	0.0025***	-0.0007***	0.23	-0.0002	0.5543***	0.0006	0.0010	-0.0002	0.52	-48%
Dev12	0.0000	0.3051***	0.0002	0.0017***	-0.0008***	0.17	-0.0001	0.4938***	-0.0010	-0.0004	-0.0013*	0.43	-62%
Dev13	0.0000	0.3663***	0.0001	0.0007	0.0005*	0.22	-0.0006	0.4668***	0.0023**	-0.0009	0.0013*	0.37	-27%
HU1	-0.0002	1.0168***	0.0007	0.0018***	0.0007**	0.77	-0.0005	0.9550***	0.0023**	0.0009	-0.0007	0.77	6%
HU2	0.0004***	0.6147***	0.0009***	0.0019***	0.0001	0.65	-0.0001	0.7700***	0.0012*	0.0001	-0.0005	0.80	-25%
HU3	-0.0001	0.8656***	0.0008	0.0014*	0.0010**	0.68	-0.0002	0.5229***	0.0031***	0.0018**	0.0021***	0.63	40%
HU4	0.0006	0.4240***	-0.0007	-0.0021**	-0.0014***	0.17	-0.0020*	0.4894***	0.0051***	0.0015	0.0023**	0.24	-15%
HU5	0.0004	0.5769***	0.0011**	0.0023***	0.0008**	0.30	-0.0018*	0.3882***	0.0075***	0.0045***	0.0034***	0.20	33%
HU6	0.0000	0.7458***	0.0008**	0.0014***	0.0007***	0.64	-0.0005	0.6946***	0.0029***	0.0003	0.0005	0.70	7%
Average R² for the full sample						0.56						0.55	
Average R² for funds investing in Hungary						0.71						0.56	
Average R² for funds investing in CEE region						0.65						0.73	
Average R² for funds investing in developed markets						0.40						0.40	

Notes: This table shows the results of the modified Carhart (1997) four-factor model, using CETOP20 as a market proxy for bullish and bearish periods. *, **, *** denote significance levels of 10%, 5% and 1% respectively.

Based on our results SMB factor has more explaining power in recession than expansion as the SMB factor is significant at 10% in 21, 13 and 20 cases for the whole, bullish and bearish periods respectively (at 1% significance the results are 13, 8 and 13).

For the momentum factor we have measured no substantial difference for bullish and bearish periods, at 10% level it was significant for 15 funds in the former and 18 funds in the latter case (at 1% 8 and 11 funds). The significant momentum factor underlines the fact the persistence in of mutual fund performance is a relevant risk factor as Bollen and Busse (2005) show for the US and Filip (2011) argues for the Hungarian mutual funds.

4 Fund flows and returns

We have incorporated an additional variable into our model the percentage change of the number of shares outstanding in order to separate the changes in the net asset value of the funds caused by the change of the price and by the purchase of new shares or redeem existing ones by the investors.

Table 4 Carhart four-factor model with C20 market proxy extended with the trade volume for the 30 funds

	Full period							Bullish	Bearish
	const	C20	SMB	HML	MOM	Vol %	R^2	Vol %	Vol %
CE1	0.0002	0.7840***	0.0003	0.0015***	0.0002	0.0019	0.77	0.0021	-0.0038
CE2	0.0000	0.8031***	0.0005**	0.0013***	0.0003**	-0.0101	0.83	-0.0115	-0.0099
CE3	0.0001	0.9384***	0.0007**	0.0006*	-0.0002	-0.0104**	0.92	0.0032	-0.0122**
CE4	0.0000	0.6965***	-0.0002	0.0010***	0.0006***	0.0026	0.69	0.0056	-0.0185
CE5	0.0000	0.7231***	0.0007***	0.0010***	0.0006***	0.0254	0.80	0.0317	-0.0087
CE6	0.0001	0.4522***	0.0023***	0.0016***	0.0012***	-0.0263	0.36	-0.0200	-0.0496
CE7	0.0002	0.3141***	0.0013***	0.0012***	0.0005**	-0.0035	0.21	-0.0035	-0.1096
CE8	0.0001	0.7890***	0.0000	-0.0002	-0.0001	0.0011	0.89	-0.0056	0.0136
CE9	0.0000	0.8349***	0.0007***	0.0018***	0.0002	0.0010	0.80	0.0012	-0.0064
CE10	0.0000	0.6952***	0.0007**	0.0018***	0.0007***	0.0569***	0.67	0.0191	0.2049***
CE11	0.0001	0.3745***	0.0013***	0.0009**	0.0006***	0.0225	0.27	0.0205	0.0522
Dev1	-0.0002	0.4594***	0.0008**	0.0008**	-0.0024***	0.0011	0.47	0.0047	-0.2003
Dev2	-0.0001	0.5501***	0.0006*	0.0022***	-0.0014***	-0.0075	0.57	0.0012	-0.0556**
Dev3	0.0000	0.3622***	0.0020***	0.0032***	-0.0031***	-0.0009	0.35	0.0043	-0.0210
Dev4	-0.0002	0.4729***	0.0008***	0.0000	-0.0006***	0.0791***	0.52	0.0768***	0.1078**
Dev5	-0.0001	0.3948***	0.0004	0.0003	0.0007***	0.0096	0.23	0.0113	-0.0224
Dev6	-0.0003	0.3219***	0.0028***	0.0018***	0.0008***	0.0131	0.15	0.0097	0.0308
Dev7	-0.0001	0.3703***	0.0008*	0.0016***	0.0009***	-0.0056	0.19	-0.0197	0.0628
Dev8	-0.0002	0.2873***	0.0025***	0.0009*	0.0005**	-0.0007	0.12	-0.0010	-0.1635
Dev9	0.0002	0.6023***	0.0000	-0.0011	0.0004	0.8683	0.65	0.6697	1.4486
Dev10	-0.0001	0.4147***	0.0018***	0.0014***	0.0003	0.0001	0.32	-0.0005	0.0284
Dev11	0.0000	0.4395***	-0.0003	0.0019***	-0.0004*	0.0147**	0.32	0.0016	0.1299***
Dev12	-0.0001	0.3766***	-0.0006	0.0013***	-0.0008***	0.0091	0.25	0.0080	-0.0073
Dev13	-0.0001	0.3985***	0.0005	0.0000	0.0009***	0.0059	0.26	0.0061	-0.0132
HU1	-0.0002	0.9878***	0.0016***	0.0018***	0.0002	0.0125	0.77	0.0111	0.0388
HU2	0.0003*	0.6715***	0.0006**	0.0015***	0.0000	-0.0012	0.71	-0.0010	-0.1161**
HU3	0.0001	0.7051***	0.0034***	0.0016***	0.0017***	0.0093	0.63	0.0002	0.0544**
HU4	0.0000	0.4332***	0.0011	-0.0016**	-0.0003	-0.0100	0.19	-0.0139	-0.0098
HU5	0.0001	0.4959***	0.0034***	0.0021***	0.0014***	0.0021	0.26	-0.0119	0.0940
HU6	0.0000	0.7239***	0.0015***	0.0011***	0.0007***	-0.0268	0.66	-0.0230	-0.1759
Average R^2							0.49		

Notes: This table shows the results of the modified Carhart (1997) four-factor model, using CETOP20 as a market proxy extended with daily percentage changes in the number of shares outstanding for the full sample period of January 2001 and February 2013.
*, **, *** denote significance levels of 10%, 5% and 1% respectively.

For the whole investigated period the trade volume variable is significant for 4 funds for the whole investigated period, for one fund in the bullish and for 7 funds in the bearish period (at 5% level, while at 1% level these numbers are 2, 1 and 2 respectively). This result suggests that when prices are falling on the given trading day the reactions of the

investors are more intense, however the signs are positive in 4, and negative in 3 cases, so investors react by purchasing new shares in the former and redeeming existing shares in the latter case. (See Table 4)

In the next version of our model we have used the percentage change in the number of shares outstanding on the day following the day of which return we wanted to explain. At first glance this may seem a bit odd as we want to explain the return with a next day data; these regressions can not be used to forecast returns, we just aim to measure the strength of the relationship between the variables (and not the causality between them). So the problem we address is whether daily returns of the funds influence investors' decisions about purchasing new shares or redeeming existing ones, or to put it another words after a significant positive or negative return they change their investment in the fund or not.

The percentage change in the number of shares outstanding in the following day shows significant relationship with the actual day return in case of 10 funds out of the 30 for the whole period, 10 funds for the bullish and 6 funds for the bearish period (at 10% level). So investors change their position in the fund after a day resulting in a positive return than after a day when prices are falling, however the direction of these changes in their positions are mixed in both periods: in exactly half of the cases they increase and in half of the cases they decrease their position during both periods. After a substantial price change investors are more likely to change their position if this change was positive, while after a day resulting in a substantial loss they are less likely to change their investment. So their relation to risk seems to be different in bearish and bullish periods confirming the Kahneman-Tversky (1979) prospect theory.

5 Conclusions

By applying the modified version of Carhart (1997) model using the Central Eastern European index as a market proxy we find that mutual fund managers neither can beat the market for the full period nor in bullish or bearish market circumstances. We find significant difference in market beta for the bullish and bearish markets, with lower betas for the bearish periods. Although book-to-market ratio proved to be significant explanatory power for the whole investigated period and for bullish market; however, in bearish market circumstances the estimated coefficients are not significant. Conversely the market cap as an explanatory variable has higher power in recession than in expansion. For persistence parameter we detect no difference for distinct market conditions. Concerning the actual trading day fund flows we find that when prices are falling the reactions of the investors are more intense. Furthermore after a substantial price change investors are more likely to change their position if this change was positive, while after a day resulting in a substantial loss they are less likely to change their investment. So their relation to risk seems to be different in bearish and bullish periods confirming the Kahneman-Tversky (1979) prospect theory.

Acknowledgments

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Insurance of Risks of Small and Medium-sized Enterprises

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Abstract: Insurance of risks of enterprises belongs to the most important parts of every insurance market with developed market economy. It helps to stabilize the operation of the business entity and its economy as well. The damages suffered by the company are covered by insurance benefit and the company can use its available funds for development activities, instead of having to spend them on renewal of its assets or processes. Currently, on the insurance market there is a large number of products that cover the vast majority of insurable risks.

Keywords: insurance, business risks insurance, small enterprises, medium-sized enterprises, risks of entrepreneurship

JEL codes: G22

1 Introduction

Business of small and medium enterprises (SMEs) plays an important and irreplaceable role in all countries with a market economy. We can argue that SMEs are the backbone of the European economy and in the long run also a major employer. The great advantage of SMEs is their flexibility, lower capital intensity, upgrade and covering more and more differentiated market segments. They are considered the most effective, most progressive and therefore the most important part of the economy.

The aim of the article is to characterize the risks of small and medium-sized enterprises, their insurance options and to present insurance market development of business risks insurance in the Czech Republic. In order to achieve the aim, the methods of analysis and comparison will be used. The statistics presented by Czech Insurance Association will be used as a data source.

2 Risks of Small and Medium-sized Enterprises and Possibilities of its Insurance

Economic activity carried out by small and medium-sized enterprises has its negative symptoms. Among the problem areas including, in particular complex legislation, poor law enforcement, high contribution burden, as well as the administrative burden of business. On the other hand, enterprise are threaten by risks arising from business activities (such as manufacturing, technical and technological, market, social, financial risks etc.). In recent decades, the range of risks faced by business entities extended. Risks associated with various natural disasters, vandalism and deception were added. Losses caused by those risks can be solved by insurance.

First of all we should define a small and a medium-sized enterprise. "For micro, small and medium-sized enterprises (SMEs) is considered an entity if:
  a) it employs less than 250 employees, and
  b) its assets/property do not exceed CZK equivalent amount of 43 million EUR or the turnover/income do not exceed CZK equivalent of 50 million EUR.

A small enterprise is considered an entity if:
a) it employs less than 50 employees, and
b) its assets/property or turnover/income do not exceed CZK equivalent of 10 million EUR." (Czech Trade, 2009).

If a company is not, in accordance with the above mentioned parameters, among micro or small or medium-sized enterprises, it belongs among the big companies. "The importance of SMEs to the national economy is irreplaceable. For example, in Slovakia, SMEs constitute 99 % of all enterprises, they are involved in employment by 66 %, their share on value added is of about 60 % and their share on gross domestic product is about 40 %." (Strážovská, Strážovská, 2010) They are the biggest employer in Slovakia and the main creator of new jobs. They are the driving force of the market economy and contribute substantially to economic growth. The situation in the Czech Republic is very similar. Between 2003 and 2010 SMEs constituted more than 99 % of all enterprises, they were involved in employment in business segment by more than 70 % (in the whole economy by more than 50 %), their share on book value added was about 1/3 (about 57 % if goes about book value added of business sector) and their share on gross domestic product was about 1/3 as well. (Dubská, 2013) "SMEs are also able to adapt quickly and flexibly to market requirements and demand, they are innovative, often come up with new products and original ideas to satisfy even the most demanding customer requirements, employ people from the region and provide numerous opportunities for employment." (Strážovská, Strážovská, 2010)

2.1 Risks of Enterprises

In order to do business seamlessly, each company must have an overview of the risks that could threaten its trouble-free operation in the future.

We can note that there are many different risks that can be sorted according to various aspects - pure and speculative risk, risk caused by natural factors and the risk caused by human factor, internal and external risks, influenceable and not influenceable risks etc.

As mentioned above, the risks of business entities can also be seen from a point of view, whether factors operate inside or outside the entity. We talk about internal and external risks. The internal risks include failure to comply with such safety regulations, which may damage the health of employees. The external risks include, for example flood that may cause damage to property and the health and lives of people. Risks occurring mainly as a result of sudden changes in natural conditions are called natural hazards.

Many risks can be eliminated. They can be influenced and subsequently revised. Such risks are called influenceable risks. Among these risks include, for example, damaged or stolen property by theft. A business entity may use various means to reduce the risk of theft of property such as setting up of guard service, security system, concierge and more. Some risks are difficult to influence or predict or even absolutely not influenceable. An example of such a risk is a volcanic eruption or flood.

When insuring risks of SMEs, it is all about insurable risks. For each risk the insurer is considering whether it is possible to accurately identify the risk, whether a loss may be quantified after the risk realization and whether the risk is economically viable and therefore acceptable for the insurer. If the risk is random, identifiable, quantifiable and cost-effective, so it is possible to insure it. We say that the risk is insurable. Each insurance company discloses risks that can be insured.

Negative event can cause to people and businesses direct and indirect losses. Direct losses they are quantifiable - for example, damage or destruction of property. Indirect losses arise from interruption of the activities of the entrepreneur (such as loss of market position) or damage to his reputation. Such losses are hardly quantifiable and therefore hardly insurable.

In practice, various risk factors and risk level are important in determining the amount of the premium. When calculating the premium, the insurance contracts are classified

according to various factors and risk levels for tariff groups. Tariff group is a group of insurance contracts with approximately the same risk. For example, for motor hull insurance, there may be these risk factors - age of driver, vehicle type and region. On that basis, different levels can be observed. For example factor "age of driver" can be divided into three levels - age 18-25 years, 26-58 years, 59 years and more. Number of tariff groups is then equal to the product of the number of factors and levels. Each group has a different tariff premium. In this way, the calculation is simplified in practice.

People or business entities may not insure any risks that endanger their life or business. Some risks can be eliminated by other means. It is important to know the instruments of coping with risks implement a process called risk management.

Risk management is a process of examining the risk, its influence, prevention and harm reduction and exploring possibilities for their financial coverage. During the process of risk management, first of all, it is important to know the risks that threaten the entity. This includes the identification, determination of severity and probability of their occurrence. Further this includes assessment of measures which could reduce risks. These include, for example, various preventive measures, such as various training courses, using a variety of security features such as fire alarms, usage of security services etc. An important part of risk management is a risk distribution and financial coverage, particularly insurance. Before risk identification the owner should make an "inventory" of all the values in the company (physical, financial, intangible assets, workforce), which could be a subject to loss or destruction. It must be done to determine risk factors as a potential threat to a company. During the identification process there can be detected and classified these and other risks (mentioned as a model in Table 1).

Table 1 Types of detected external and internal risks

External Risks	➢ Natural Hazards ➢ Theft and Vandalism Risks
	➢ Credit Risk ➢ Risks of non-payment of Debts ➢ Payment Risks
	➢ Transport Risks – Risks of National and International Carriage
Internal Risks	➢ Risk of occupational accident ➢ Risk of losing skilled workers

Source: Čejková (2012)

Businesses have insurance that they are obliged to have by law, i.e. compulsory contractual insurance, and beyond it also voluntary contractual insurance contract which the company decided itself for. The compulsory contractual insurance comprehends e.g. motor third party liability insurance, environmental damage insurance and other insurance products. Voluntary insurance comprehends e.g. motor hull insurance with the coverage of these risks: accident, theft, vandalism, unauthorized use of a vehicle or natural hazards. Among these risks belong: storms, hail, floods, fires, landslides, earthquakes etc.

During the process of risk identification number of risks is usually identified, of which only a tiny part tends to have any insurance coverage. Risks representing catastrophic impact on the enterprise as natural hazards and risks of theft are sometimes not covered at all. In turbulent economic times insurance can be the difference between the company staying afloat or going out of business.

2.2 Insurance Products for Enterprises

In accordance with the Czech Insurance Association we can mention a wide classification of business risks insurance:
- Property Insurance (theft, vandalism, natural hazards)
- Motor Insurance (Hull insurance, Motor Third Party Liability - MTPL)

- River/Sea/Aircraft/Railway Vehicle Hull Insurance
- Technical Risks Insurance/Machinery and Electronics Insurance (Technical Risks Insurance - insurance of machinery and equipment, insurance of electrical equipment; construction and installation insurance – this insurance is sometimes offered separately and does not correspond to machinery and electronics insurance)
- Business Interruption Insurance
- Agricultural Insurance
- Cargo Insurance
- Legal Expenses Insurance
- Credit Insurance (general insolvency, export credit, mortgage credit, business credit, agricultural credit)
- Financial Risks Insurance (e.g. covering losses incurred to banks and other financial institutions caused by malversation/embezzlement, fraud or forgery)
- Insurance of Leasing Payments
- Financial Default Insurance of Travel Agency
- Liability Insurance (Management Liability Insurance; Carrier Liability Insurance; Environmental Damage Insurance; Liability Insurance for Cities and Municipalities; Farm Entities Operation Insurance/Farm Business Insurance; Selected Professions Compulsory Liability - for doctors, experts, assessors, interpreters, translators, accountants, engineers etc.; Product Liability Insurance; Freight Forwarder Liability Insurance; Intermediaries' Liability Insurance; Employer's Statutory Liability Insurance)
- Life and Accident Insurance
- Other risks (Czech Insurance Association, 2007, 2010a)

In the following text, the selected insurance products for SMEs will be discussed.

Property Insurance

Property Insurance includes insurance coverage for a case of natural hazards and theft. It is important for enterprises to have insurance for a case of realization of these and also other risks. The subjects of this insurance are various office buildings, repair workrooms and other service buildings. The basic part of property insurance is the natural hazards insurance. Property (individual things or their set) is in base insured for the event of damage or destruction by fire, explosion, lightning strike and collision or aircraft crash. This basic insurance can be extended to protection of damages caused by flooding, flash flooding, storms, hale, landslide, falling rocks or earth, avalanches, trees, earthquake, weight of snow and frost, water leaking from water supply equipment, fluid escaping from the sprinkler etc. If the building is insured, the insurance can cover also the water pipe, drainpipe, heating and solar systems. The second part is the theft insurance that provides protection in a case of theft or robbery, if the offender overcame barriers protecting the insured object or used violence. Insured matters must be protected against theft manner consistently with their values (security locks and film, safes etc.).

Business Interruption Insurance

"Property Insurance may be extended by Business Interruption cover that provides protection against financial consequences (lost profit, extra expense) of a material loss." (AIG, 2013) It replaces business income lost as a result of an event that interrupts the operations of the business, such as fire or a natural disaster. Business interruption insurance is not sold as a separate insurance, but is either added to the Property Insurance. This insurance covers "loss of profit from manufacturing or commercial activities which the insured would otherwise earn for the period of business interruption, but not longer than for the insured period, and fixed costs specified in the insurance contract which the insured must unconditionally carry even in case of business interruption, for the period no longer than the insured period. Variable costs which do not happen during business interruption are not covered, for example, costs of materials, raw material, technological energy supply and delivered goods, if the costs in question are not maintenance costs or operational costs etc." (MAXIMA, 2013b)

Cargo Insurance

Cargo Insurance provides coverage against physical damage or loss of goods during shipping, whether by land, sea or air. Because of the many dangers inherent in shipping, most individuals and businesses choose to insure their goods while they are in transit. The entrepreneur can choose an all-risk insurance. All-risk offers broad coverage against loss or damage from external causes. Although it is called "all-risk," most policies exclude many types of damage from coverage. These may include damages from improper packing, infestation, rejection by customs, abandonment of cargo and employee dishonesty, among others. It is very important with all-risk coverage to examine the policy and conditions carefully to determine what types of loss are not covered. The advantage of all-risk coverage is that it is not necessary to first prove the carrier's liability to claim damages. The insurance will pay out regardless of who is at fault. (Demand Media, 1993-2013)

Credit Insurance

Credit Insurance is insurance for the risk of non-payment of short-term receivables from buyers as a result of their insolvency or protracted default (commercial risks), or as a result of territorial (political) risks on the part of a foreign buyer. The goal of credit insurance is to secure the non-payment risk (business risk) in relations between business entities. The price of the insurance is a fraction of a percent of the invoiced amount, whereas the possible indemnity may be as high as the invoiced amount (minus the deductible). (KUPEG, 2011) The second form of this insurance is payment protection insurance (Creditor Protection Insurance), purchased by consumers to insure payment of credit extended to the consumer. This insurance is offered also by banks when providing a credit and is available also for entrepreneurs (natural persons). The covered risks are: death, full disability, temporary inability to work and job loss.

Legal Expenses Insurance

"Legal Expenses Insurance is designed to provide cover against the potential costs of legal action against an institution or individual. The insurance covers the legal costs involved in pursuing or defending a claim. Legal costs include the appointment of solicitors, barristers and expert witnesses." (Telegraph Media Group, 2010) In other words, "it provides affordable coverage for the legal fees and expenses incurred by a lawyer on specified matters. These matters are defined as fortuitous events, or issues that are not anticipated. These could include employment disputes, litigation, disciplinary actions, Human Rights complaints and criminal charges." (LegalExpenseInsurance, 2011)

General Business Liability Insurance

General Business Liability Insurance covers the entrepreneur's expenses for claims of third parties which he carries legal responsibility for. In case of a small business, the loss in question does not necessarily have to happen due to negligence or due to violation of legal obligations of an entrepreneur. In many cases an entrepreneur is responsible for a loss regardless of whose fault it is (i.e., objective fault). Losses can incur due to damage to health or life, material loss and consequent financial loss. (MAXIMA, 2013a)

Business Liability Insurance usually covers losses incurred to the insured person in the result of operational activities, exercising of the right of ownership, maintenance and administration of the immovable property and by faulty product (see below).

This liability insurance can also be extended to include insurance for recourse of health insurance companies in the event of an occupational accident, recourse of sickness benefits paid out and insurance for damage to items assumed and used. Business liability insurance can have many forms and the risks mentioned above can be divided in a different way.

Product Liability Insurance

"Companies that manufacture, wholesale, distribute, and retail a product may be liable for its safety. Product liability insurance protects against financial loss as a result of a

defect product that causes injury or bodily harm. The amount of insurance depends on the products that the entrepreneur sells or manufactures." (US Small Business Administration, 2013) *"Product liability and the related damages are governed by the provisions of act number 59/1998 Coll." (IMG, 2011)* The (defecte) product "can cease to perform its functions due to faulty construction or material fault and as a result may cause losses (e.g., faulty refrigerating equipment may cause damage to stored food in a shop). The subject of the insurance is not the faulty product itself (a mender), but a loss which it incurred." (MAXIMA, 2013a) "The Act No. 59/1998 Coll. stipulates the responsibility of the manufacturer in a case where a product defect causes damage to health or death or damage to property. The injured party has a choice whether to apply for damages under this Act or under the general rules on liability for damages." (Czech Trade Inspection Authority, 2012)

Table 2 Development of selected indicators of business insurance coverage

	2012	**2011**	**2010**	**2009**	**2008**	**2007**
Non-life Insurance						
Premium Written (thousands of CZK)	67 460 347	71 447 131	72 740 658	73 857 822	74 050 076	70 556 338
Number of policies (non-life insurance)	19 245 994	19 197 418	18 739 476	18 588 193	17 839 389	16 923 224
Total Business Insurance Coverage						
Premium written (without mandatory insurance; thousands of CZK)	18 151 474	17 811 634	17 205 668	17 208 236	16 669 497	15 647 603
Insurance Benefit (thousands of CZK)	N.A.	9 046 154	9 324 787	8 125 852	7 648 754	6 837 811
Loss Ratio (%)	N.A.	50,8	54,2	47,2	45,9	43,7
Business Insurance Coverage Premium/ Non-life Insurance Premium (%)	26,9	24,9	23,7	23,3	22,5	22,1
Number of policies (business insurance coverage)	807 924	810 911	799 536	818 413	799 108	780 865
Number of policies in business insurance coverage / number of policies in non-life insurance (%)	4,2	4,2	4,3	4,4	4,5	4,6
Property Insurance in Business Insurance Coverage						
Premium Written (thousands of CZK)	N.A.	12 344 256	12 132 345	12 113 437	11 643 323	11 183 738
Insurance Benefit (thousands of CZK)	N.A.	7 107 108	7 500 515	6 521 121	5 848 414	5 333 326
Loss Ratio (%)	N.A.	57,6	61,8	53,8	50,2	47,7
Business Liability Insurance						
Premium Written (thousands of CZK)	N.A.	4 459 168	4 193 104	4 132 085	4 516 074	3 791 336
Insurance Benefit (thousands of CZK)	N.A.	1 751 548	1 676 228	1 466 022	1 566 361	1 196 401
Loss Ratio (%)	N.A.	39,3	40,0	35,5	34,7	31,6

Source: Czech Insurance Association (2010b, 2011, 2012, 2013)

3 Business Risks Insurance as a Part of Insurance Market

As mentioned above, Business Risks Insurance (Business Insurance Coverage) has a great importance in every market economy. The importance and level can be shown by several indicators. In developed economies, there are used (for instance) these indicators: premium written, insurance benefit or loss ratio. (Čejková, Martinovičová, Nečas, 2011). It can also be very interesting to show the share of business risks insurance on the whole non-life insurance market. In recent years, there was an increase

in the field of business risks insurance in the Czech Republic (see data in Table 2 for years 2007 – 2012). (Czech Insurance Association, 2013)

It is apparent an increasing trend of companies to protect against consequences of their risks and to use insurance instead of relying on the use on their own resources. But unfortunately it is still true that in case of economic problems of a particular business entity, the insurance is on the first place when the cost reduction is needed. (Šídlo, 2011) In the Czech Republic, this insurance has a long tradition and comprises about ¼ of non-life insurance market according to premium written and about 4 % according to number of insurance policies (see data in Table 2). Although this data does not seem to too high, we have to mention that some business risks are covered and thus reported in other insurance products e.g. motor hull insurance or MTPL. Of course, there is still a huge space pro insuring the risks of other entities. If goes about financial stability of business risks insurances, the situation is very good. Loss ratio is only about 50 % (in property insurance about 60 %, in liability insurance about 40 %) and such results are satisfactory.

4 Conclusions

The business activities of small and medium-sized entrepreneurs also have its negative manifestations. These companies threaten various business risks - internal and external ones. Insurance is an important form of financial coverage of risks. Insurance is aimed to cover risks whose realization would cause to entrepreneur considerable damages and could lead even to the collapse of the company. Therefore, nowadays a role of business risks insurance of small and medium-sized entrepreneurs increasingly accrues.

In this paper we described and presented the typology of risks of enterprises, a segmentation of possible insurance products for these enterprises and also details of several selected and very important products. In the final part of the paper, there was a brief analysis of insurance market of business risks insurance. SMEs conclude various insurance products for protection from the consequences of their risks. In the first place, these are mainly insurances, which they are obliged to conclude by legislation norms, as we stated in our article. Beside compulsory insurances they conclude also voluntary insurance products, but markedly less than they could and should do.

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Country Risk as a Phenomenon of the Current European Debt Crisis

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Abstract: *Current European debt crisis leads to new roles for economic theory that should try to find solutions of actual problems. There are a couple of new problems in the financial markets as well. The risk attitude of investors has changed significantly, especially the perception of sovereign risks. Issues of securities and trading with bonds and shares are among the most affected. From the investor point of view it is important to quantify the level of country risk that reflects not only the danger of default but also a risk premium based on development of various macroeconomic fundamentals. The aim of this paper is to analyze economic category "country risk" and methods of quantification of country risk premiums with focus on current situation in Europe and the change of country risk perception in the case of developed (Germany, France, Italy, Spain) and emerging (Slovakia, Czech Republic, Poland, Hungary) European countries, compared to the pre-crisis era. The country risk premium calculations are based on credit ratings and credit default swaps that have huge impact on risk perception of the particular country. As calculations show, the real market situation doesn´t match theoretical calculations, which is caused by various political and psychological factors.*

Keywords: country risk, risk margins, risk rating, financial markets, debt crisis

JEL codes: G11, G15, E52

1 Introduction

Risk on financial markets is in the centre of attention of today´s economic theory and praxis. It represents a wide range of problems which creates space for various spheres of research, from country risk on the macroeconomic level to sector risks and company risks on microeconomic level. There are also different types of risks for different segments of financial markets. Especially impacts of particular risks on stock and bond markets are being analyzed intensively.

The key problem in analyzing risks on financial markets is the quantifying of country risk and setting the risk free interest rate correctly. These parameters are highly important factors for investors to evaluate the effectiveness of investment projects as well as the incremental value of securities.

There are a lot of opinions on the problematic of country risk in the economic literature nowadays. The authors tend to use various attempts and methodologies. The attention should be paid to authors such as Booth, Laurence (1999), P. Santa-Clara and S. Yan (2006).

A world renowned specialist in this area is A. Damodaran who studies the problematic of country risks mostly from the point of view of company valuations. His publication "Security Analysis for Investment and Corporate Finance" (2006) is frequently cited and well renowned by theorists and investment professionals as well.

Other important authors are A. Goyal and I. Welch (2007), J.Y. Campbell and S.B. Thompson (2008), I. Alexopoulou, I. Bunda and A. Ferrando (2009), J.H. van Binsbergen, M.W. Brandt and R.S.J. Koijen (2011). Some of the authors, for example S. Lyócsa, E. Baumohl and T. Výrost (2011), focus primarily on emerging markets of Eastern Europe.

This paper is focused on problematic of defining risk free interest rates and quantifying country risk margins for developed European countries and emerging markets of Vysegrad Group (V4) countries.

2 Economic Category "Risk Free Rate"

Financial theory says that risk is the deviation of the actual return from the expected return. When the actual return equals the expected return, the risk equals zero. Thence resulting that the actual return of a risk free investment equals the expected return. The risk free investment must fulfill three conditions:

- There is no default risk
- There is no reinvestment risk
- Time horizon of investment

On financial markets the role of "risk free" investments play government securities. They are supposed to be the safest investment vehicles. The best suitable for this task are T-Bills and partially also longer term government bonds. But it is important to note that there is a threat of the reinvestment risk when investing in 5- or 10-year bonds. The reason is that the change of interest rates can cause a change in realized yields and thence there is the threat of deviation of actual yield from expected yield. T-Bills are short term discounted securities therefore the reinvestment risk is diminished.

The reinvestment risk of longer term bonds can be resolved by issuing of zero bonds. The actual yield of zero bonds equals the expected return when holding it to maturity. The issuance of zero bonds is more popular under current conditions in Europe.

But it is important to note that government bonds can´t be supposed to be risk free anymore. A lot of European countries face the risk of default. This risk is reflected in higher risk margins. The simplest way to determine the country default risk is the country rating.

Table 1 shows particular levels of country rating (Moody´s) and related basis points. Ratings express the probability of default of the rated country. Basis points express the default risk margins related to particular rating levels.

Table 1 Country Ratings and Default Spreads in Basis Points (January 2013)

Investment range									
Rating	Aaa	Aa1	Aa2	Aa3	A1	A2	A3	Baa1	Baa2	Baa3
Points	0	25	50	70	85	100	115	150	175	200
Speculative range									
Rating	Ba1	Ba2	Ba3	B1	B2	B3	Caa1	Caa2	Caa3	D
Points	240	275	325	400	500	600	700	850	1000	

Source: own processing, using data of www.damodaran.com

According to table 1, default risk equal to zero can be attributed only to countries with Aaa rating. The differences between rating levels in the investment range are quite small. The difference between Aaa and Baa3 level are only 200 basis points. On the other hand we can see significantly growing differences in the speculative range. For example the B1 level brings 400 basis points of default risk spread and B2 level brings 500 points of default risk spread. The difference between Ba1 and Caa3 is notable 760 basis points. As the data show, it is in the best interest of every country to have as good credit rating as possible. High credit rating means lower risk spreads and lower risk spreads result in lower costs of debt service.

This paper analyses some of the biggest Eurozone economies as well as Vysegrad Group countries (Slovakia, Czech Republic, Poland, Hungary). The decrease of credit ratings has impacted the level of default risk spreads of big countries such as France, Italy or Spain. Only the German economy holds its Aaa rating which means no risk of default. On the

other hand Spain has Baa3 rating which means significantly increased default risk (200 basis points compared to Germany).

The best rating out of the Vysegrad group countries has Czech Republic and the worst rating has Hungary that has slipped to the speculation range. According to table 1, the risk spread between Czech Republic (A1) and Hungary (Ba1) is 155 basis points.

The key factor for quantifying of country risk is the aforementioned risk free rate. In Europe we can use Germany as a risk free country because of its Aaa rating and strong economic fundamentals. Thence the risk free rate is determined by the parameters of German bond and stock markets.

3 Country Risk Premium

Based on the risk free rate we can quantify risk premium of a selected country. There is a couple of methods. The simplest one is based on calculating of risk spread as a difference between yields of short term bonds (T-Bills) of analyzed country and yields of T-Bills of a risk free country. There are also some more complex mathematical-statistic methods that calculate risk premiums using various parameters of bond and stock markets. These methods are often used together in order to get the final result that involves wider spectrum of various factors.

The aforementioned simple method quantifies country risk spread based on comparison of short term government bonds (T-Bills) (1). According to this method, the default risk spread of a country equals the difference between yield of its T-Bills and yield of T-Bills of a country with triple-A rating. T-Bills of the triple-A rated country represent so called risk free asset and its yields represent risk free yield.

$$Default\ Risk\ Spread_{countryX} = Yield_{T-BillsCountyX} - Yield_{T-Bills\ Risk\ FreeCountry} \qquad (1)$$

Figure 1 10-year Government Bond Yields (2003 – 2012)
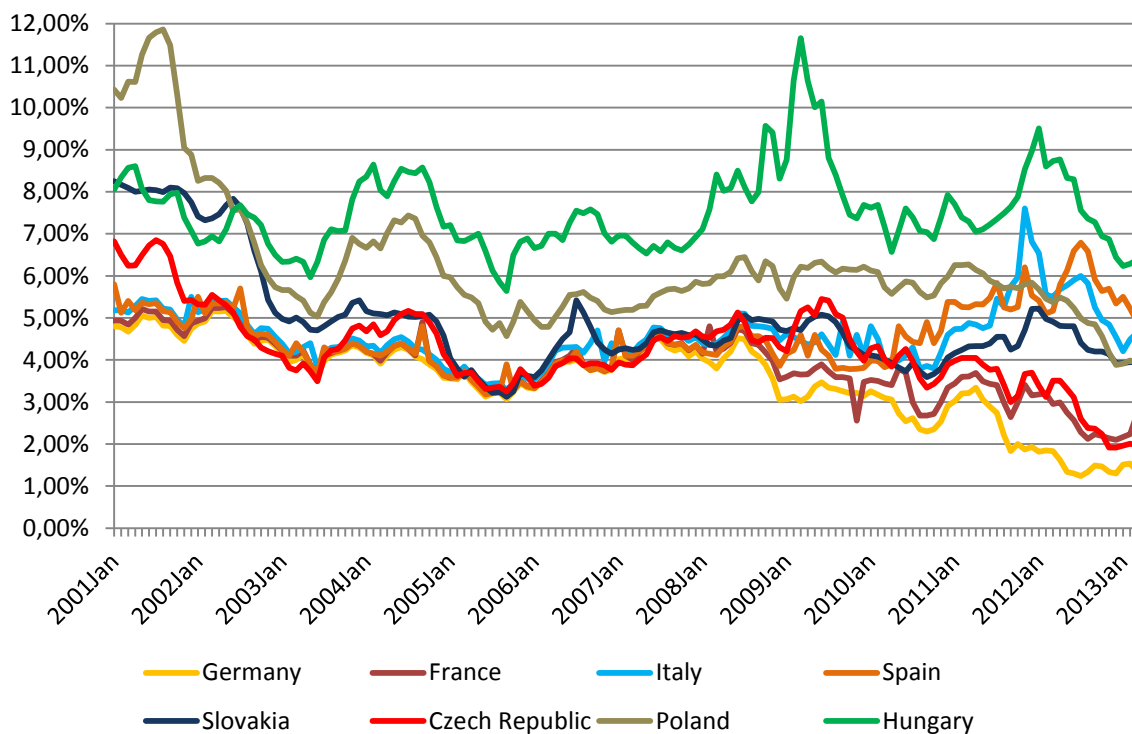
Source: Own processing, using data of Eurostat

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Long term government bonds bring higher level of risk compared to T-Bills. Spread changes are related not only to ratings but also to market risks of interest rate changes and currency risk. Most of analyses tend to use 10-year government bonds that bring reinvestment risk because this time horizon often brings significant changes of capital markets environment.

As figure 1 shows, yields of 10-year government bonds have changed dramatically during last decade. Only Germany, France and Czech Republic have managed to maintain their long term trend of slightly decreasing government bond yields. Slovakia and Poland show signs of stagnation from 2006 to 2013. Despite high level of volatility, Hungarian government bond yields have oscilated around the 7-8% range most of the time. Negative impact of the European debt crisis can be seen especially on Spanish and Italian bond yields that have risen significantly during 2009-2012.

We can also see a notable increase in risk spreads. France, Spain, Italy and Czech Republic used to have almost non-existent risk spread compared to German bonds before 2009. But this risk spread has widened significantly during the last years. Specifically Spain and Italy are eye-catching examples because their risk spreads have risen from around 0,5% in 2009 to 3-3,5% in 2013, with peak values in 2012 in the range between 5-6%.

A method of quantification of risk premium of stock markets is based on standard deviations. Standard deviation quantifies the volatility of the stock market. It shows absolute value of average deviation of measured values from their average value. The higher is the standard deviation, the higher is the volatility and the higher is the riskiness of the asset. A. Damodaran (2006) states following relations:

$$\text{Re}\,lative\;Standard\;Deviation_{country\,X} = \frac{Standard\;Deviation_{EquityMarketOfCountryX}}{Standard\;Deviation_{EquityMarketOfRisk\,Free\,Country}} \qquad (3)$$

$$Equity\;risk\;premium = Risk\;premium_{RiskFreeCountry} x\;\text{Re}\,lative\;Standard\;Deviation_{CountryX} \qquad (4)$$

$$Country\;risk\;premium = Country\;default\;spread\;\;x\;\frac{\partial_{EquityMarket}}{\partial_{BondMarket}} \qquad (5)$$

Equity risk premium equals risk premium of a risk free country times relative standard deviation of analyzed country (4). Relative standard deviation of analyzed country equals standard deviation of its equity market divided by standard deviation of equity market of a risk free country.

Risk premium of a particular country is calculated as a default spread of the country times the standard deviation of its equity market divided by standard deviation of bond market of the country.

For calculation of standard deviation of stock markets and standard deviation of bond markets historical data are used. The calculations are based on a benchmark stock market index and a 10-year government bond.

Country default spreads can be determined by two methods. The first one bases default spreads on country credit ratings. The second one determines it by CDS (Credit Default Swap) spreads.

As table 1 shows, Germany has credit rating based default risk spread 0% while Spain has default risk spread 2%. On the other hand equity markets bring significantly higher risk premiums, from 5,8% to 8,8% compared to bond markets. The overall sovereign rating based risk premium of Germany is 0%, followed by France (0,38%). Country risk premiums of Spain and Italy are 2,63% and 3% respectively.

Table 1 Country risk based on rating and CDS principles

| Country | Sovereign Rating based Equity Risk Premiums | | | Country Risk Premium | Sovereign CDS based Equity Risk Premiums | | Country Risk Premium |
	Local Currency Rating	Rating-based Default Spread	Equity Risk Premium		CDS Default Spread	Equity Risk Premium	
Germany	Aaa	0,00%	5,80%	0,00%	0,82%	6,03%	0,23%
France	Aa1	0,25%	6,18%	0,38%	1,44%	6,96%	1,16%
Italy	Baa2	1,75%	8,43%	2,63%	3,03%	9,34%	3,54%
Spain	Baa3	2,0%	8,8%	3,00%	3,14%	9,51%	3,71%

Source: own processing, using data of www.damodaran.com

CDS spreads signalize higher default risk compared to credit ratings thence country risk premiums calculated using CDS spreads are higher. German country risk premium according to this method is 0,23% which is slightly higher compared to rating based method. As we can see the difference of results is higher in the case of France, Italy and Spain where it ranges from 0,71%-0,91%. The quantification using CDS spreads shows that also a country with risk free rate brings a risk premium.

Table 2 Country risk based on rating and CDS principles (V4 countries)

| Country | Sovereign Rating based Equity Risk Premiums | | | Country Risk Premium | Sovereign CDS based Equity Risk | | Country Risk Premium |
	Local Currency Rating	Rating-based Default Spread	Equity Risk Premium		CDS Default Spread	Equity Risk Premium	
Slovakia	A2	1,00%	7,30%	1,50%	1,42%	6,93%	1,13%
Czech Republic	A1	0,85%	7,08%	1,28%	0,89%	6,13%	0,33%
Poland	A2	1,00%	7,30%	1,50%	1,30%	6,75%	0,95%
Hungary	Ba1	2,40%	9,40%	3,60%	3,16%	9,54%	3,74%

Source: own processing, using data of www.damodaran.com

Table 2 shows country risk premiums of V4 countries. As we can see Slovak, Czech and Polish country risk premiums are comparable to the German and French ones. Hungarian country risk premium is more similar to Italian and Spanish ones. As we can see it is in a contradiction to the real market situation (Figure 1) because yield spreads between Slovak or Polish government bonds and German government bonds are similar as spreads between German and Italian or Spanish bonds. Only Czech Republic and France are in line with calculated results.

4 Conclusions

The aim of this paper was an analysis of economic category "country risk" and methods of quantification of country risk premiums with focus on current situation in Europe. The base for quantification of the country risk is credit rating that shows probability of default of particular country. An alternative method is based on CDS spreads. The country risk is also related to the stock market that brings even higher level of risk compared to bond market. As we can see, country risk affects also countries with risk free rating although their country risk is much smaller compared to other countries.

It is also important to note that in reality the country risk premiums doesn´t reflect the theoretical quantifications well. Real risk premiums of most of the analyzed countries are higher compared to risk premiums calculated using aforementioned methods.

Acknowledgments

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Rate of Investments as a Parameter of the VIM Model for Appraising Trademarks of Unlisted Companies

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Abstract: *The value of a trademark is based on its economic benefit to its owner or the economic entity owning/using the trademark. All methods of appraising the fair value of a brand are based on three approaches - comparability, cost and income approach. In appraising intangible assets of unlisted (private) companies operating in developing markets, appraisers have to face the problem of the lack of empirical data, or their low quality. This makes the application of standard appraising methodology disputable. Therefore we suggest the VIM (Verifiable Interdependent Model) model, which has been designed specifically for the conditions of use in this environment. VIM model is a combination of methodological approaches, however results in the income based valuation approach. We found the income based value of the brand to be the most sensitive to the rate of the brand relevance, to the amount of reinvestment of earnings from the brand after taxes in ensuring and maintaining the brand value creation and to the assumed rate of growth (g) during the second stage of the valuation process. The goal of the paper is to discuss the costs of branding and to suggest appropriate level of earnings reinvestments to the brand necessary to preserve and increase the brand value under different conditions.*

Keywords: brand value, intangible assets, costs of branding, investments

JEL codes: M20, M30, G32

1 Introduction

According to International Valuation Standards, (IVS, 2007, GN 4), trademarks of products and services belong among intangible marketing assets, which are used in advertising and marketing. The same category also includes geographical designations and appellations of origin, trade name, industrial designs, corporate wear, Internet domains, and non-competition contracts.

A trademark which is regulated in the Czech legal order by Trademarks Act no. 441/2003 Sb., can be, under the conditions specified by that Act, any designation that can be graphically represented, especially words, including personal names, colours, drawings, numerals, the shape of a product, or its packaging, provided that this designation can differentiate products and services of one person from products and services of another person. Trademarks are protected designations which are either entered in a relevant register (e.g. a register maintained by the Office for Harmonization in the Internal Market) or are "generally known".

Instead of the "trademark" term, marketing literature talks about a brand in general, which is defined by Hanzelková et al. (2009) as a name, designation, symbol and set of unique associations connected with the name, designation, or symbol, which differentiate from rival brands and strongly influence the buyer decision process (similarly also with the American Marketing Association).

Apparently, there is (or can be) a difference between the brand value perceived by customers and the financial value and/or the value for an enterprise (see also Pelsmacker et al., 2003). According to Keller (2007), the brand value perceived by the customer is created if the consumer's response to marketing activities differs depending on whether the customer knows the brand or not.

According to Aaker (2003), the brand value is formed by five categories of "assets": awareness of the brand name, brand loyalty, perceived quality, associations connected with the brand, and other ownership assets (e.g. patents), which increase or decrease the value brought by a product or service to the enterprise and/or customer in various ways. The assets:

- increase the value for the customer, if they increase/improve the interpretation and processing of information, confidence in buyer decisions and user satisfaction;
- improve the value for the company, if they increase/improve the efficiency and effectiveness of marketing programmes, brand loyalty, price/margin, brand extension, the leverage effect in business activities, and competitive advantage.

The brand value for a company is therefore created if the risk-free benefits of the brand (higher income or lower costs) exceed the costs (investment) required for creating and maintaining brand value.

The goal of this paper is to investigate more the microeconomic factors influencing the rate of investments in the VIM model for appraising trademarks of unlisted companies. Therefor we approach the task from top down by designing the model in the first place and going to the elaboration of the parameters having an impact on the model results next.

2 Methodology of Appraising Trademarks of Unlisted Companies

According to Keller (2007), a strong brand can bring many benefits regarding higher revenues and lower costs. According to Hanzelková et al. (2009), a quality brand is able to strengthen the loyalty of customers, contribute to maintaining stable relationships between the customer and the producer, improve distribution channels, and reduce threats to the company from customers. A strong brand reduces marketing costs and can bring more stable sales and profits. For more details about the issue, see also Aaker (2003, p. 9).

The financial value and appraisal of a trademark is based on its economic benefit to its owner or the business that owns the trademark. Products and services produced by a business with a successful trademark are sold at premium prices. The business owning the trademark receives this bonus because it can sell at higher prices than its rivals who are either without a trademark or with a weaker trademark, or because it sells and produces more, and thus it has saved more fixed costs per production unit.

For the purposes of this paper, we will only deal with the category of the value of intangible assets, i.e. the fair value. The interpretation and content of this term can be found in the International Valuation Standards (IVS, 2011) and, in a slightly different version, within the IFRS 13 standard (for context, see Krabec, 2009).

As Krabec and Čižinská (2013b) state, all methods of appraising the fair value of a trademark are based on three approaches (see IFRS 13, IVS, 2007, 2011, Krabec, 2009, Svačina, 2010):

- Comparability approach – this approach is based on the balance principle = competitive intangible asset markets are able to create balanced prices of intangible assets with a comparable utility. This approach serves as the basis for the "market multiples method".
- Cost approach – based on the principle of economic substitution = a prospect is not willing to pay more for the relevant assets than he would spend on their creation. In this case, we consider two types of costs: reproduction costs and substitution costs.
- Income approach – based on the expectation principle = a prospect is not willing to pay more for the relevant assets than the present amount of expected income from the use of the assets.

In general, it can be concluded that the utility, and also therefore an economic benefit from the ownership of a trademark, must be analysed in relation to market chances of the products and services designated by the trademark on one side, and any savings in

the costs of creating the differentiated brand perceived by target groups of customers on the other (especially in the cases where the enterprise shows a technologically high rate of fixed costs, and the use of a licensed trademark leads to a realisation of the effects of the operating leverage thanks to the accelerating dynamics of earnings. These economic benefits can be examined empirically (the comparability approach and its methods) within the relevant segment. Because the empirical data is often significantly variable, the methods deriving the value on the basis of comparison will generally offer a less accurate estimation. This has many reasons, starting from the lack of data, through a different structure of realised transactions, to a different value generator, which the royalties can follow from (gross or net earnings, i.e. earnings less discounts, rebates, and returns). The income-based valuation is another method, which enables taking more account of the specifics of a particular enterprise and/or transaction.

A different perspective on the classification of approaches to valuation is offered by Zimmermann (2002), who, in addition to the standard quantity (monetary) approach, distinguishes models based partly or wholly on quality aspects. Zimmermann's categorisation extends the aforesaid classification by another three groups of methods, which, within the determination of the brand value, take more account of the quality factors. In addition to the commercial-financial methods (see e.g. Fischer, Hermann & Huber, 2001, Zimmermann, 2003), there are psychographical-behavioural methods (see e.g. Aaker, 1991, Andersen, 1991, Kapferer, 1992, Keller, 1993, Riesenbeck, 2000), combined financial-behavioural (see e.g. Schulz & Brandmeyer, 1989, Maretzki & Wildner,1994, Bekmeier & Feuerhahn, 1998, Sattler, 1999) and input/output models, and/or portfolio models (see e.g. Preißner, 1990). The particular methods within individual approaches are summed up, for example, by Krabec and Čižinská (2013b).

3 VIM Model – Combination of Methodological Approaches

In applying the aforesaid basic or somehow modified valuation methods, appraisers usually obtain results which differ significantly. This is usually caused by the subjectivity of parameterisation of relevant valuation models, and mainly by the lack and/or high scatter of market data. Therefore, we suggest the following combined application of competitive and income based methods so that the results obtained from independent, mutually confirming calculations can be verified.

We have suggested a phase VIM (Verifiable Interdependent Model) model (see Krabec a Čižinská, 2013a, 2013b), where the calculation procedure includes steps in the following order:

1) Calculation of the enterprise value of the whole company

It is appropriate to use one of the income based methods for the calculation, preferably the economic value added method.

Interim step: Partial analysis of brand strength and its evaluation: Subsequently a corporate discount rate is to be transformed into a discount rate corresponding to the brand-specific risk on the basis of the evaluation of brand strength.

2) Application of the Benchmarking Valuation Method

Application of multipliers resulting from the share of a price of comparable intangible assets on the selected economic characteristics related to those assets – the values of various multipliers can be found in many empirical surveys, e.g. the long-term quantity research of the Corporate Branding Index® by the CoreBrand company, which works with the contribution of the brand value to the market capitalisation of the business).

3) Application of Income Based Valuation Methods

We set up brand relevance parameter so that we are able to identify the portion of economic profit EVA attributable to the brand. The cash flow attributable to the brand is discounted at a discount rate adjusted by the brand strength – see interim step 1. The calculated income based value of the brand is an important information input for the

calculation of an implicit royalty rate. The procedure is similar to the valuation of a business by the method of discounted cash flow, the operating profit being replaced with the total income and implicit royalty rate. Such "profit" is subject to an effective income tax rate. Then, investment that is necessary in order to ensure and maintain the brand value driving, is deducted. This determines free cash flow on the FCFF level. The real nature of the calculated implicit royalty rate must be evaluated in the context of available information about market transactions.

4) Calibration and Reconciliation of Results

The last step involves a detailed study of differences in results, if any, detailed economically and methodologically justified calibration of model parameters of income based valuation and further specification of empirical methods according to step 2. If we deem these parameters of income based value on the level of the enterprise value of the whole company to be indisputable, the comparability of results within the determination of the income based value of the brand is most sensitive to values of the following information inputs:

- Brand relevance in the form of a share of cash flow of the brand in the economic profit of the business as a whole (method of cash flow attributable to the brand)

- Amount of reinvestment of earnings from the brand after taxes (earnings * implicit royalty rate) in ensuring and maintaining the brand value creation

- The assumed rate of growth of the operating profit and/or free cash flow during the second stage of the valuation process (if going concern assumption is justifiable and if the two-stage method has been applied).

4 Investments in Ensuring and Maintaining the Brand Value

As stated above, Aaker (2003) perceives the brand value as a set of assets. Therefore, brand value management also involves investments required for creating and strengthening these assets. As for investments in the brand, Keller (2007, p. 70) talks about the rapid growth of the costs involved in launching new products, or of promoting existing products, which results from the considerable growth of competition in markets in recent years. The database of trends of test and repeated purchases of average consumer products (A.C.Nielsen and NPD) indicates that the rate of testing a product (when a household buys a particular consumer product at least once during an introduction year) decreased from 15% in the second half of the 1970s to below 10% at the beginning of the 1990s.

We found out that the rate of investment (and/or reinvestment of income from the brand after taxes) in ensuring and maintaining brand value is one of the key parameters which may influence the resulting income-based value of the brand significantly. The purpose of this chapter is to specify the factors, on the basis of which this parameter should be quantified, in detail.

4.1 Impact of the Investment Rate on the Calculation of the Income-Based Brand Value in the VIM Model

This chapter specifies in detail how the quantified investment rate (and/or the absolute volume of investments) enters the calculation of the income-based value of the brand by means of the VIM model. In this model, the brand value is calculated in two ways so that the income-based valuation parameters (see step 4 of the VIM model) can be checked and calibrated by comparing the results. Both methods work with the investment rate in a slightly different way – of course, they differ only in the calculation technique.

Brand Value Based on Flows on the EVA Entity Level

On the basis of the EVA calculation for an enterprise as a whole, cash flow of the brand in individual years of the first phase is calculated, taking brand relevance into consideration.

$$FCFF_{Zt} = (NOPAT_t - NOA_{t-1} * WACC) * RZ \qquad (1)$$

where $NOPAT_t$ is the net operating profit after tax in year t

NOA_{t-1} are the net operating assets at the beginning of year t (and/or year t-1)

RZ is brand relevance in buyer decisions

The duration of the first phase of the valuation (T) corresponds to the number of years for which a detailed plan of individual valuation parameters can be drawn up. For the calculation of the current value of cash flow, a discount rate on the level of a corporate rate of WACC, adjusted for the brand strength calculated in the first interim step (see Chapter 3), is used. The corporate WACC rate is divided into a risk-free rate and risk premium. According to the brand strength, the resulting adjusted discount rate ($WACC_{adj}$) can range between <rf; WACC>, or can be higher than WACC.

Within the calculation of the income-based value of the brand in the second phase of the valuation process, for which we assume the stability of key parameters (rate of growth, investment rate, return on investment), Gordon's formula is applied (see e.g. Mařík et al., 2012) as follows:

$$PH_Z = \{[NOPAT_T * (1+g) - NOA_T * WACC] * RZ\}/(WACC_{adj}-g) \qquad (2)$$

where g is the rate of growth in the second phase of the valuation process

Within this approach, the rate of investment in the brand can be quantified as the product of year-on-year growth of NOA for an enterprise as a whole, and the brand relevance coefficient. The discount rate for the calculation of the current value of cash flow is adjusted as against WACC, which also means a change in the requirement for the return on investment in the brand, in comparison with the return on investment of the enterprise as a whole.

Brand Value Based on the Rate of Royalties

On the basis of the resulting brand value verified by a valuation using the method of discounted cash flow of the brand and method of market multipliers, an implicit royalty rate or internal rate of royalties is calculated retrospectively (iteratively) by the determined portion of total revenues. However, the calculation technique actually corresponds to the DCF entity valuation method, using free cash flow, which is assignable to the brand in individual years, while:

$$FCFF_{Zt} = T_t * LSi * (1-d) - I_t \qquad (3)$$

$$I_t = m_{IZT} * [T_t * LSi * (1-d)] \qquad (4)$$

Where T_t is income (revenues) of an enterprise in year t

LSi is an implicit royalty

d is an effective income tax rate

I_t are investments in year t

m_{IZt} is a rate of investment in brand management from brand revenues after taxes in year t

The duration of the first phase of valuation (T) should, as in the previous case, correspond to the number of years for which a detailed plan of individual valuation parameters could be drawn up. For calculation of the current value of cash flow, a discount rate on the level of corporate WACC is used. Within the calculation of the income-based value of the second phase of the valuation process, for which we assume the stability of key parameters (rate of growth, investment rate, return on investment), Gordon's formula is applied (see e.g. Mařík et al., 2012) as follows:

$$PH_Z = FCFF_{ZT+1}/(WACC - g) \qquad (5)$$

$$FCFF_{ZT+1} = [T_t * LSi * (1-d)] * (1 + g) * (1 - m_{IZ2}) \qquad (6)$$

where WACC (weighted average cost of capital) is a corporate discount rate

g is a rate of growth in the second phase of the valuation process

m_{IZ2} is a rate of investment in brand management from brand revenues after taxes in the 2nd phase

4.2 Determinants of the Rate of Investment in the Brand Management

Svačina (2010) summarises cost items related to the creation of intangible assets in the form of a trademark as follows:

- Logo creation: one of the basic cost items, which includes the graphic design of a logo, final form (specification), and licence to use it;
- Industrial-legal protection: the category containing the costs of protection as such (registration fee, territorial distribution, re-registration) and costs of services of a patent agent in registering trademarks;
- Monitoring: the costs typical for more mature stages of the existence of designation, which are based on the assumption that more significant designations are imitated or used in a way that violates trademark law. Monitoring therefore consists in keeping track of counterfeits and registered trademarks;
- Advertising costs: the costs connected with the launch of a new designation, and, in the second stage, the costs of advertising an established designation;
- Opportunity costs: opportunity costs of creating intangible assets, because the costs incurred could have been invested alternatively;
- Amortisation after the benefit from tax deductibility of the asset has been taken into account: however, designation should be subject to amortisation, because its significance grows over time.

According to Svačina (ibid.), the amount and significance of individual types of costs differ in various phases of the brand lifecycle (see e.g. Vysekalová et al., 2011). In this connection, Hanzelková et al. (2009) state that each phase of the brand's lifecycle is dominated by a different part of the brand's value. However, brand value is determined by individual assets which form brand value (see Aaker, 2003) in various ways. For example, brand loyalty leads to a decrease in marketing costs; perceived quality can be a source of price premiums, etc.

It can be assumed that there will be problems within the quantification and prediction of individual costs, especially at the level of advertising costs, or, generally speaking, at the level of costs of a marketing programme. According to Pickton and Broderick (2005, In. Hanzelková et al., 2009), marketing budgets range from 1% to 25% of the volume of annual sales. However, a particular amount depends on many field factors that influence the enterprise.

The planning and implementation of marketing programmes and activities are based on the identification and determination of brand positioning and values, which consists of making decisions about planned offer and image of a company aimed at placing the brand into consumers' minds so that any potential advantage of the company is maximised. According to Keller (2007), it means to persuade customers about the advantages of the brand compared to competing brands, and also to reduce their interest in potential disadvantages. However, the marketing costs (or rather marketing investments) are especially related to:

- Product research, development, and design;
- Trade or support of middlemen (support of distribution channels);
- Differentiation from competitors by extra features offered by the brand (e.g. specific guarantees, security guarantees, or reliability guarantees);
- Marketing communications (e.g. advertising, promotion, sponsorship, direct and interactive marketing, face-to-face selling, publicity, and public relations).

For a detailed analysis of the issue of marketing investments (and/or investments in marketing programmes), we will use the analysis of the value chain of the brand, which, according to Keller (ibid.) refers to a structured approach to the appraisal of sources and benefits of the brand, and how marketing activities create brand value. This approach assumes that brand value is definitely based on customers – the process of creating brand value therefore begins with corporate investment in a marketing programme, which focuses on existing or prospective customers. The transfer between a marketing

programme and subsequent stages of creating value is carried out by three sets of multipliers:

1) Programme multiplier: The ability of a marketing programme to influence the way consumers think, which is determined by quality (not just quantity) parameters of financial investments in the marketing programme (it especially involves the clarity, relevance, difference from competitors, consistency).

2) Customer multiplier: The extent, to which the value created in customers' minds influences performance in the market. The extent is high if the brand attracts a sufficient number of profitable customers, if members of distribution channels and other mediators provide the brand with strong support, and primarily if the quality and quantity of marketing investments of rival brands is not effective enough.

3) Market multiplier: The extent to which the market performance of the brand is reflected in the value of an enterprise for its owner. Market performance is connected with customers' opinion on the brand, as well as their responses. For example, if a market share is high, customers are willing to pay a price premium for the brand, they respond non-flexibly to increases in prices, and flexibly to their decreases; there is a positive impact on the flow of profits over time. The profitability of the brand is then supported if these aspects are combined with the ability of the enterprise to improve its source of profits (expansion of the brand, product range, or launching new products) and with savings resulting from the reduction of costs of a marketing programme, thanks to the prevailing opinion on the brand. The market multiplier is then determined by parameters of the financial market (capital costs, approaches to risk), growth potential of the brand and industry, risk profile of the brand, and its significance in the general corporate brands portfolio.

The analysis described above indicates that an effectively designed, financed, and implemented marketing programme is an inevitable, but not sufficient, precondition for creating brand value, because some factors of the value chain can be out of reach of marketers. Moreover, the effects of some marketing investments can only be seen after a long period of time. On the other hand, the image of the brand is often connected with the image of a guarantor or bearer of the brand –as a result, any additional marketing costs of the brand are reduced.

5 Conclusions

Brand value can be perceived from the point of view of a customer or from the point of view of an enterprise. From the customer's point of view, the value is determined by the level of the effect of the awareness of the brand on the consumer's response and on the marketing of the brand. The financial value of the brand is then realised on the basis of the ability to use the effects of the brand potential by the enterprise itself – by its management or owner. However, we can talk about creating a positive income-based value of the brand in the case that the risk-free benefits of the brand (higher income or lower costs) exceed the costs (and/or expenses or investments) required for creating and maintaining brand value.

The goal of this paper was to specify determinants of the rate of investment in brand management in detail. Chapter 4.1 indicates that the rate of investment significantly influences the resulting brand value calculated by the VIM model (i.e. in multiple ways) for the first and second phase of the valuation process. Chapter 4.2 specifies in detail the individual types of investments required for creating and maintaining brand value.

Acknowledgments

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Co-movements of bank stocks' prices
as signs of interdependence and contagion

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Abstract: *This paper examines the interrelations between six bank stock indices, illustrating world's biggest banking systems, to test the directions of market integration and possible contagion. Employing cointegration analysis methodology, we find evidence of cross-border banking sector interdependence, apparently formed separately by investment and commercial banks, and contagion, which in our case follow the timing convention in business activities of the chosen countries.*

1 Introduction

The study of the co-movements between asset markets is a central issue in finance as it has many crucial practical implications in asset allocation and risk management. Moreover, the integration of financial markets, especially between those of developed countries, is nowadays considered an established fact. However, the majority of studies is focused on the integration of the stock markets overall or major stocks only, while the interdependence on the lower level (between stocks representing one economic sector of different countries) is not yet considerably studied. We believe that investigation of such processes could give us better understanding of the drivers of the global financial integration. For this reason, and considering the importance of banking system for the stability of financial and economic development and dominance of banking system's contagion channels in the propagation of crises, the co-movements of bank stocks' prices are of main interest for the deeper understanding of financial integration.

It is extremely hard to distinguish the difference between interdependence (integration) and contagion. Interdependence and contagion in times of extreme shocks between banks or banking systems arises on the larger scale from common asset exposures. Bank portfolio diversification is privately beneficial but increases the likelihood of systemic risk, as portfolios become more similar (for the discussion see Ibragimov et al., 2011 and Allen et al., 2010). The situation is worsened when biggest banks are exposed to sovereign debt securities. Therefore, it might be equally critical to assess indirect financial linkages, which may arise from exposure to common risk factors such as similar business models, common accounting practices, etc. One method to extract this information consists of tracking the market's perception, usually reflected in securities prices. Not knowing to what type of securities certain banks are generally exposed to and taking the assumption, that, if investors can identify the condition of banking accurately, bank's stock prices provide useful information on their economic condition (Flannery, 2010), we suggest detecting possible financial contagion through the co-movement of banks' stock prices. In terms of cointegration analysis, possible contagion is seen as short-term linkages between markets to transmit common shocks established in the long run.

Studies investigating relationships among world stock markets find evidence of comovement among them. Most of the studies focus on the equity markets of the United States, South-East Asia and Western Europe using pair-wise and group analysis. It should be stated that direct comparison of such research is not completely appropriate, since different studies employ different differencing intervals (daily, weekly, monthly), different time periods and sub-periods, and different market indices as representatives of

the studied markets. Hence, these studies draw different conclusions about the interdependent relations in the selected markets.

2 Data and methodology

To depict the structure of the global banking market, six national bank systems with highest assets and capital were chosen, namely US, UK, Germany, France, Japan and China. For our empirical investigation we use FTSE banking sector indices collected from Datastream, which captures more than 75% of the total market. FTSE Banks indices are capitalization-weighted indices of publicly traded domestic banks' stocks, which are designed to measure the performance of the banking sector of the chosen countries. Index for each market is evaluated in US dollars, logs are subsequently calculated. The sample data consists of weekly closing index prices from March 2nd, 2009 till August 13th, 2012. Our investigation is conducted on the most recent market situation, since several studies have shown that financial integration increases after the major financial turmoils.

Figure 1 describes data in levels. Causal observation of levels implies that each stock price series appears to be non-stationary and that these six stock price indices tend to move more or less together over time without a trend. The differences of chosen variables seem to vary over a constant level of zero, although there are few large outliers, which should be accounted for in the model. From the inspection of properties of data seen in first differences (not reported here due to space constraints, but available on request), it is indicated that the assumption of multivariate normality might be accepted with minor changes of the model in order to obtain better specification and robustness of further analysis.

Figure 1 Co-movements of bank indices' prices (in logs, scaled)
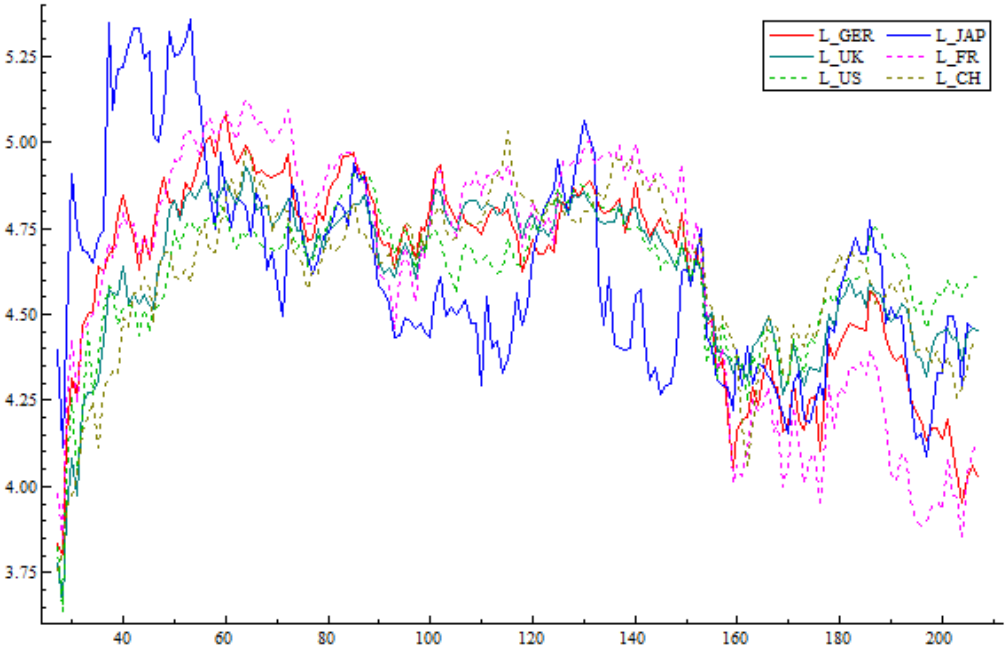
Source: Bloomberg

The study employs cointegration analysis and follows theoretical formations described in Johansen (1996) and Juselius (2006). Stepwise cointegration analysis allows an identification of the structure of interdependence/integration (long-run structure of the cointegrated system), common trends driving the integrated system as well as contagion channels (short-run dynamic adjustment structure).

The baseline VAR model in its vector equilibrium correction form is specified by:

$$\Delta x_t = \alpha\left(\beta', \rho'_D\right)\binom{x_{t-1}}{D_s} + \sum_{i=1}^{t} \Gamma_i x_{t-1} + \sum_{i=1}^{t} \theta_i D_s + \Phi D_p + \varepsilon_t \qquad (1)$$

where $x_t = [\log GER_t\,;\, \log JAP_t\,;\, \log UK_t\,;\, \log FR_t\,;\, \log US_t\,;\, \log CH_t]$ is a data vector, Γ_i is the short-term matrix, measuring how an increase or decrease (in the form of a positive or negative difference respectively) in last period's log price affects this period's log price, α is the long-run adjustment matrix, measuring how a shock to the cointegration relations affects this period's log price (the "weights" of the cointegrating variables), and β defines the stationary linear combinations (cointegration relations) between variables. Clear linear trends are not observed in the data and were rejected by testing as well. Inclusion of constant term in the model is not seemed to be reasonable, since it will indicate that some of the stock portfolios comprising the chosen indices are more profitable than the others. Otherwise, we would expect returns to have a zero mean.

We include a shift dummy D_s to illustrate market awareness of the European sovereign debt crisis (several ECB measures were taken during that week) and its effect on the integration process or, in terms of our model, the cointegration relations between markets. Two more dummies $D_{p,1}$ and $D_{p,2}$ are included in days March 30th, 2009 and May 11th, 2009 to account for the "blips" in the variables' differences and they correspond to the announcements of banks' write-downs to reach market-to-market valuations of structured credit assets.

The residual analysis is conducted to determine whether chosen model specification is statistically well-specified, or in other words, to check the assumption of the error terms being independently normally distributed (results are summarized in Table 1). It is worth mentioning that valid statistical inference is sensitive to violation of certain assumptions, such as autocorrelated or skewed residuals and parameter inconstancy, and quite robust to violation of others, such as residual heteroskedasticity or excess kurtosis.

We cannot reject the null hypothesis of no first or second order autocorrelation. Model has no severe skewness effects, however, there is still an evidence of kurtosis (which does not interfere with the asymptotic results of the model). The multivariate test of normality is rejected, while univariate tests indicate normal distribution for all variables, except for Chinese index. Model exhibits moderate ARCH effects, which will not influence the test of cointegration rank. Moreover, we believe that non-normality in the error terms of the Chinese banking index and presence of ARCH-effects in the error terms of the Chinese and German banking indices would not effect the explanatory power of following analysis, since the situation of no autocorrelation is achieved.

Table 1 Misspecification tests (p-values in brackets)

Multivariate tests	
Residual autocorrelation LM(1)	$\chi^2(36) = 38.594\ [0.353]$
Residual autocorrelation LM(2)	$\chi^2(36) = 42.288\ [0.218]$
Test for normality	$\chi^2(12) = 53.325\ [0.000]$
Test for ARCH LM(1)	$\chi^2(441) = 575.126\ [0.000]$

Univariate tests						
	$\log GER_t$	$\log JAP_t$	$\log UK_t$	$\log FR_t$	$\log US_t$	$\log CH_t$
Skewness	-0.080	0.094	-0.110	-0.226	-0.143	-0.217
Kurtosis	3.082	3.430	2.680	2.951	3.471	3.471
ARCH	7.563 [0.023]	0.872 [0.646]	5.053 [0.080]	5.199 [0.074]	2.606 [0.272]	7.431 [0.024]
Normality	0.571 [0.751]	2.659 [0.265]	0.866 [0.649]	1.626 [0.443]	3.093 [0.213]	10.561 [0.005]

For the determination of the lag length we estimated several unrestricted *VAR(k)* models with different lag length *k=1,2,3....,k_max* and than compared these models using general to specific testing. The same effective sample is used to ensure models to be nested. The

p-values of the LR-tests are reported in Table 3, where model in the column is tested against the model in the row. Results indicate the choice of lag *k=2*.

Table 2 Lag length determination

	VAR(7)	VAR(6)	VAR(5)	VAR(4)	VAR(3)	VAR(2)
VAR(6)	0.0131					
VAR(5)	0.0097	0.1372				
VAR(4)	0.0071	0.0800	0.1663			
VAR(3)	0.0020	0.0217	0.0391	0.5500		
VAR(2)	0.0002	0.0023	0.0035	0.0038	0.1222	
VAR(1)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

The investigation of co-movements between banks' stock prices allow us to test several hypotheses:

1. Global banking system, depicted by the indices of world's biggest national banking systems, is highly integrated.
2. Sovereign debt crisis in Europe had a significant impact on the interdependence and contagion in the global banking system.
3. Chinese banking system, mostly consisting of state banks, is independent (to some degree) from the developments in other markets.

In order to confirm Hypothesis 1, any number of cointegration relations between all chosen variables should be found. The significance of European debt crisis would be established, if we discover the presence of a break in the equilibrium. The variable for Chinese banks' stock prices should be considered weakly exogenous to verify self-sufficiency of the Chinese banking system.

Except for the above-mentioned hypotheses, we also assume that shocks to the system might be determined geographically as American, European and Asian shocks (3 or 4 common stochastic trends are expected) and not coming from each country individually, and hence indicating regional integration. We consider the structure of short run linkages between bank markets to specify the distribution channels of contagion.

3 Tests of model specific data properties

Estimation of the baseline VAR model without the rank imposed (not reported here but available on request) allows us to conduct several tests to specify model properties with economic meaning.

Table 3 Lag length determination

p-r	r	Eig.Value	Trace	Frac95	p-value
For the model without deterministic components					
6	0	0.337	144.610	139.890	0.024
5	1	0.178	72.860	104.599	0.898
4	2	0.104	38.657	74.387	0.992
3	3	0.069	20.814	49.300	0.988
2	4	0.054	9.197	29.187	0.957
1	5	0.000	0.076	13.882	0.998
For the full model with the level shift (after simulation)					
6	0	0.337	144.610	95.063	0.000
5	1	0.178	72.860	71.297	0.035
4	2	0.104	38.657	49.188	0.313
3	3	0.069	20.814	31.576	0.460
2	4	0.054	9.197	17.186	0.489
1	5	0.000	0.076	7.744	0.983

The trace test is performed in order to determine cointegration rank of the model (upper part of Table 3). Since model contains several dummies, asymptotic tables of the trace test should be corrected with $\chi^2(1)$ for each dummy (the results of the trace test based on the simulated asymptotic properties are given in the lower part of Table 3). According to the test, the rank of *r=2* should be chosen.

We run several test to ensure more parsimonious specification of the model, namely the possibility of long-run variable exclusion, individual stationarity, weak exogeneity of the variables (corresponds to a zero row in α), and their exclusive adapting (corresponds to a unit vector in α).

Test of exclusion (Table 4) suggest the exclusion of the variable for German market, however, test based on the model with rank *r=1* gives lower (5,6%) confidence of exclusion, also indicating that German market participates at least in one cointegration relation. The shift dummy is not long run excludable either.

Table 4 Test of long-run variable exclusion

r	$\log GER_t$	$\log JAP_t$	$\log UK_t$	$\log FR_t$	$\log US_t$	$\log CH_t$
1	3.640 [0.056]	10.236 [0.001]	5.402 [0.020]	0.626 [0.429]	0.784 [0.376]	24.706 [0.000]
2	4.020 [0.134]	10.425 [0.005]	19.653 [0.000]	10.979 [0.004]	7.392 [0.025]	24.707 [0.000]
3	4.142 [0.247]	17.200 [0.001]	21.618 [0.000]	11.003 [0.012]	7.853 [0.049]	29.522 [0.000]
4	6.959 [0.138]	19.230 [0.001]	22.006 [0.000]	13.824 [0.008]	7.972 [0.093]	32.018 [0.000]

*LR-test, Chi-Square(r), P-values in brackets

The hypothesis of long-run weak exogeneity, or no levels feedback, of a variable x_{it} for the long-run parameters β means that the variable x_{it} has influenced the long-run stochastic path of the other variables in the system but has itself not been influenced by them. In our study, stock prices of Chinese banks are found to be weakly exogenous (Table 5). These findings prove our hypothesis of Chinese banking system self-sufficiency.

Table 5 Test of weak exogeneity

r	$\log GER_t$	$\log JAP_t$	$\log UK_t$	$\log FR_t$	$\log US_t$	$\log CH_t$
1	22.250 [0.000]	9.630 [0.002]	32.603 [0.000]	14.273 [0.000]	37.511 [0.000]	2.224 [0.136]
2	30.544 [0.000]	12.791 [0.002]	39.430 [0.000]	27.074 [0.000]	48.147 [0.000]	2.442 [0.295]
3	34.999 [0.000]	18.475 [0.000]	42.811 [0.000]	33.904 [0.000]	48.700 [0.000]	8.530 [0.036]
4	37.077 [0.000]	20.729 [0.000]	44.971 [0.000]	36.653 [0.000]	48.700 [0.000]	9.075 [0.059]

*LR-test, Chi-Square(r), P-values in brackets

We cannot reject the null hypothesis of a unit vector in alpha (Table 6) for the variable characterizing French banking market. Therefore, stock prices of French banks are only adjusting to the long-run equilibrium, while shocks in the French market simply have transitory effects.

Table 6 Test of unit vector in α

r	$\log GER_t$	$\log JAP_t$	$\log UK_t$	$\log FR_t$	$\log US_t$	$\log CH_t$
1	55.938 [0.000]	60.982 [0.000]	52.020 [0.000]	42.411 [0.000]	51.340 [0.000]	60.818 [0.000]
2	20.285 [0.000]	22.552 [0.000]	20.019 [0.000]	6.220 [0.183]	24.022 [0.000]	28.901 [0.000]
3	6.683 [0.083]	7.874 [0.049]	8.120 [0.044]	6.200 [0.102]	9.743 [0.021]	13.707 [0.003]
4	0.618 [0.734]	6.578 [0.037]	1.253 [0.535]	1.469 [0.480]	3.013 [0.222]	10.224 [0.006]

*LR-test, Chi-Square(6-r), P-values in brackets

4 Identification of the long-run structure (interdependence)

We impose a restriction on the model that the rank of Π matrix is *r=2*, meaning that between the six variables in the model (banking systems) we have *r=2* cointegration relations and *p-r=4* common stochastic trends. In order to give economically meaningful explanation to the estimations, we should test restrictions on β and identify the set of cointegration relations. Since we previously have not assumed any directions of integration relations, we allow the data "to speak freely". Hence, the best identification of the long-run structure should have the highest statistical explanatory power (highest p-value for the test of the restricted model). β coefficients for three model specifications with highest p-values are reported in Table 7.

Table 7 Chosen specifications of the long-run structure

β'	$\log GER_t$	$\log JAP_t$	$\log UK_t$	$\log FR_t$	$\log US_t$	$\log CH_t$	$D_s(2011{:}08{:}08)$
			Model 1: p-value 0.8809				
$\beta'(1)$	0.000 [NA]	0.000 [NA]	1.000 [NA]	−0.606 [-9.805]	-0.437 [-7.376]	0.000 [NA]	-0.219 [-6.186]
$\beta'(2)$	−0.532 [−2.327]	0.611 [4.000]	0.000 [NA]	−0.470 [−2.424]	−0.830 [−5.534]	1.000 [NA]	−0.486 [−6.456]
			Model 2: p-value 0.6094				
$\beta'(1)$	0.000 [NA]	0.029 [3.909]	1.000 [NA]	-0.614 [-9.909]	-0.482 [-7.495]	0.000 [NA]	-0.224 [-6.307]
$\beta'(2)$	0.024 [2.212]	0.000 [NA]	1.000 [NA]	-0.593 [-9.923]	-0.444 [-7.194]	-0.045 [-6.781]	-0.202 [-5.948]
			Model 3: p-value 0.4148				
$\beta'(1)$	0.000 [NA]	-0.247 [-3.941]	1.000 [NA]	-0.218 [-7.320]	0.000 [NA]	-0.514 [-15.885]	0.000 [NA]
$\beta'(2)$	-0.187 [-1.943]	0.000 [NA]	1.000 [NA]	-0.408 [-4.703]	-0.330 [-4.274]	-0.131 [-2.198]	-0.186 [-6.325]

Test of the restricted model with better economically meaningful explanation and statistical properties gives Chi-squared statistics of 0.254 with the p-value of 0.881. The estimations of the final model specifications are stated in Table 8.

Table 8 The estimations of the final model specification

β'	$\log GER_t$	$\log JAP_t$	$\log UK_t$	$\log FR_t$	$\log US_t$	$\log CH_t$	$D_s(2011{:}08{:}08)$
$\beta'(1)$	0.445	−0.518	1.000	−0.200	0.236	−0.853	0.196
$\beta'(2)$	−0.104	0.051	1.000	−0.551	−0.467	−0.002	−0.232

		α	$\alpha(1)$	$\alpha(2)$
		$\Delta \log GER_t$	−0.233 [−6.219]	0.231 [2.737]
		$\Delta \log JAP_t$	−0.070 [−3.601]	0.090 [2.045]
		$\Delta \log UK_t$	−0.193 [−7.262]	0.084 [1.397]
		$\Delta \log FR_t$	−0.230 [−5.355]	0.431 [4.433]
		$\Delta \log US_t$	−0.232 [−8.012]	0.042 [0.643]
		$\Delta \log CH_t$	−0.039 [−1.588]	0.030 [0.547]

Π	$\log GER_t$	$\log JAP_t$	$\log UK_t$	$\log FR_t$	$\log US_t$	$\log CH_t$	$D_s(2011{:}08{:}08)$
$\Delta \log GER_t$	−0.110 [−6.455]	0.127 [6.455]	−0.029 [−0.322]	−0.080 [−1.554]	−0.158 [−3.740]	0.207 [6.455]	−0.094 [−4.529]
$\Delta \log JAP_t$	−0.034 [−3.823]	0.039 [3.823]	0.019 [0.419]	−0.042 [−1.562]	−0.062 [−2.823]	0.063 [3.823]	−0.035 [−3.253]
$\Delta \log UK_t$	−0.089 [−7.375]	0.103 [7.375]	−0.111 [−1.757]	−0.011 [−0.315]	−0.087 [−2.887]	0.168 [7.375]	−0.057 [−3.874]
$\Delta \log FR_t$	−0.114 [−5.806]	0.131 [5.806]	0.173 [1.684]	−0.205 [−3.474]	−0.259 [−5.333]	0.214 [5.806]	−0.142 [−5.921]
$\Delta \log US_t$	−0.106 [−8.029]	0.122 [8.029]	−0.193 [−2.798]	0.023 [0.588]	−0.074 [−2.260]	0.199 [8.029]	−0.055 [−3.389]
$\Delta \log CH_t$	−0.018 [−1.628]	0.021 [1.628]	−0.017 [−0.292]	−0.006 [−0.170]	−0.020 [−0.732]	0.034 [1.628]	−0.013 [−0.945]

As we have previously established that the stocks of French banks are exclusively adjusting to the equilibrium, the pulling forces of the banking market should be in the best way described by two relations: between the US and UK banks and between US, European and Asian banks. In our opinion, these relations depict the difference between the investment and commercial banks (the majority of the investment banks are originated from the US and UK) as also seen and important to the investors.

5 Common driving trends

The restricted model in the simplified MA-form (without short-run dynamics and deterministic components) is given by:

$$x_t = \widetilde{\beta_\perp} \alpha'_\perp \sum_{s=1}^t \varepsilon_s + C^*(L)\varepsilon_t + A \qquad (1)$$

where $\widetilde{\beta_\perp} = \beta_\perp(\alpha'_\perp \beta_\perp)^{-1}$, $\beta_\perp$ and $\alpha_\perp$ are respective orthogonal complements to β and α, $C^*(L)$ is a lag polynomial, an A depends on initial values. The term $\alpha'_\perp \sum_{s=1}^t \varepsilon_s$ defines the common stochastic trends driving the system and $\beta_\perp$ defines their loadings, describing how the common trends are transmitted to the system variables.

With a cointegration rank of *r=2* we have *p-r=4* common stochastic trends. Taking into consideration previously revealed weak exogeneity, the common stochastic trends, which drive bank stocks' prices, are comprised by the shocks to:

- UK and US banks;
- Japanese banks (with small insignificant effects from UK);
- Chinese banks;
- European (German, French and UK) banks.

Table 9 The MA-representation of the restricted model with the imposed weak exogeneity

$\alpha'_\perp$	$\log GER_t$	$\log JAP_t$	$\log UK_t$	$\log FR_t$	$\log US_t$	$\log CH_t$
CT(1)	0.000	0.000	-1.483	0.186	1.000	0.000
CT(2)	0.000	1.000	-0.191	−0.198	0.000	0.000
CT(3)	0.000	0.000	0.000	0.000	0.000	1.000
CT(4)	1.000	0.000	−0.826	−0.349	0.000	0.000

$\widetilde{\beta_\perp}$	CT(1)	CT(2)	CT(3)	CT(4)
$\log GER_t$	−0.487 [−3.257]	0.179 [1.687	0.762 [6.110	0.910 [6.173
$\log JAP_t$	−0.114 [−1.074]	1.006 [13.31	0.284 [3.194	−0.081 [−0.769
$\log UK_t$	−0.081 [−0.769	0.255 [3.397]	0.694 [7.869]	−0.126 [−1.206]
$\log FR_t$	−0.770 [−5.089]	0.161 [1.499]	0.584 [4.623]	0.100 [0.670]
$\log US_t$	0.681 [5.099]	0.332 [3.510]	0.720 [6.468]	−0.392 [−2.982]
$\log CH_t$	0.017 [0.166]	−0.071 [-0.666]	1.083 [8.656]	0.217 [1.465]

C	$\log GER_t$	$\log JAP_t$	$\log UK_t$	$\log FR_t$	$\log US_t$	$\log CH_t$
$\Delta \log GER_t$	0.910 [6.173]	0.179 [1.687]	−0.063 [−0.157]	−0.444 [−1.829]	-0.487 [−3.257]	0.762 [6.110]
$\Delta \log JAP_t$	−0.081 [−0.769]	1.006 [13.310]	0.044 [0.154]	−0.193 [−1.113]	−0.114 [−1.074]	0.284 [3.194]
$\Delta \log UK_t$	−0.126 [−1.206]	0.255 [3.397]	0.266 [0.937]	−0.033 [−0.193]	−0.142 [−1.346]	0.694 [7.869]
$\Delta \log FR_t$	0.100 [0.670]	0.161 [1.499]	1.030 [2.531]	−0.210 [−0.856]	−0.770 [−5.089]	0.584 [4.623]
$\Delta \log US_t$	−0.392 [−2.982]	0.332 [3.510]	−0.749 [−2.088]	0.198 [0.913]	0.681 [5.099]	0.720 [6.468]
$\Delta \log CH_t$	0.217 [1465]	-0.071 [-0.666]	−0.191 [−0.474]	−0.058 [−0.240]	0.017 [0.116]	1.083 [8.656]

In terms of achieved financial integration, it is obvious that higher degree of integration exists between US and UK banking systems and in Europe. We have not tried to find the structural MA representation of the system, since it directly contradicts the aim and main hypothesis of complete integration between biggest banking systems, which was confirmed earlier.

6 Identification of a short-run dynamic adjustment structure (contagion)

The short-run dynamics between the bank markets help us identify contagion in the banking system, which will reflect in asset prices and may occur only in the situation of extreme shocks. It might be also argued that weekly data of financial markets do not correspond to the short-run dynamics, but it should be equally seen as a sample of daily data reduced to every fifth (last working day of the week) observation.

Table 10 Short-run linkages

Π	$\Delta \log GER_t$	$\Delta \log JAP_t$	$\Delta \log UK_t$	$\Delta \log FR_t$	$\Delta \log US_t$	$\Delta \log CH_t$
$\Delta \log GER_{t-1}$	–	–	–	–	–	–
$\Delta \log JAP_{t-1}$	−0.1973 [0.025]	−0.1687 [0.010]	–	–	−0.2672 [0.003]	–
$\Delta \log UK_{t-1}$	–	–	–	–	–	0.3722 [0.000]
$\Delta \log FR_{t-1}$	–	–	–	–	–	–
$\Delta \log US_{t-1}$	–	0.1720 [0.000]	–	–	0.1944 [0.000]	−0.3418 [0.000]
$\Delta \log CH_{t-1}$	–	–	–	–	−0.1773 [0.004]	–
CIa_{t-1}	–	–	−0.1110 [0.003]	0.1810 [0.000	−0.1736 [0.002]	–
CIb_{t-1}	0.2152 [0.000]	0.0652 [0.000]	0.1772 [0.000]	0.2263 [0.000]	0.1969 [0.000]	0.0382 [0.042]
$D_p(2009:03:30)$	–	−0.0648 [0.045]	−0.1471 [0.000]	−0.1349 [0.000]	−0.2388 [0.000]	–
$D_p(2009:05:11)$	–	0.1524 [0.000]	0.0797 [0.001]	–	–	–
$D_s(2011:08:08)$	−0.2016 [0.002]	−0.1007 [0.002]	−0.1726 [0.000]	−0.2038 [0.005]	−0.2773 [0.000]	−0.1261 [0.002]

To identify the short-run causality we impose restrictions on the variables with the lowest t-values. According to the LR-test of over-identifying restrictions ($\chi^2(37)=29.975$), the final structure is accepted with a p-value of 0.7880 and all remained coefficients are significant. The dummy corresponding to European debt crisis is found significant in all studied markets. Taking into consideration the previous findings (the weak exogeneity of Chinese banks' stock prices and pure adjustment of French banks' stock prices), the identification of a short run dynamic adjustment structure easily draws the following causality chain:

$$UK \rightarrow US \rightarrow Japan \rightarrow Germany$$

In the times of extreme shocks it should be considered a main distribution channel of contagion, which to higher extend corresponds to the timing convention in business activities of the chosen countries.

Other techniques of short-run structure identification, such as identification of simulation effects, give similar results, however with a lesser degree of statistical significance. At the same time, the usage of same-time period variables is somewhat inconclusive, if we take into consideration the time difference of trading activities and index calculation in the each market.

7 Conclusions

Using cointegration analysis we have documented the evidence of interdependence between globally biggest banking markets. Through the examination of banks' stock prices co-movements we were able to confirm initially formulated hypotheses. The

presence of cointegration relations among bank stock indices is an evidence of integration and interdependence of world's biggest banking systems. In times of extreme market shocks these relations change; as an example we found a significant impact of the European sovereign debt crisis both in long and short run. At the same time, Chinese banking system, mostly consisting of state banks, is found to be partially independent from the developments in other markets.

The structure of short run linkages between bank markets as an indicator of contagion is reasonably not the best option to depict market contagion. However, it displays the distribution channels of contagion, which rather coincide with the timing convention in business activities of the chosen countries.

Probably the main implication of our study for the practical usage is that diversification in bank stocks is hard to achieve with the only exception of Chinese banks. On the other hand, the existence of cointegration relations between bank stocks suggests the possibility to predict its prices.

Acknowledgments

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Resolving the consequences of work-related injuries in the conditions of the Czech Republic

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Abstract: *Work-related injuries can have serious consequences for employees, often long-term. Currently, in the Czech Republic is the current issue of the future shape of financial instrument to deal with the consequences of work-related injuries. Insurance required by law, which is at present in connection with claims of work-related injuries is not relevant, from an economic perspective and from the perspective of prevention of work-related injuries. Therefore, it is considered for solving two basic solutions: inclusion in social insurance or use of commercial principles (compulsory contractual insurance). The aim of this paper is to analyze the various possible solutions.*

Keywords: work-related injuries, commercial insurance, social insurance, Insurance required by law, compulsory contractual insurance

JEL codes: G22, G28, G29, G38

1 Introduction

The risks of work-related injuries and occupational illnesses are considered to be significant from the point of view of their impact on employees. From the legal point of view, it is the employer who is liable for these events. Financial compensation for the consequences of work-related injuries is provided for in different countries by various forms of security. In the conditions of the Czech Republic the consequences of work-related injuries are currently resolved through a system of Insurance required by law, which, as an operation commissioned by the state, is carried out by two commercial insurance companies. This approach is in conflict both with insurance theory and the general principles of the functioning of commercial insurance. Entrusting the task in question to selected insurance companies means giving them a privileged position. The aim of this contribution is to analyze the situation regarding the consequences of work-related injuries in the conditions of the Czech Republic, and to analyze and evaluate the various approaches to the financial resolution of the consequences of such injuries.

When processing is based on an analysis and an analysis of the possible approaches to solutions based on theoretical models and findings from other countries . Furthermore, analysis of the impacts of the current approach to the Czech insurance market . Here are mainly used data published by the Czech Insurance Association.

2 Possible approaches to the resolution of the consequences of work-related injuries

Security in cases of work-related injuries was considered, in the past, to be a social priority, which led to priority being given to work-related injuries – insurance for work-related injuries was the first branch of workers' social insurance to develop (Vostatek, 2000). Various approaches to the security of compensation for work-related injuries have been developed over the years.

There are, in theory, two basic approaches to the problem of work-related injuries and occupational illnesses (Vostatek, 2000).:

➢ **social insurance** – This is financed by contributions paid by both employees and employers, and may be supported by state subsidies (when work-related injuries are resolved with the emphasis on finance from the side of the employer). So-called continuous financing is used. The claim to payments from social insurance by the

insured parties is based on the payment of insurance premiums or on the length of time of employment; a solution within the framework of social insurance means that compensation for work-related injuries and occupational illnesses is administered by the state or a public institution, and the insured party is the employee, as in other areas of social insurance, and employers pay social premiums and do not pay compensation to their employees. The insured parties therefore have the right to claim social benefits provided by the relevant state institution. Payments outside the framework of accident insurance would have to be covered by voluntary additional insurance, as is the case in other areas.

➢ **company provisions,** which fall into the following two types, according to the form of security a company has for the eventuality of work-related injuries:

a) Company provisions without the use of insurance. This means that the company provides its employees with social security payments from its own resources (from its current income or from appropriate reserves created to cover the payment of benefits) according to law or on the basis of an agreement with its employees;

b) Company provisions with the use of insurance (insurance to cover the employer's liability for damage arising from work-related injuries). Nowadays, this type involves the mandatory contractual insurance of the employer, which functions on a commercial basis, which means that the employer is obliged to take out insurance from one of the commercial insurance companies which offer third party insurance. Third party insurance is offered by commercial insurance companies in accordance with the technical principles of the insurance business.

In relation to social security benefits, compensation for work-related injuries and occupational illnesses can take two different forms:

• A completely independent system of benefits, which provides full security in the case of an injury.
• A system which supplements pension, sickness and other benefits paid irrespective of the cause of inability to work.

In Europe, there are two systems of insurance for cases of work-related injuries and occupational illnesses:

- A system in which the main responsibility is borne by state institutions. Such a system operates, for example, in Germany, Great Britain and France (Mesršmíd, 2012). This model focusses mainly on work-related injuries (as well as occupational illnesses).
- A system based on the activity of private subjects (commercial insurance companies) – Such a system operates, for example, in Portugal, Belgium, Finland and Denmark (Mesršmíd, 2012). The commercial model deals with all injuries within a single system and does not make great distinctions between them. The insurance company reacts in the same way whether an employee has broken his arm working in a factory or while doing the cleaning at home. This model spread rapidly through Western Europe mainly because, in the course of the last few decades, the proportion of different types of injuries has been reversed – while, in the past, accidents at work predominated, nowadays injuries incurred outside the workplace are more common. This model is transparent and has balanced tariffs.

Both systems have their pros and cons. The advantage of the public systems is, above all, that they maintain continuity with a minimal risk of collapse. Their disadvantage is that they are generally slower in settling insurance claims. The advantage of the private systems lies in the insurance companies' experience with settling claims and their ability to adapt quickly to changes in the work environment. Their disadvantage is that they offer no guarantee of continuity.

In the Czech Republic there is currently a system of Insurance required by law, for the liability of the employer for losses arising from work-related injuries and occupational illnesses. The establishment of Insurance required by law was justified by the necessity

to cover losses arising from work-related injuries or occupational illnesses while, at the same time, respecting the Czech Republic's international legal obligations arising from the conventions of the International Labour Organisation, which impose the obligation to ensure compensation for work-related injuries and occupational illnesses even in cases where the employer has ceased to exist and has no legal successor, or when the employer is insolvent.

3 The current situation in the conditions of the Czech Republic

The current system of insurance was established at the beginning of the 1990's as a temporary solution at a time when thousands of new companies were appearing on the scene and it was necessary to provide cover for their employees in cases of work-related injuries or occupational illnesses. This temporary system was meant to be transformed several times. Indeed, there was already a separate functioning insurance company with salaried employees which was meant to administer a transformed system of accident insurance instead of the two commercial insurance companies.

The employer's liability for a work-related injury or occupational illness is an objective liability. This means that there is no requirement to prove the employee's fault or any illegal act, merely the existence of an objective fact. The employer is liable for losses arising from a work-related injury, even if he has broken no legal obligation or directive. It is enough that one of his employees has suffered an injury while carrying out a task at work or in direct connection with it. This is so-called objective liability, according to which the employer is liable for the incident and its consequences. The generally binding legal document which governs statutory insurance for the employer's liability for work-related injuries and occupational illnesses is the currently valid version of the Labour Code, which sets the conditions for the establishment and operation of statutory insurance for the employer's liability for losses arising from work-related injuries and occupational illnesses. The conditions for Insurance required by law are governed by the accompanying decree of the Ministry of Finance (Decree of the Ministry of Finance no. 125/1993 Sb.).

Insurance for the employer's liability for losses arising from work-related injuries or occupational illnesses takes the form of statutory insurance, which gives rise to the way in which it is financed.

Figure 1 Proportion to the volume of received premiums in % - Česká pojišťovna and Kooperativa
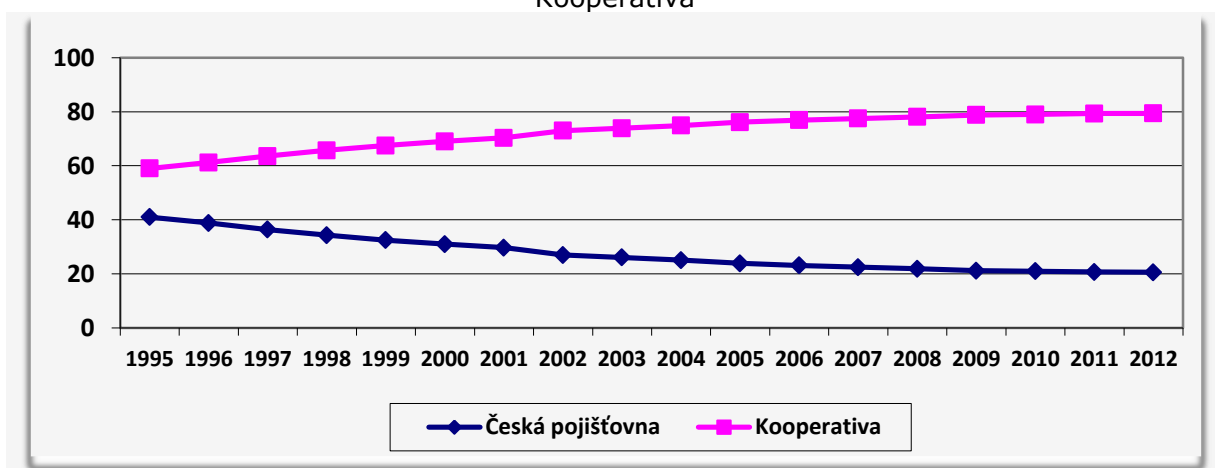
Source: Annual report of the Czech Insurance Association, information on the insurance market, available at www.cap.cz

A consequence of the conception of Insurance required by law and its structure is the fact that, strictly speaking, it is not really insurance, but, rather, from the point of view of the operating insurance companies, an operation commissioned by the state. The

employer is obliged to take out an insurance policy for a specified type of insurance, as well as to pay premiums to the appropriate insurance company at a specified tariff and according to a specified timetable. The nature of the Insurance required by law means that its operation was entrusted to specifically identified insurance companies. Those companies are Česká pojišťovna (which at present has an approximately 20% share of the volume of received premiums, see Figure 1.), and Kooperativa (80% of the volume of received premiums, see Figure 1). At the same time, because of the statutory nature of the insurance, these two insurance companies cannot compete with each other, because they have precisely defined classes of employers to whom they can provide insurance, and strict rules for operating. Kooperativa's rising share stems from the change in the structure of the market (Česká pojišťovna administers insurance for companies which had already taken out insurance for liability for work-related injuries before 1993).

The insurance is not operated using an insurance method, but rather a kind of combination of an insurance method and a budget method. In practice, it is financed continuously on the principle of intergenerational solidarity. The operation of statutory insurance of the employer's liability for losses arising from work-related injuries or occupational illnesses is regulated as a non-profit making business (commercially based insurance with a state guarantee). In reality this means that any losses incurred by the insurance companies during the operation of this type of insurance are covered by the state budget, while, on the other hand, any surplus they may have from the operation of insurance, is transferred by the companies to the state budget. The administrative costs incurred by the insurance companies are fixed (see Table 1). At the same time, the premium tariffs are regulated (Decree of the Ministry of Finance no. 125/1993 Sb.,). The level of the premium is set as a percentage of the tax assessment base (the employees' gross earnings), and is differentiated according to the main economic activity of the employer (it ranges from 2.8 per mille of the tax base to 50.4 per mille of the tax base, according to the risk level of the economic branch in question).

Table 1 The estimated sizing of the administrative costs

Period	Percentage of the size of the administrative costs of premium income
1993-1994	29,5 %
1995-2001	25,0 %
2002- 2011	13,5 %
2012 -	9,0 %

Source: Decree of the Ministry of Finance No. 125/1993 Sb., which sets out the conditions and rates of employer liability insurance for damage accident at work or occupational disease, as amended, section 16, Labour Code as in effect from 1..1. 2013, section 365, paragraph 2.

One significant deficiency of Insurance required by law is its economic basis. The mechanism functions on the principle of continuous financing: the received premiums are used up during the appropriate year to pay compensation and to cover administrative costs (the difference between the received premiums and costs is made up by the state budget). The system does not, therefore, allow the entrusted insurance companies to create the technical reserves necessary for the payment of long term compensation payments (annuities) in the future. The system does not, therefore, anticipate the basic technical insurance principles and the basic theoretical principles for the functioning of insurance as a category of activity (Ducháčková, Daňhel, 2012). In the light of the fact that compensation is predominantly in the form of annuities (payments of compensation often spread over a long period of time), this "non-insurance" approach generates future commitments, for which adequate technical reserves have not been created, which means future commitments for the state. From the point of view of the functioning of the insurance business as an economic category, the approach to the setting of premiums does not correspond to the basis of the business: fixed premium tariffs (arising from the statutory nature of the insurance) do not allow the insurance companies to vary insurance premiums according to the risk level of individual employers, that is, to base

the premiums on the size of the risk, which would be in line with insurance principles. It also makes it impossible to influence the size of the risk through the individualisation of premiums on the basis of the level of risk of an employer and his insurance history.

The level of compensation provided in cases of a work-related injury or occupational illness does not sufficiently motivate the injured party to return to work, and, likewise, does not motivate the employer to take effective measures to prevent work-related injuries. The original motivating element, that is the participation of the employer, was abolished by an amendment of the law in 1995. Today's system of compensation for work-related injuries is defective because it is practically impossible to ascertain whether all those who should pay premiums do so, whether they pay the amount stipulated by law, and whether the compensation paid out is at all justified. The current version of statutory insurance does not, therefore, contain certain important elements which are found in similar laws in other countries, for example incentives for employers to take preventative measures which lead to a reduction in the number of work-related injuries and occupational illnesses. At the same time, the law makes it impossible for the insurance companies to engage in the prevention of work-related injuries and occupational illnesses.

Table no.2 shows the development of the amount of premiums received and the costs, both of compensation payments and administration. The amount of premiums is rising (in 2002 the more marked growth was the result of a change in the insurance tariff), while on the other hand there has been a long-term decline in the number of insurance events (see graph no.2), although the volume of compensation paid out is rising (as a result of an increase in compensation tariffs in 2002, when various changes took place to the rules governing the size of compensation).

The current set-up in the Czech system of Insurance required by law also does not fulfill the requirements of the European Union to protect economic competition. During the negotiations on the accession of the Czech Republic to the European Union and the harmonisation of Czech law with the laws of the EU member states it was noted several times that the legal system of the Czech Republic, in unprecedented fashion, gives precedence to two commercial insurance companies by allowing them to operate statutory insurance. The EU demanded a change in the law to allow all insurance companies to operate that form of insurance, or, alternatively, to exclude the insurance companies and transfer statutory insurance to the state.

4 New approaches to a solution

In theory, there are several approaches to resolving the situation relating to work-related injury compensation which can be considered, based, above all, on theoretical models for resolving the consequences of work-related injuries.

From a practical point of view there are two possible options:

- a commercially based solution, that is, the operation of insurance on commercial principles involving the opening-up of insurance to other companies,
- the allocation of cover for work-related injuries to social insurance.

It is the second option that was selected within the framework of the Law on Employees' Accident Insurance (Act no. 266/2006 Sb., on employees' accident insurance. This law was passed, but did not take effect, It was postponed first until 2010, then 2012 and then until 1. 1. 2015), where, on the basis of this amendment, compensation for work-related injuries is regarded as an element of social insurance. This approach to a solution means that people injured at work (or suffering from an occupational illness) receive social benefits irrespective of their individual needs.

The Act on Employees' Accident Insurance changes the existing concept of the provision and legal regulation of statutory insurance of the employer's liability for losses arising from work-related injuries and occupation illness in line with the position adopted by the Czech Republic during the negotiations on the conditions of the Czech Republic's

accession to the European Union, leading to a shift to insurance within the framework of the social system, which is formulated as insurance complimentary to the statutory system of social security. Accident insurance should complement health insurance, sickness benefit and social security.

Table 2 The indicators of employer liability insurance for work injuries and occupational diseases

Year	Premium income in CZK million	Insurance benefits in CZK million	Administrative expenses in CZK million
1995	1 656,5	588,3	432,7
1996	1 922,2	883,8	480,6
1997	2 151,3	1 180,0	537,8
1998	2 181,9	1 460,3	570,5
1999	2 356,0	1 650,8	589,0
2000	2 402,2	1 639,8	600,5
2001	2 618,7	1 849,1	654,7
2002	4 067,3	2 079,2	549,1
2003	4 297,0	2 416,0	580,1
2004	4 551,0	2 595,6	614,4
2005	4 859,3	2 713,9	656,0
2006	5 199,6	2 973,3	701,9
2007	5 675,9	3 098,8	766,3
2008	6 222,4	3 269,1	840,0
2009	6 139,9	3 397,8	828,9
2010	6 094,1	3 317,7	822,7
2011	6 285,6	3 502,7	848,6
2012	6 408,1		

Source: Annual report of the Czech Insurance Association, information on the insurance market, available at www.cap.cz

In cases of work-related injuries and occupational illness, the Czech Administration of Social Security (ČSSZ) would make regular payments of compensation directly to the injured employees. This compensation should therefore be a form of social accident insurance with its own system for providing payments, in which insurance events and compensation for losses are replaced by a social event and social payments, which may be smaller in value than in the current system. The basic feature of the new system of insurance is that it introduces a system of payments similar to that used in social security, which, from the point of view of the employee, maintains the current set-up, in which the employee does not have to demonstrate that his work-related injury or occupational illness was the fault of the employer.

This approach means the introduction of the principle of general solidarity. When the level of compensation is set, no regard is given to the loss of income incurred, and the type of work carried out by the injured party is immaterial. An employee who suffers 35% damage to his health, without regard to the resulting disability, receives only a one-off payment, not an annuity, while, at the same time, a ceiling is set for compensation payments.

The Act on Employees' Accident Insurance means a fundamental systemic change which transfers responsibility for operating accident insurance to the state. It is a complete transformation of the nature of compensation.

5 The compulsory contractual form of insurance of liability for losses arising from work-related injuries

The second option is to solve the problem using commercial principles – that is, to implement compulsory contractual insurance. This approach enables the implementation of the employer's liability for losses arising from work-related injuries in full. At the same

time, this system enables the use of the classic concept of the insurance product with all its characteristic features. The insurance of liability for losses makes it possible, at the same time, to look to an amendment in the Civil Law Code which is based on the principle of compensation for losses incurred to property and other losses (a worsened position in society, pain, mental suffering). A system of commercial insurance means individual assessment of the risks of each employer by the insurance company (with preferential treatment for employers who actively engage in the prevention of work-related injuries and occupational illnesses), the use of incentives, such as participation, or a "bonus malus" system (no claims bonus). At the same time, the implementation of classic insurance principles enables active risk management.

Another important fact for the implementation of this type of solution is that the commercial insurance market is one of the most regulated branches of the economy. A similar change was implemented from the year 2000 onward within mandatory insurance for liability for losses incurred through the use of vehicles (Ducháčková, 2011); that is, a move from statutory insurance to compulsory, contractual insurance. That means:

- the employer's obligation to take out third party insurance,
- compensation according to insurance for liability for losses, in its current form (compensation for lost income, for losses to property, for physical pain suffered, for damage to social position etc),
- compensation paid directly to employees who have suffered a loss,
- the introduction of a limit to compensation, the employer's participation in compensation, and the implementation of the bonus-malus system (no claims bonus)
- monitoring of the ability to fulfil commitments, within the framework of regulation of the insurance business and with regard to fixed amounts of compensation and the creation of reserves for future payments of compensation,
- the creation of a guarantee fund to cover events which have no connection with existing insurance contracts (failure to fulfil the obligation to take out insurance etc.), and the setting-up of the institution of an "Office", which, as well as administering the guarantee fund, would deal with the prevention of work-related injuries and monitor issues connected with accidents at work. It would have a similar role to that fulfilled by the Czech Insurers' Office (Česká kancelář pojistitelů) with regard to mandatory liability insurance for losses incurred through the use of vehicles.

One problematic issue connected with the shift to a commercial approach to the resolution of work-related injuries and occupational illnesses is how to move to that system. Because the two insurance companies which currently carry out that task, in effect on behalf of the state, do not apply the technical principles of the insurance business, a financial deficit has arisen during the period that the current system has been in operation. This deficit consists of financial liabilities arising from the claims of injured parties. It stems from the failure to create technical reserves to cover future compensation for events occurring during the period that the system has been in use (This deficit ranges at present between 40 and 50 billion CZK. In the coming years of the application of statutory insurance in the monitored area, this deficit will grow). The question of which source to use to finance annuities arising from claims connected with the statutory nature of the insurance system remains unanswered. Because the operation is a state commission (the commercial insurance companies currently carry out a commission for the state, and that commission is strictly specified), the appropriate source of finance appears to be the state. There are several different possible solutions to be considered, each, in a different way, proposing financing from the state budget. The most realistic options appear to be one that proposes a one-off transfer of an appropriate amount of finance to the "Office", and another option which proposes a gradual, annual release of resources from the state budget (Analysis, 2012).

6 Conclusions

There has been a long-term attempt to resolve the consequences of work-related injuries, because the current solution based on Insurance required by law operated by

two specified commercial insurance companies is in conflict with the principles of commercial insurance, and due to its character, it is not an instrument of social insurance either. It is a non-standard approach to the problem. On the other hand, the character and structure of compensation payments within this system do comply with the rules for compensation for losses arising from liability. A solution based on the Act on Employees' Accident Insurance would mean a shift to compensation for work-related injuries based on the solidarity principle, using social security payments, meaning that the existing principles for compensation would be suppressed. With regard to the development and habits of the field of compensation for work-related injuries, the commercial approach seems more appropriate, that is, the introduction of a form of compulsory contractual insurance and the application of insurance principles in full. This approach is used to cover the consequences of work-related injuries in a number of countries. At the same time, this approach is attractive because it offers the possibility of incentives for employers, the prevention of work-related injuries and individual risk assessment, which mean a fairer solution. The main problem is the move to this system, which could be the basic issue affecting its implementation. It also is necessary to resolve the financing of claims for compensation (annuities) in the future.

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Trends in Integration of the Electronic Banking

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Abstract: *A summarization of the current state of electronic banking (e-banking) from the perspective of the general e-business in the new economy is presented. It is an expression of system integration in the technical and economic models. It is a description of the dynamics of the structure and behaviour of systems in the integration process of the system concept of contemporary reality for the new economy. Trends of a dynamic integration process in real systems are presented. There is a brief description of the models of electronic banking and their likely trends in the upcoming system integration of electronic banking. Expected trends in selected areas of electronic banking system from the perspective of technical solutions, design and user experience are shown.*

Keywords: e-banking, e-business, new economy, system integration, integration process, system, model

JEL codes: 032

1 Introduction

The current state of electronic banking is seen in the information resources of the world as a trend of the new economy and upcoming knowledge society.

To the creation of this article contributed a perception of processes as system solutions of economic, legal, technical and technological processes in the world on the basis of new theoretical disciplines supported by philosophical and physical knowledge of principles and laws. And with a precise use of artificial languages as a means of communication with the scientific proving of new effects and expected benefits of the model of Applied Informatics with regard to the creative use of mathematical language and other languages arising from basic research. First of all it is the perfect application of modern Systems Theory, the Theory of Modelling and Simulation and completely new specialization of Applied Cybernetics (highly developed in the world of Medicine's Cybernetics, now very progressive in the world's superpower of the Military Cybernetics, and upcoming Economic Cybernetics and others) from the position of a scientific knowledge of Theoretical Cybernetics principles.

The Electronic Banking is thus part of the rapidly developing Information and Communication Technologies (ICT), a base of developing Economic Cybernetics and from the user point of view dynamically developing Financial markets and their banking.

The current state of Informatics in this user environment is understood as:

- very fast developing area of processing and transfer of information (ICT) on the basis of new technical means and appropriate technology (electronics yet, gradually optoelectronics, nanotechnology, and then later use promising bionic devices and techniques),
- highly dynamic process using high-quality data (state space of spread hierarchical cybernetic systems), information and gradually integrated information transformed into knowledge spaces and gradually integrating skills in new spaces of the knowledge in developing intelligent cybernetic and robotic systems in the near future,

- highly rapidly growing needs of the emotional intelligence growth of social systems as a environment of:
    - projection (using the Theory of Artificial Intelligence to a new "smart" application environment of information society and in the future knowledge society),
    - structural (using new resources of automated design of intelligent information and robotic systems based on a perfect application of methods and resources of Technical Cybernetics),
    - user (using effective methods of learning to a sophisticated using of a system of effective E-learning in expanding education systems of the Virtual Schools Environment and in the future World Universities).

The development of the modern concept of electronic banking (e-banking) can be understood only as systemically integrated environment of these areas and also from the point of view of the general nature of very sophisticated electronic business (business), electronic commerce (e-commerce), the electronic environment of the state and public administration (e-government) and others in the new world economy based on applications of electronic communication and transformation in the cyber environment so far. This environment would solve demanding needs:

- transmission speed and processing all kinds of information, accuracy and reliability of information for the management and cyber security of the modern economy environment,
- sensitive to the environment for attacks on cyber security and understanding of new and highly dangerous manifestation of a new cyber war in the world.

2 Methodology and Data

Information sources used for the conducted research activity in the field of e-commerce and the modern teaching of EBAN (electronic banking) in the Department of Finance of Masaryk University in Brno, mainly describes the systematically defined environment suitable for modelling, simulation and optimization of the structure and behaviour of these systems (such as electronic banking).

In general terms, in this research, teaching, bachelor and master thesis of students, it is a very interesting problem of the relationship of two environment which are simplified shown on (Figure 1 System Integration of modelled e-banking), where it is illustrated:

A. Relationship of technical and social environment (relationship "human-machine")
- technical environment defined by the current means which allow clients' contact (social environment) implemented by:
    - credit cards (cash machines of various kinds),
    - internet banking (different PCs and the Internet),
    - television banking (various means of TV service) etc.
- social environment defined by a literacy of clients is given by:
    - possibilities of understanding to this new environment and capabilities based primarily on information literacy of clients,
    - availability of technical and service resources of technical security of electronic banking.
- interface defined by the technical and social environment which is constantly changing and there is the general effort to minimize this environment as much as possible.
B. Relationship of models for all three environments - the technical environment, the interface between these two environment and the social environment - are given by:
- modern means for developing a transformation of system to models and modelling in the appropriate environment in order:
    - to create an optimal model (of technical environment with regard to the transmission characteristics of that environment, security and

confidentiality of performed banking transactions by these means, reliability, diagnostics and others),

- o to create a suitable model for the effective operation of this environment with option of economic adaptability to other means of electronic banking,
- o the future integration of the current environment of electronic banking in the process of introducing new technical, organizational, client and operational capabilities of electronic banking,
- o the new banking resources (such as digital money), etc.
- ▪ modern trends in the integration of all three quoted environments in order (modelling and optimization of electronic banking):
  - o to create a suitable environment for a communication in the field of integrated activities of electronic banking that is undertaken with trends in e-commerce, economic cybernetics and other promising areas,
  - o to create conditions for intelligent environment of robotic systems in cybernetic concept of the new banking world,
  - o by automating the entire environment using intelligent learning environments of technical and social facilities in order to minimize the quoted interface and replace it by a training environment with adaptive learning in environment of multi-criteria optimization.

Figure 1 System Integration of modelled e-banking
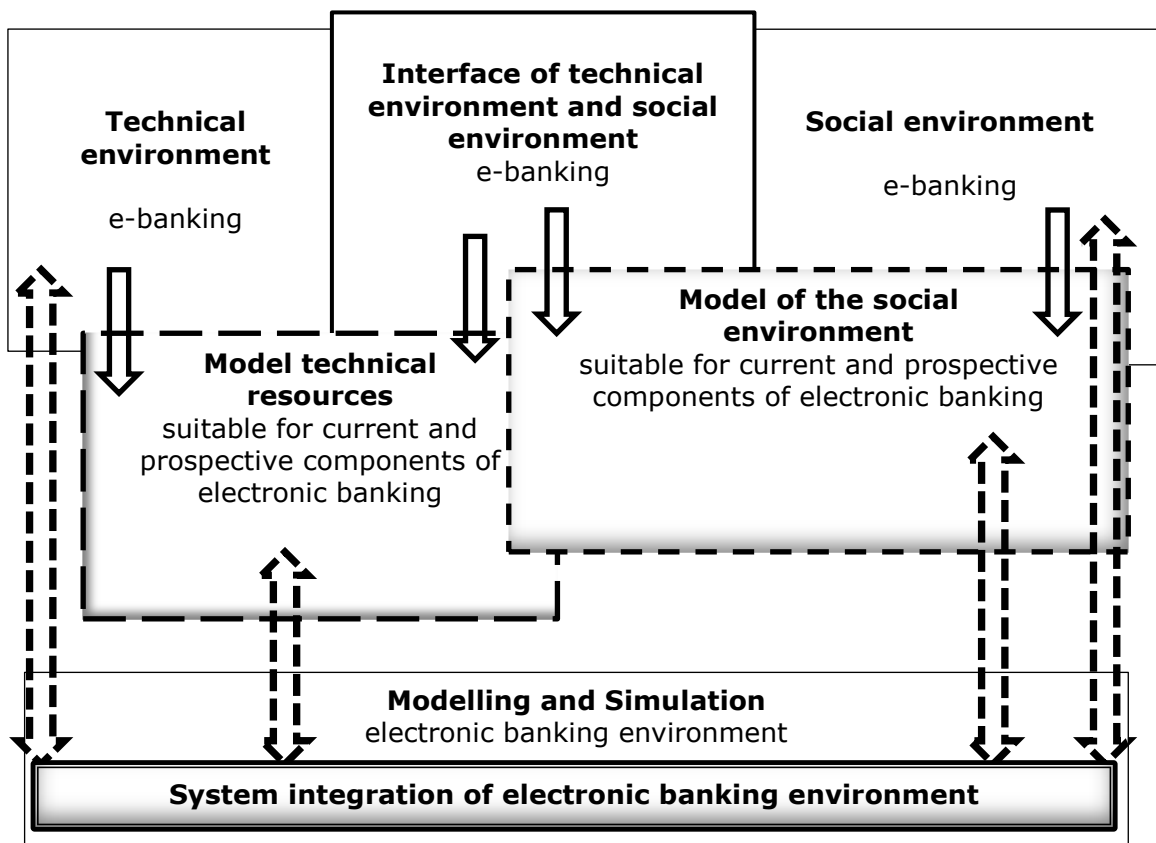
The research can show an approximate data so far, which clearly highlights the quality of the technical means of electronic banking and the ease of communication with higher security transactions (Figure 2).

Figure 2 Current evaluated possibilities of e-environment for business and banking
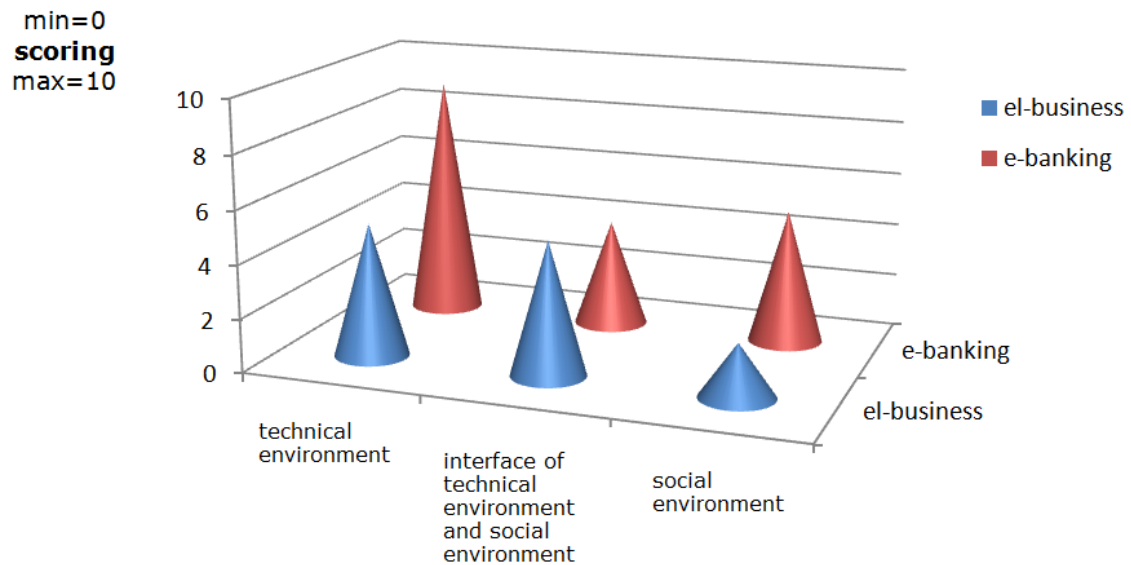
3 Conclusions

Trends in integration of electronic banking must be an essential part of models for a modern e-business and an application of modelling process for a possible methodology for designing intelligent e-business in environment of technical, economic and social of new economy.

This paper is the result of progressively acquired information and knowledge in field of developing modern electronic environment and trends in the world of electronic economy.

Based primarily on innovated subject EBAN (e-banking) taught at the Department of Finance FES Masaryk University in Brno and surveys conducted by students in assignments for this subject.

Acknowledgments

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Implied forward rates as a source of market expectations – implications for monetary policy in Poland

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Abstract: A yield curve which could be understood as a plot of zero-coupon rates for different terms plays an important role in monetary policy. With the assumption of expectation hypothesis (with risk premium different from zero), the implied forward rates are particularly interesting for central banks to extract market expectations from yield curves. The aim of the paper is twofold: to derive the implied forward rates from the assets' prices with two parametric models and three different goal functions. The second is to compare risk premium depending on source of data and estimation method to find the most transparent asset and the most useful method of estimation. This paper applies data for several segments of Polish market: inter-bank deposits, forward rate agreements (FRA) and interest rate swaps. During the analyzed period we found that there is a period of time when a higher positive premium in the form of calculated differences was noticed. The result could be used as a leading indicator of market disturbances – especially for the central bank which wants to assure markets that it controls the situation and does not let investors lose the mutual confidence.

Keywords: yield curve estimation, parsimonious models, market expectations

JEL codes: C53, C92, E43, E58

1 Introduction

Last disturbances on financial markets show how important is a good understanding of market behaviors. Extracting market expectations from asset prices and their further analysis plays a crucial role in modern monetary policy management (Bernanke et all 1999), (Mishkin 2007). The idea assumes that monetary policy should be focused on transparency because it let minimize shocks caused by unexpected interest rate movements. Following expectation hypotheses central bank managers can control how market participants predict future move of the central bank and may check if the prediction is correct.

Generally central bank extracts the expectations from the instantaneous term structure which is understood as the relationship between the yield of the investment with the same credit quality but different term to maturity (Nawalkha, Soto, Beliaeva 2004). Because financial markets offer only discrete data, one of the most important problems to be solved is a model selection for fitting data. There are several methods which let create a yield curves (James, Weber 2000) but in countries with well developed debt markets central banks use both parsimonious models coming (Nelson, Siegel 1987) (Svensson 1994) and a method based on cubic splines (Fisher, Nychka, Zervos 1995).

The main aim of the article is an analysis of the difference between implied forward rate and a reference rate understood as a risk premium (ex post analysis) to show that it could be utilize as an indicator of market disturbances. Then to compare calculated risk premiums depending on source of data and estimation method to find the most transparent asset (the best source of expectations) and the most useful method of estimation. To find the sensitivity of expectations to market disturbances the construction of six term structures for every of four types of data was taken into account.

The paper is structured as follows: Section 2 provides a general overview of the term structure modeling, the evolution of methods and shows their applications into monetary policy, Section 3 shows the methodology of term structure modeling based on

parsimonious models, Section 4 is an empirical one – it involves risk premium analysis which illustrates an influence of market expectations (fears and believes) on its value. The final part covers concluding remarks.

2 Expectations and monetary policy

A forward rate $f_\tau(s,t)$ extracted at time τ is an agreement made to lend money at some future date s and t (Tuckman 2002), but sometimes analysts differentiate forward rates taken directly from the market from these implied forward rates which are derived from the spot interest rates (theoretical ones) (Choudhry 2004). Predictive power of implied forward rates (as an estimation of the future spot rates) depends on the efficiency of the market and various hypotheses try to explain both the relation itself and several biases which may be included in forward rates. According to one of hypothesis, the preferred habitat theory (Modigliani, Sutch 1966), the term structure reflects directly the market expectations of future rates with a risk premium.

$$\begin{cases} f_\tau(s,t) = E_\tau[i(s,t)] + \Phi_\tau(s,t) \\ \Phi_\tau(s,t) \in \Re \end{cases} \tag{1}$$

where: $i(s,t)$ - the reference rate of the central bank

$E_\tau[i(s,t)]$ **-** expected at moment τ the level of the reference rate of the central bank

$\Phi_\tau(s,t)$ – a risk premium

With the assumption of the predictability of monetary policy understood in its narrower definition as the ability of financial markets to correctly anticipate the next monetary policy decisions of a central bank (ECB 2006) we can observe:

$$E_\tau[i(s,t)] = i(s,t) \tag{2}$$

Then the equation (1):

$$\begin{cases} f_\tau(s,t) = i(s,t) + \Phi_\tau(s,t) \\ \Phi_\tau(s,t) \in \Re \end{cases} \tag{3}$$

And the risk premium could be explain as:

$$\Phi_\tau(s,t) = f_\tau(s,t) - i(s,t) \tag{4}$$

The shorter is the period $s - \tau$ between term of establishing of the implied forward rate and the beginning of the spot contract, the lower should be the risk premium (market participants receive more information about future moves of the reference rate and are able to predict them properly).

The implied forward rates are particularly interesting for central banks, especially if the time period of calculated implied forward is equal to the duration of the central bank's key open market operation. To evaluate the central bank's predictability we can analyse the difference between a reference rate and an implied forward rate (ex post analysis of risk premium). The lower the difference is the clearer and more transparent monetary policy has been before a decision-making meeting. If the level of the risk premium is high, the question arises what are the reasons for – sometimes it is an inefficiency of the market (lack of liquidity), sometimes biases mentioned earlier: either lack of trust to current monetary policy or the incomprehension of the central bank purposes.

It is also possible that market participants permanently overestimate the scale of central bank decisions as an effect of market behavior. Being familiar with determinants that shape the term structure, the central bank is able to improve its transparency through official and unofficial messages sent to the market to keep the inter-bank rates as stable as possible (Choudhry 2002).

3 A yield curve construction

To derive the implied forward rates from asset prices two parametric models were taken into account. At the first step one should explain the process of zero-coupon yield construction with the assumption of the continuously compound interest.

The parametric models, proposed here, the Nelson-Siegel model with four parameters and the Svensson model with six parameters respectively are described in the forms:

$$f(s) = \beta_0 + (\beta_1 + \beta_2 \frac{s}{v_1}) \cdot e^{-\frac{s}{v_1}} \tag{5}$$

$$f(s) = \beta_0 + (\beta_1 + \beta_2 \frac{s}{v_1}) \cdot e^{-\frac{s}{v_1}} + \beta_3 \frac{s}{v_2} \cdot e^{-\frac{s}{v_2}} \tag{6}$$

where: $f(s)$ - instantaneous forward rate

$[\beta_0, \beta_1, \beta_2, v_1], [\beta_0, \beta_1, \beta_2, \beta_3, v_1, v_2]$ – vectors of parameters describing the curve:

β_0 - parameter which shows a limit of $f(s)$ as s approaches infinity, $\beta_0 > 0$

β_1 - parameter which shows a limit of $f(s)$ as s approaches zero, $\beta_0 + \beta_1 \geq 0$

β_2 - parameter which shows a strength of first curvature

β_2 - parameter which shows a strength of second curvature

v_1 - parameter which shows a place of first curvature, $v_1 > 0$

v_2 - parameter which shows a place of second curvature, $v_2 > v_1$

The forms of parametric models allow to receive implied forward rates directly. It guarantees different shapes of theoretical term structures. Having both theoretical and market vector of prices we try to find such value of parameters to achieve as good approximation of theoretical data to market ones as possible. The sets of parameters: $[\beta_0, \beta_1, \beta_2, v_1]$ in case of the Nelson-Siegel model and $[\beta_0, \beta_1, \beta_2, \beta_3, v_1, v_2]$ in case of the Svensson are to be estimated by three different goal functions which let minimize mean square errors between:

- market prices and theoretical ones:

$$\min_{\beta^*} \frac{\sum_{l=1}^{k}(P_l - \overline{P_l})^2}{k} \tag{7a}$$

- market prices and theoretical ones divided by duration of the asset:

$$\min_{\beta^*} \frac{\sum_{l=1}^{k}(\frac{P_l - \overline{P_l}}{D_l})^2}{k} \tag{7b}$$

- market yields and theoretical ones:

$$\min_{\beta^*} \frac{\sum_{l=1}^{k}(i_l - \overline{i_l})^2}{k} \tag{7c}$$

where: $P_l - \overline{P_l}$ – a price error of l-th asset

$i_l - \overline{i_l}$ – a yield error of l-th asset

D_l - duration of the l-instrument

k – number of bonds

$$\beta^* = \begin{cases} [\beta_0, \beta_1, \beta_2, v] & \text{for the Nelson-Siegel mode} \\ [\beta_0, \beta_1, \beta_2, \beta_3, v_1, v_2] & \text{for the Svensson model} \end{cases}$$

When a vector of parameters is known, it is easy to construct a set of zero-coupon rates and then an implied forward term structure which let analyze a current situation in the market.

$$i(\tau; t_l) = -\frac{\ln \delta(t_l)}{t_l} \text{ for every cash flow times} t_l \qquad l=1,2...m \qquad (8)$$

According to the rules laid down by the National Bank of Poland this analysis uses a both parametric models. To calculate the implied forward rate the estimation of four $[\beta_0, \beta_1, \beta_2, \nu_1]$ and six parameters $[\beta_0, \beta_1, \beta_2, \beta_3, \nu_1, \nu_2]$ was performed in three different ways – by minimizing the difference between theoretical and market prices, prices divided by duration, and yields of given assets (formula 7a, 7b, 7c). This is why for each set of assets we receive six different term structures for every research day.

Generally a term structure is typically built with a set of liquid and common assets; the problem arises in a case of not so liquid market (as in Poland) with a small number of data. One solution, proposed here, is to analyze several types of models and then choose this one which let achieve the best approximation.

4 Data and results

The term structure building begins by gathering the sample of the instrument to be used. In Polish money market, which is analyzed here, there is lack of short term data (apart from money market fixing quotations), that is why all available quotations were taken into account with no quality check.

For several years Polish money market has become one of the most important places of trade in Eastern Europe attracting both speculators and long term investors. Following the openness and liberalization, Polish market has started to be more liquid and can be used as a source of market participants behavior. Three types of instruments were taken into a forthcoming research. They vary in terms of their liquidity, maturity and default risk.

- Interbank lending rates are represented by WIBOR (Warsaw InterBank Offer Rate) seven in total: 1-week, 2-weeks, 1-month, 3-, 6-, 9-months, one year,
- FRA rates: first set involved thirteen 3-months FRA rates (1x4, 2x5, 3x6, 4x7, 5x8, 6x9, 7x10, 8x11, 9x12, 12x15, 15x18, 18x21, 21x24) and second with eight 6-month FRA rates (1x7, 2x8, 3x9, 4x10, 5x11, 6x12, 12x18, 18x24),
- Swap rates, ranged from one to ten years plus POLONIA index.

Since 1999 due to the implementation of the direct inflation targeting strategy (IT strategy) into Polish monetary policy, the National Bank of Poland defines the inflation target and then adjusts basic interest rates in order to maximize the probability of achieving the target. The NBP maintains interest rates at a level consistent with the adopted inflation target by influencing the level of nominal short-term interest rates in the money market. The minimum yield of the 7-days open market operations is one of the instruments used by the NBP to determine interest rates in the market (the reference rate adopted by the Monetary Policy Council).

The research takes into account the period between 2005 and 2009, when the National Bank of Poland (NBP) firstly decreased its main reference rate from 6,5% to 4% (2005-2006). From the beginning of 2007 it started to increase the reference rate to the level of 6,25% in 2008. The disturbances in money market, lack of trust among participants and high volatility caused by Lehman Brothers bankruptcy made the NBP change the direction of Polish monetary policy – from that time the process of decreasing interest rate was begun and lasted till the beginning of 2011. We focus on dates of Monetary Policy Council decision-making meetings that took place between January 2005 and June 2009 and the dates 14 days before the meetings. For the first period (2005-2007) two instruments were taken (inter-bank deposit rates, swap rates) and for 2007-2009 period four: inter-bank deposit rates, 3-months FRA, 6 months FRA and swap rates.

For each of these particular days, and for each instrument, six implied forward term structures were constructed using different models and estimation processes (through three estimation functions for each of two parametric models). Having six estimated vectors of parameters for each dates and asset, a set of 7-days implied forward rates was calculated. Additionally, the difference between an implied 7-days forward rate (calculated 14 days before the decision of the Monetary Policy Council - MPC) and the reference NBP rate settled on that day was taken into account. We wanted to examine the level of the risk premium and check if the disturbances in financial markets have had influence markets expectations. The research then is based on the equation:

$$\Phi_\tau(s, s + \frac{7}{365}) = \frac{365}{7} \cdot \ln \frac{\delta(s)}{\delta(s + \frac{7}{365})} - i_{NBP} \tag{9}$$

where: $\Phi_\tau(s, s + \frac{7}{365})$ – risk premium.

Because for each date and asset we receive six different levels of risk premium we assumed following notations:

NS_P – the level of risk premium where the implied forward rate was calculated from the Nelson-Siegel model with the fitting criteria based on prices;

NS_P/D - the level of risk premium where the implied forward rate was calculated from the Nelson-Siegel model with the fitting criteria based on prices divided by the duration;

NS_Y - the level of risk premium where the implied forward rate was calculated from the Nelson-Siegel model with the fitting criteria based on yields;

Sv_P - the level of risk premium where the implied forward rate was calculated from the Svensson model with the fitting criteria based on prices;

Sv_P/D - the level of risk premium where the implied forward rate was calculated from the Svensson model with the fitting criteria based on prices divided by the duration;

Sv_Y - the level of risk premium where the implied forward rate was calculated from the Svensson model with the fitting criteria based on yields.

Figure 1 Risk premium for implied forward rate taken from WIBOR and SWAP quotations 14 days before the MPC meeting (2005-2007)
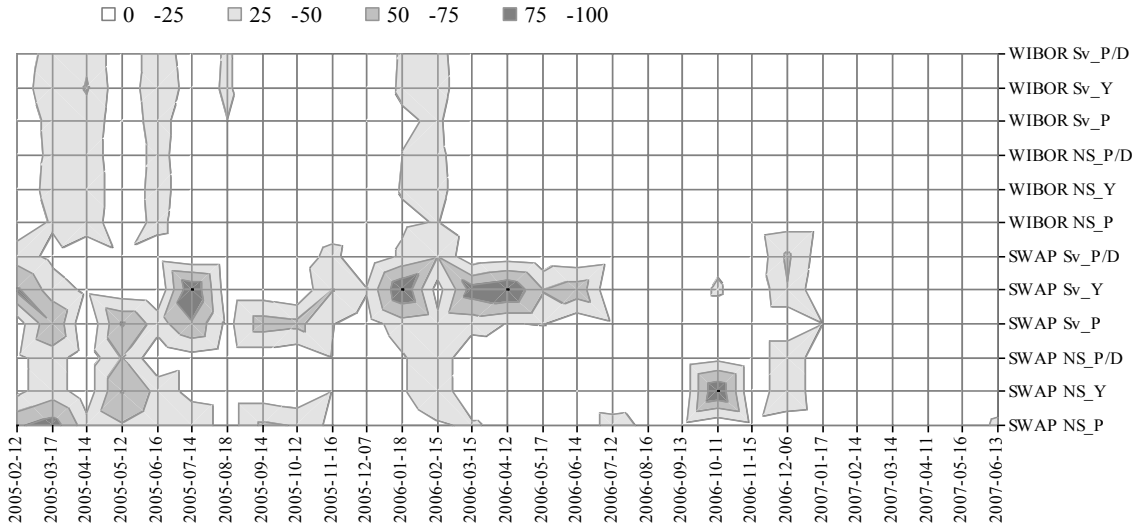
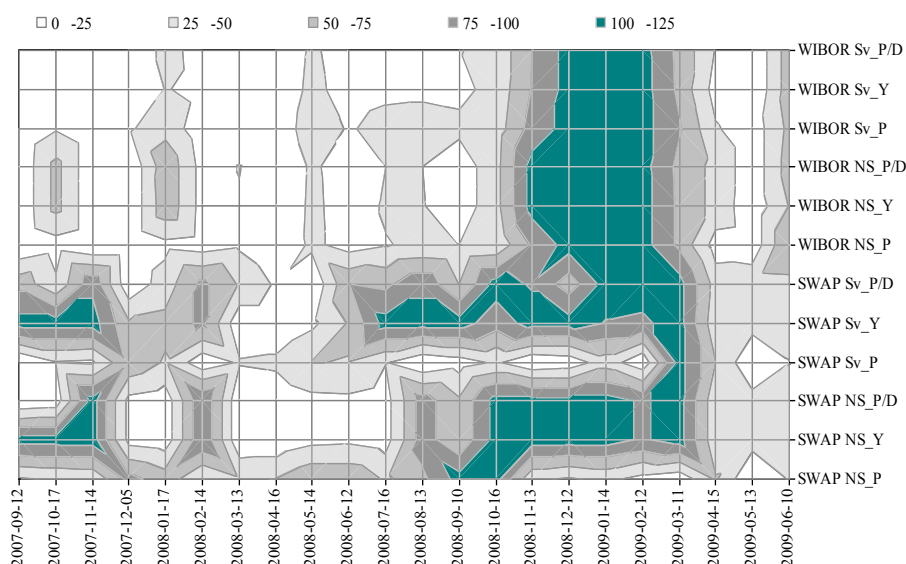Source: own computations based on WIBOR and swap data

2005-2007 period

Looking at Figure 1 we can observe how market participants foresaw 7-days reference rate 14 days before and how their expectations had influenced different data (two types of assets) and estimation method (three types shown in 7a-7c). The differences between an implied 7-days forward rate and the reference NBP rate settled on that days show that WIBOR rates almost every time were a good predictor of Polish monetary policy, and that the monetary policy was transparent through that kind of asset.

2007-2009 period

The results shown in Figure 2 could be used as a leading indicator of market disturbances – since October 2008 the predicting power of all data (especially WIBOR) has become lower. The higher positive premium (understood in a form of calculated differences) reflects a fall in banks' mutual confidence. This situation affects asset prices and their strong changes were observed, so they did not truly reflect the expectations of future interest rates.

Figure 2 Risk premium for implied forward rate taken from WIBOR and SWAP quotations 14 days before the MPC meeting (2007-2009)

Source: own computations based on WIBOR and swap data

In January 2009 the reversal behavior have been noticed – in spite of the financial crisis the asset prices showed the tendency to return back to its common value. It was probably the effect of messages sent by central bank's officials who wanted (like other central bankers around the world) to assure markets that they control the situation and do not let investors lose the mutual confidence.

The similar results can be observed in Figure 3 when FRA instruments were taken into account. They also could be used as a leading indicator of market disturbances. The higher is the positive premium the lower is the confidence between the investors and traders whose reaction (to new information, here about the financial crisis,) is exaggerated.

In a whole analyzed period the implied forward rates overestimated future short rates. Such surprisingly results (regardless of data were used to create the implied forward) give market participants a chance to make excess profits. For the central bank it is additional information which should be taken into account during an analysis of a monetary transmission mechanism.

Figure 3 Risk premium for implied forward rate taken from FRA 3M and FRA 6M quotations 14 days before the MPC meeting (2007-2009)
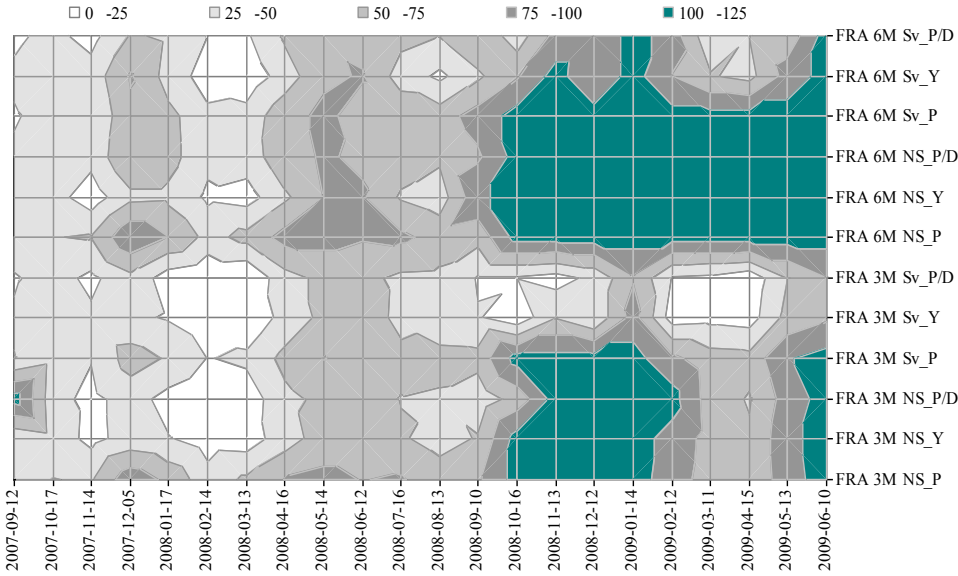

Source: own computations based on FRA data

5 Conclusions

For several years central banks have focused on the techniques to extract market expectations from financial instruments to judge their influence on real economy and analyze theirs transparency (ECB 2006). In countries with well developed debt market there are parsimonious models that play an important role in term structure building process. For research purposes, the most useful source of rates were WIBOR and FRA rates which becomes an important segment of financial markets. This paper took data for several segments of Polish market: interbank deposits, forward rate agreements (FRA) and interest rate swaps taken from 2005-2009 period. Parameters were compared every 14-days before a central bank decision-making meeting to examine if the market participants expected movements correctly.

During the period 2005-2009 we found that there is a period of time when a higher positive risk premium was noticed. The result could be used as a leading indicator of market disturbances – especially for the central bank who wants (like other institutions around the world) to assure markets that it controls the situation and does not let investors lose the mutual confidence. These results should be interpreted with caution, because a small open market, sensitive to external shocks and speculative attacks (like Polish one) is too changeable to recognize results as typical. This is why this research did not relay on one source of data but examined several types of assets to get a wider spectrum of market situations. It is also too early to indicate with no doubts the best fitting method. The result we received show how wide is spectrum of implied forward rate for the same date. We should be very careful about formulating the conclusions.

The useful supplementary information is that market participants overestimate (overreaction in a behavioral sense) future movements of the Polish central bank as an effect of bank transparency. It is an additional argument for the central bank authorities to inform (officially and unofficially) about future movements of the key interest rates to keep the interbank rates as stable as possible.

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Factors influencing the microeconomic and fiscal effects of the reduced VAT on books

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Abstract: Value added tax as the general tax on consumption has a significant influence on the consumer behaviour and is a significant source of public revenues. Many tax policies in response to the current financial and public finance crisis employ the increase of the VAT rate on previously exempted or tax-favoured goods. On the other hand, in previous years some countries adapted decreased VAT rates on specific goods, e.g. books among others, in order to achieve certain non-economic goals. The effectivity of such actions depends strongly on the nature of the demand for the specific good, i.e. how will consumers react in situations of increased or decreased tax rate. The goal of this paper is, on the example of the changes of the VAT rate on books, to identify crucial factors determining the nature of the demand for books and to develop a basic logical framework for further analysis.

Keywords: indirect tax, VAT, microeconomic effects, demand elasticity

JEL codes: D11, H22, H31

1 Introduction

The actual role of taxation is not only fiscal, but due to their influence on the taxpayer's behaviour social as well. Taxes through the income and substitution effect have the opportunity to significantly influence the economic decisions of taxpayers. General consumption tax plays an important role in the most of the current modern economies. For instance in Slovakia the income from VAT constitutes some 50 % of the total state budget tax revenues. Therefore it would be recommendable to use the indirect tax policy measures for non-fiscal purposes exclusively in cases when there is a strong probability that the effects of the measure will be desirable. Otherwise we risk the loss of the tax revenues without any relevant response in social behaviour.

By the so-called tax reform in 2003 in Slovakia all the goods and services were included under the standard VAT rate of 19%. In case of the books it probably caused an increase in the price level. In 2007 the Slovak government adopted amendment to the Value Added Tax Act which, with effect from 1.1.2008, has assigned books to a group of products with a reduced VAT rate (from 19% to 10%, i.e. decrease of 9 percentage points). The explanatory memorandum to the Act No. 222/2004 Coll. on Value Added Tax to the point 53-60 (Annex No. 7) of the amendment states:

Slovak Republic has the smallest book market among EU Member States, therefore in Slovakia, in comparison with other Member States, fewer books are being issued. After transferring books to the basic tax rate of 19% the literature became beyond the reach for certain groups for financial reasons. Decline in supply of books for public and school libraries remains as well as the decline in the development of the state language, which affects the overall educational level of the Slovak population in European and global context. In order to improve the availability of literature we suggest shifting books from the basic tax rate of 19% to reduced tax rate of 10%.

The financial impact … constitutes accrual decrease of state budget revenues in 2008 of SKK 320 million (circa €10,6 millions), in 2009 amounted to SKK 338 million (€11,2 millions), and in 2010 of SKK 357 million (€11,85 millions).

With this measure Slovak Government decided to shift the books back to the reduced VAT rate group in order to make the books more affordable to the common consumers.

However, doing so in time of the financial and economic crisis shall raise some questions regarding the timing and substance of such measure. The justification for this political action could be based on the recommendations from the European Commission or the experience from other countries. For example, analysis of the Copenhagen Economics (2007) focused on the effects of reduced VAT rates gives the example of Sweden, which in 2002 reduced rate of VAT on books from the standard 25% to 6% (i.e. a reduction of 19 percentage points). Then we analyse further developments on the book market after the adoption of this measure, and according to their findings 19% decrease in the rate of VAT at 12 months led to a 16% decline in the book prices. These data were confirmed by the information from the The Swedish Publishers' Association (2003).

But the question is whether it is possible to consider such a measure in the Slovak Republic as justified from the economic point of view? Are the assumptions on which the measure is based, correct? What factors determine the way taxpayers will react to this action? It is the goal of this paper to address these questions in our paper.

## 1.1 Logical assumptions of the tax policy measure

In order to assess the economic rationality of the measure we shall first look at the substantial structure of it. The logical structure of the proposed measure could be put as follows: Reduction of VAT on books would have the effect of reducing the price of books to final consumers (1), which would then increase the availability of literature and lead to increased demand and consumption of books (2). Increasing consumption of books should be reflected in the better development of the state language and increase the overall "educational level of the Slovak population in the European and global context" (3).

The main goal of this fiscal policy measure is apparently of non-economic nature, and is based on three logical assumptions. In this paper we will not deal with the analysis of the third assumption, according to which an increase in "consumption" of books shall be reflected in the better development of the state language and the overall educational level of the Slovak population in the European and global context. Assumptions 1 and 2 are interrelated and represent the economic substance of the measure. Basically, the tax rate reduction should lead to lower prices (assumption 1), which should in turn lead to an increase in demand (assumption 2). We will focus on the rationality of these two assumptions.

1.2 Book-price level development – 2002 to 2012 reality

According to the Statistical Office of the Slovak Republic the development of the price of item 09.5.1.1 Books was as follows (aggregated data for better comparability):

Figure 1 Average prices of books in 2002 – 2012 : aggregated data

Source: Statistical Office of SR 2013
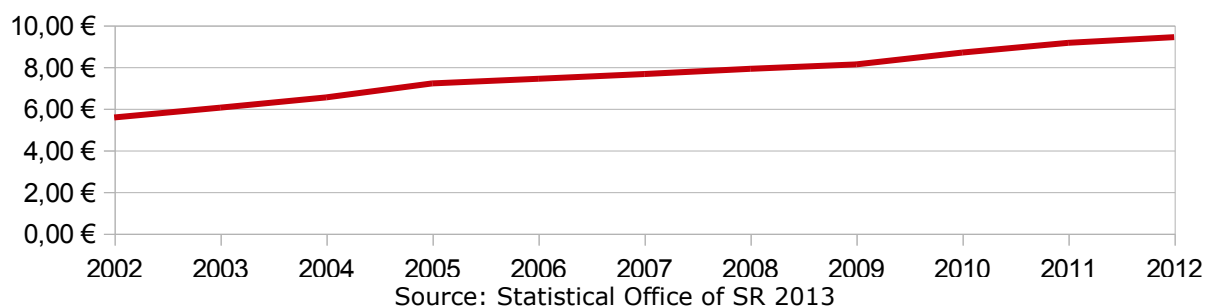
We have studied the intensity of the price increase as well since if the overall inflation would be higher than the book-price increase in the observed period then the VAT rate decrease would only diminish the increase of the price.

Figure 2 Inter-year change in the book-price growth (intensity)

Source: Statistical Office of SR 2013
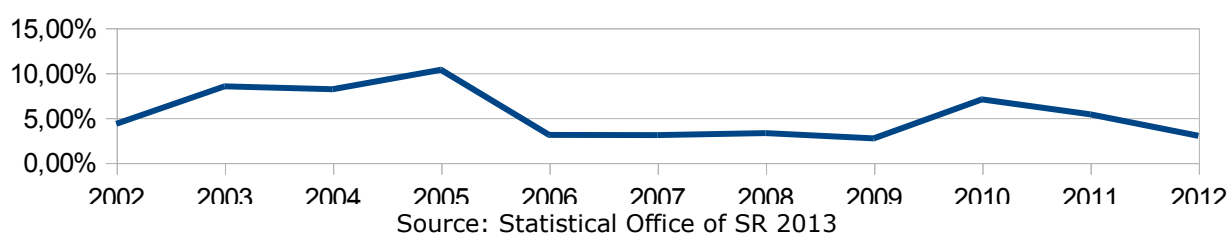
This was clearly not the case since the overall inflation (increase in consumer prices) however did not show any differences compared to the book-price development. In case of the book prices the price increase was consistent with the previous year and the overall inflation as well. In following years 2009 and 2010 the book-prices rose even more intensively than the inflation level.

Figure 3 Inflation measured by CPI (national methodology) - total, core, net (2002 - 2012)

Source: Statistical Office of SR 2013

The development of the VAT rate in observed period was as follows:

Figure 4 VAT rate on books in period 2002 - 2012

Source: The Tax Directorate of the Slovak Republic 2013

Along with the statistic data also non-professional observations (Záborský 2008) of price changes at bookstores after the introduction of lower VAT rate suggests that prices did not change after the rate decrease. As could be seen from the figures the book prices did not react to the VAT rate decreas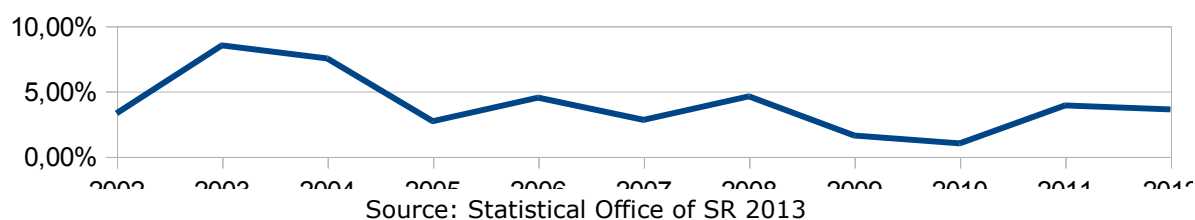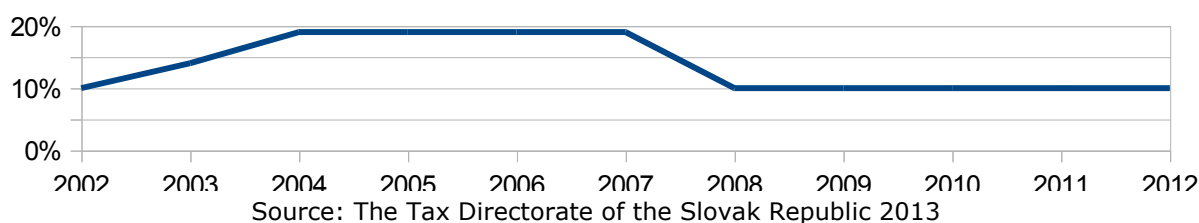e in 2008. Observed slowdown in book prices increase started already in 2005 therefore it could not be directly attributable to the VAT rate decrease.

2 Analysis

As was shown in the previous overview we could argue that the tax measure in form of decrease of VAT rate on books was not successful since the decreased VAT rate on books did not result in decreased book prices. Further we will try to find the reasons why.

2.1 Theoretical background

Income effect is the first and necessary consequence of imposing or increasing any tax. As result the taxpayer loses part of his disposable resources without receiving adequate remuneration in the form of goods and services. Impact on behaviour is caused by the tendency of taxpayers to keep (or increase) the level of benefits deriving from consumption over time. Another important effect of taxation, a direct consequence of the income effect, is the substitution effect: an imposition of the commodity tax reduces available resources of the taxpayer through the change the relative prices of goods and

services and thus "motivates" a taxpayer to change economic behaviour (Zubaľová 2012). The elementary theory counts with the shift of the tax into consumer through the prices. In reality, however, it is not always the case. The way how consumers react to the change in the tax could be measured by the price elasticity of the demand (PED). And this elasticity is the most important factor influencing the ratio of the shifting the tax onto consumers. The PED determine how will the changed tax burden disperse among the suppliers and consumers.

The PED is determined by several factors, from our point of view we consider as the most important the following:

1) The existence of substitutes – relatively cheaper substitutes allow the consumer to keep his level of the utility he previously received from the consumption of the now-taxed and more expensive good. If the consumer could substitute the supplier would be aware of increasing the price. Therefore we could say that the higher availability of the homogenous substitutes results in higher PED.

2) The level of the disposable income or the gross household expenditure respectively – this is probably the most important factor at all. The disposable resources which could be used to satisfy the needs form the final limits for the consumption. We will describe in more details in Ad 5) how people satisfy their needs, however, we could say that with the growing disposable income we could afford more goods which satisfy the less urgent needs and thus we are becoming more sensitive to the price change = the PED is growing.

3) The share of expenditure on a good in total consumption expenditure – in general we could say that the lower is the share of the certain expenditure on the total expenditures the lower is the PED. If the expenditure on certain good constitutes just a small percentage of our resources we are not so aware about the price change. The reason could be that the increase as well as decrease of the price will change our current level of utility minimally.

4) The size of the tax change – this is closely related to the previous factor. In case of a high sensitive demand even the small change in the price could create a significant response of the demand. However, with the lower PED, the price change shall be greater in order to create a relevant demand response.

5) The nature of the need to be satisfied by the relevant good - the basic motivation of human activity is to satisfy the needs. The need is felt as a lack of something, a bad feeling. Satisfying the need makes us feel relief, a good feeling. We prefer to feel good before bad. Needs can be virtually endless, while the means or resources to satisfy them are limited. Men satisfy needs gradually until exhausts its resources. People satisfy their needs in some order. We could draw the relation between the needs, PED and income as follows:

1. Basic physiological and living needs – air, food, basic clothes, living space and other basic living conditions. We are forced to satisfy the basic physiological and living needs first. In accordance to the Engel's law the share of the necessity goods expenses decreases with the increase of income.
2. Imposed and acquired needs – needs externally imposed to us by the law or other social rule, or acquired as a custom or addiction. Their share on the total expenditure is given by the external factors. We try to minimise them as much as possible since we do not valuate them subjectively.
3. Social and cultural needs – higher needs, social status, self-realisation, etc. Its intensity could vary a lot and is very subjective. However, we tend to treat them as more price sensitive in general. Their share depends solely on the disposable income and satisfaction of the more intense needs of the lower grades. In general we could say the higher is the intensity of the need the lower would be the price elasticity of the demand.

Normally we satisfy the needs in order bottom-up with growing disposable income. The intensity of the needs tends to fall moving up with the growing income. As we see from the diagram the elasticity tends to rise along with rising disposable income and level of needs. The effects of these main factors form the final behavioral response of the consumers and suppliers to the tax rate change.

All the demand for goods is determined by the nature of the need which it is supposed to satisfy. What needs are books are supposed to satisfy? Various needs could by satisfied by the books. Reading custom is a form of the cultural heritage of the individual obtained in the learning process. This custom is being satisfied through the use of libraries or purchase of books. It could be said that first basic layer of the book demand is formed by the relatively less elastic demand of people not willing to stop purchasing books regardless of cost. For these people is to read book one of the more intense needs as part of their intellectual life. Another part of the overall demand for books would be constituted by the *imposed demand* of students, parents, researchers. These are "forced" to purchase books by the external factors and this kind of the demand is less price elastic as well. If these two types of demand prevail, the commodity tax increase would be probably, to the great extent, shifted forward onto consumers. On the other hand, tax rate decrease would be probably "consumed" by the sellers and thus not reflected in price.

Another type of book demand is the common demand for books as type of the leisure or cultural activity. With higher income and other more urgent need satisfied become reading a form of relaxation and cultural life of a person. This need would be higher within the hierarchy and therefore it would be more price sensitive. In our opinion this demand for books is an expression of "higher" need for cultural life. If we accept the idea that the higher within the hierarchy of the needs the specific need is, the lower is the intensity of motivation for its fulfillment (compared to the basic needs). To meet this cultural need requires a relatively high level of satisfaction of lower needs.

Demand for books is obviously not homogenous. Each of the mentioned demand-types plays a role in its composition. It could be said that to a certain level of income (purchasing power) the less price elastic demand prevails. The higher the disposable income of households in the economy, the higher the price elasticity of demand for additional (marginal) books.

After the brief overview of our premises we shall take a look at the real case.

2.2 Real case analysis

What do we know as certain is that the VAT rate decrease was not reflected in book-price by the sellers. This could be because the sellers choose not to decrease the price since they were not expecting significant rise in sales if they do. Therefore we could conclude that their experience with the Slovak consumers led them to belief that the demand is relatively less price elastic. This belief is quite surprising since the experience from Sweden showed that the demand for books in Sweden is price elastic. Why is the situation so obviously different in Slovakia?

If we look at the situation from the bottom, we shall first analyse the main factors forming the final response of the consumers to the price change (i.e. the PED). Then we can formulate some premises which could explain the behavioral response of the consumers on the book market.

In the previous part we have identified five main factors forming the final response of the customers and suppliers to the VAT rate change. Further we look briefly on statistical data characterising the real status of the Slovak consumers and thus determining their consumption behaviour.

1) The existence of tax-free substitutes. Books and the reading as the very specific "higher" cultural activity have no real and homogenous substitute. Of course, there is a modern phenomenon of e-books which could change our perspective on the issue.

However, it is not widespread enough yet and even its homogeneity with the "real" books is questionable, therefore we will not include this into our considerations. Influence of the e-books and related tax consequences shall be analysed by the further research.

2) The level of the disposable income (or the gross household expenditure respectively) which could be used for consumption expenditure limits the degree to which we satisfy our needs. As we have mentioned in previous part our needs are being satisfied in some order with the physiological needs on the first place and the cultural followingly. Therefore, if we consider a particular situation, we must examine the income levels and overall purchasing power in the Slovak Republic. Tables and graph below document the average level of disposable income of households and its usage (expenditures type) as well as the estimate of purchasing power in the Slovak Republic.

Figure 5 Gross money incomes of private household (EUR/month/person) in period 2004 – 2012 in Slovakia
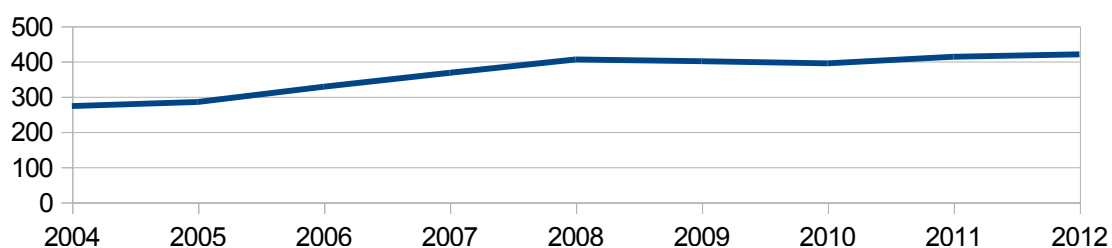
Source: Statistical Office of SR 2013

According to the Statistical Office of the Slovak Republic the development of disposable income of households was in years 2004-2012 as showed in Graph 5. Slight increase in 2004 to 2008 period has been replaced by the decrease in 2008 to 2010 period, followed by the recovery period until 2012. The overall income level remains still at the low level compared to the economically more developed European countries. For example, according to the Austrian Statistical Office, the gross household income of the median household in Austria for 2011 is EUR 21 319 per year. In 2008 an estimated purchasing power of the Slovak population reached the 48.8% of the European average, and only 40.7% of the EU 27. For comparison, the purchasing power of the population in Slovakia in 2008 with the amount of EUR 6 102 reached 34.8% of the purchasing power of the Swedish population with the estimated amount of EUR 17 552 (GfK 2009). According to the EUROSTAT figures the median household income in 2011 was: Slovakia EUR 6 303, Sweden EUR 22 498, Finland EUR 21 826, Austria EUR 21 319, Czech Republic EUR 7 451.

3) The share of expenditure on specific good in total consumption expenditure. Statistical item Recreation and culture includes expenditures on books as well. However, expenditure on books constitutes only the minor part of the item since it includes the holidays, theatre and cinema visits as well.

Table 1 Gross money expenditures of households on Recreation and Culture (EUR/month/person) in period 2004 – 2012

Expendeture	2004	2005	2006	2007	2008	2009	2010	2011	2012
Recreation and culture	5,49%	5.21%	5.50%	5.79%	6.11%	5.81%	6.31%	6.10%	5.99%

Source: Statistical Office of SR 2013

For the year 2012 item represents the average amount of EUR 272 per year (including holidays, but also books), representing 5,99% of the total gross household expenditures per year. For comparison, according to the Statistical Office of Germany the average amount of the total household expenditure in Germany is EUR 2 252 per month, i.e. EUR 27 024 per year. Item Recreation and culture constitutes 10.8% of it, representing an average annual expenditure of EUR 2 919. In Sweden the average expenditures on

Leisure (Recreation) and culture counts for 18% (out of the total household disposable income in amount of EUR 22 498).

4) The size of the tax change. The VAT rate decreased from 19% to 10%, i.e. 9% percentual points. Rough calculation: if the average consumer price for the regular (not textbook or for children) book in the Czech Republic for 2010 was CZK 208,90, i.e. EUR 8,34, the VAT decrease, if fully reflected in price, would cause the decrease in price to EUR 7,59, i.e. EUR 0,75. For comparison, the average book price for the hardcover in Sweden as of 2009 was app. EUR 25.

5) The nature of the need to be satisfied by the relevant good. As we have already written in the theoretical background the demand for books has some specific features. We could conclude that on the lower levels of the income the greater part of the overall demand for books would consists mainly of the imposed (students, researchers, parents, libraries, etc) demand, as well as with the demand of the people with stronger reading habit who are satisfying their basic needs for reading (reading as the intellectual activity). With the increasing income the proportion of the imposed demand would probably remain stable. The demand of the people with reading habit would probably rise more than proportionally since the readers with the stronger habits would be satisfying their marginal needs along with the new consumers – common readers with the common reading habit. This latter demand is probably more price elastic.

2.3 Summary

To sum up the situation in Slovakia we could conclude that:

1. There were not relevant substitutes for books at the time.
2. The overall level of household income and expenditures is still relatively low compared to other European countries. The share of the more "urgent" needs is significant and the space for "higher" needs remain low.
3. The share of the expenditures on books compared to the overall expenditure level is low.
4. The VAT rate decrease from 19% to 10% is relatively low with the possible price decrease app. EUR 0,75 which probably could not provoke any change in consumer behaviour. This is more obvious if we take in to account previously mentioned income/expenditure level and the share on overall expenditures factors.
5. Demand for books is obviously not homogenous. Each of the previously mentioned demand-types plays a role in its composition. It could be said that to a certain level of income (purchasing power) the less price elastic demand prevails. Important is the intensity and the degree of fulfillment of other needs. As we have seen from the statistic data the overall income level in Slovakia is relatively low, therefore the less price elastic demand would probably create the more sizeable share on the overall demand.

3 Conclusions

Our theoretical insight as well as the empirical surveys shows that the decrease of the VAT rate on books in Slovakia did not bring expected results. We believe that the main reason for this failure of the tax policy measure lies in insufficient understanding of the tax principles and microeconomics of taxation.

The Copenhagen Economics on the example of Sweden shows the relatively high price elasticity of demand for books. As we see, what works in Sweden does not have to work elsewhere. The economy is created by people with their customs, needs and history operating under different circumstances and conditions. These differences could create a difference in the economic activities, therefore the good economic policy shall reflect these differences and special circumstances.

All the factors we analysed indicate the low price elasticity of the overall demand for books at the time in Slovakia. Therefore, taking into account the mechanism how the indirect tax reacts in case of the low price elasticity, we would not recommend

undertaking the VAT rate decrease. Undertaking such measure in order to lower the book price would be ineffective and would transfer the money resources from the state budget to the book supplying chain (app. EUR 32 mil. from 2008 to 2010). According to our opinion, if the subsidy to book supplying chain would be the purpose of the measure, we would recommend to rather undertake the direct means instead. Doing so through the indirect tax measure could not be seen as targeted and effective, causing the distortion of the tax system neutrality. The question which inevitably pops up by analysing the issue is: Cui bono? As Randall Holcombe (2002) warned in his paper: "The information necessary to set taxes in conformance with the Ramsey rule is not directly observable, which will lead to rent-seeking activities as interest groups try to influence the political determination of tax rates they face."

We hope that the future tax policy measures will be more sophisticated and will bring better results.

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Value at Risk estimation using a Monte Carlo simulation

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Abstract: *In this paper we deal with a value at risk (VaR) based on simulation approach, known as Monte Carlo method and its predictive performance is evaluated with respect to a given portfolio of 4 equities. The aim of this paper is to apply Monte Carlo simulation for value at risk (VaR) estimation and other goal is to check our results with empirical obtained values. There is paying attention to the importance of back testing. When testing the model results are compared to actual future results. During testing, therefore, expected losses of the portfolio compared with actual losses of the portfolio in order to know the accuracy of the model.*

1 Introduction

VaR is nowadays frequently used model for risk analyses mostly in the banking and insurance companies. Following the characteristics of the model principle, we focus to the Monte Carlo method. Monte Carlo method is used to simulate a variety of scenarios for the portfolio value on the target date.

By the method VaR (Value at Risk) is estimated worst loss that can occur with a specified probability of a specified future period. The result of this method could be, for example daily VaR 10,000 € with 95% confidence, there is 5% probability that the potential daily loss of more than 10,000 €.

In banks, it is one of the most used approaches in the so-called internal models to calculate capital requirements for market risk. The results of this method are used:

- In determining the capital requirement
- The allocation of investment funds
- The evaluation of individual traders (risk of their investment activities)
- Financial risk management
- The integration of various types of risk into a single value

The VaR method is characterized by two factors that must be determined in advance, holding period and confidence level. Holding period – characterizes, during which period the possible loss considering. The choice of holding period depends on:
- the market liquidity,
- no changes in portfolio (constancy portfolio),
- the verifiability of results.

The choice of both factors is indeed subjective, but in some systems is fixed, for instance: RiskMetrics (American bank J.P. Morgan) uses a one-day holding period and a 95% confidence level, while the recommendations of the Basel Committee's 10-day VaR with a 99% confidence level. (In practice, however there are other values such as Citibank uses a 94.5% confidence level). In calculating capital requirements, the value of VaR sometimes is multiplied by a "safety factor" whose value is predetermined.

Denote the profit or loss of the investment portfolio as a random variable X. If we consider the daily holding period, then X is the daily profit or loss. If we denote the

required confidence level as c (eg for system RiskMetrics $c = 0.95$) then the respective value VaR^{abs} is defined as

$$P(X \geq -VaR^{abs}) = c, \tag{1.1}$$

i.e. $-VaR^{abs}$ is a $100 \cdot (1-c)$ percent quantile q_{1-c} of a random variable X, and from theory of probability we know: $\quad P(X < -VaR^{abs}) = 1 - c$.

As follows defined value is called the **absolute value at risk** VaR^{abs} (or absolute VaR). It is used the so-called relative value at risk VaR^{rel} (relative VaR) which refers to the mean (expected) value of $E(X)$ of random variables X and is defined as

$$VaR^{rel} = VaR^{abs} + E(X). \tag{1.2}$$

Figure 1 VaR as 5 percent quantile
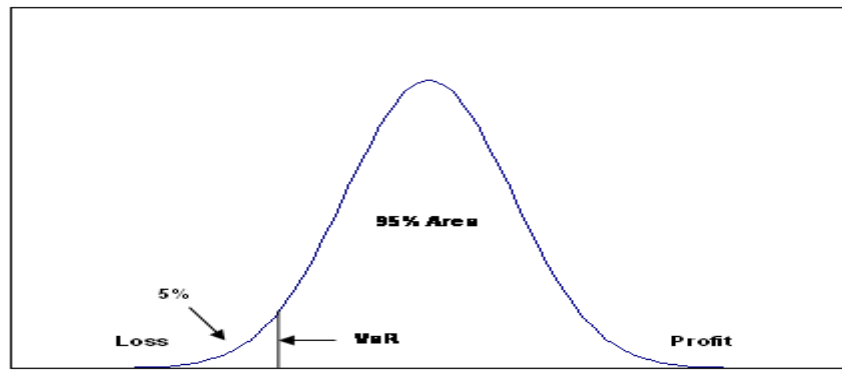
In practice, in the investment context, it is preferred to work with profit rates. Let's consider the investment portfolio with the price P and the rate of profit during the relevant time horizon as a random variable r with mean μ.

If the $100 \cdot (1-c)$ percent quantile q_{1-c} of a random variable r we denote r^{*}, then absolute value at risk for the considered holding period and confidence level c is

$$VaR^{abs} = -P \cdot r^{*}, \tag{1.3}$$

and the corresponding relative value at risk is

$$VaR^{rel} = VaR^{abs} + E(X) = -P \cdot r^{*} + P \cdot \mu = -P(r^{*} - \mu). \tag{1.4}$$

Remark 1.1 The price changes can be defined in different ways. We will consider the logarithmic rate of profit r_t (it is also known as a profit rate of continuous interest) which is defined

$$r_t = \ln(1 + R_t) = \ln\left(\frac{P_t}{P_{t-1}}\right), \tag{1.5}$$

where P_t is the price of asset at time t, P_{t-1} is the price of asset at time t-1 and R_t is the discrete rate of profit at time t.

The logarithmic rate of profit seems to be more complicated than discrete. However, it has some advantages, especially here, that it can be modeled by a normal distribution, which implies a log-normal distribution of the ratio $\frac{P_t}{P_{t-1}}$.

2 Methodology and Data

Parametric VaR estimation can take place if we know the distribution of the rate of profit in the period described by a distribution of the estimated parameters. For this purpose a normal distribution is most commonly used $r \sim N(\mu; \sigma^2)$. For the $100 \cdot (1-c)$ percent quantile r^{*} of random varible r it holds

$$r^* = \mu + \sigma \cdot q_{1-c} \,, \tag{2.1}$$

where q_{1-c} is (1-c) percent quantile of $N(0;1)$.

For relative value at risk we receive

$$VaR^{rel} = -P(r^* - \mu) = -P(\mu + \sigma \cdot q_{1-c} - \mu) = -P \cdot \sigma \cdot q_{1-c} \tag{2.2}$$

Remark 2.1 For simplicity, we will further denote relative value at risk without superscript refers to as VaR.

Approximation by the normal distribution may not always be satisfactory. In terms of calculating the value-at-risk bothers to approximate by normal distribution the "heavy tails" distribution rate of profit (and it actually just heavy negative tail). Improper use of the normal distribution approximation value comes in lower risk than should properly be, which is in practice very dangerous. For the calculation of VaR is therefore also used other distributions namely heavy-tailed distribution as the gamma distribution, Pareto distribution etc.

Remark 2.2 One of the major criticisms of the wide use of the normal distribution to estimate risks is American scientist (Lebanese origin) Nassim Nicholas Taleb, author of the book "The Black Swan".

The calculation of VaR by Monte Carlo uses large number of simulations on the price of the portfolio to calculate VaR. On the basis of mathematical and statistical models we simulate random processes governing the price development of tools creating portfolio.

Figure 2 Market price of Google

Source: Yahoo Finance

We notice (Figure 2) that market price is much more random. From the course of price is visible the randomness, which means that prices cannot be modelled by deterministic functions. Therefore, we use stochastic processes.

Wiener process is the basic process from which are derived many others. Wiener process $W_t(x)$ is stochastic process having the following properties:

    i. $W_0 = 0$,
    ii.   The function $t \rightarrow W_t$ is with probability one everywhere continuous
    iii. W_t has independent increments with $W_t - W_s \sim N(0, t-s)$ (for $0 \leq s < t$),

Monte Carlo method proceeds as follows:

    −   We determine the descriptive statistics of each instrument in the portfolio,
    −   In modelling the evolution of the share price P_t we use Wiener process

$$dP_t = \mu \cdot P_t \, dt + \sigma \cdot P_t \, dz_t \, , \qquad (2.3)$$

where μ is a rate of profit of share, σ is volatility of share price a dz_t is random variable with normal distribution $N(0;dt)$. For practical purposes (for a better understanding) the model is used in the differential form

$$P_{t+\Delta t} - P_t = \mu \cdot P_t \, \Delta t + \sigma \cdot P_t \cdot \varepsilon_t \cdot \sqrt{\Delta t} \, , \qquad (2.3)$$

where $\varepsilon_t \sim N(0;1)$, whereas it holds

$$E(P_{t+\Delta t} - P_t) = \mu \cdot P_t \, \Delta t \, , \quad \sigma(P_{t+\Delta t} - P_t) = \sigma \cdot P_t \cdot \sqrt{\Delta t} \, . \qquad (2.4)$$

If we generate ε_t independently for each time interval, then we can write

$$P_t = P_0 \cdot e^{\mu \cdot t + \sigma \cdot \varepsilon \cdot \sqrt{t}} \, , \qquad (2.5)$$

where $\varepsilon \sim N(0;1)$.

In the case of more instruments in the portfolio, it is necessary to determine their correlation matrix **R**. Simulation of random vectors $\boldsymbol{\varepsilon}^T$ ($\boldsymbol{\varepsilon}^T$ is a row vector) with a multidimensional normal distribution $N(0; \mathbf{R})$ is possible to get by a simple simulation of random vectors $\boldsymbol{\eta}^T$ with distribution $N(0; \mathbf{I})$, where **I** is an identity matrix, i.e. components of the vector $\boldsymbol{\eta}^T$ are mutually independent random variables with distribution $N(0;1)$.

When $\mathbf{R} = \mathbf{L} \cdot \mathbf{L}^T$, with lower triangular matrix **L**, then it is called the Cholesky decomposition of matrix **R** (such a decomposition exists for every positive definite matrix), and then we can write

$$\boldsymbol{\varepsilon}^T = \boldsymbol{\eta}^T \cdot \mathbf{L}^T \, . \qquad (2.6)$$

By repeating and mutually independent use of a suitable random number generator we simulate the probability distribution of prices of the portfolio and by the histogram we will find the value at risk VaR.

3 Results

We will use Monte Carlo simulation for Value at Risk to evaluate the risk of a portfolio of four financial instruments. We use one-day holding period and the confidence level 95%. From the historical prices (source: finance.yahoo.com), we calculate the mean, standard deviation and other statistical characteristics of our assets (Table 1.). We chose ConocoPhillips, Dow Chemicals, Gannett and Masco which were a part of the Pension fund "Progress" of Allianz d.s.s. Historical prices are from 4.1. 2009 to 9.11. 2011, that we draw from finance.yahoo.com

Table 1 Descriptive statistics of assets

	Conoco	DowChem	Gannett	Masco
Mean	0,071%	0,003%	-0,083%	- 0,028%
St. dev. σ	1,657%	1,333%	1,141%	1,629%
Skewness	- 0,244386	- 0,788095	- 0,036463	0,2309727
Kurtosis	0,2279892	8,1025948	0,732302	3,4038782

Correlations are calculated from series of historical prices, too (Table 2).

Table 2 Correlation matrix

ConocoPhillips	1	0,250802384	0,196232538	0,243851077
Dow Chemicals	0,250802384	1	0,292515638	0,344501424
Gannett	0,196232538	0,292515638	1	0,315929936
Masco	0,243851077	0,344501424	0,315929936	1

Now we decompose the correlation matrix by the Cholesky decomposition (Table 3).

Table 3 Cholesky decomposition

1	0	0	0
0,250802384	0,968038307	0	0
0,196232538	0,25133308	0,947799807	0
0,243851077	0,292698119	0,205226567	0,901524553

We work with the assumption we have invariable (fictive) portfolio (Table 4).

Table 4 Portfolio

	Value of each asset in the portfolio ($)	Value of assets on 9.11.2011	Number of shares
ConocoPhillips	600 000	82,56	7267
Dow Chemicals	750 000	41,81	17938
Gannett	250 000	39,84	6275
Masco	400 000	23,17	17264
Sum	2 000 000		

Then we simulate returns of each asset by multiplying the decomposed matrix by a random vector (Table 5) of independent standard normal random variables.

Table 5 Random vectors

	N(0;1)	N(0;1)	N(0;1)	N(0;1)	e1	e2	e3	e4
1.	0,52458	-1,71488	-0,20495	1,05307	0,52458	-1,52850	-0,52231	0,53329
2.	0,09227	-1,16861	0,42689	-1,04683	0,09227	-1,10811	0,12901	-1,17568
3.	-1,22788	0,22522	-0,96634	-0,98966	-1,22788	-0,08992	-1,10024	-1,32402
4.	1,39434	-1,57640	0,07024	0,87932	1,39434	-1,17631	-0,05600	0,68575
5.	-1,41195	0,26052	0,19808	-0,95602	-1,41195	-0,10192	-0,02385	-1,08927
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮

We ran 500 hypothetical trials of daily returns for each asset in our portfolio.

Table 6 Generated prices of each asset

	Conoco	DowChem	Gannett	Masco	Value of the portfolio	Profit/Loss
1.	83,34	40,97	39,57	23,37	1 992 250,55	-7 749,45
2.	82,74	41,20	39,87	22,72	1 982 829,70	-17 170,30
3.	80,95	41,76	39,31	22,67	1 975 483,31	-24 516,69
4.	84,55	41,16	39,78	23,42	2 006 827,38	6 827,38
5.	80,71	41,75	39,80	22,76	1 978 119,21	-21 880,79
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮

Prices (Table 6) are generated by the formula $P_t = P_0 \cdot e^{\mu \cdot t + \sigma \cdot \varepsilon \cdot \sqrt{t}}$, where $t = 1$, since there are one-day values.

We sort the 500 prices of our portfolio from the lowest to the highest and read the price which corresponds to the 5% quantile, since we want to get the VaR at 95% confidence level. We will get -33 558,28.

Our result therefore leads to the following conclusion: with 95% confidence, we do not expect to lose more than 33 558,28 $. If we ran it again, we would get a different result, although the differences would be narrow.

A part of each methodology should be a verification of accuracy of used procedures. Therefore, in the framework of Value-at-Risk are used different methods to resolution of the relevant discrepancies. In practice the most commonly we use back testing. The most common test of a VaR model is to count the number of VaR exceptions, i.e. days (or holding periods of other length) when portfolio losses exceed VaR estimates. If the number of exceptions is less than the selected confidence level would indicate, the system overestimates risk. On the other hand, too many exceptions give a signal of underestimation of risk.

Denoting the number of exceptions as k and the total number of observations as T, we may define the failure rate as $\frac{k}{T}$. In an ideal situation, this rate would reflect theselected confidence level. For instance, if a confidence level of 95 % is used, we have a null hypothesis that the frequency of exceptions is equal to 5%. This type of statistical test was proposed by Kupiec. According to Kupiec, the POF-test (proportion of failure) is best conducted as a likelihood-ratio (LR) test. The test statistic takes the form

$$l = 2\ln\left(\left(1 - \frac{k}{T}\right)^{T-k}\left(\frac{k}{T}\right)^{k}\right) - 2\ln((1-p)^{T-k}p^{k}), \tag{3.1}$$

where
T – number of observed historical values
k - number of exceedances of the VaR during the observed time-horizon
p – confidence level

The idea is to find out whether the observed failure rate $\hat{p}$ is significantly different from p, the failure rate suggested by the confidence level. Under the null hypothesis that the model is correct, LR_{POF} is asymptotically χ^2 (chisquared) distributed with one degree of freedom.

Figure 3 **Backtesting results**
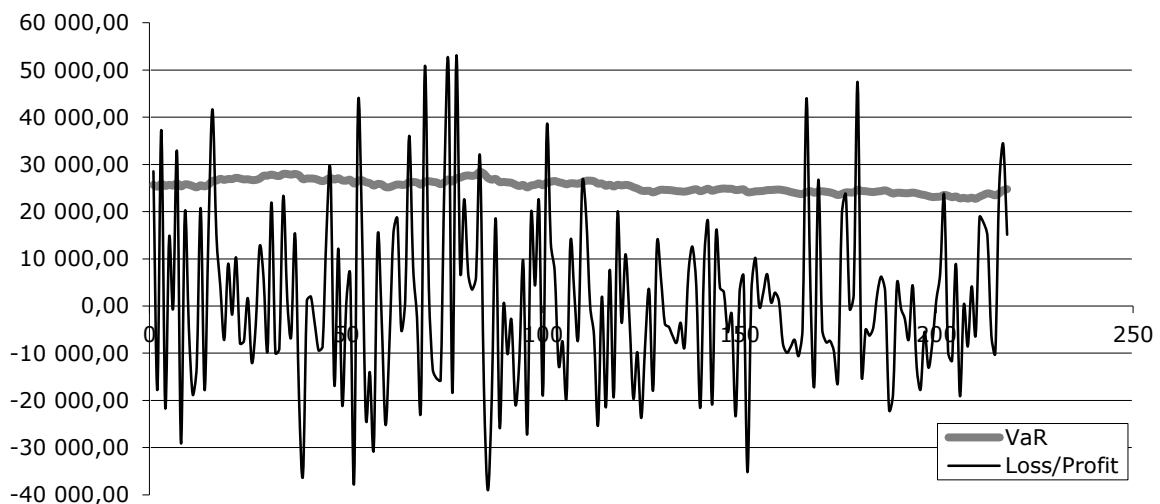
The following table shows the number of exceedances to the Value-at-Risk during the monitored time horizons T for the specific probability.

Table 7 k - number of exceedances of Value-at-Risk

p	$T = 255$	$T = 510$	$T = 1000$
0,01	$k < 7$	$1 < k < 11$	$4 < k < 17$
0,05	$6 < k < 21$	$16 < k < 36$	$37 < k < 65$
0,10	$16 < k < 36$	$38 < k < 65$	$81 < k < 120$

Source: Cipra (2002)

We tested the value of the portfolio VaR calculated by Monte Carlo methods. On the back testing we chose 255 observed time horizons (from 12.11. 2011 to 15.11. 2012) and Kupiec test results showed us the following chart. (Where loss is positive and profit is negative.)

4 Conclusions

Based on Kupiec test, we found that the number of exceedances of VaR over 255 observed time horizons is 18. Thus, during the 255 observed time horizons number exceeded the Value-at-Risk is in the interval (6, 21) at the significance level of 5% we accept the hypothesis that the probability of 0.05 is correct. We came to the conclusion that the Monte Carlo method is suitable for the calculation of Value-at-Risk of our portfolio with the chosen and confidence level 5% and the holding period one day.

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Nowcasting business cycles using transportation index

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Abstract: *Today's relationship between financial market and real economy is one of the main topic in scientific debate in the field of many different approaches. It is practically impossible separate economics science from others disciplines, like psychology, human behavior, philosophy, ethic and etc. Financial markets after losing the Gold standard in 1970 exploited to enormous amount, very active monetary policy in USA, EU and Japan last few years made the situation even more complicated. Some economist see current situation in financial markets as normal, their argument is that expansive monetary policy increasing liquidity in financial market and provide efficient recourse allocation in real economy. On the other hand, such intensive policy could lead to misallocation of recourses, high cyclical fluctuations and even possibility for hyperinflation. For the real business society it is very important to have a reliable forecasting tools to identify current phase of a business cycle. Because of the complexity financial instruments and difficult economical situation today instead of forecasting it is useful to have real-time and reliable data, that might identify current stage of a business cycle. There are different scientific opinions, that some financial indicators have power to predict market action, one of them is transportation sector. The research object of this article is possibility of identification a business cycle phase using transportation index providing readers with understanding of nowcasting approach regarding regional heterogeneity using transportation index.*

Keywords: market driven economy, business cycle, nowcasting, transportation sector

JEL Classification: G01, G15, G17

1 Introduction

According to traditional economics theory, financial markets acting depending on situation in the real economy. The positive or negative expectations in stock market reacting to change in main economic indicator as GDP, unemployment level, inflation and ect. On the other hand, there are different opinions about correlation between financial markets and real economy: financial markets are primary factors to change expectations and sentiments, and they impact directly to real economic indicators. But for the real business society it is very important to have a reliable forecasting tools to identify current phase of a business cycle. Because of the complexity financial instruments and difficult economical situation today instead of forecasting it is useful to have real-time and reliable data, that might identify current stage of a business cycle (Klus, Landon-White, 2005; Schumacher, Breitung, 2008; Giannone, Reichlin, Small, 2008; Kuzin, Marcellino, Schumacher, 2012). There are different scientific opinions, that some financial indicators have power to predict market action, one of them is transportation sector (Gordon, 1992; Han, Fang, 2000; Bosworth, 2001; Lahiri, Young, 2004;, Lahiri, Yao, 2006; Fenz, Schneider, 2009; Askitas, Zimmermann, 2012)

The research aim of this article to describe and evaluate different approaches of nowcasting business cycle regarding selected levels of regional heterogeneity using transportation indexes. *The research object* is identification a business cycle phase using transportation index and ability to forecast market action in particular regions. The results of research is to provide readers with understanding of nowcasting approach regarding regional heterogeneity using transportation index.

2 Nowcasting in market driven economy

Using different econometrical tools for nowcasting it is crucial to have reliable and precise data sets. This problem of reliability is even more actual for different economic research in small economy country like Lithuania. A good example of this might be famous expression of former prime minister of Lithuania G. Kirkilas at the beginning of year 2008: "*there will be no crisis in Lithuania, this is happening somewhere else, it is not affecting our economy...* ", but second year decreasing of Lithuania GDP was 16 percent.

Many economists trying to find "golden key" indicator, that would forecast real situation in economy. There are many theories (beginning whit Dow Jones theory regarding industrial and transportation sector's interaction in 19 century in USA) that one of the top indicator might be transportation sector. To substantiate or negate this theory, it is necessary to evaluate predictive power of transportation index.

Figure 1 Heterogeneity of levels of liquidity in financial markets and availability of data
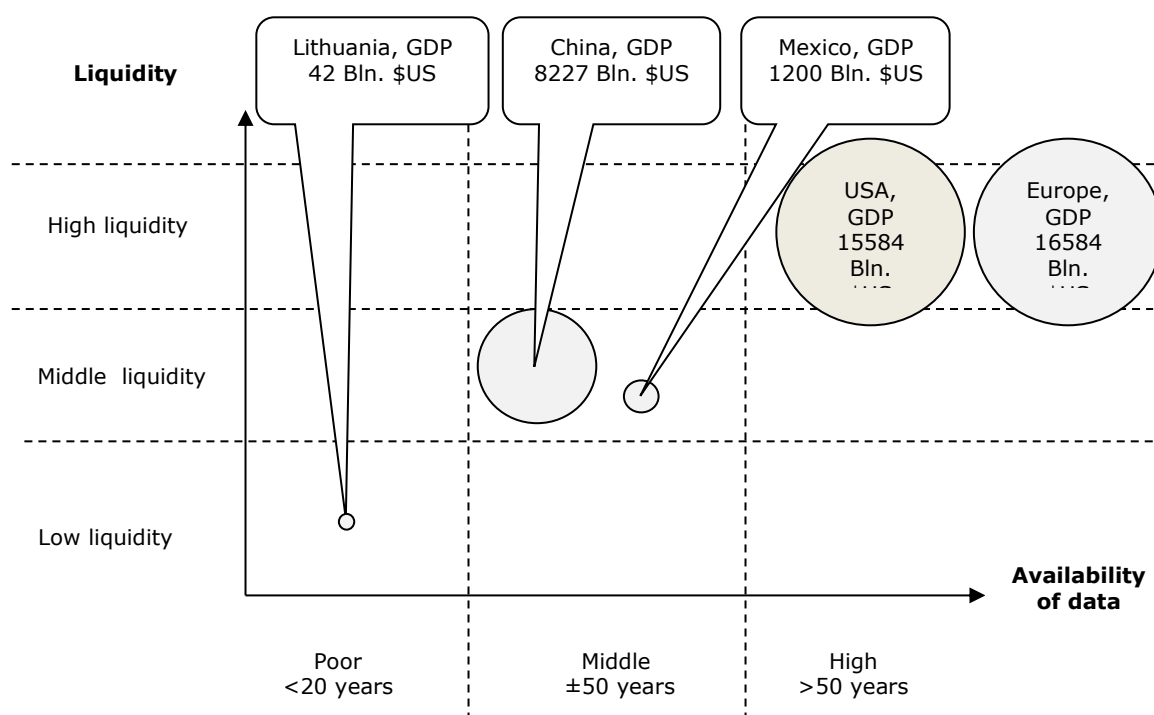
Looking at the world economy living is small economy country gives an advantages to find best solution for problem of poor data set availability. Lithuania became independent just 20 years ago, there has been different economic systems from planning economy, transition economy to market economy. It is complicated to compare long term data, it is necessary look wider in to the economies with long term data set available. In market driven economy the financial sector is leading parameter and it might be helpful looking for contemporary data. Because of high liquidity in financial markets, fluctuations of business cycle became global instead of local, however, there is a risk of relying on liquidities reliability because of complicated action of trading computer's algorithms, so called HFTP (high frequency trading platforms).

Identifying high liquidity and data availability as main factors for successful econometrical nowcasting process, we are suggesting separate levels for different countries approaches (see figure 1). The first level including countries (USA, Europe) whit very high liquidity in financial markets and excellent availability of long term data, those countries dominating in the world economy. The second level including countries, participating in the world economy very actively, but having middle liquidity and data availability. The most difficult and interesting level are countries whit very small

economies, having almost no impact on global financial system, with very poor data availability and low liquidity in financial markets. Verification of transportation index as nowcasting tool for economy in such environment might be interesting and serve as substantiation of reliability.

Starting whit the USA, the bankruptcy of Lehman Brothers in 2008 precipitated what is likely to be judged to be the most global recession ever. The causes of the current recession are being debated, but it is widely believed that the housing downturn, which started in 2006, is a primary cause of the broader economic failure. The fall of housing prices from its peak levels affected very negatively on home building and home purchases. This also caused a sharp rise in mortgage foreclosures for many institutions that had exposure to mortgage securities (see figure 2). There has been many crises in the last decade, but the last financial crisis was unprecedentedly global and effected all countries in the World.

Figure 2 Recent market crises and Dow Jones transportation Average index (DJ-20)
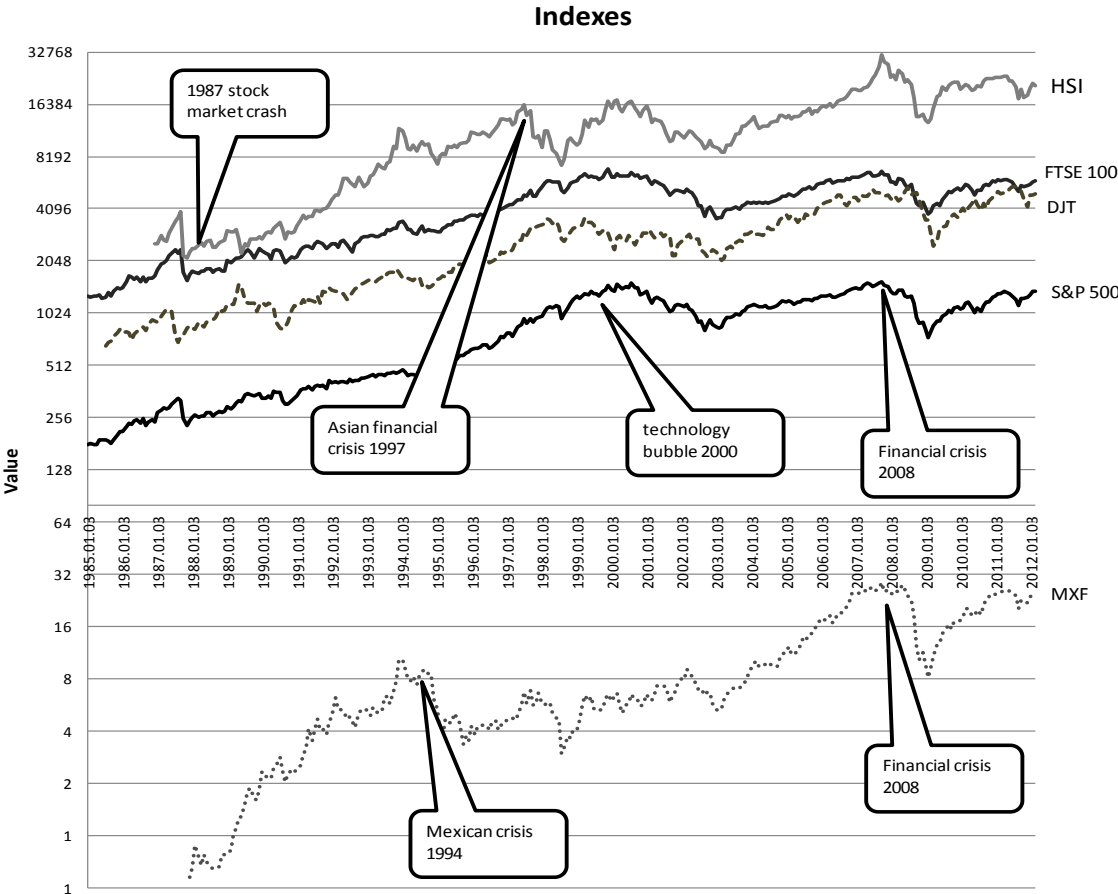
Looking at the strongest economy in World, there are different scientific approach regarding possibility to forecast future action. In the 19th century in USA was created so called Dow Jones theory, and one o the main postulates was that stock market averages (indexes) must confirm each other (Dixon, 1924; Rhea, 1932; Cowles, 1934; Henricksson, Robert, 1981). In Dow's time, the USA was a growing industrial power. The US had population centres but factories were scattered throughout the country. Factories transport their goods to market, usually by rail. Dow's first stock averages were an index of industrial companies (Dow Jones Industrials, DJ-30) and rail companies (Dow Jones Transport Averages, DJ-20). According to this logic, if manufacturers' profits are rising, it follows that they are producing more. If they produce more, then they have to transport more goods to consumers. If an investor is looking for signs of health in manufacturers, they have look at the performance of the companies that transports production to market. The two averages should be moving in the same direction. When the

performance of the averages diverge, it is a warning signal for investors. Transportation index (e.g. DJ-20) usually acting first, probably because to follow transportation data and to have an interpretation is more possible then evaluate the real value of an industry company regarding fundamental analysis of financial data. However, despite of some higher probability of forecasting accuracy in short run period, long run forecasting using transportation data is more complicated. Predicting crises there is a hope, that the crisis will not be worse or will somehow be "controlled" by economic policy but, we see more and more developments that look unsustainable from the macroeconomic perspective. An example might be European sovereign debt crisis. Domestic demand continues shrinking in large parts of the euro area countries, and uncertainty remains high, effectiveness of monetary policy stimulus remains limited.

Even more difficult situation dealing with forecasting main macroeconomics indicators at the regional level using different indicators (see figure 3). Using national forecasts for business purpose can lead to mis-estimation because of a high degree of regional heterogeneity (e.g., different economic structures).

Figure 3 Transportation sector and gross national product (GDP) in Lithuania
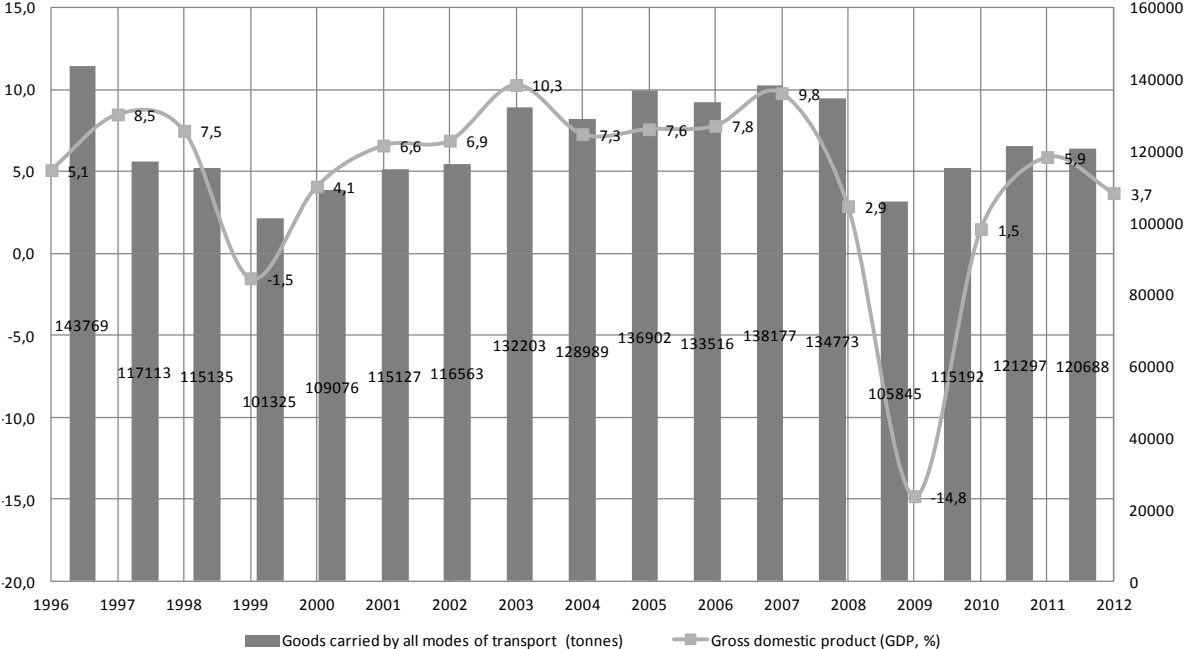
Source: Eurostat, Statistic Lithuania

Overcoming the problem of a 'data-poor environment' at the sub-national level there has to be included not just regional, but also national and international indicators. An example might be situation in Lithuania. There is very clear correlation of transportation sector and gross national product (GDP) in Lithuania. Despite short economic history (Lithuania became independent in 1991) and limited availability of data set, we see, that last two crises affected our market to (crisis 1999 and 2007).

Different nowcasting models using heterogeneous set of predictors, including diferent statistics, as also surveys. The data are monitored by market participants to identify the state of the economy. This methodology might be designed to include essential characteristics of the economic problem in real time. Because of shortage of available data about transportation sector, the biggest Employers organization in country Lithuanian Confederation of Industrialists is providing survey of highest level Lithuanian company's management opinions and prognosis analysis. It is called Industry Expectations Index (IEI). The goal of IEI – provision of constant and easily interpreted indicators of Lithuanian manufacturing industry company expectations. Survey result - answers received from the CEOs of 130 largest Lithuanian manufacturing industry

companies on the current status and future perspectives for the upcoming quarter. By the statistical method and calculations, answers to the questions presented are converted into an interactive numerical expression.

Business entities always depend on accurate information, including reliable short-term analysis of economic activity. Forecasting and time lags in the publication of national accounts data imply that main economic indicators must be given on the basis of higher frequency data from indicators which are available earlier than the national accounts estimates. Nowcasting of economy provide important inputs into macroeconomic projections, as they help to improve the understanding of economic developments in the current time period.

3 Conclusions

The definition nowcasting has recently become popular in economics sciences. Forecasting used to identify the state of an economy, for example, gross domestic product, inflation, unemployment are only determined after a long delay, nowcasting only have to identify present and even the recent past.

The transportation indexes representing sector, that plays a main role in facilitating economic activities between sectors and across regions, and can be useful in monitoring and identifying cyclical turning points the current state of the economy, however, regional heterogeneity and different approaches regarding liquidity in financial markets and data availability are necessary.

Techniques of nowcasting have been based on simplified heuristic approaches and can be formalized in a different statistical models. Models collecting information from a large quantity of data series at different frequencies and with different time lags. Signals about the direction of change in main economic indicators can be extracted from heterogeneous set of information sources, data are used to compute the real time flow of data.

Among the coincident indicators that the institutions in Europe uses to date business cycle turning points, none specifically represents the transportation sector. It is important to provide the usefulness of the transportation sector indexes as coincident indicators in determining the peaks and bottoms of economy.

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Financial and operational performance of hospitals in the Czech Republic

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Abstract: Article aims to describe and analyze the performance of hospitals in times of economic instability. It describes the important dimensions of financial and operational performance in both profit and non-profit hospitals in the Czech Republic during selected period. Years 2008 and 2011 were chosen quite intentionally, because of the differences in findings between the time of the very beginning of the global economic crisis that started in 2008 and last possible researchable year. The year 2011 is so far the latest year for which hospitals submitted their annual reports. Empirical research has been conducted by evaluating secondary data, which were selected from reporting and internal materials of hospitals in years 2008 and 2011. The authors identify potential factors - geographical location and operating subsidies, and by using statistical methods they explore the relationship between these factors and identify differences for individual years. The research results demonstrate differences in selected areas in health care sector.

Keywords: hospitals, non-profit hospitals, net income, economics, performance, subsidies

JEL codes: H2

1 Introduction

Performance of organizations is at present closely observed discipline monitoring and evaluating success of an organization. Performance of organizations is primarily the domain of business organizations and is associated with a variety of approaches to its determination (Šiška and Kozáková 2012), (Částek and Pokorná 2013). Considering the importance of responsible management of public resources it is a subject of interest in the area of public services or in the administration of public and government (Krajicek and Valouch, 2011). Besides, the concept of performance is also found in other human activities.

The performance of the organization is essentially the same as with any living organism whose behavior is consciously focused on achieving a certain level of performance and in conjunction with the fulfillment of organizational goals. The starting point of the performance viewpoint lies in the approaches used in the field of performance management. Basis can be described as a trust in the stability of the basic parameters of the business environment, business performance ranging from the operational to the tactical horizon. Business owners are usually directly involved in the management of the company in senior management positions and are users of performance information (Král et al, 2012). As the basic performance measures are considered profit or loss if its recognized concept of surveys is based on the so called accrual principle. The broader concept of business performance includes in its measurement the impact of current actions on the future development of business performance. In the area of performance benchmarks for external users there is the effort to harmonize both the content and the methods through the development of International accounting standards (IAS) and their successors International Financial Reporting Standards (IFRS), US Generally Accepted

Accounting Principles (US GAAP) and the Court of the European Communities (Wagner 2009).

Business performance is measured by many different methods, whether simple or complex, both conceptually and mathematically. The crisis in 2008 and 2009 means undeniable change in perspective. During this period, many companies dealt with their existential issues and with maintaining or increasing the market share in terms of position against the competition (Kislinger, 2009).

It is necessary to remember that hospitals are more complex and considerably sparser than most other types of organizations. We can mark the so called four hospital worlds - the world of therapy, care, administrative hierarchy and the world administrators. These worlds correspond to four sets of activities, four different ways of organizing and thinking (Glouberman and Mintzberg, 2001).

The topic in many countries of Central and Eastern Europe is the transformation of legal form of hospitals (Albreht, T., Klazinga, N. 2009), (Mishtal, J. 2010). In the Czech Republic it came to a transformation of the legal form of the companies after the year 2000. The original district hospital, maintained by the state, passed to the newly established regions. Changing the form from contributory organization to commercial company was accompanied by the idea that the council of the region or city will, according to valid regulations, have the maximum decision-making powers of inspection. With the transition there was a promotion of an entrepreneurial approach to some health care services. The expectation was to optimize the decision-making and stabilizing the company's economy (Střítecký, R., Pirožek, P. 2002), (Pirožek, P. Střítecký, R. 2003).

Opponents of this transformational change argued that health services have the character of mainly public service and their providing system must come from the public sector system (Holčík, J. 2004).

The aim of this paper is to describe and analyze the performance of hospitals in times of economic instability, which dates back to 2008, compared to the last possible researchable year - the year 2011. In this period the effects of hospital management have been examined, i.e. whether the management of hospitals and hospital facilities has been influenced.

2 Methodology and Data

To describe and analyze the performance of hospitals we used hospitals' annual reports for 2008 and 2011 with regard to the evaluation of the effect of the transformation of their legal form. A total number of 112 for 2008 and 134 for the year 2011 have been gathered. Due to the need of determining comparable data, the annual reports of hospitals, which were not represented in both years, were excluded from the sample. The annual reports of hospitals from both years, where it was not possible to determine the required data were also excluded. The final number of annual reports for each year was fixed at number 64 out of 188 annual reports, which can be obtained for the period 2008 and 2011.

For each hospital the following information was logged: year of publication of the annual report, hospital name, legal status and geographical location (region). The economic parameters logged were net income and an operating subsidy received.

2.1 Geographical location of hospitals

Structure of the sample of hospitals by geographical location was as follows. Information was obtained from 64 health facilities in 2008 and 2011. The dislocation of hospitals according to the survey data is as follows - in South Bohemian region there are 7 hospitals, in the South Moravia region 8 hospitals, in the Karlovy Vary region 1 hospital, in Hradec Kralove region 1 hospital, in Liberec region 0 hospitals, in the Moravian-Silesian region 14 hospitals, in Olomouc region 2 hospitals, in Pardubice region 5 hospitals, in Pilsen region 5 hospitals, in Prague 9 hospitals, in the Central Bohemian

region 2 hospital, in Usti Region 3 hospital, in Vysočina region 3 hospitals and in Zlín region 4 hospitals.

Figure 1 Dislocation of health facilities by region in 2008 and 2011
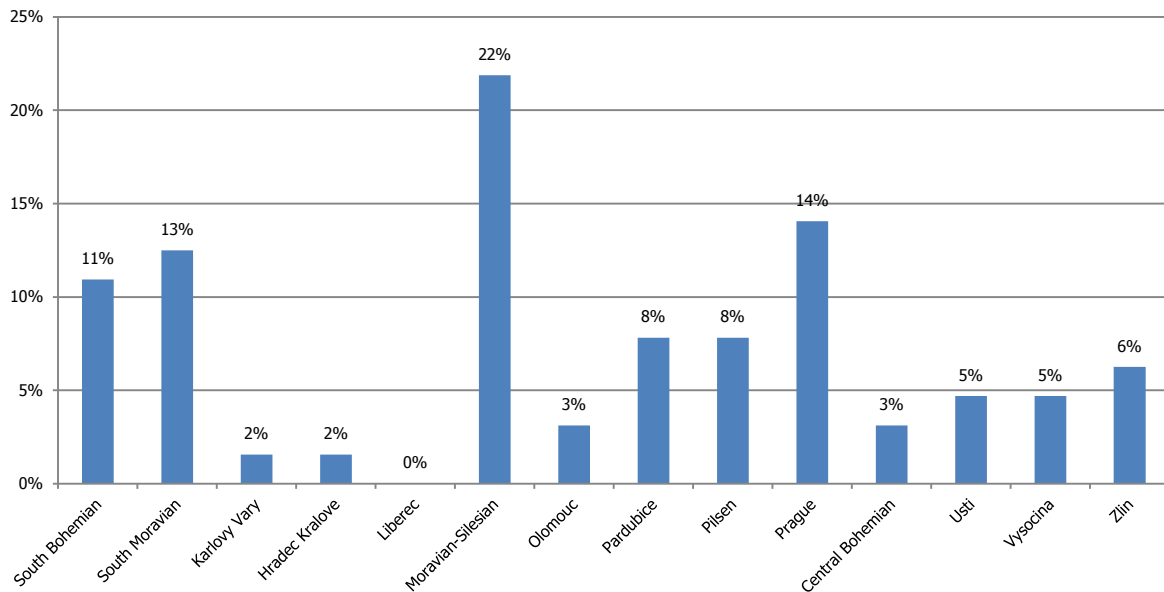
2.2 Legal status of hospitals

Structure of the sample of hospitals by legal status was as follows. Information was obtained from 64 health facilities in 2008 and 2011. Numbers of hospitals based on the survey data are as follows - 29 joint-stock companies, 27 contributory organizations, 7 companies with limited liability and there was also 1 non-profit organization.

Figure 2 Legal status of hospitals in 2008 and 2011
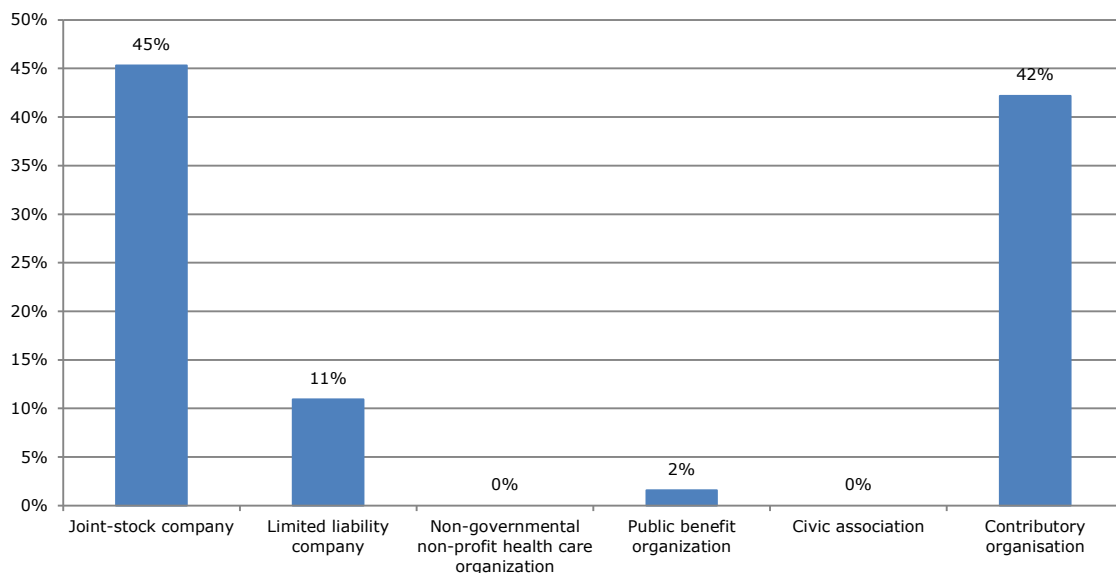
2.3 Net income

Economic parameters of managing the hospitals' economy were identified through indicators of net income. Determining of the net income was based on public data statements that hospitals process in accordance with Act No. 563/1991 Coll., on Accounting and decrees implementing this law. Hospitals, whose annual reports do not contain these data and their statements could not be found on the web www.justice.cz

were excluded from the sample. For this reason the number of surveyed hospitals reduced significantly because it was necessary to unify net income for the years 2008 and 2011. Net income is a key measure of performance and was selected due to the harmonization of its conception in the Czech Republic in relation to abiding the laws and regulations.

Since net income did not grossly match a normal distribution, the nonparametric statistical methods were used for analysis. All presented analyzes were performed in the statistical software R, version 2.15.0 (R Development Core Team 2012).

Table 1 Net income in thousands CZK vs. legal form – median (lower, upper quartile)

year	joint-stock	limited liability	Others
2008	70 (-8254, 1995)	1538 (-2885, 6734)	1988 (-62, 23486)
2011	506 (-3367, 1776)	1866 (-9234, 11830)	1676 (66, 5529)

Note: others = 27 contributory organizations and one public benefit organization

The median shows that the joint-stock company stands, in terms of the net income, for the worst. Nevertheless, at the 5% significance level it cannot be proved using the Kruskal-Wallis test that the net income would significantly differ between the companies of a different legal form, both in 2008 (p = 12.4%) and 2011 (p = 26.7%). For the year 2008, where the p value is lower, we additionally conducted multiple comparisons, where the p values of two-sample Wilcoxon tests for each pair were adjusted for multiple comparison using the Holm's correction (Holm, S. 1979). The post-hoc analysis shows that the closest to the statistical significant difference in net income is between the limited liability companies and contributory (or public benefit) organizations (p = 13.5%).

2.4 Operating subsidies

Another parameter examined in the hospitals' economy was operating subsidies received. Determination of operating subsidies is quite problematic. Operating subsidies are not fully specified in the annual reports by many processors. The reports prepared in accordance with applicable regulations (the preparation of financial statements) do not show a clear separation of subsidy data from other grants, gifts or other types of income. The actual amount was mostly determined from the auditor's report, if this report has been included in the financial statements. Most hospitals, however, provide data outside reports and draw operating subsidies from the owner or founder.

Even operating subsidies received did not match a normal distribution, thus the nonparametric statistical methods were used for analysis. All presented analyzes were performed in the statistical software R, version 2.15.0 (R Development Core Team 2012).

Table 2 Subsidies in thousands CZK vs. legal form – median (lower, upper quartile)

year	joint-stock	limited liability	others
2008	5703 (2739, 11623)	923 (259, 2745)	17345 (3618, 50219)
2011	5989 (2890, 11345)	1523 (1176, 4924)	11246 (2400, 19749)

Regarding subsidies, there can be statistically significant differences demonstrated between hospitals with different legal form in 2008 (p = 2.6%), but cannot be demonstrated in 2011 (p = 18.6%). Detailed post-hoc analysis for 2008 identifies the biggest difference in subsidies between limited liability companies and contributory (or public benefit) organizations, where contributory (or public benefit) organizations are subsidized by most according to the median.

2.5 Net income vs. operating subsidies

The authors measured the dependence of the net income on operating subsidy in the examined period and within each region. This dependence is demonstrated using the Spearman correlation coefficient (p-values).

Table 3 Net income vs. subsidy – Spearman correlation coefficient (p-value)

2008	0.144 (p=35.2%)
2011	0.397 (p=1.3%)

Statistically significant relation between net income and the amount of subsidies can be proved only in 2011. Analysis of the regions has not been made because the type of legal form, in some cases, is closely linked with the region that administers the hospital's management. (e.g. in the South Bohemian region there are only joint stock companies, while in Vysocina region there are only contributory organizations), moreover some regions are relatively underrepresented in the dataset.

3 Conclusions

Paper evaluated the performance of hospitals in a period of economic instability, which dates back to the year 2008, compared to the last possible researchable year - the year 2011. Given the sources used it was quite difficult to interpret the set of economic parameters determined through the hospitals' annual reports. Many results reported were either incomplete or did not match the amounts reported in the financial statements. This was mainly the issue of the amount of the operating subsidy, which has very significant impact on the total amount of the net income. However, it is possible to draw conclusions from the interactions between selected parameters and years.
From the statistical processing, a relation between the legal form and the net income was not proved. Nevertheless, joint-stock companies seem to stand, in terms of the net income, for the worst. On the other hand, relationship of the legal form to subsidies was statistically significant in the year 2008. The biggest difference was identified in subsidies between limited liability companies and contributory (or public benefit) organizations, which are subsidized by most. Relation between net income and the amount of subsidies can be proved only in 2011.

Acknowledgments

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Analysis of the problem of pro-cyclicality in the Eurozone and pro-cyclicality solutions in Basel III

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Abstract: The main causes of changes in banking regulation were in negative impacts of the financial crisis, which has shown the weaknesses of Basel II. Basel Committee on Banking Supervision adopted in September 2009 the basic principles of international regulatory framework for banks under Basel III designation. In December 2009 has been published consultative documents Basel III. Concrete actions and implementation were adopted in September 2010 and finally published on 16 December 2010. The main objectives of the new regulation were the ability of the banking sector to absorb shocks caused by economic crises, improvement of the banks management system and increasing of the banking business transparency. The way for analysis of the problem of pro-cyclicality in the Eurozone and solutions pro-cyclicality in Basel III document leads through analysing and increasing of quality and quantity of capital, liquidity and pro-cyclicality solution, as main tasks of Basle III.

Key words: Basle III, pro-cyclicality of the regulation, quality of capital

JELClassification: E58, G28, G21

1 Objectives, instruments and key priorities of Basel III

Mr Nout Wellink, Chairman of the Basel Committee on Banking Supervision and President of the Netherlands Bank, described the Basel III Framework as "a landmark achievement that will help protect financial stability and promote sustainable economic growth. The higher levels of capital, combined with a global liquidity framework, will significantly reduce the probability and severity of banking crises in the future." He added that "with these reforms, the Basel Committee has delivered on the banking reform agenda for internationally active banks set out by the G20 Leaders at their Pittsburgh summit in September 2009".[1]

The purpose of capital requirements of credit institutions and investment firms in documents Basle III is to overcome difficult times. Basle III introduces two levels of risk control:

1. Micro-prudential regulation of the commercial banks;
2. Macro-prudential regulations of systemic risks in the banking sector.

Objectives and instruments of micro-and macro-prudential regulation are illustrated in the Table 1.

Table 1 Objectives and instruments of micro- and macro-prudential   regulation

	Objectives	Indicators
Macro-prudential regulation	Financial system stability	Dynamics of the GDP
Micro-prudential regulation	Financial (credit) institution stability	Protection of the consumer on financial market

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[1] Basel III: A global regulatory framework for more resilient banks and banking systems

Among main solutions for reducing of the pro-cyclical effects of financial regulation are included:
- monitoring of systemic risk,
- creation of countercyclical instruments in the capital and reserves,
- improving of accounting rules,
- creation a framework for better systems of employee remuneration.

1.1 Key priorities of Basel III

Key priorities of Basel III can be summarized as follows:
- Support of banking institutions at the macro level (macro-prudential regulation).
- Removal of pro-cyclicality of credit institutions regulations.
- Solution of problems resulting from negative externalities and from action of systemically important financial institutions.
- Identification and risks mitigation of OTC derivatives.
- Support of the credit institutions liquidity and limiting of leverage ratio.

To achieve these objectives of Basel III is important:
- Increasing of the regulatory and economic capital quality.
- Actions to eliminate cyclicality.
- Liquidity risk management.
- Reducing the leverage ratio.
- Return character of capital from government bailouts to banks.

The financial crisis has shown that a risk in the banking sector is too large regarding to the capital to risks covering. Objective of Basel III in improving the quality and quantity of capital will be implemented on the basis of concrete steps. In the quantitative criteria notably the gradual implementation of the indicators in a time sequence expressed in the following figure.

2 Pro-cyclicality in the Eurozone

Pro-cyclicality represents the largest problem in existing approaches to capital adequacy regulation.
- Pro-cyclicality is manifested by regulation as an enhancing of the actual tendency of the economic cycle. In times of crisis, makes deepening of the crisis and during boom supports overheating economy.

Figure 1 Development of credits and capital (left) and capital and reserves and GDP (right)
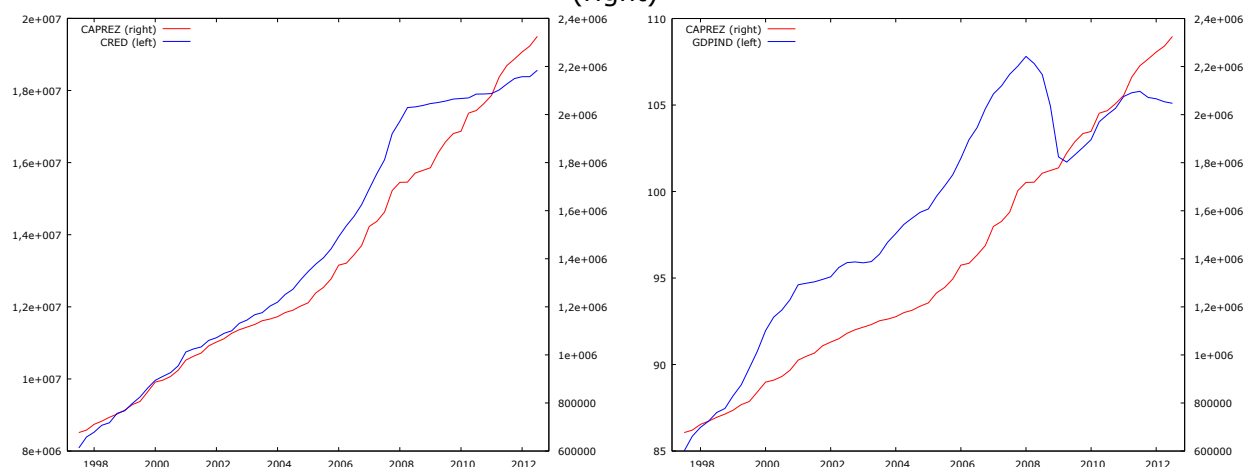
Source: European Central Bank

- Pro-cyclicality is supported by the possibility of saving capital through the using of advanced methods of capital calculating introduced under Basel II. The following graph shows that the volume of credit (CRED) and capital including reserves

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(CAPREZ) did not develop evenly, capital lagged behind credits at the time of incoming crisis.

The situation changed in 2011 in according due Basle III. Addition of capital there were also pro-cyclical, because it takes place in a time of growing financial crisis (see left part of Figure 1).

Capital and reserves lagged behind the growth of GDP. After 2010, the situation has changed due to the tightening of regulation as a result of the financial crisis. Pro-cyclicality is reflected in the fact that capital growth was slower in the pre-crisis period, and vice versa capital was growing faster than the volume of loans after crisis period.
The right part of Figure 1 shows the evolution of capital and reserves on one side and GDP growth on the other.

Pro-cyclicality is also affected by the 2009 financial crisis. It is also seen on the development of indicators in the euro area (Figure 2). Another example of pro-cyclicality is leverage ratio. Leverage (Leverage ratio) represents the requirement that the ratio between capital and assets (unweighted risk) will be at least 3%. Indicator of financial leverage will become part of Pillar 1 since 2018.

Figure 2 Euro area economic indicators
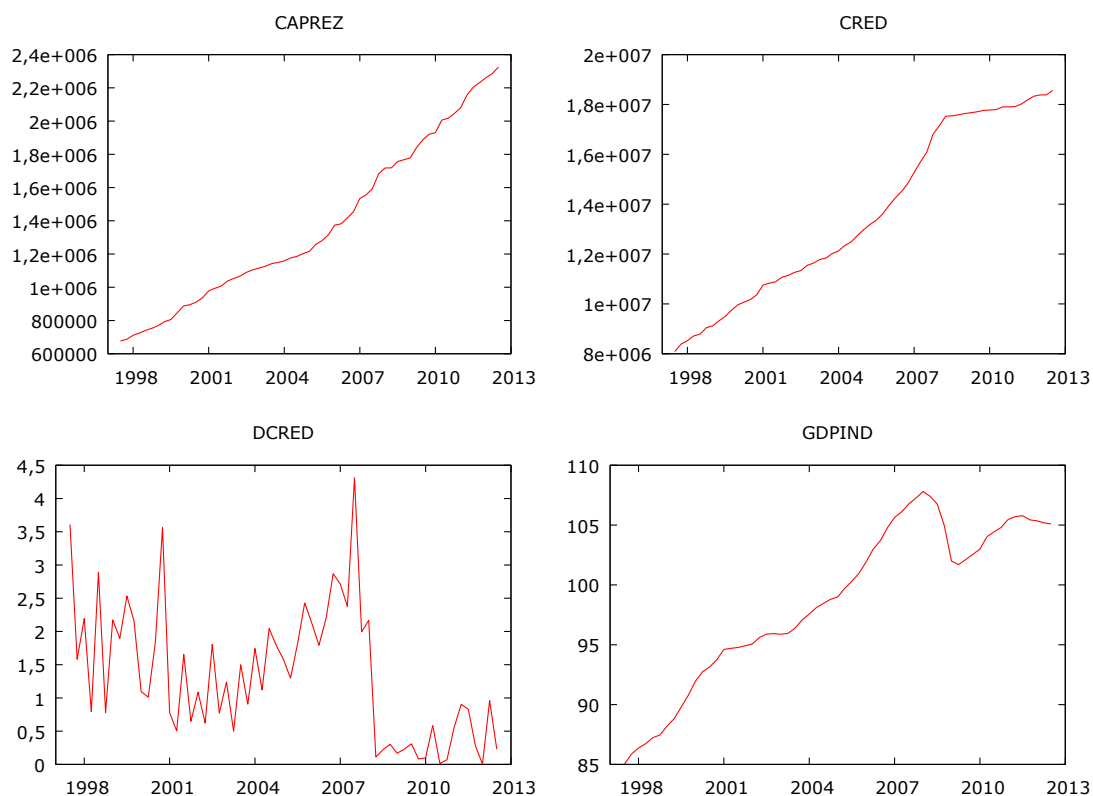
Note: CAPREZ = capital and reserves; DEPOS = deposits; CRED = credits; DCRED = changing of credits; DLOMB = lombard credits.
Source: European Central Bank

3 Steps to eliminate pro-cyclicality and the market reaction

In order to reduce of pro-cyclicality are intended the Capital conservation buffer and the countercyclical buffer. Capital conservation buffer shall be 2.5% above the level of core capital of Tier 1. In order to fulfil this task will be involved restrictions according to profit, especially to payment of dividends to shareholders.

Counter cyclical buffer will be up to 2.5% of RWA (Risk Weighted Assets). Signal to the formation of countercyclical buffer will give the national regulator in accordance to the evolution of the business cycle. The national regulator will be responsible for ensuring that excessive credit growth does not lead to systemic risk.

Table 2 The sequence of steps in raising capital requirements in Basel III

	2011	2012	2013	2014	2015	2016	2017	2018	2019
Minimum CET1 ratio			3,5 %	4,0 %	4,5 %	4,5 %	4,5 %	4,5 %	4,5 %
Capital conservation buffer						0,625%	1,25%	1,875%	2,5 %
Minimum Tier 1 capital			4,5 %	5,5 %	6,0 %	6,0 %	6,0 %	6,0 %	6,0 %
Minimum regulations capital			8,0 %	8,0 %	8,0 %	8,0 %	8,0 %	8,0 %	8,0 %
Minimum regulations capital + Capital conservation buffer			8,0 %	8,0 %	8,0 %	8,625%	9,25%	9,87 %	10,5 %
The phasing out of less quality capital - supplementary Tier 1 and Tier 2				The phasing out of less quality capital					
CCB - Counter cyclical buffer	Start of monitoring								Minimum standard validation
LCR – Liquidity coverage ratio	Start of monitoring				Minimum standard validation				
NSFR – Net stable funding ratio	Start of monitoring							Minimum standard validation	

In addition, Basel III requires more capital. In the current is also changed capital structure in order to improve its quality and stability. Global banks operate with Tier 1 part capital including hybrid "innovative" instruments with debt-like character. We have had Tier 1 capital, innovative Tier 1, upper and lower Tier 2, Tier 3 capital, with own limits and with functions of other capital elements.

The complexity in the definition of capital made it difficult to determine what capital would be available to cover which of the losses. This combination of weaknesses permitted tangible common equity capital, the best form of capital, to be as 1% of risk-weighted assets."[1]

Repayment of government capital assistance provided to commercial banks

- Many banks have had government support during the financial crisis.
- The support has the form of joint ownership or the form of loans. Government assistance is repayable and must be efficiently utilized. Much capital assistance had not absorbed losses as was expected.
- Therefore are important principles of management remuneration.
- Today is a very timely idea that **management has to be paid not by profit, but by increasing value of managed property.**

3.1 Analysis of pro-cyclicality in the practice of Eurozone

Using regression analysis, we examine the relationship between dependent variable and explanatory variables (for example between GDP growth and credit growth). Regression analysis examines the functional relationship between changes in dependent variable Y and changes in the independent variables x_1, x_2, x_n. Regression model has the form:

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[1] Hannoun, H.: The Basel III Capital Framework: a decisive breakthrough. BoJ-BIS High Level Seminar on Financial Regulatory Reform: Implications for Asia and the Pacific Hong Kong SAR, 22 November 2010. Dostupné na internete: http://www.bis.org/speeches/sp101125a.pdf .

$$Y_i = a + \beta x_i + \varepsilon_i$$

where: i = 1, 2, …, n

Estimate of the regression function Y is: $\hat{y} = a + bx$

Parameters α, β of the regression function a, b are calculated by the method of least squares. We have also focused on the comparison of longer term and shorter term, reflecting the impact of the crisis.

Figure 3 Connection between credit increasing and GDP increasing 1997 - 2012
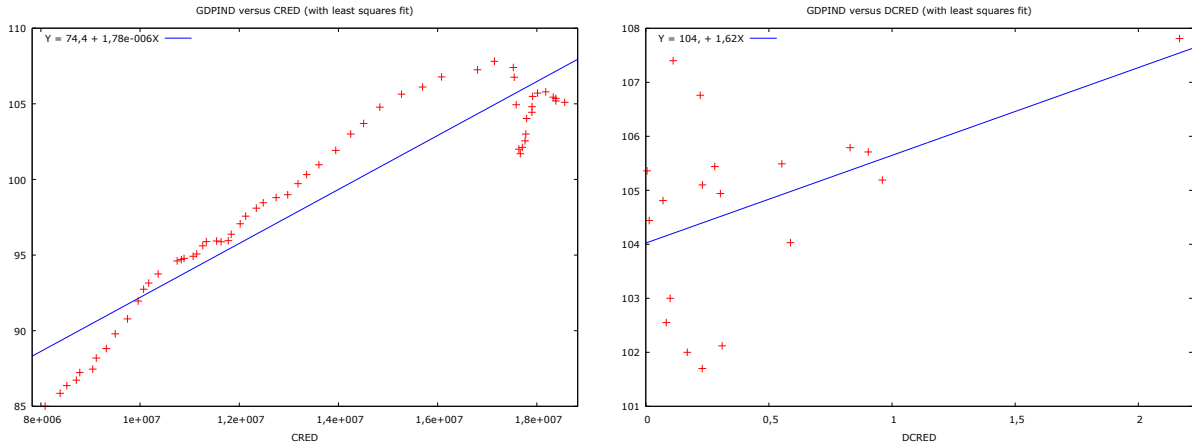
Source: European Central Bank

Model 1 OLS, using observations 1997:3-2012:3 (T = 61)
Dependent variable: CRED

	Coefficient	Std. Error	t-ratio	p-value	
GDPIND	139465	3391,94	41,1167	<0,00001	***

Mean dependent var	13603506	S.D. dependent var	3453237
Sum squared resid	4,11e+14	S.E. of regression	2618602
R-squared	0,965726	Adjusted R-squared	0,965726
F(1, 60)	1690,581	P-value(F)	1,17e-45
Log-likelihood	-987,5183	Akaike criterion	1977,037
Schwarz criterion	1979,148	Hannan-Quinn	1977,864
Rho	0,998660	Durbin-Watson	0,005078

According to the results of the regression analysis showed a positive correlation between loans and GDP, which indicates strongly pro-cyclical developments. For the period 1Q2008 to 3Q2012 came following results:

Model 2 OLS, using observations 2008:1-2012:3 (T = 19)
Dependent variable: CRED

	Coefficient	Std. Error	t-ratio	p-value	
GDPIND	170696	1032,23	165,3659	<0,00001	***

Mean dependent var	17879842	S.D. dependent var	358601,9
Sum squared resid	4,00e+12	S.E. of regression	471231,4
R-squared	0,999342	Adjusted R-squared	0,999342
F(1, 18)	27345,89	P-value(F)	4,28e-30
Log-likelihood	-274,6452	Akaike criterion	551,2904
Schwarz criterion	552,2348	Hannan-Quinn	551,4502
Rho	0,721667	Durbin-Watson	0,204102

Table 3 Correlation coefficients, using the observations 2008:1 - 2012:3
5% critical value (two-tailed) = 0,4555 for n = 19

| CAPREZ	DEPOS	CRED	DCRED	DLOMB	
1,0000	0,8154	0,9597	-0,0436	-0,9928	**CAPREZ**
	1,0000	0,8885	-0,2853	-0,7791	**DEPOS**
		1,0000	-0,2543	-0,9262	**CRED**
			1,0000	0,0125	**DCRED**
				1,0000	**DLOMB**

The relationship between credit growth and GDP growth for the period 1Q2008 to 3Q2012 is shown in the right part of Figure 3. Slope of the line is less steep. It shows that the growth rate of GDP is less than the growth rate of credits. It notes the pro-cyclicality.

Pro-cyclicality is also reflected by the fact that during the crisis to reduce the amount of loans faster than the reduction in GDP growth (Figure 4 left). Relationship between loans and capital (Figure 4 right) shows that during the crisis has increased the slope line, thus credits grew faster than capital, which also indicates the pro-cyclicality. Olson model points to a negative correlation between capital and GDP growth, hence the lack of capital formation in boom times.

Figure 4 Connection between GDP growth and equity (reserves) growth (left) and between the ratio of credits and capital & reserves (right)
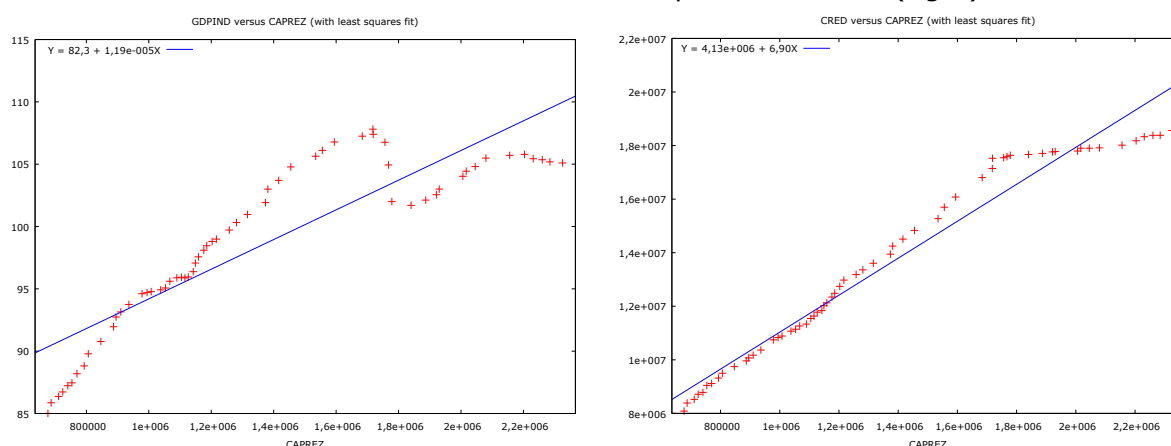
Source: European Central Bank

The next section explores the relationship between capital as the dependent variable and GDP, loans and deposits. It turns out, that GDP and loans had the highest impact on the creation of reserves in 2008 - 2012. In the period 2008-20012 their capital formation slowed.

Model 3 OLS, using observations 1997:3-2012:3 (T = 61)
Dependent variable: CAPREZ

	Coefficient	Std. Error	t-ratio	p-value	
CRED	0,152932	0,0045458	33,6425	<0,00001	***
GDPIND	-7185,99	645,134	-11,1388	<0,00001	***

Mean dependent var	1372453	S.D. dependent var	490434,1
Sum squared resid	5,02e+11	S.E. of regression	92205,12
R-squared	0,996122	Adjusted R-squared	0,996056
F(2, 59)	7576,712	P-value(F)	7,33e-72
Log-likelihood	-782,8765	Akaike criterion	1569,753
Schwarz criterion	1573,975	Hannan-Quinn	1571,408
Rho	0,966446	Durbin-Watson	0,067455

Model 4 OLS, using observations 2008:1-2012:3 (T = 19)
Dependent variable: CAPREZ

	Coefficient	Std. Error	t-ratio	p-value	
CRED	0,341423	0,0650902	5,2454	0,00007	***
GDPIND	-39220,2	11114,3	-3,5288	0,00258	***

Mean dependent var	1996139	S.D. dependent var	204529,4
Sum squared resid	2,88e+11	S.E. of regression	130132,7
R-squared	0,996235	Adjusted R-squared	0,996013
F(2, 17)	2249,015	P-value(F)	2,48e-21
Log-likelihood	-249,6531	Akaike criterion	503,3061
Schwarz criterion	505,1950	Hannan-Quinn	503,6258
Rho	0,880999	Durbin-Watson	0,240387

Recently also increased the impact of LTRO on credits (Figure 5). This dependence may indicate inflation based on credit growth, which clearly growing.

Figure 5 Connection between long-term refinancing operations and loans
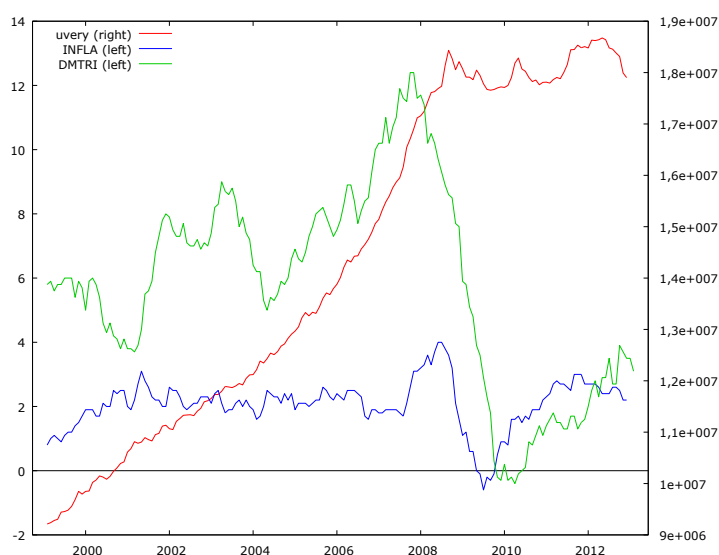
Source: European Central Bank

4 Conclusions

Analysing the degree of pro-cyclicality in terms of the euro area we can make conclusion that actions under Basel III are correct. Risks in terms of the euro area can be divided into two groups. On the one side, there are risks, which are reflected lack of credit and capital. On the other side, there are risks associated with macroeconomic developments, especially with inflation due to rising consumer loans. Limiting the scope of assets under leverage can significantly contribute to the elimination of risks, which could put pressure on public resources. Problem is in that - the solution of pro-cyclicality comes at a time of crisis and therefore currently Basle III operates pro-cyclical. Basel III is thus solution to the problem in the future.

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The yield curve as a predictor of economic activity – the case of the Visegrad group

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Abstract: *In this paper we study the ability of the yield curve to predict GDP activity in four countries of the Visegrad group – Czech Republic, Slovakia, Poland and Hungary. The dataset contains the spread between 10-year and 3-month sovereign bonds and real GDP of the countries mentioned above between the years 2002 and 2012. The results showed that the prediction of the GDP growth or decrease was proven after year 2008 (the financial crisis) in the Czech Republic, Slovakia and Hungary, the predictive power of the yield curve was lowered in those countries before the year 2008. Certainly the simple yield curve growth forecast should not serve as a replacement for the complex predictive models, it does, however, provide enough information to serve as a useful check on the more sophisticated forecasts. These findings provide further evidence of the potential usefulness of the yield curve spreads as indicators of the future economic activity*

Keywords: yield curve, slope, Visegrad, GDP, spread

JEL codes: E43, E44, E47, G01

1 Introduction

Predicting of the future has always fascinated people, moreover economic forecasting doubles the interest by adding the chance of profit.

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 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 10-year and 3-month bond is negative) it may signal GDP decrease (recession).

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 Visegrad group and to examine if this rule was weaken at the beginning of 21st century and appeared again during the financial crisis.

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.

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) spread has the greatest ability in predicting one-year horizon (four quarters ahead).

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. Thus we avoided both complicated nonlinear specifications and a detailed search for the best predictor.

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 us the yield of each maturity. Creating and calculating of the yield curve is a rather difficult task because there are many ways how you can do it. There are many models which try to model the best fitted yield curve for each country.

The yield curves are constructed by Bloomberg, therefore we used the data for spreads from Bloomberg. For the spread we chose 10-year bond rate minus 3-month bond rate (Estrella and Hardouvelis, 1991; Estrella and Mishkin, 1996). We use quarterly data for the spreads because the data for the economic activity are taken on quarterly basis as well. The data for real GDP can be used from Eurostat or Bloomberg as well. The data of real GDP obtained and used in this paper are from Eurostat.

The selected countries are Czech Republic, Slovakia, Poland and Hungary. There is no previous research which would prove or reject the hypothesis of real GDP and bond spread dependence. This hypothesis was proven first for United States of America and later on for other countries in North America, Europe (western countries) and Asia (Japan).

As our measure of real growth we use four-quarter percent change in real GDP (thus we calculate the percent change of the quarter against the last year's same quarter, e.g. we calculate the change from 1Q2004 and 1Q2003 real GDP). GDP is standard measure of aggregate economic activity and the four-quarter horizon answers the frequently asked question – what happens the next year?

Our sample period starts from 3Q2002 and ends on 4Q2012. This mainly covers the period before financial crisis, period of financial crisis and period after financial crisis. Our basic model is designed to predict real GDP growth/decrease four quarters into the future based on the current yield spread (Bonser-Neal and Morley, 1997).

We accomplish this by running of a series of regressions using real GDP activity and the spread between 10-year and 3-month bond yields lagged four quarters (e.g. the interest rate spread used for 3Q2004 is actually from 3Q2003).

The last step is to find out if there is the change of behaviour of the spreads and GDP activity at the beginning of 21st century and after the year 2008 (De Pace, 2011).

To generate the GDP predictions we run the regression using the whole sample, and later 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).

The following equation is estimated for each country:

$$Real\ GDP_{t+4} = \propto + \beta * spread_t \qquad\qquad (1)$$

The program software used for regression (ordinary least squares) is Gretl.

3 Results

Does the yield curve accurately predict the future GDP? First we can look at the data. Figure 1 shows the growth of real GDP and the lagged spread (4 quarters) between 10-year and 3-month bond yields in the Czech Republic (the similar figures can be constructed for the rest of the countries, this one is for example).

Figure 1 Real GDP and spread in the Czech Republic (spread lagged four quarters)
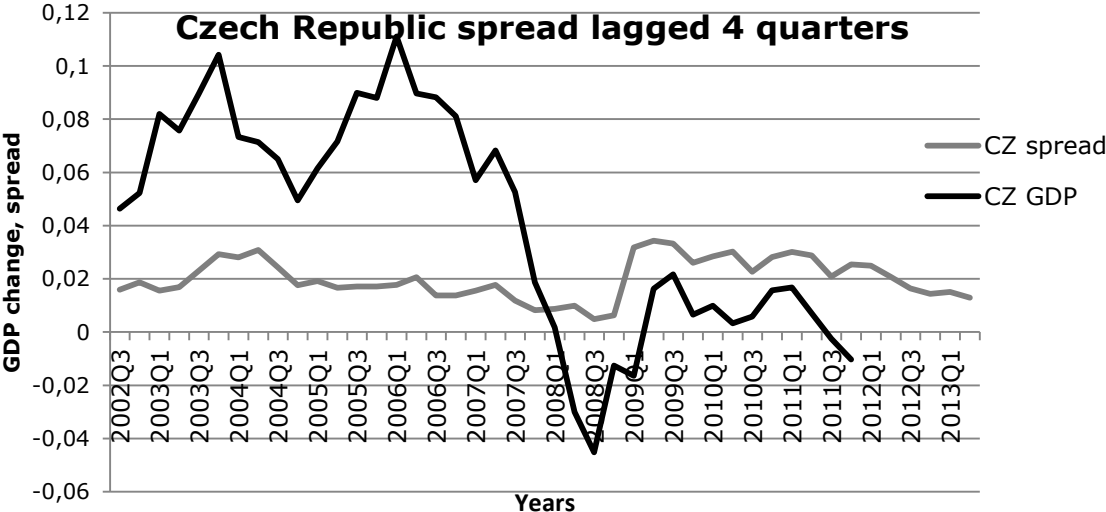
Source: Bloomberg, Eurostat

A decline in the growth or real GDP is usually preceded by a decrease in the yield spread and narrowing yield spread often signals a decrease in real GDP growth. A negative spread usually precedes recessions, but not always. You can see at the first sight that the dependency between real GDP and spread is more visible form the year 2008 than before. The recession that began in 2009 was preceded by many quarters of decreasing

spread and at the end the spread was very close to zero. The same situation repeated in 2011 and 2012. The prediction of the future GDP for 2013 is also quite clear – Czech Republic should remain in recession due to down-sloping spread going very close to zero.

When we constructed a scatterplot with each point representing a particular combination of real GDP growth and the lagged yield spread of Czech Republic, it showed that the relationship between the two variables is mostly positive. It means that positive real GDP growth is associated with a positive lagged yield spread and vice versa. Plotting the data gives a strong impression that the yield spread predicts future real activity.

To generate the GDP predictions we run a regression using the whole sample to generate each predicted data point.

Results of regression for Czech Republic, Slovakia, Poland, Hungary – whole sample

The whole sample of dataset contains the real GDP from 3Q2002 to 4Q2012. We ran a regression of the whole sample and got the results as seen in Table 1.

Table 1 The results of all countries and whole sample from OLS regression

Whole sample	Constant	Spread	P - value (F - test)	R^2
Czech Republic	0,042029	-0,02796	0,9744	0,000029
Slovakia	0,081257	-1,37952	0,0229	0,13558
Poland	0,069407	0,422761	0,2384	0,038395
Hungary	0,049057	-0,66949	0,076	0,084874

For example for the Czech Republic it means:

Real GDP$_{Czech Republic}$ = 0,042029 – 0,02796 * spread$_{Czech Republic}$

However it is necessary to say that we cannot contribute this model as statistically significant because of very poor R^2 and very high p-value. Thus this model cannot be used as predictive model. It might be because of the different behaviour of the spread and GDP before and after the year 2008. This hypothesis will be tested later on.

The p-value seems to be good (at low level under 10%) for dataset of Slovakia and Hungary, however the R^2 coefficients, which show us how many percentage of the sample can be explained by these models, are very poor for all countries.

We have to say that there is not any proven dependency between the spread and real GDP.

Table 2 The results of all countries and sample of period 3Q2002 – 4Q2007 from OLS regression

3Q02 – 4Q07	Constant	Spread	P - value (F - test)	R^2
Czech Republic	0,0436233	1,53286	0,062477	0,162926
Slovakia	0,104807	-0,249324	0,638152	0,011274
Poland	0,0773092	1,86793	0,000045	0,573331
Hungary	0,0771587	0,138518	0,758746	0,004824

Results of regression for Czech Republic, Slovakia, Poland, Hungary – divided samples

We continued with the research as follows – we divided the sample into two samples. The first one is from 3Q2002 to 4Q2007, the second one is from 1Q2008 to 4Q2012 in order to show if there is any dependency between the variables before or after the financial crisis. We ran a regression of the first sample and second sample. The results for the time span of 3Q2002 – 4Q2007 (first sample) are possible to see in Table 2, the results for the period of 1Q2008 – 4Q2012 (second sample) are in Table 3.

Table 3 The results of all countries and sample of period 1Q2008 – 4Q2012 from OLS regression

1Q08 – 4Q12	Constant	Spread	P - value (F - test)	R^2
Czech Republic	-0,031118	1,31273	0,001533	0,523567
Slovakia	-0,059265	3,48847	0,000062	0,693569
Poland	0,0515843	0,508590	0,180447	0,124307
Hungary	-0,006203	1,91095	0,003610	0,465161

It is clearly visible, that the dividing of sample made a great difference in results. In the first period (2003 – 2007) only model for Poland was statistically significant and could be used for GDP future prediction. It is because its p-value was very low and R^2 showed us that this model explains 57,33% of the sample, which is good. All the other models could not be used because of their statistical insignificance (high p-values and low R^2).

The second period (2008 – 2012) showed big differences. Models for the Czech Republic, Slovakia and Hungary can be used for future real GDP prediction, however the model for Poland cannot be used due to its statistical insignificance.

The models for the Czech Republic, Slovakia and Hungary have very low p-values (under 1%) and high R^2. The models are therefore usable for future prediction of GDP.

We can say that:

Real $GDP_{Czech\ Republic}$ = - 0,03118 + 1,31273 * $spread_{Czech\ Republic}$

Real $GDP_{Slovakia}$ = - 0,059265 + 3,48847 * $spread_{Slovakia}$

Real $GDP_{Hungary}$ = - 0,06203 + 1,91095 * $spread_{Hungary}$

For example if there would be a change of 1% up in the spread of the Czech Republic then the GDP would increase about 1,28% (-0,03118+1,31273*1%).

The findings of De Pace (2011) were confirmed in the Czech Republic, Slovakia and Hungary. The models should predict the future GDP well after 2008, however the model in Poland worked well before the financial crisis but not anymore.

Table 4 The prediction of real GDP in the Czech Republic, Slovakia and Hungary

Prediction of GDP	Czech Republic		Slovakia		Hungary	
	spread	GDP	spread	GDP	spread	GDP
1Q2013	0,0249	0,00151	0,028088	0,03872	0,0166	-0,0303
2Q2013	0,02079	-0,0039	0,029829	0,04479	0,0079	-0,0469
3Q2013	0,01637	-0,0097	0,025603	0,03005	0,01153	-0,04
4Q2013	0,01439	-0,0123	0,023523	0,02279	0,00916	-0,0445

Prediction of real GDP in 2013 – Czech Republic, Slovakia, Hungary

At the end we can compute the future real GDP for the Czech Republic, Slovakia and Hungary. The spreads are known from the year 2012. The results are in the Table 4.

The GDP of the Czech Republic should decrease from 0,39% in 2Q2013 to 1,23% in 4Q2013. However the GDP of Slovakia should increase approximately about 2,5% in each quarter. The future economic activity of Hungary does not look good, the model predicts the decrease of GDP around 3 – 4% (depending on the quarter).

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 four quarters into the future. Nevertheless from 2002 to 2008 the predictive power of the yield curve was lowered in the Czech Republic, Slovakia and Hungary, however in Poland the model had a good predictive power. Our results presented above confirm that 10-year, 3-month yield spread has significant predictive power for real GDP growth after the year 2008 in the Czech Republic, Slovakia and Hungary. This paper confirms the previous work of De Pace, that there was a break in the time of financial crisis and the hypothesis that future growth of GDP can be explained by spread of bonds did not work properly at the beginning of 21st century, however it started to work after 2008. It also proves that this spread model works even in the countries of Eastern Europe, as the previous researches were done only on countries of North America, Western Europe and Asia.

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.

Acknowledgments

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Mergers in Czech Agricultural Companies

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Abstract: Mergers of trading companies are significant trading transactions that represent a combination of companies from an economic as well as legal perspective. The aim of mergers is usually a further development of a company. One of the factors that influence the number of mergers and their results is the field of business of relevant companies. Agricultural production is a field which takes one of the last places as concerns the number of implemented mergers. Agricultural companies are specific due to their subject of business and the number of factors that influence them. That is why their analysis is highly interesting. The aim of the paper is to analyze and evaluate mergers in Czech agricultural companies.

Keywords: mergers, financial position, performance, agriculture, economic development of a company

JEL codes: M 41, Q19

1 Introduction

Mergers of trading companies are significant trading transactions that represent a combination of companies from an economic as well as legal perspective.

Reasons for mergers can be related to business or speculative. Business reasons include situations when the company aims at a further development so it needs to grow, change its structure, expand its share in the market or find a new market. Speculative reasons include an effort for a maximum appreciation of capital in a short time, when the gained companies can be gradually sold out. Another significant effect is tax savings. (Mařík, 1995)

Statistical data concerning mergers and acquisitions in the Czech market are hard to obtain. The trade register, in which the movement is captured, does not provide these data in a temporal series. Mediators, who participate in these transactions by counselling, do not provide these data either as mainly in large counselling agencies the data overlap and duplicity occurs (in some transactions these agencies are listed as counsellors for purchase, in others for sale or other types of counselling services related to mergers and acquisitions). Therefore, the data provided by individual counselling agencies differ and cannot be used for obtaining the real state of mergers. (Hýblová et al., 2012)

As regards classification of mergers based on fields, the first place in the number of implemented mergers is taken by fields of production and services. Agricultural production appears in one of the last places. Although the number of mergers within this field is small, the analysis of their results is important.

2 Characteristics of Agricultural Companies

Agriculture represents a significant part of national economy. It secures production of food and other products and influences the related processing industries. Agricultural production is a specific field. Its main features are:

- biological character of production,
- smaller human control over the production process,
- long-term production cycle,
- seasonal character of production,
- dependence on natural and climatic conditions. (Dvořáková, 2012)

Agricultural production has a biological character; natural biological processes are the value-forming essence of agricultural production. This leads to a relatively smaller control of the production process by human beings as it cannot be always directed. The production cycle is long, neither a use of modern technologies can bring any essential changes in this aspect. The development and intensification of production may get into conflict with the environment protection. The production is seasonal and thus a fluctuation of the need of workforce occurs. Agriculture is dependent on natural conditions; there are risks related to adverse weather conditions and natural disasters.

Although agriculture is a significant field, the proportion of agricultural production in the gross domestic product is decreasing in developed economies. The Czech Republic has a considerably lower proportion of agriculture in GDP than EU-15 countries. The Czech proportion is 0.5%, while the EU-15 average is 1.2%. In the past 14 years, the proportion of agriculture in GDP in the Czech Republic decreased by 83%, while in EU-15 countries it only decreased by 29%. (Smítal, 2012)

The drawbacks appearing from the comparison of the Czech agriculture with EU-15 average (due to the high demands of EU legislation) are the high indebtedness, long-term persistence of a lower sale of agricultural production and lower European or national subsidies. Social disparities between agriculture workers and other workers in national economy are increasing; the attractiveness of agriculture for young and qualified people is decreasing mainly due to the salary disparities.

The problems arise also in financial reporting and evaluate the performance of agriculture enterprises. The specifics of agricultural production and biological transformation connected with that type of production are not taken into account by most of the existing accounting systems. (Bohušová, et al. 2012) According to Sedláček (2010), in comparison with other economic branches, the agricultural activity is characterized by specific activities that require the appropriate accounting treatments.

3 Mergers in Agriculture

The aim of the paper is to analyze and evaluate mergers in Czech agricultural companies. Results of mergers were analysed using companies that merged in the period of 2001–2010. The data were acquired from financial statements of the companies published in the Trade Register of the Czech Republic. Out of the total number of 2676 mergers, 95 were mergers of agricultural companies, which is 3.55%. The result of the research is only a comparison of absolute values, using modern statistical methods is not possible, the number of rated firms is too small.

The overview of mergers in individual years is presented in Table 1.

Table 1 Development of the number of mergers in 2001–2010

Year	Total number of mergers	Number of mergers of agric. comp.	Proportion of agric. comp. mergers in the total number (%)
2001	69	5	7.24
2002	142	5	3.52
2003	249	7	2.81
2004	185	4	2.16
2005	135	3	2.22
2006	300	12	4
2007	320	9	2.81
2008	429	15	3.49
2009	415	15	3.61
2010	432	20	4.63
Total	2676	95	3.55

Source: Authors based on data in Trade Register of Czech Republic

A comparison of mergers implemented in all fields with mergers in agricultural companies is shown in Figure 1.

Figure 1 Comparison of the number of agricultural mergers with the total number of mergers in 2001–2010
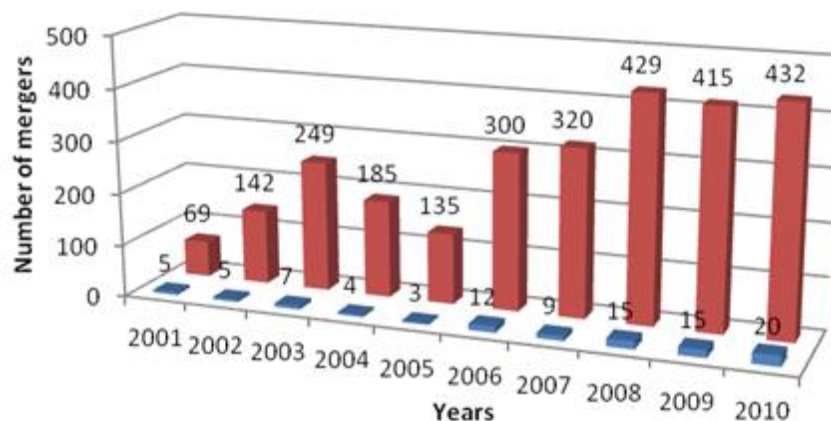
Source: Authors based on data in Trade Register of Czech Republic

Table 1 and Figure 1 show that agricultural companies merged to a minimum extent in 2001–2005 and there was a slight increase after 2006. This trend also occurs in the total number of mergers.

The consequences of mergers from the perspective of financial position and company performance can only be evaluated for 12 out of the 95 companies; the others have not published complete data in the Trade Register.

The following items were analysed in the companies where the data was available for the year of merger and three years after merger.

- total assets;
- equity;
- earnings after taxes.

Out of the total number of 12 companies that published their data, 4 companies implemented a merger in 2001, 4 companies in 2002, 1 company in 2004, 3 companies in 2007. The data of 2003, 2005, 2006, 2008, 2009, 2010 are not available, see Table 2.

Table 2 Number of companies that published their financial statements

Year of merger	Number of companies
2001	4
2002	4
2003	X
2004	1
2005	X
2006	X
2007	3
2008	X
2009	X
2010	X
Total	12

Source: Authors based on data in Trade Register of Czech Republic

The basic aim of business of each company generally is to increase its market value in a long-term horizon. The energy which allows business to be done (company's activities) is

capital. From a purely financial point of view, a company can be seen as a money machine where the invested capital is gradually transformed during the production process into various assets whose final demanded form is money (new capital). Financial statements provide initial economic data to evaluate a company, (Sedláček, 2001).

Total assets express the size of the company's possessions which serve for the increase in the future economic profit of the company. They represent a sum of long-term assets and current assets, which are used to ensure the company's activities. The values of total assets are presented in Table 3. The found data show that the value of assets decreased in the years after the mergers.

Table 3 Value of total assets in thousands CZK

Year of merger	As of the merger date	1st year after merger	2nd year after merger	3rd year after merger
2001	1191378	1059283	994695	991297
2002	3127152	670353	628345	587303
2004	260302	226067	218238	227296
2007	1616660	1626253	1609122	483833
Total	6195492	3581956	3450400	2289729

Source: Authors based on data in Trade Register of Czech Republic

Equity is the share of company assets remaining after debts are deducted. It expresses the value of net trade property, i.e. the assets that are financed from the company's own sources. The values of equity are presented in Table 4. It shows that this value decreases in the years after mergers.

Table 4 Value of equity in thousands CZK

Year of merger	As of the merger date	1st year after merger	2nd year after merger	3rd year after merger
2001	434320	406665	338677	337729
2002	2787192	435357	403937	411038
2004	186407	139125	151981	171786
2007	1480571	1526246	1522587	383450
Total	4888490	2507393	2417182	1304003

Source: Authors based on data in Trade Register of Czech Republic

Profit or loss is a measure of the company performance. It expresses the relationship between revenues and expenditures during the accounting period. Earnings after taxes are a basis for the creation of funds and distribution among owners. They are also a basis for the calculation of other indicators. Its values are presented in Table 5. In total, the value fluctuated.

Table 5 Value of earning after taxes in thousands CZK

Year of merger	As of the merger date	1st year after merger	2nd year after merger	3rd year after merger
2001	43771	-13854	18141	23322
2002	-12109	5276	-2483	9009
2004	4704	3414	14268	20707
2007	1913	44351	-3216	-7567
Total	38279	39187	26710	45471

Source: Authors based on data in Trade Register of Czech Republic

The relationship between total assets and equity is presented in Figure 2.

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Figure 2 Development of total assets and the equity
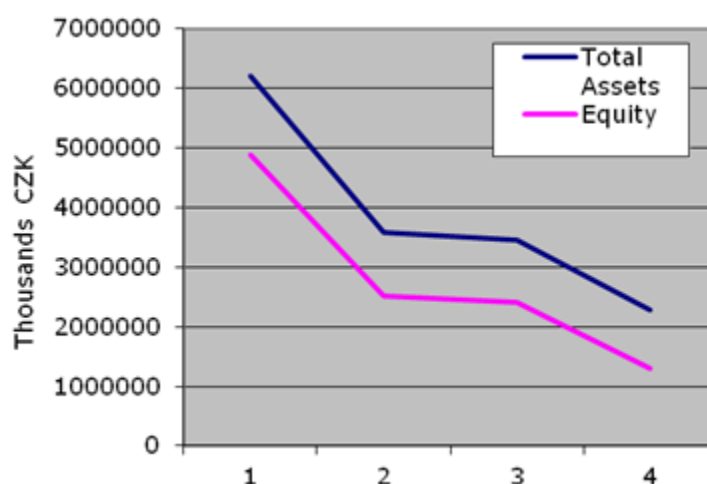
Note: Legend for x axis: 1- Data for the date of merger; 2- Data for the first year after merger; 3- Data for the second year after merger; 4- Data for the third year after merger

Source: Authors based on data in Trade Register of Czech Republic

Total assets and equity in the years after the merger decreased when compared to the day of merger. The decrease could be caused either by reclassification of assets and sale of redundant properties, or due to the shrinking of the companies that were not able to meet the demanded merger aims. The change in the value of assets has to be considered in correspondence with the other indicator - earnings after taxes - shown in Figure 3.

Figure 3 Development of earnings after taxes
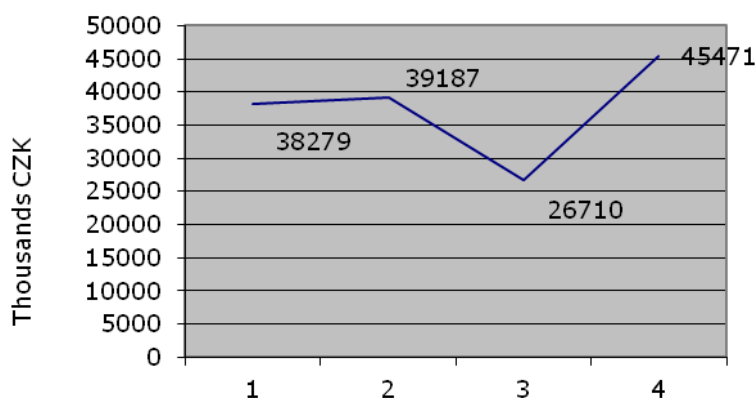
Note: Legend for x axis: 1- Data for the date of merger; 2- Data for the first year after merger; 3- Data for the second year after merger; 4- Data for the third year after merger

Source: Authors based on data in Trade Register of Czech Republic

Earnings after taxes fluctuate: after a slight increase in the first year after the merger, there is a sharp drop in the second year followed by a rise in the third year. To clarify the reasons for earnings fluctuation, we conducted the analysis of the development of added value, see Table 6. The results show that the development of earnings after taxes was considerably affected by the development of revenues and expenses in the field of product sale and service provision.

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Table 6 Development of added value in thousands CZK

	As of the merger date	1st year after merger	2nd year after merger	3rd year after merger
Added value in total	418180	482176	270086	406207

Source: Authors based on data in Trade Register of Czech Republic

When compared with Figure 3 and Table 5, we can see that the development of added value follows the development of earnings after taxes.

4 Conclusions

Agriculture is a specific field and the number of mergers implemented in this field is very small. In relation to the total number of mergers (mergers of agricultural companies forming only 3.55% of this), the data are not really comparable. Another significant impediment to the evaluation is the fact that out of the total number of 95 agricultural mergers, only 12 companies, i.e. 12.6%, published information from their financial statements. In spite of the small number of companies and lack of data, the evaluation is highly important, although in this case, you can not use modern statistical methods.

Agriculture represents a very important field, which ensures production of food and creates inputs for related processing industries.

The analysis confirmed a decreasing value of assets and equity in the years after the mergers. Earnings after taxes fluctuated and depended on the development of added value.

The analysed agricultural companies were from the category of small and medium-sized companies. Assets of small and medium-sized companies within all fields of economy increased (Valouch, et al. 2012), while those of agricultural companies decreased.

This result can have various reasons. It can be affected by the small number of samples – 12 companies cannot provide relevant information. The result can also be distorted by measuring of assets in agricultural companies whose specific nature can affect the pricing. Act on accounting or the related regulations do not deal with measuring of biological assets in detail. For example, measuring of lands or permanents stands for sale depends on the market value established by an expert. Also valuation of animals and plants gained by the companies' own production can be inaccurate. The last reason can be the fact that agricultural companies are so special as regards their position and subject of business that they are incomparable with other fields.

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The calculation of the output gap in the machinery sector of the Slovak Republic

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Abstract: *The aim of this paper is the calculation and evaluation of the output gap by Cobb-Douglas function in the terms of the Slovak economy with focus on the mechanical sector as an important part of the national economy during the period 2000 – 2012. The advantage of the chosen calculation of the output gap is the possibility to use it for the part of economy. The output gap is an important economic indicator determining the difference between actual and potential output of the economy, respectively of its part. In the first part of the paper we present the methodology and data used for current calculation. Consequently, we evaluate the growth of machinery sector by achieved results. Important information for the formulating strategic objectives in the machinery sector is to determine its potential growth, which means whether the industry is above or below its value. In this paper, we investigate the value of output gap, the source of economic growth in the machinery sector and their contribution on the performance of the Slovak economy in the period 2000 – 2012.*

Keywords: output gap, Cobb-Douglas function, sectorial growth, economy performance.

JEL codes: E23, E24

1 Introduction

Successful decisions of a country's economy and its policy are related not only with the knowledge of the current status of the economy, but also with knowledge of the circumstances that led to it. The countries in order to ensure a desirable status of their economy proceed with regard to the sustainability of economic activity, its appropriateness and balance. Negative deviations from this level represent a burden to the economy and create economic imbalances in the country. The output gap represents the difference between actual and potential output of the economy and plays an important role as economic indicator. Whether the economy is above or below its potential growth, is very important information in relation to the formulation of monetary policy of the country, as well as other economic policies. The aim of this paper is to evaluate the output gap using the Cobb-Douglas function in conditions of the Slovak economy, in particular in machinery industry, the economic growth in the sector and its contribution to the performance of the Slovak economy.

The difference between real and potential product reflects the output gap. Since it is not commonly measurable, in practice the calculation means rather its estimation. Among the simplest statistical methods for estimating the output gap are included calculations using the deterministic linear and quadratic trend, which decompose output into two elements, trend element and cyclical element (output gap). The calculation of the potential product by using linear trend brings constant potential growth and does not allow changes of individual growth factors.

Structural methods extend the capabilities of variables examination in calculation of the output gap, most frequently of the labor productivity and capital. The output gap is calculated using the production function, in our case the Cobb-Douglas function. This method uses the OECD (Orlandi, 2012) and also International Monetary Fund.

2 Methodology and Data

Coubb-Douglass function determines the value of GDP, with an average utilization of production factors. Establishment of Cobb-Douglas function is attributed to the American economist Paul Douglas, who in the twenties of the last century noticed that the share of labor and capital on U.S. GDP is stable in the long term view. Mathematician Charles Cobb subsequently derived production function, which satisfies the requirements of stable shares. In the production function is the value of potential product dependent on primary sources of production - labor, capital and effective use of resources aggregate factor productivity. Two-factor Cobb-Douglas function adjusted for some part of the economy, for the particular industry, has the form:

$$Y_t = AFP_t * C_t^{1-a} * L_t^a, \tag{1}$$

where Y is product, L is labor, C is capital, AFP is aggregated factor productivity and a is share of labor on the product.

The share of labor a was determined as an average share of employees compensation on GDP at current prices in the monitored period. If we know the number of employees in the sector (L) and the capital stock at constant prices (K) we obtain AFP from equation (1) as a residue. Potential GDP is calculated by substituting the aggregate factor productivity, capital stock and potential employment to the production equation. The data necessary for the calculation were obtained from the Statistical Office and from the SR Ministry of Economy materials which deal with the development characteristics of the machinery industry in the observed period. The labor was calculated as an average number of workers in machinery industry. The capital is expressed in constant prices and includes the gross stock of machinery and equipment, buildings and constructions. The share of labor a on GDP in the observed period was 41%, therefore the share of capital was 59 %. The value of a share depends on the maturity of that country and in developed countries it is higher. Labor in SR is in comparison with developed countries worse evaluated (Konuki, 2008).

$$\ln Y^{pot} = OFP^{pot} + \alpha * \ln L^{pot} + (1 - \alpha) * \ln K, \tag{2}$$

The potential employment is defined as the highest value of employment without inflationary pressures. The calculation uses the indicator NAWRU (Non-Accelerating Wage Rate of Unemployment). It expresses the unemployment rate at which is growth of wages is stable. The bottom line is that wages are rising when unemployment is below the equilibrium value.

$$L^{pot} = IPP^{pot} * PP * (1 - NAWRU), \tag{3}$$

where L^{pot} is potential employment, IPP^{pot} represents the participation rate of employed population in active age to working process, PP is population in working age and NAWRU. Theoretical definition of NAWRU can be found in works of Elmeskov (1993), Holden and Nymoen (2002), Hofer (2010). Orlandi (2012) defines NAWRU as the following equation:

$$\Delta wg_t = -c_t * (U_t - U_t^{NAWRU}), c_t > 0, \tag{4}$$

where Δwg_t is wages growth in time t, U_t represents unemployment growth in time t, U_t NAWRU is NAWRU rate in time t. If the value NAWRU is not changing between two following observations, the relation (4) will be used for expression of c_t parameter for each observation separately.

$$c_t = \Delta^2 wg_t / \Delta U_t. \tag{5}$$

The NAWRU value will be calculated by substituting c_t from (5) to (4).

$$U_t^{NAWRU} = U_t - (\Delta U_t / \Delta^2 wg_t) \Delta wg_t. \tag{6}$$

Within the evolution of the Slovak machinery industry growth we paid the attention to the sectional development of AFP and to selected quantitative performance indicators in machinery industry. Quantitative indicators of business performance in machinery sector are processed on the base of the statistical classification of economic activities (NACE

Rev. 2), which is used and effective since 2008. Statistical classification of economic activities SK NACE Rev. 2 contained in the Decree no. 306/2007 of the Slovak Republic Statistical Office from the June 18th, 2007 follows-up a European Parliament regulation and Council (ES) regulation no. 1893/2006, classifies industrial production in the structure of economic activities in section "C". The entire section has divisions 10 to 33. We divided the reviewed period into three time intervals in which we expressed an individual values as averages of the periods (2000-2004, 2005-2008, 2009-2012). Industrial production is the most significant contribution to the economic growth of countries and also plays an important role in the development of developed countries. The main part of the industrial production is machinery industry. The categories CH, CK, CL of classification NACE Rev. 2, which defines machinery industry as the sum of selected divisions, classes and groups of economic activities, it is a division 25 - Manufacture of fabricated metal constructions except machinery and equipment, division 28 - Manufacture of machinery and equipment, division 29 - Manufacture of motor vehicles, trailers and semi-trailers and division 30 - Manufacture of other transport equipment.

3 Results

For adapting an indicator NAWRU in SR conditions, we used data about real wages trends and about the level of unemployment. Development of unemployment and NAWRU indicator is shown on Figure 1. According to the NAWRU theory, the growth of unemployment and wage growth are inversely proportional (Orlandi, 2012). However, if unemployment raises and at the same time the wages are growing, we can expect fluctuations in the NAWRU indicator. In Figure 2 we depict Cobb-Douglas function applied to the conditions of Slovak machinery industry, with an average utilization of production factors. The level of potential product is dependent on the basic production sources - labor, capital and AFP.

Figure 1 Development of unemployment and NAWRU indicator in SR
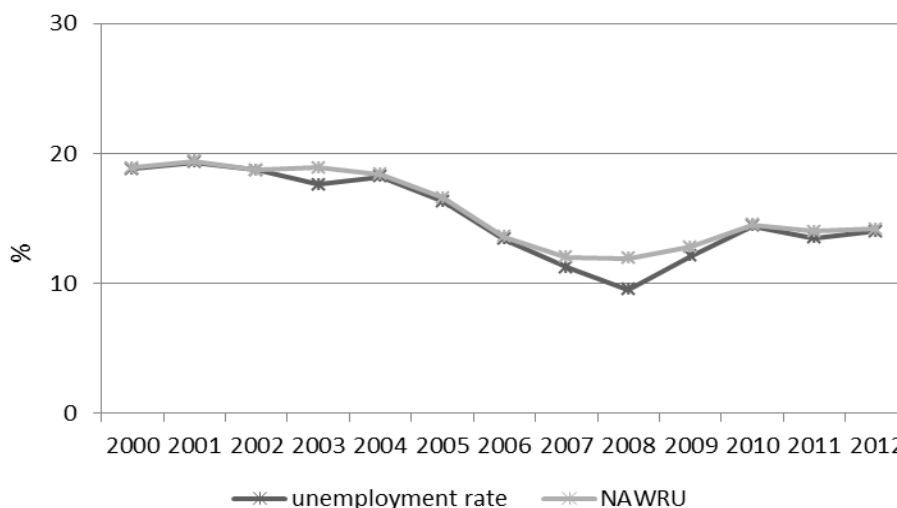
Source: Statistical Office of the SR (2013)

Calculated values of NAWRU, except years 2003 and 2008, copy the actual unemployment throughout the period under review. The higher is the unemployment rate in the country, the greater is the structural unemployment.

In 2008, Slovakia reached the lowest unemployment rate since the establishment of independence. Its value according to the Statistical Office of the SR was 9.57%, which is in absolute terms 257 500 unemployed persons. The impact of the economic crisis was reflected in the second half of 2008. The crisis began to manifest itself by reducing employees in machinery industry (especially in automotive industry) and in chemical

industry. Rapid rise in unemployment has stabilized in 2011, but now there has been reported increase in unemployment again.

Production function takes into account the structural changes in the economy of the SR which were made at the beginning of the period under review. By 2005, the growth in the machinery sector was below its potential capabilities, as well as the whole economy of the SR. The industry came to its production possibility limits one more time, in 2009. Currently, the economy of the SR together with the machinery industry is above the potential product growth level (Figure 2). Potential output growth since 2004 has been supported by increased capital accumulation in machinery enterprises. In 2009, however, there are significant economic problems in areas with traditionally high employment, not excluding the area of machinery industry. Gradually, the share of labor costs on potential output growth (a gradual increase in employment in machinery enterprises), which shows an increasing trend until the end of the period.

Figure 2 Output gap calculation using Cobb-Douglas function in the machinery sector
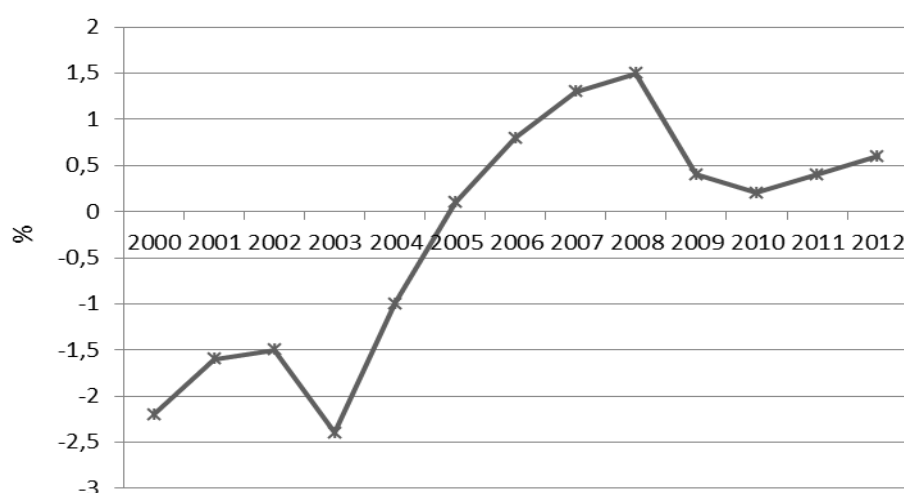
Table 1 Basic data about SR machinery sector in period 2000 – 2012

	2000 - 2004	**2005 - 2008**	**2009 - 2012**
Enterprises*	489	712	605
Revenues (mil. €)	9 875	17 610	18 025
Added value (mil. €)	1 020	2 701	2 986
Export (mil. €)	x	16 854	17 243
Import (mil. €)	x	13 598	13 128
Number of employees	78 000	120 218	110 445
Consumption of materials, energy and other non-stocking supplies (mil. €)	x	14 520	12 753
Average monthly salary (in €)	x	785	858
Returns (mil. €)	11 485	21 451	19 338
Costs (mil. €)	10 988	20 756	18 566
Asset (mil. €)	4 596	8 062	9 984
Revenues/Employees (€)	126 600	146 483	163 203
Added value/Employees	13 076	22 467	27 036
Added value/Revenue	0,103	0,153	0,166

*number of enterprises with 20 and more employees
Source: Statistical Office of the SR (2013)

During the years 2008 - 2012 is development of Slovak manufacturing production characterized by the drop in sales, revenues, employment and worsening of performance outputs. Recession, the decline in consumption and the increase in debt have a direct

impact on the enterprises functioning as the essential elements of global economy (Pukala, 2010). On the other side, the positive of development is growth of the manufacturing productivity indicators measured by the productivity parameters and value added rate (Kafková and Hudák, 2012).

Slovak Republic is among the countries of the European Union, where the values of basic indicators in machinery sector compared with industrial production are well above the average of EU-27 (Table 1). Machinery is the largest manufacturing industry sector in Slovakia. In 2012, revenues from machinery sector reached 36 % of industrial production and employment reached 32%. (SR Ministry of Economy, 2013). Machinery industry has a significant share on production and on employment across industries in SR. As a consequence of the economic crisis, machinery production in SR experienced decline in revenues and employment.

Predominance of production in the section of motor vehicles has manifested mainly at the beginning of the second half of the period under review, when along with the production of parts for motor vehicles has created 60 % of all revenues. Despite of the decline in automotive industry revenues in 2005 we can, based on the averages of individual time intervals, to evaluate the period 2005 to 2008 as a period of growth in the machinery sector (Table 1). The increase of the goods production in the industry and in other sectors helped to this growth, which partially eliminated the drop in revenues of the own machinery performances and goods.

4 Conclusions

The output gap plays an important role not only in analyzing the economic development of the country but also in the implementation of decisions relating to its future development. The calculation of potential product was influenced by the character of the time series in SR and its structural changes at the beginning of the period under review. This was also reflected on the shape of output gap curve in SR machinery industry, which resembling a sinusoid, passing from the position below the production possibilities of the industry (-2,5 % in the year 2003) to the changes over the production possibilities frontier, which is associated with the economic crisis (0,4 % in the year 2009 until 0,55 % in the year 2012) . It proves how sensitively responded Slovak industry, specifically machinery industry, on the sharp drop in demand and on a significant reduction of products exported abroad. Currently, the Slovak machinery industry is above potential output growth. This fact has its exogenous but also endogenous reasons. The exogenous reasons include the influence of economic policy of the SR government, which seeks to provide a positive economic growth by investment incentives for foreign investors. To the endogenous reason belongs stable investment expectations related to the participation of Slovakia in the EU and in the Eurozone. Positive expectations of investors are conditioned also by better economic policy of SR in comparison with other EU countries.

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Credibility Theory and Its Using In Insurance Practice

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Abstract: *The subject of this paper is to introduce the theory of credibility. Credibility theory is a set of quantitative tools that allows an insurer to estimate future premiums based on past experience of policyholder. First, risk factor for policyholders is defined. Then sorts of premium are described and the credibility premium is introduced as a linear function of the past data. The simplest credibility model, the Bühlmann model, is shown. It is tryed to use for the determination of the amount of premium. The model example is solved with the use of mathematical and statistical methods.*

Keywords: Bühlmann model, premium, theory of credibility

JEL codes: C11, C63

1 Introduction

In insurance practice it often occurs that one must set a premium for a group of insurance contracts. The insurer has information about past claim experience regarding the group itself or a large group of contracts that are more or less related. The problem is then to set up an experience rating system to determine next year's premium. The premium should be set not only on the basis of individual experience but also on the basis of collective experience (Kaas et al., 2008).

This problem can be solved by using the credibility theory. Credibility theory:

- is the mathematical tool to describe heterogeneous collectives;
- answer the question of how one should combine individual and collective claims experience;
- belongs mathematically to the area of Bayesian statistics;
- is motivated by questions arising in insurance practice (Bühlmann et al., 2005).

We try to define credibility premium and then we introduce the simplest credibility model, the Bühmann model. This model is used in computation of premium in simple example.

2 Methodology

We assume that we have observed n exposure units of past claims $\boldsymbol{X} = (X_1, \dots, X_n)^T$ for a particular policyholder. We have a manual rate μ applicable to this policyholder, but the past experience indicates that it may not be appropriate, e.g. $\bar{X} = n^{-1}(X_1 + \dots + X_n)$, as well as $E(X)$, could be quite different from μ. Should premiums for the next year be based on μ, on $\bar{X}$ on combination of the two?

The insurer must consider whether the policyholder is really different from what has been assumed in the calculation of μ, or has it just been random chance that has caused the differences between μ and $\bar{X}$ (Klugman et al., 2008).

We assume each policyholder could be characterized by a risk parameter θ. The risk parameter is not known and it is unobservable. θ could be viewed as representative of residual factors that affect the risk level. θ is changeable and varies according to the policyholder. We assume the probability distribution with probability function $\pi(\theta)$ is known. θ is a scalar parameter with distribution function $\Pi(\theta)$. It can be interpreted as a probability the proportion of policyholders in the rating class with risk parameter Θ less than or equal to θ (Θ is a random variable).

We would like to determine next year's premium. If the portfolio is homogeneous (all policyholders have identical means of claim) we can use *pure premium (collective premium)* . Pure premium is suitable when we know nothing about the individuals. Then

$$\mu_{n+1} = \mathrm{E}(X_{n+1}) = \mathrm{E}[E(X_{n+1}|\Theta)] = \mathrm{E}[\mu_{n+1}(\Theta)].$$

It is not depended on a risk parameter θ and does not use observed experience x.

On the other side is the *individual premium (hypothetical mean)* $\mu_{n+1}(\theta)$. Individual premium is justified if the portfolio is heterogeneous (policyholders have different means of claims). This premium is a function of the individual risk parameter θ. But it is impossible to determine individual premium because θ is unknown. Therefore it has been replaced by *Bayesian premium.* It uses the past data. Then it is possible to determine the Bayesian premium as

$$\mathrm{E}(X_{n+1}|\boldsymbol{X} = \boldsymbol{x}) = \int \mu_{n+1}(\theta)\pi_{\Theta|X}(\theta|\boldsymbol{x})\mathrm{d}\theta,$$

where $\pi_{\Theta|X}(\theta|\boldsymbol{x})$ is the posterior distribution.

As a compromise between these options we may ask *credibility premium*

$$P = Z\bar{X} + (1 - Z)\mu.$$

This premium is weighted average of past experience of policyholders $\bar{X}$ and pure premium μ. Z is called credibility factor, $Z \in [0,1]$. Charging this premium is justified because the portfolio is general neither completely homogeneous, nor completely heterogeneous.

3 The credibility premium

Bühlmann suggested an alternative premium in 1967 (Bühlmann, 1967). We can estimate a premium as a linear function of the past data. Consider premiums in the following form

$$Z\bar{X} + (1 - Z)\mu = \alpha_0 + \sum_{j=1}^{n} \alpha_j X_j,$$

where $\alpha_0, \alpha_1, \dots, \alpha_n$ we must choose. We minimize the square error loss to do so. That is

$$Q = E\left\{\left[\mu_{n+1}(\Theta) - \alpha_0 + \sum_{j=1}^{n} \alpha_j X_j\right]^2\right\},$$

where we use joint distribution of $X_1, X_{2,} \dots, X_n$ and Θ. Now we differentiate by α_0

$$\frac{\partial Q}{\partial \alpha_0} = \mathrm{E}\left\{2\left[\mu_{n+1}(\Theta) - \alpha_0 + \sum_{j=1}^{n} \alpha_j X_j\right](-1)\right\}.$$

We use the notation $\tilde{\alpha}_0, \tilde{\alpha}_1, \dots \tilde{\alpha}_n$ for minimized values of $\alpha_0, \alpha_1, \dots, \alpha_n$. We solve the equation

$$\partial Q/\partial \alpha_0 = 0.$$

Then we get

$$\mathrm{E}[\mu_{n+1}(\Theta)] = \tilde{\alpha}_0 + \sum_{j=1}^{n} \tilde{\alpha}_j \mathrm{E}(X_j).$$

Since $\mathrm{E}(X_{n+1}) = \mathrm{E}[E(X_{n+1}|\Theta)] = \mathrm{E}[\mu_{n+1}(\Theta)]$, we can write

$$E(X_{n+1}) = \tilde{\alpha}_0 + \sum_{j=1}^{n} \tilde{\alpha}_j E(X_j).$$

When we differentiate Q by α_j, $j = 1, \dots, n$, and equate it to 0 to get

$$E[\mu_{n+1}(\Theta)X_i] = \tilde{\alpha}_0 E(X_i) + \sum_{j=1}^{n} \tilde{\alpha}_j E(X_i X_j).$$

We can rewrite the left-hand side as $E[\mu_{n+1}(\Theta)X_i] = E(X_i X_{n+1})$ and then we have

$$E(X_i X_{n+1}) = \tilde{\alpha}_0 E(X_i) + \sum_{j=1}^{n} \tilde{\alpha}_j E(X_i X_j).$$

The system of these equations together with the equation for $E(X_{n+1})$ are called normal equations. The solution of these equations $\tilde{\alpha}_0, \tilde{\alpha}_1, \dots \tilde{\alpha}_n$ can be used to determine the credibility premium

$$\tilde{\alpha}_0 + \sum_{j=1}^{n} \tilde{\alpha}_j X_j.$$

3.1 The Bühlmann model

The Bühlmann's model is the simplest credibility model. This model considers for each policyholder that pass losses $X_1, X_2, \dots, X_n$ have the same mean and variance and that data are independent identically distributed conditional Θ (Klugman et al., 2008).

Thus, we can define

$$\mu(\theta) = E(X_j | \Theta = \theta)$$

and

$$v(\theta) = \text{Var}(X_j | \Theta = \theta),$$

where $\mu(\theta)$ is the *hypothetical mean* and $v(\theta)$ is the *process variance*. Further we define

$$\mu = E[\mu(\Theta)],$$
$$v = E[v(\Theta)],$$

and

$$a = \text{Var}[\mu(\Theta)].$$

We use μ when we don't have information about policyholders (about θ). It can be proved

$$E(X_j) = \mu,$$
$$\text{Var}(X_j) = v + a.$$

and

$$\text{Cov}(X_i X_j) = a,$$

(Klugman et al., 2008). Thus the credibility premium is

$$\alpha_0 + \sum_{j=1}^{n} \square_j X_j = Z\bar{X} + (1 - Z)\mu,$$

where

$$Z = \frac{n}{n + k}$$

and

$$k = \frac{v}{a} = \frac{\mathrm{E}[\mathrm{Var}(X_j|\Theta)]}{\mathrm{Var}[\mathrm{E}(X_j|\Theta)]}.$$

Thus determined factor Z we call the *Bühlmann credibility factor*.

Premium obtained in this way is a weighted average of the sample mean $\bar{X}$ and the manual rate μ. When n increases the formula gives more importance to $\bar{X}$ rather than μ. This corresponds to the intuitive assumption that importance of $\bar{X}$ increases when we have more past data. When we have homogeneous population with respect to the risk parameter Θ, the variance of hypothetical mean is small. Thus a is small relative to v, then k is larger and Z is closer to 0. It makes sense, because when we have homogenous population importance of μ (manual rate) increases. In the other side, when we have a heterogeneous population, the hypothetical means are more variable and Z is closer to 1. This means that when we have heterogeneous population we give more importance to the past experience of each policyholder.

4 Use of the Bühlmann model

Consider an insurance company which have two types of driver. Good drivers represent 80% of the population and bad drivers represent other 20% of the population. Good drivers have zero claims with probability 0.75, one claim with probability 0.2 and two claims with probability 0.05 in one year. Bad drivers have zero, one or two claims with probability 0.5, 0.35 and 0.15, respectively, in one year.

We can describe this process with the use the risk parameter θ.

Table 1 Probabilities for insurance company

x	$P(X = x|\Theta=G)$	$P(X = x|\Theta=B)$	θ	$P(\Theta=\theta)$
0	0.75	0.50	G	0.8
1	0.20	0.35	B	0.2
2	0.05	0.15		

Suppose the insurance company has this observation for a particular policyholder: $x_1 = 1$ and $x_2 = 0$. The insurance company wants to determine the Bühlmann estimate of Bayesian premium.

First we must compute the hypothetical means. Thus

$$\mu(G) = \mathrm{E}(X_j|G) = (0)(0.75) + (1)(0.20) + (2)(0.05) = 0.3$$

$$\mu(B) = \mathrm{E}(X_j|B) = (0)(0.50) + (1)(0.35) + (2)(0.15) = 0.65.$$

We know $\pi(G) = 0.8$ and $\pi(B) = 0.2$. Now we can determine pure premium μ and variance of the hypothetical means a

$$\mu = \mathrm{E}[\mu(\Theta)] = \sum_\theta \mu(\theta)\pi(\theta) = 0.3(0.8) + 0.65(0.2) = 0.37$$

and

$$a = \mathrm{Var}[\mu(\Theta)] = \sum_\theta \mu(\theta)^2\,\pi(\theta) - \mu^2 = 0.09(0.8) + 0.4225(0.2) - 0.37^2 = 0.0196.$$

The process variance is computed as

$$v(G) = \mathrm{Var}(X_j|G) = 0^2(0.75) + 1^2(0.2) + 2^2(0.05) - 0.3^2 = 0.31$$

$$v(B) = \mathrm{Var}(X_j|B) = 0^2(0.5) + 1^2(0.35) + 2^2(0.15) - 0.65^2 = 0.5275.$$

For the process variance the expected value is determined as

$$v = \mathrm{E}[v(\Theta)] = \sum_{\theta} v(\theta)\pi(\theta) = 0.31(0.8) + 0.5275(0.2) = 0.3535.$$

Then

$$k = \frac{v}{a} = \frac{0.3535}{0.0196} = 18.0357$$

and it gives

$$Z = \frac{n}{n+k} = \frac{2}{2 + 18.0357} = 0.09982.$$

Now we can determine the Bayesian premium. Thus

$$Z\bar{X} + (1-Z)\mu = 0.09982\frac{1+0}{2} + 0.90018(0.37) = 0.38298.$$

5 Conclusions

We met with the theory of credibility and we showed that it is very useful when we have a heterogeneous portfolio in the insurance company. We showed that we can determine premium as a linear combination of the manual rate and past data. The Bühlmann model was presented. We also showed how we can use it for determine Bayesian premium for vehicle insurance. There exist other models witch used Bayesian methods – for example Bühlmann-Straub model.

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Linkages between bonds and credit default swaps of the European financial institutions

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Abstract: *Credit default swap markets have been considered as a leading indicator of the future development of creditworthiness, which can point out the potential situation in economy. The aim of the study is to find out whether the role of credit default swap markets and bond markets has been changed by the financial crisis and the debt crisis. The attention is paid to the credit default swaps and bonds of 22 financial institutions, which are included in Markit iTraxx Europe Senior Financial index. Granger causality tests are employed in order to discover short-run causality. Findings can be favourable for all participants in the financial markets, especially for investors and regulators as a possible indicator of credit risk.*

Keywords: credit default swap market, bond market, causality

JEL codes: G20

1 Introduction

Increased attention to the credit derivatives started to be devoted after the outbreak of the financial crisis. Because of the limited availability of data for credit derivatives, most published empirical studies focus on credit default swaps primarily. Authors obtained data concerning credit default swaps directly from bank or other institutions. Since the credit default swap indices have started to emerge, the credit default swap market can be investigated by means of time series.

First empirical studies paid attention mainly to the relationship between investment grade bonds and CDS. Blanco, Brennan, Marsh (2003) published first study which investigates credit default swap prices with time series application. They found out that spreads of credit default swaps are close to bond spreads. Their next finding was that the credit default swap markets "overtake" the bond markets. In our study, we try to explore interaction between credit default swap markets and bond markets by investigation of prices and we try to confirm the theoretical statement that the credit default swap markets "overtake" the bond markets.

There are two main reasons why credit default swap markets are expected to lead the bond markets. 1) The information is reflected earlier in the credit default swap market than in the bond market. 2) Institutional features of the credit default swap markets facilitate a continuous flow of transactions, because short positions in the bond markets are more difficult to establish (Norden and Weber, 2009, p. 532).

The aim of the study is to find out whether the role of credit default swap markets has been changed by financial crisis. Theoretically, credit default swap markets are considered as a leading indicator of the future development of creditworthiness, which can point out the potential situation in economy.

2 Data and methodology

In our research, we pay attention to 22 financial institutions which are included in the Markit iTraxx Europe Senior Financial index. This index comprises 25 equally weighted credit default swaps on investment grade European entities. It covers spectrum of financial institutions e. g. banks, insurance companies, asset management companies etc. All data were obtained from Bloomberg on daily basis. We omitted financial

institutions which did not issue bonds during observed period from our research (Hannover Rueckversicherung SE, Swiss Reinsurance Co Ltd and Credit Suisse Group AG). All observed financial institutions are listed in Table 1 together with country of origin and industry.

Figure 1 Development of Markit iTraxx Europe Senior Financial index (last price, EUR)
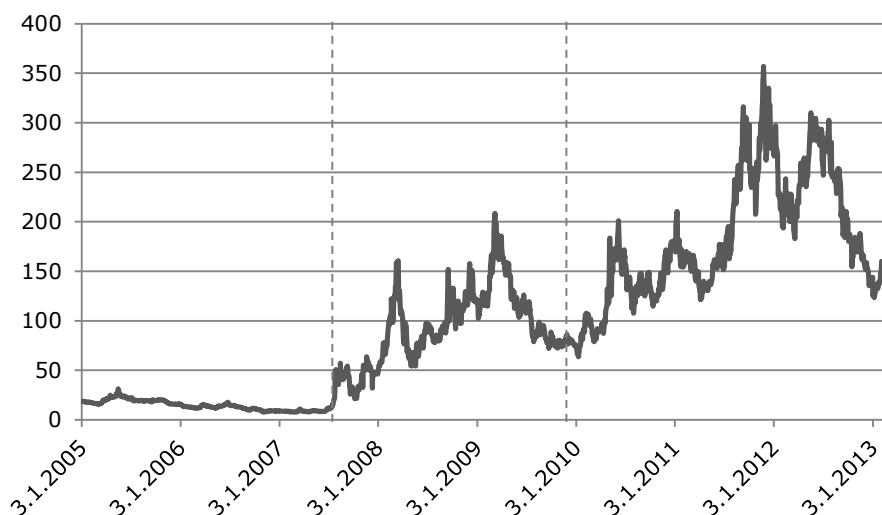
Source: Bloomberg

Table 1 Observed financial institutions

Company	Abbr.	Country	Industry
Aegon NV	AEGON	Netherlands	Insurance
Allianz SE	ALVGR	Germany	Insurance
Assicurazioni Generali SpA	ASSGEN	Italy	Insurance
Aviva PLC	AVLN	United Kingdom	Insurance
AXA SA	AXASA	France	Insurance
Banco Santander SA	SANTAN	Spain	Banking
Barclays Bank PLC	BACR	United Kingdom	Banking
BNP Paribas SA	BNP	France	Banking
Commerzbank AG	CMZB	Germany	Banking
Credit Agricole SA	ACAFP	France	Banking
Credit Suisse Group AG	CSG	Switzerland	Financial Services
Deutsche Bank AG	DB	Germany	Financial Services
HSBC Bank PLC	HSBC	United Kingdom	Banking
ING Bank NV	INTNED	Netherlands	Banking
Intesa Sanpaolo SpA	ISPIM	Italy	Banking
Lloyds TSB Bank PLC	LLOYDS	United Kingdom	Banking
Muenchener Rueckversicherungs AG	MUNRE	Germany	Insurance
Royal Bank of Scotland PLC	RBS	United Kingdom	Banking
Societe Generale SA	SOCGEN	France	Banking
Standard Chartered Bank	STANLN	United Kingdom	Banking
UBS AG	UBS	Germany	Financial Services
UniCredit SpA	UCGIM	Italy	Banking
Zurich Insurance Co Ltd	ZURNVX	Switzerland	Insurance

Source: Bloomberg

The total sample period (January 2005 – February 2013) is divided into three sub-periods according to trends in development of the Markit iTraxx Europe Senior Financial index, see Figure 1:

a) pre-crisis period (01/01/2005 – 05/31/2007),
b) financial crisis period (06/01/2007 – 10/31/2009),
c) debt crisis period (11/01/2009 – 02/28/2013).

The crisis period is understood as period of the biggest turmoil in the financial markets. Then the crisis has been transformed into a sovereign debt crisis that has not yet finished, therefore the period after the financial turmoil is denoted as the debt crisis period.

Model Specification

We employ Granger causality tests to estimate linkages between prices of bond and credit default swaps. It is employed in order to discover short-run causality. This causality test was developed by Granger (1969). General concept of Granger causality is related to prediction. In case that one time series has an influence on the second time series, the first one should help to improve predictions of the second one (Cipra, 2008, p. 439). Granger causality means only correlation between present value of one variable and past values of other variables (Brooks, 2008, p. 298). Traditional Granger causality test is defined for two time series only; in order to build a network of interactions from a collection of time series, a simple approach applies it to all possible pairs of signals (Guo et all, p. 76).

The standard Granger causality model for two variables can be represented as:

$$Y_t = \sum_{i=1}^{\rho} \alpha y_i\, Y_{t-1} + \sum_{i=1}^{\rho} \alpha x_i\, X_{t-1} + \varepsilon_t \tag{1}$$

$$X_t = \sum_{i=1}^{\rho} \beta x_i\, \Delta X_{t-1} + \sum_{i=1}^{\rho} \beta y_i\, Y_{t-1} + \varepsilon_t \tag{2}$$

where Y_t and X_t are stationary time series, ε_t is uncorrelated white noise, αx_i and βx_i are coefficients chosen to minimize σ^2, ρ is finite and shorter than the given time series (it can equal infinity but in practice, it is finite due to the length of the available data).

The null hypothesis "X does not Granger cause Y" (formula 1) or "Y does not Granger cause X" (formula 2) is rejected if the coefficients αx_i and βy_i are jointly significant.

In our research, Granger causality test tries to find if credit default swap prices do "Granger-cause" bond prices (past values of credit default swap prices improve the prediction of bond prices), and vice versa if bond prices do "Granger-cause" credit default swap prices (past values of bond prices improve the prediction of credit default swap prices). Before application of Granger causality test, the continuously compounded rates of returns (log returns) are calculated; we denote rate of return of credit default swap as R_CDS and rate of return of bond as R_BOND. We include five lags (in our case 5 days) within lag specification of Granger causality test.

3 Results

The Granger causality tests enabled us to examine two null hypotheses:

1) R_CDS "does not Granger cause" R_BOND.
2) R_BOND "does not Granger cause" R_CDS.

3.1 Full sample

Table 2 shows summary results of Granger causality tests in all periods. For full sample data, results indicate that rates of return of credit default swap of 18 financial institutions (from total 22) "Granger causes" rates of return of bond. Detailed results are shown in Table 3. Probabilities are lower than 10 % significance level in these cases, therefore the null hypothesis "R_CDS does not Granger cause R_BOND" can be rejected. The second

null hypothesis "R_BOND does not Granger cause R_CDS" can be rejected for 15 observed financial institutions.

Table 2 Summary of Granger causality test results (at 10% significance level)

Period	No. of institutions	No. of causal relationships		
		CDS -> bond	Bond -> CDS	Mutual
Full sample	22	18	15	13
Pre-crisis period	17	0	2	0
Financial crisis	22	15	5	4
Debt crisis	21	18	11	9

A unidirectional relationship from R_CDS to R_BOND was proved in three cases. It means R_CDS is strongly exogenous. Both null hypotheses can be rejected in 13 cases simultaneously; it shows that there is a backward relation (feedback) between variables. Full sample results do not indicate how the relationships between variables were changing in time, therefore our attention was paid to the particular periods.

3.2 Pre-crisis period

Almost any Granger causality was not detected in the pre-crisis period. The null hypothesis "R_CDS does not Granger cause R_BOND" cannot be rejected in any case and the second null hypothesis can be rejected only in two cases. Financial markets were quite stable during this period without doubts about creditworthiness.

3.3 Financial crisis period

In the financial crisis period, we observed 22 financial institutions. Results of the Granger causality test indicate that the null hypothesis "R_CDS does not Granger cause R_BOND" can be rejected in 15 cases, R_CDS is a strongly exogenous variable in 11 cases.

The null "R_BOND does not Granger cause R_CDS" can be rejected in five cases; only in one case is R_BOND strongly exogenous. Four relationships are mutual. Increased number of relationships can be seemed as a consequence of turmoil in the financial markets.

3.4 Debt crisis period

The number of relationships increased compared to the financial crisis period. Nine of relationships are feedback. In this period, we found 18 causal relations from 21 observed cases in total for our first null hypothesis. R_CDS is strongly exogenous in nine cases. 11 relationships were found for our second null hypothesis. R_BOND is strongly exogenous in two cases.

4 Conclusions

The aim of the study was to find out whether the roles of credit default swap markets and bond markets have been changed by the financial crisis and following debt crisis. Granger causality tests were employed in order to discover relationships in the particular periods. Our research showed that the role of both markets has changed. We found out that the number of causal relations grew during the financial crisis period and has grown in the debt crisis period. According to obtained results, the credit default swap markets can be comprehended as a leading indicator in most observed cases and as a potential indicator of increasing credit risk. It has to be taken into consideration that the results are valid in this research for financial institutions, which have the most important role in the credit derivative markets. Findings can be useful for all participants in the financial markets, policy makers and regulators. Future research of other interactions among markets is needed as research of determinants of credit default swap prices. Attention should be paid to long-run causality. The research should be applied on sovereign credit

default swaps and bonds, it could have interesting implications for all financial markets participants.

Table 3 Detailed results of pairwise Granger causality tests

Institution	Null hypothesis	Start of the period	Probability			
			Full sample	Pre-crisis	Financial crisis	Debt crisis
AEGON	CDS -> Bond	01/01/2005	6.E-07*	0.9225	0.0049*	5.E-06*
	Bond -> CDS		0.0007*	0.2212	0.0287*	4.E-05*
ALVGR	CDS -> Bond	01/01/2005	5.E-13*	0.6964	0.0016*	8.E-15*
	Bond -> CDS		0.0354*	0.2148	0.1379	0.1969
ASSGEN	CDS -> Bond	06/27/2006	6.E-10*	0.8858	0.0906$^#$	5.E-11*
	Bond -> CDS		0.7544	0.3623	0.8849	0.3021
AVLN	CDS -> Bond	01/01/2005	5.E-15*	0.7232	0.0017*	1.E-10*
	Bond -> CDS		0.3964	0.0408*	0.8063	0.0575$^#$
AXASA	CDS -> Bond	01/01/2005	2.E-05*	0.9741	0.0376*	2.E-06*
	Bond -> CDS		5.E-06*	0.7769	0.0033*	0.0001*
SANTAN	CDS -> Bond	01/01/2005	9.E-05*	0.5649	0.0724$^#$	4.E-09*
	Bond -> CDS		0.0069*	0.7952	0.2692	0.1502
BACR	CDS -> Bond	01/01/2005	4.E-09*	0.2897	0.0517$^#$	1.E-07*
	Bond -> CDS		0.0040*	0.0198*	0.2137	0.0548$^#$
BNP	CDS -> Bond	01/01/2005	0.4380	0.6626	0.0517$^#$	0.7365
	Bond -> CDS		0.5976	0.3972	0.9389	0.0024*
CMZB	CDS -> Bond	06/15/2008	0.0008*	-	0.0787$^#$	0.0005*
	Bond -> CDS		0.7384	-	0.6325	0.1019
ACAFP	CDS -> Bond	06/16/2008	0.0062*	-	0.0170*	8.E-09*
	Bond -> CDS		0.0607$^#$	-	0.4429	0.0008*
DB	CDS -> Bond	01/01/2005	0.0134*	0.4859	0.5949	5.E-08*
	Bond -> CDS		0.8018	0.7852	0.9667	0.4116
HSBC	CDS -> Bond	09/14/2005	0.0021*	0.3168	0.2539	0.0001*
	Bond -> CDS		0.0176*	0.3662	0.2993	0.3267
INTNED	CDS -> Bond	01/01/2005	5.E-08*	0.2658	0.0065*	0.0003*
	Bond -> CDS		0.0163*	0.9877	0.1718	0.0183*
ISPIM	CDS -> Bond	01/01/2005	0.0002*	0.6285	0.2763	2.E-06*
	Bond -> CDS		0.0077*	0.8531	0.1192	0.7451
LLOYDS	CDS -> Bond	01/01/2005	0.0013*	0.5449	0.2482	0.0002*
	Bond -> CDS		0.0540$^#$	0.6346	0.4337	0.7560
MUNRE	CDS -> Bond	01/01/2005	6.E-13*	0.7112	2.E-05*	9.E-07*
	Bond -> CDS		0.2457	0.4420	0.2197	0.0648$^#$
RBS	CDS -> Bond	01/01/2005	0.8166	0.4722	0.5826	0.4581
	Bond -> CDS		0.3440	0.1813	0.0012*	0.9142
SOCGEN	CDS -> Bond	01/01/2005	0.1062	0.6883	0.6101	0.0202*
	Bond -> CDS		0.0380*	0.4127	0.2260	0.9509
STANLN	CDS -> Bond	06/17/2005	3.E-11*	-	0.0460*	3.E-17*
	Bond -> CDS		1.E-05*	-	0.0010*	0.0050*
UBS	CDS -> Bond	06/28/2007	0.0002*	-	0.0140*	-
	Bond -> CDS		0.0820$^#$	-	0.2478	-
UCGIM	CDS -> Bond	01/01/2005	3.E-17*	0.9126	0.0197*	6.E-18*
	Bond -> CDS		6.E-05*	0.6407	0.0106*	0.0005*
ZURNVX	CDS -> Bond	08/28/2008	0.8787	-	0.7977	0.4171
	Bond -> CDS		0.0368*	-	0.1895	0.0631$^#$

* denotes significance at 5% level; # denotes significance at 10% level

Acknowledgments

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Alternative bankruptcy models – first results

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Abstract: *The article is focused on showing first results of two newly created (alternative) bankruptcy models. The used database contains available data of Czech companies (CreditInfo database). Based on result comparison with standardized bankruptcy models (IN 05, Z-fce) the two new models are equivalent in one case and significantly better in the second case.*

Keywords: discriminant function, alternative bankruptcy models, standard models

JEL codes: G17, G32, G33

1 Introduction

The exclusive position of bankruptcy models in financial analysis methods is out of question. However their accuracy is regularly being discussed.

The usual praxis of expressing successful predictions in percentages is more and more often supplemented or substituted with ROC curves (see later).

Two newly created alternative discrimination functions (CZ2 and FK) are presented in this article. Their accuracies are evaluated using ROC curves. Relative success of these functions is based on the comparison of their results with standard bankruptcy model benchmarks – Z function and IN05.

2 Aim and Methodology

The objective of this article is to provide the first objective view of the applicability of the new created alternative bankruptcy models (CZ2 and FK) in Czech Republic (hereinafter as CR).

The following shall be used to fullfil the above mentioned aim of this article:

a) proposal of new discriminant function (model) and empirical verification of theirs predicative ability in a full set of available data on businesses based in the CR
b) comparison of the predictive ability this new discriminant functions (models) with other bankruptcy models.

The used set of methodical instruments consist mainly of:

- literature review,
- comparison,
- analysis,
- historical analogy and
- synthesis.

The methodology of the construction of the new created models is out of the scope of this article. It does not allow us to neither present the process of financial ratios selection nor the process of calculating the weights of the models.

3 Data

3.1 Database of Businesses

All data used in this work come from the database Firemní monitor (Creditinfo Czech Republic 2010), formerly known as Albertina. It is a comprehensive database of all registered firms and organizations in the Czech Republic. It captures the basic data on more than 2,400,000 business and non-profit economic entities. It has the largest set of financial statements processed into a structured form. Only financial statements and industry classification CZ-NACE (Český statistický úřad 2011) was used.

The above suggests that as far as the data base, with which the proposed discriminant function operates, is concerned; it is basically about working with the base selection. All adjustments to this set described above follow only one viewpoint - to eliminate irrelevant data.

3.2 Data on Export and Import

Even though the source database contains basic information on more than two million entities, at least one financial statement is available for only 149,423 entities. On average, there are three financial statements - not necessarily consecutive - available for each entity. The total amount of financial statements, which meet the verification conditions stated below, is 538,162.

During the import of the database, the data redundancy in the financial statement was used to detect and sometimes also to repair the incorrect values. The set of these functions were named verification conditions. Part of the verification conditions requires that the difference between the summands and their declared sum is insignificant. One condition is also formed by the balance equation. The value of CZK 10,000 was determined as insignificant. 2.4% of financial statements did not meet the verification conditions. This article uses data from the database Firemní monitor as of March 2010. All monetary values are in thousands of CZK, unless otherwise indicated.

3.3 Selection of the Bankrupt and the Surviving

Every financial statement, which precedes the date of bankruptcy, variably depending on the selected time horizon - in this paper 720 days (min. 2 years) - was considered a bankrupt business over time. The issue of insolvency is governed by the Insolvency Act No. 182/2006 Coll. with effect from 1st January 2008. Before this date, insolvency was governed by the Act No. 328/1991 Coll., on Bankruptcy and Settlement.

3.4 Selection of Sample and Retained Data

Each financial statement prepared for the period of 12 months is considered an individual case entering the mathematical model. A randomly selected half of all cases is always used as the sample used for the calculation of the model. The other half of the retained (validation) data serves to verify the model.

3.5 Data Profile

In terms of frequency of bankrupt firms over time, the database is of the following nature. Among all financial statements, there are 1,619 firms two years before bankruptcy, i.e. 0.3%. If we limit the information ability of the group to 3, there are 1,017 bankrupt firms, i.e. again 0.3%. If we focus on the frequency of bankruptcies declared in individual years, which is the number of businesses, the database covers 32% of all bankruptcies declared in legal entities in 2009 with a gradual decrease to 12% in 2005. The database contains a total 1,863 businesses in bankruptcy, for which at least one financial statement before the date of bankruptcy exists. In addition, the database contained a sign of bankruptcy in 1,259 businesses without a date of bankruptcy - these are ceased businesses (or in liquidation for a long time) which cannot be found in the Commercial Register or ongoing insolvency proceedings. All statements of these businesses were excluded.

An unpleasant aspect of the Czech business environment is occasional huge delays between a debt that is unpaid for 30 or 90 days and the beginning of the insolvency proceedings. Delays of four years are not an exception (Klima 2009, p. 2). The result of this situation is the fact that any bankruptcy model will see the financial data with the goal to classify it as a healthy business for a time period shorter than the mentioned delay. If it classifies positively (as bankrupt), it will be penalized in the form of an error of second kind.

4 Results and Discussion

4.1 Resulting Models CZ2 a FK

The model CZ2 was obtained from the MDA analysis using the Fisher discriminant includes eight ratio indicators: CapitalReinvested, DaysPayableOutstanding, DaysSalesOutstanding, InventorySales, CashLiquidity, LiabilitiesHealthPension, ROA, InterestCoverageRatio.

The model FK was obtained by analysis of causalities between financial ratios. It includes only three ratios, which are listed in Table 2.

The coefficients of the CZ2 model for the horizon of two years are stated in Table 1. The coefficients of the FK model for the horizon of two years are stated in Table 2.

The definition of financial coefficients is based on standard approach. Exact definitions are not the goal of the article. Also beware of the coefficients mentioned in Table 1. They are to be used solely for economic interpretation not for direct evaluation from financial ratios.

Table 1 Linear discriminant model CZ2 with failure time horizon two years

Ratio	Coefficient
CapitalReinvested	0,416
DaysPayableOutstanding	-0,160
DaysSalesOutstanding	-0,103
InventorySales	-0,047
CashLiquidity	0,321
LiabilitiesHealthPension	-0,685
ROA	0,317
InterestCoverageRatio	0,340

Source: Author's construction based on data base Firemni monitor

Table 2 Linear discriminant model FK

Ratio	Coefficient
CurrentAssets/ShortLiab	2,0
CurrentLiquidAssets/ShortLiab	1,0
Inventory/ShortLiab	-1,0

Source: Author's construction based on data base Firemni monitor

4.2 Models Comparison

The output of some discriminant models such as MDA or logistic regression is x, to which it applies that the more the value approaches infinity, the higher is the probability that the correct classification of the given case. In the field of financial risk, this value is called the score. A user of these models must determine a threshold value of the score, according to which they will classify businesses as healthy or acutely at risk of bankruptcy. Each such choice implies the size of the error of the first kind (FP or false positive) (classification of a healthy business as a business at risk of bankruptcy) and the error of the second kind (FN or false negative) (classification of a business at risk of bankruptcy as a healthy business). The function, which puts both these characteristics indirectly into a relationship, is called ROC curve and is frequently used in the newer

studies on bankruptcy models (Altman, Sabato, and Wilson 2010), (Escott, Kocagil, Rapallo, and Yague 2001) and (Castro 2008).

The relation between specificity and sensitivity follows the definition in equation 1.

The accuracy of the model is defined as the area under the curve (AUC) which is related to the *Gini* coefficient G given by the equation 2 where the meaning of the symbols A and B is shown in Figure 1. Some works (Escott, Kocagil, Rapallo, and Yague 2001), (Castro 2008) use the *Gini* coefficient instead of the AUC.

The actual accuracy of the model is not directly compared to another model, but indirectly through so-called benchmark which is one version of the Z-function by Edward I. Altman.

$$
\begin{aligned}
specificity &= \frac{TN}{N} = \frac{N - FP}{N} \\
sensitivity &= \frac{TP}{P} = \frac{P - FN}{P}
\end{aligned}
$$

(1)

$$
\frac{A}{A+B} + 1 = G + 1 = 2 \cdot AUC
$$

(2)

Figure 1 ROC curve
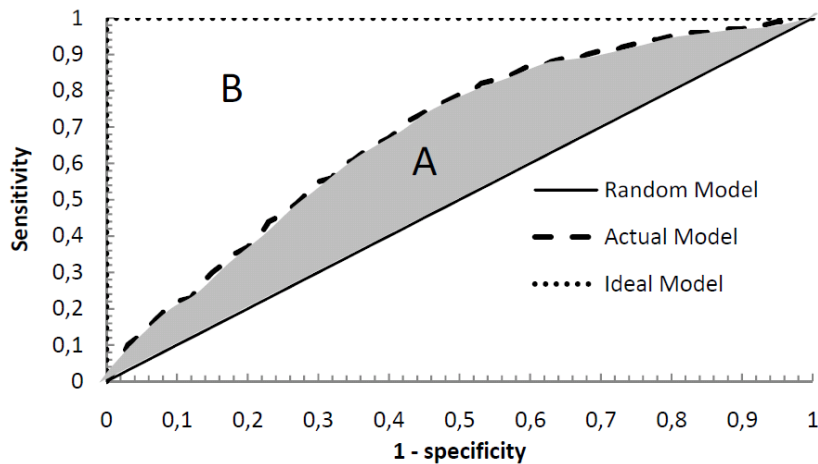
Figure 2 ROC curve model comparison on two year time horizon
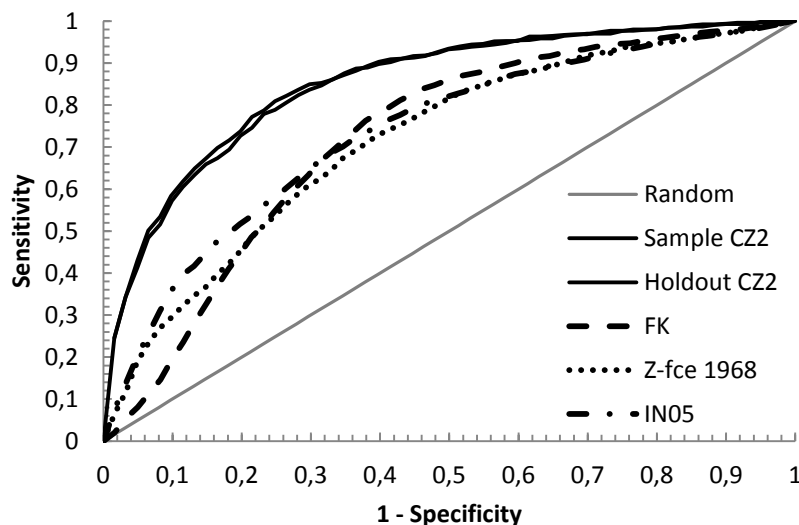
Source: Author's construction based on data base Firemni monitor

4.3 Comparison of the Resulting Models

When calculating the model CZ2, the accuracy of the model on the input sample was *Gini* = 0*.*701 and on the holdout (validation) sample it was *Gini* = 0.703. The difference is less than half a percentage point. When calculating the model FK, the accuracy of the model was *Gini* = 0.43. There is no need to use a validation sample for model FK as the weights were not directly based on the input data.

We perform the comparison of the accuracy of the model not only against the benchmark Z-function models (as mentioned in 4.2) but also against other works (Neumaier and Neumaier 2005). For the comparison only values calculated on the validation (holdout) data were used. The comparison is divided according to data source in Figure 2.

Table 3 Model comparison using Gini and AUC values on two year time horizon

Ratio	Gini	AUC
CZ2	0.703	0.852
IN05	0.500	0.750
Z-fce 1968	0.495	0.748
FK	0.434	0.717

Source: Author's construction based on data base Firemni monitor

5 Conclusions

First tests of the newly created bankruptcy models provided encouraging results. Prediction horizon in this case was chosen to be two years.

The accuracy of all the tested models using the ROC curve with AUC criterion and sorted descending by accuracy is shown in Table 3. It is clear from the results that the prediction accuracy of the newly created model is fully comparable with standard models (model FK), and also clearly better (model CZ2).

The results obtained are considered as a work in progress. The final assessment will be done after a second round of tests; this time with five year accuracy. It is appropriate to remark that the information capability of the new models is thanks to the input data base practically absolute.

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Crisis Management of Banks in the Context of Financial Crisis

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Abstract: *The aim of the paper is an analysis of impacts of the existing financial crisis on the management of a commercial bank. The present financial crisis has drawn attention to the fact that there was not created a system of management of financial institutions for the crisis period and only few rules and measures which should be applied in the case of emergency of a bank crisis were made. The absence of effective instruments to manage institutions in the period of crisis often resulted in the necessity of using public means to restore confidence in the banking sector to prevent even higher negative impacts on the real economy. The drawbacks in the sphere of instruments for solving the crisis situations of financial institutions have shown the need to create a system for an early and effective intervention in the problematic institution. At the level of regulation and supervision the measures, which are creating their own systems for solving crisis situations are simultaneously being elaborated in the management activities of the banks. To meet this aim, the influence of the financial crisis on the banking sector will be analyzed, and consequently we will analyze the impact on commercial banks in the selected parts of the EU legislation in the sphere of banking regulation. The preliminary results present the activities of commercial banks in case of early signals of crisis.*

Keywords: management of commercial bank, crisis management of bank, financial crisis, EU supervision, measures of the NBS

JEL codes: G18, G21

1 Introduction

At the beginning the European countries were rescuing the financial sector in different ways. At early stages of the crisis they initially provided financial assistance to the institutions in the form of monetary assistance and the solutions of averting local crises by accepting measures of regulation and supervision of financial markets were taken.

The result of the efforts of the central banks of the EU Member States and the ECB to support the liquidity of the banking sector was a decision of common procedure to reach the stability of financial systems (27 Member States). The agreement on renewal of the markets focused on three main areas.

The first area was the government guarantees for interbank loans. The second area was in the form of recapitalization of financial institutions in various ways, even in the form of cash injection or possible nationalization of the problematic financial institutions. The third area concerned the decision on a common deposit insurance up to EUR 100,000.

The adopted agreement is aimed at maintaining a stable financial market in terms of transparent competition. Aid must be temporary and well-targeted, with no discrimination to avoid the possible "spillover". Discrimination would include only the financial support to domestic financial institutions, excluding the foreign ones. Another common measure was the reduction of key interest rates, in particular to achieve the required bank capital.

To improve the regulation of financial markets Larossiere Commission suggested focusing on reorganization of regulation and supervision of the banking system and the problems of regulation, which the financial crisis had revealed. The aim was both to create an efficient, integrated and sustainable European system of supervision and regulation, and

to improve cooperation between the European supervisory bodies. Currently, the results of these efforts are to create a single banking supervision in the banking union.

For various commercial banks operating in the European Union, these changes have brought the changes in terms of banking supervision, as well as of an effective management of banks concerning the demands of shareholders. This has been reflected in the changes in approach to the management of commercial banks themselves. Part of this change is an expansion of the portfolio of indicators that commercial banks are required to follow in order to be considered safe for their business based on a going-on concern principle.

To meet this aim, the influence of the financial crisis on the banking sector, and consequently the impact on commercial banks will be analyzed in the selected parts of the EU legislation in the sphere of banking regulation.

2 Reasons for changes in the approach to the management of banks

In terms of the European Union at the legislative level, certain steps have been made to prevent the recurrence of financial crises. They are particularly the legal standards relating to the prudential treatment of commercial banks creating safe conditions for the banking sector.

2.1 Directive of the European Parliament and the Council

Its aim is to achieve a timely and early intervention in the declining financial companies, ensuring continuity of essential functions and minimizing the impact of decline of an institution on the financial system. In several Member States the supervisory authorities have powers to manage the bankruptcy of financial institutions. Discrepancies between the Member States in terms of crisis management raised the need to harmonize the procedures in dealing with emergencies. In 2010 the Commission adopted a plan for the crisis management framework in the financial sector, which set the timetable, specific actions, plans and tools for the comprehensive framework for the EU crisis management. Subsequently, in 2012 the European Commission adopted the "Proposal for the Directive establishing a framework for recovery and crisis management of credit and investment firms. The proposed directive deals with the impacts of the crisis to prevent significant adverse effects on financial stability, inter alia, to prevent "contagion" and to maintain market discipline, to protect public resources by minimizing extraordinary reliance of the public financial support, to prevent unnecessary spoilage and to seek the ways of minimizing the costs of crisis management, to protect depositors covered by the Directive 94/19/EC, and investors covered by the Directive 97/9/EC, and to protect client funds and property. "

The Directive enables the financial companies and the authorities responsible for crisis management to draw up plans to be used in the case of a crisis situation, such as a recovery plan and a plan for crisis management.

Recovery plan is made by the financial institution. The member States should ensure that "... the institutions included in the appropriate recovery plans and procedures to ensure timely implementation of corrective measures, as well as a wide range of recovery options" [4] and that these institutions have tested their recovery plans using a range of scenarios of financial distress.

The plan for crisis management is made by the Member States' authorities responsible for crisis management, and for each institution. The full spectrum of scenarios, including systemic crisis has to be taken into account.

2.2 Liikanen report

The report of the Expert Group of the European Commission on the structural reform of banks or also called Liikanen report, published on 2 October 2012, divided the financial crisis into 5 phases:

Phase 1 - the mortgage crisis (from 2007 to September 2008): This phase begins with bursting of the mortgage bubble in the U.S., which also caused the collapse of prices of mortgage-backed securities. Due to the loss of values of these securities, which some banks kept in large quantities in their portfolios, the banks had to endure considerable depreciation resulting in large losses. No one knew how many banks owned those bad assets, which led to mistrust in banks and greatly hurt the inter-bank market.

Phase 2 - systemic crisis (September 2008 - early 2009): At the beginning of this phase there was a crash of the international investment bank Lehman Brothers, which led to the mortgage crisis, which spread to the whole system and caused a systemic crisis. Within a few days there was a great panic and volatility in the global capital markets, which made the investors realize that even large financial giants may not always be rescued by the Government.

Phase 3 - economic crisis (2009): The major rescues and rehabilitation of the banking sector in the U.S. but also in Europe in 2008 resulted in the quiet year 2009. The prices in the financial markets began to recover and for some banks they showed gains. Although several countries approved of incentive packages, which were intended to prevent global depression, there was a significant rise in unemployment, decline in GDP and contribution of tax revenues to the state budget.

Phase 4 - sovereign phase (2010-2011): At this stage the heart of the global crisis became Europe, namely when in November 2009, the new Greek Government revealed a fair amount of debt in the country. Speculations about who might hold Greek debt started. The investors believed that most of this debt was held by the European banks, which further reduced the confidence of international investors in the European banks. The most affected small and medium-sized banks throughout Europe, especially in the troubled countries, such as Greek banks, lost the ability to operate in the capital markets. In May 2010 the European Union and International Monetary Fund decided to help Greece by the rescue package of 110 billion euro. Since Greece's rating further reduced, and thus the possibility of its return to the financial markets was unrealistic, the bailout of Greece had to be extended by further 109 billion euro. The requested financial assistance of Portugal and Ireland was made from a special rescue fund created by the EU countries.

Phase 5 - the crisis of confidence in Europe (at present): The problems in the banking sector and some EU member countries during the crisis led to the breach of trust in the European countries and the European Union as a whole. In order to remedy this trust, in June 2012 the President of the European Council, the European Commission, the Eurogroup and ECB President issued a joint report, which sets out four cornerstones of the European Monetary Union, which should be achieved in the future as "integrated financial framework, integrated budgetary framework, integrated economic policy framework and enhanced democratic legitimacy and accountability."

2.3 Vickers report

In parallel with the activities of the Liikanen Commission, the Independent Commission on Banking (led by J. Vickers) was established in the UK. Its objectives are as follows: to reduce a systemic risk, to mitigate moral hazard and to reduce the possibility of negative impact of the bank failure on the entire system. The main recommendation of the group is to introduce the so-called ring-fence, the main goal of which is separation of commercial banking from investment banking. Managing, monitoring and control of these banks would be easier.

Services could be performed only by ring-fenced banks, which would provide mandated services including the acceptance of deposits and provision of overdraft loans and payment services to individuals and small businesses. Other services would remain out of the ring-fence and their implementation should be banned from ring-fenced banks.

The Group has also proposed the ring-fenced banks to be split off from the investment banks. Defined ring-fenced part of the bank should have its own board of directors and must be legally and functionally separated from the parent bank. Capital buffer should be increased to 20% and include the equity of 10% and another 10% may be other assets, such as bonds. The largest banks should have at least 17% equity and bonds and other loss-absorbing instruments up to 3% in the case the bank supervision would be concerned about their ability to solve the crisis situation with no burden for the taxpayers. The capital may be moved from a ring-fenced bank to an investment bank, if the capital adequacy of the split-off bank does not fall below 10%.

Table 1 Comparison measures against crisis situations

	Directive of the European Parliament and the Council	Liikanen report	Vickers report
Adoption	Draft published on 6 June 2012, directive not yet	Published in October 2012	Published in September 2011
Territory	European Union	European Union	United Kingdom
Investment and commercial banking	It does not impose allocation of investment from commercial banking	Proposes mandatory unbundling dealing on its own account and other risky operations by the custodian of banks	Proposes separation of commercial banking from investment banking by the so-called. ring-fence
Capital adequacy	It does not address solvency, which is governed by Directive 2006/49/EC on the capital adequacy	Proposes massive capital requirements for unbundled investment of banks	It does not address capital adequacy
The main contribution in the field of crisis management of banks	Requirement to draw up a recovery plan living wills and introduce possible means to solve the crisis	Separation of retail from investment activities of the bank activities and strengthen corporate governance of banks	Greater protection of basic banking activities that are within the ring-fence

2.4 Risk management

Being clear from the above reports, it is necessary to prepare an effective framework for the crisis management of banks, which could prevent transfer of infection to other participants in the financial system. To be able to use this crisis management framework, the relevant government authorities should possess the instruments to be effective in the event of an emergency and should ensure financial stability and minimize losses of taxpayers.

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 the negative impact on the bank. Crisis management includes performing coordinated measures to control the damage and to preserve or restore public confidence in efficient management of a wide range of risks in the banking system during the crisis from a macro and micro point of view.

The bank's primary risk management objective is to achieve a position where it will be able to identify all significant risks it faces, to assess their potential impact and have the relevant policies to manage them effectively.

The most important categories of risk, that the bank faces, include:
• Credit risk is the risk of a loss arising from default by a creditor or counterparty.

- Operational risk is the risk of a loss resulting from inadequate or failed internal processes, people and systems or from external events; it includes legal risk, but does not include strategic and reputation risks.
- Market risk is the risk of losses in on and off-balance-sheet positions arising from the movements in market factors, i.e. prices, interest rates, foreign exchange rates, volatilities, etc.
- Liquidity risk is defined as an inability to meet bank's cash obligations as they come due because of an inability to liquidate assets or obtain adequate funding.
- Concentration risk is the risk of losses due to potential adverse consequences which may arise from concentrations in risk factors or risk types, such as the risk arising from loans to the same client, to a group of connected clients, to clients from the same geographic region or industry, etc. Concentration risk may be both intra-risk and inter-risk, and is not limited to credit risk only.
- Fraud risk is the risk of financial or reputation losses originating from the intent to defraud the bank or its entities by falsifying information or by misrepresentation by employees, existing or potential customers, or any third parties.
- Compliance risk is the risk of breaching regulatory rules and related litigation risk (with regulators or clients), financial risk (fines, compensation of damage), reputation risk and the risk of breaking corporate culture.
- Reputation risk is the risk of losses arising from failure to meet stakeholders' reasonable expectations of the bank's performance and behavior.
- Strategic and business risks are risks to earnings and capital arising from changes in the business environment and from adverse business decisions, improper implementation of decisions or lack of responsiveness to changes in the business environment.
- Macroeconomic risk is the risk of losses due to adverse changes in the overall macroeconomic environment.

The ultimate risk management body is the Board of Directors. It delegates some of its authority for particular risk management areas to respective committees (ALCO, ORCO and CRC). Currently, the Chairman of the Board of Directors and CEO also serve as Chief Risk Officer (CRO). Asset & Liability Committee (ALCO) has ultimate authority over market risk of both trading and banking books (including interest rate risk) and over liquidity risk. As for corporate credit risk, the ultimate decision making body is the Credit Committee (CRC) which consists of the members of the Board. Operational Risk and Compliance Committee (ORCO) is the authorized body to make decisions on operational risk strategies and procedures, it decides on risk appetite and tolerance levels, and decides on mitigation measures for operational risk, compliance, financial crime, and anti-money laundering issues. ALCO, ORCO, and CRC are composed of the members of the board and senior managers. Chief Risk Officer is a member of all three committees. Operating Liquidity Committee (OLC) governs the execution of liquidity management. OLC reports directly to ALCO. It analyzes the liquidity situation of the bank on a regular basis and proposes measures to be taken. OLC consists of members of Treasury, BSM and Strategic Risk Management units. Risk Appetite and Stress Testing Committee (RAST) consists of senior managers of BSM, Accounting & Controlling, and SRM. It serves as an advisory body which defines the overall risk appetite of the bank and handles all issues related to comprehensive stress testing. Risk Advisory Committee (RAC) is composed of senior risk managers and specialists from risk management areas. It analyzes overall credit risk development on a monthly basis and proposes measures and follow-ups to be taken. Watch List Committee (WLC) analyzes actual and expected credit risk development of non-retail watch list clients (closely monitored clients are typically assigned to worse rating grades). It proposes actions to be taken, including decrease of client's exposure, increase of collateral, rescheduling, etc. The members of WLC are senior managers, responsible risk managers from Corporate Credit Risk Management, Restructuring & Workout and representatives of business lines.

The structure of risk management organization consists of five crucial units:
-   Strategic Risk Management (SRM) – is responsible for integrated risk management (ICAAP), operational risk, liquidity risk, market risk (overall as well as particular trading and banking books), and credit risk control, provisioning, and credit risk statistical and rating models.
-   Corporate Credit Risk Management Division - carries out all activities concerning operative credit risk of corporate clients.
-   Retail Credit Risk Management Division – is responsible for management of credit risk for retail lending, specifically credit policy, organization of lending process, early collection process and portfolio management of the retail segment.
-   Restructuring & Workout – is responsible for effective debt recovery and write-off management. It is also responsible for monitoring, restructuring of receivables overdue, and for specific provisions and collateral management.
-   Financial Crime & Compliance – is responsible for compliance risk management (e.g. code of ethics, full compliance with legal requirements, anti-money laundering program) and for fraud risk management (prevention, detection, investigation, deterrence, and recovery of financial fraud).

The risk management function is completely independent from commercial business lines. Overall risk management has the following roles:
•   setting strategies and policies for risk management,
•   building a risk-aware culture within the bank,
•   designing and reviewing processes of risk management,
•   risk identification, calculation, measurement, and control,
•   risk reporting,
•   setting of risk premium and risk price,
•   implementation, calibrating and periodical reviewing of models for risk measurement,
•   risk management action, including risk acceptance, elimination, mitigation, limits, etc.

Crisis prevention in commercial banks has a rich variety of new regulatory actions to ensure quantitative aspect of "measuring" risk prevention. Those indicators are related to the currently approved legislative standards in the European Parliament 4/16/2013, which approved of significant pieces of legislation representing a breakthrough of steering commercial bank under the name Capital Requirement Directive IV. (CRD IV.) and Capital Requirement Regulation (CRR).

This is particularly the modification of existing and adoption of new prudential indicators of commercial banks.

$$CAR = \frac{Regulatory\ Own\ Funds}{RWA + 12,5 * (CRofMR + CRofOR)} \quad [1]$$

$$LCR = \frac{Stock\ of\ High\ Qaulity\ Liquid\ Assets}{Net\ Cash\ Outflows\ over\ nex\ 30\ days} \quad [3]$$

$$NSFR = \frac{Available\ amount\ of\ stable\ funding}{Required\ amount\ of\ stable\ funding} \quad [2]$$

3 Conclusions

The global financial crisis has forced the country to consider the way of preventing crisis situations and to propose appropriate measures. The main task of the received or proposed reforms is to strengthen the banking system to overcome another potential crisis without bailout.

The most significant measure of the European Parliament and the Council is establishing the forthcoming framework for recovery and crisis management of credit and investment institutions. Several Member States use bank resolution instruments which are applied to other entities that have become insolvent. Such an approach to the banking sector is not correct, since these standard tools do not always ensure sufficiently rapid intervention,

continuity of essential functions of banks or do not preserve financial stability. Due to the deficiencies indicated in the instruments for crisis financial institutions, the proposed directive is to create a system that will provide the competent authority tools for early and effective intervention in the credit institutions, in order to ensure the continuity of essential functions, to minimize the impact of failure on the financial stability and ensure that losses shall be borne by its shareholders and creditors.

We can conclude that, if this Directive is adopted, the Member States should follow its provisions. It cannot exclude the emergency of a banking crisis, but it would significantly help to ensure that in such a situation the participation of taxpayers would be minimal. On the other hand, the proposed European system of funding mechanisms with the above ex ante contributions from the financial institutions would also burden taxpayers, as the banks are likely to move the costs to their clients. The proposed plans should be prepared for the case of a crisis, so that recovery and crisis management plans can be effective measures against bankruptcy, but only if they are regularly updated, based on realistic assumptions, applicable in a range of scenarios and reflect the systemic importance of an institution or group.

Vickers and Liikanens reports focus on separation of investment banking from commercial one. Their main objective is to separate the most risky part of banking business from the one which deals with the insured deposits, i. e. that funds received from clients in the form of deposits, should not be used for investment in venture funds. It is evident that similar efforts in the thirties of the last century in the United States (Glass-Steagal Act) helped to deal with the consequences and repercussions of the economic crisis.

The main objective of the crisis management is to ensure such a banking sector, which would be able to finance real economy and carry out its other functions. This goal will not be achieved without restoring banks' resilience and confidence in the banking sector as a whole. The banking sector needs to become sustainable and should not rely on any special support from taxpayers. The measures, that we have analyzed, should contribute to the mentioned stability of the banking sector and set a clear framework for the financial sector ensuring all relevant authorities to be well prepared to deal with the difficulties of banks and properly handle possible bank failures.

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Cash Management in Practice

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Abstract: One of the major components of banking is commercial banking and innovation of its products. Banks in an effort to retain significant clients create new, sophisticated banking products that safeguard the bank even at the cost of lower profits, if these clients remain with her, it will make a profit through the economies of scale and creating competition to other banks. Cash Management and Cash Pooling are considered as innovative banking products. These products have been in important position in recent years. Paper is devoted to Cash Management from the sight of its provision in banking practice and the motivation of involved subjects in Cash Management in its use.

1 Introduction

Cash Management is one of the determining tasks each entrepreneurial entity has to deal with to optimize its management. The fundamental types of participants in Cash Management relations are banks and companies. These are both connected and divided by their interest in achieving higher profits, which can only be reached at the expense of another entity, either from a different category or from the same category.

A change in the amount of profit (an increase or a decrease) needs to be evaluated at the level of individual entities and not at the level of all entities within a category. Non-banking entrepreneurial entities achieve a higher profit by cost saving with a better use of financial flows, which is reflected in a reduction of used borrowed (bank's) financial means, a better use and appreciation of their own financial means.

As regards banks, there is a decrease in incomes within the entire banking sector; but individual banks increase their profits at the expense of other banks that do not offer Cash Management. Cash Management can be defined as:

- management of the available amount of money in the right place and at the right time in the necessary volume;
- cash management is related to the organization's liquidity and includes decisions on the management of cash flows in the field of its planning and monitoring;
- activities that are directly or indirectly harmonized with the organization's financial potential;
- a complex of measures and solutions following from a short-term prognosis of surplus and deficit.

There are two opposing tendencies within the relations of banks to Cash Management. On the one hand, banks are aware that they need to offer their top clients from the "blue chips" category most interesting and innovated banking products and services. On the other hand, they are aware that these offers reduce the profit made from these clients. These are also marketing strategies aimed at gaining and keeping a client – especially a client who is strategically significant. Banks perceive these costs as costs of keeping clients in the environment of growing competition and with the purpose of achieving economies of scale.

In this paper we draw mainly of the following methods: positivist research methodology, followed by the methodology of pragmatism, and on the methodology of critical rationalism, followed by economic and statistical methods to evaluate lessons learned.

2 Current situation

For an application of Cash Management, it is necessary to know basics of banking and particular banking products and services which are interconnected within Cash Management so that they form a complex banking product. This is necessary to understand the position and function of Cash Management.

The most often stated aim of banking is achievement of profits, which is also a prerequisite for a stable position of a bank at the market. A bank should not aim at profit maximization at the moment (in the short term). The amount of the achieved profit should respect a long-term perspective of the bank (long-term achievement of profit) and its permanent competitiveness.

Besides the direct achievement of profit, we can define the aims of banking as follows:

- achievement of the maximum market price of the bank or achievement and maintenance of a significant position at the banking market; these aims are closely related to the achievement of the maximum profit;
- other possible aims are banking stability, security for the client and the bank's owner, but also here the original aim of banking – profit achievement – is reflected.

The primary aim (profit achievement) has to be put in harmony with secondary aims (profitability, bank growth and goodwill). Prerequisites necessary to achieve these aims are security and liquidity of the bank. The bank has to search for a compromise between the aim of profit and security (stability).

The formation of the Eurozone enabled organizations to centralize a huge part of their cash and liquidity, not only within a state, but also on an international level. This allows for a better control of treasury operations in banks as well as businesses. At the international level, it is necessary to take into account the different currencies, legal environments, regulatory frameworks, payment systems and tax regulations in particular countries. Especially tax regulations are highly autonomous in each member state as the tax harmonization is not one of the European Union's priorities at the moment. This means that it is necessary to know all the above mentioned legal conditions and their application. Companies (also the big international ones) often have no capacity to deal with them themselves. As a consequence, they need to use sophisticated banking systems and products.

In spite of all this, the current situation within the field of banking services does not fully reflect the needs of entrepreneurial non-banking entities for sophisticated banking services and everything that is related. This is not a problem of the Czech Republic only; we can see similar tendencies in the surrounding countries. The current Czech literature deals with Cash Management only to such an extent that it states that such a phenomenon exists. Mainly the clarification of Cash Pooling and its significance and impact on economies of banks and organizations is insufficient.

Multinational holdings that operate in several countries cannot coordinate financial flows in all their subsidiaries at the same time. And these are the entities that banks' offers of Cash Management are designed for as in large volumes one can reach the necessary savings that follow from its application. Naturally, banks are also interested in non-profit organizations, organizations of the state administration and mainly self-government for which they have offers of Cash Management as well. However, this issue does not relate to multinational organizations only. This also relates to all medium-sized and mainly large companies that have their accounts in more currencies or are divided into several independent entities with their own accounts and differing financial consumptions.

The requirement concerning the information systems securing Cash Management are huge and they follow from the need to process large volumes of financial data. Banks especially have mechanisms for their monitoring and liquidity management and it is better to use these within the business sector.

The determining factors for further development of banking services, especially Cash Management, are:

- Development of information technologies. Their development and new opportunities they have brought in the last 30 years (since the mid-1980s) have enabled banks to use them fully within their offers to clients. The development of information technologies enabled the creation and development of sophisticated banking services as well as the possibility to offer banking services to a higher number of clients, mainly the development of banking for a wider range of small clients. Retail banking is directly related to a growing capacity of bank computers that are able to process a huge amount of data. This is then reflected in an increase in profits of the banking sector.

- Pressure of large clients and clients who are significant for the banks, and mainly their consultants, to use and create new and more sophisticated products that bring cost savings.

- Marketing strategies of banks that focus on gaining the market and needs of large and multinational clients who are able to bring huge profits even with the low margins, due to the low costs of services (much fewer bank employees are needed for them than for a comparable volumes and profits in the case of smaller clients). This indicates the need to offer these clients services that are attractive for them.

There are two opposing tendencies in the relations of banks to Cash Management. On the one hand, banks are aware that they need to offer their top clients from the "blue chips" category most interesting and innovated banking products and services. On the other hand, they are aware that these offers reduce the profit made from these clients. These are also marketing strategies aimed at gaining and keeping a client – especially a client who is strategically significant. Banks perceive these costs as costs of keeping clients in the environment of growing competition and with the purpose of achieving economies of scale.

These strategies are applied to gaining and keeping clients that are significantly interesting for banks. These are the clients that are related to other bank's clients or its potential clients.This all increases the significance of Cash Management as a highly innovative product of modern banking in the conditions of growing competition at the banking market.

Cash Management is in its basis formed by a combination of classical banking products. An important innovation is its part – Cash Pooling. A significant role is also played by Shared Services Centres whose use is offered by banks within Cash Management. Thanks to the interconnection and compilation of classical banking products into the resulting product offered to clients, Cash Management is considered a sophisticated banking product.

The centralized management of liquidity performed by banks for their clients (Cash Management) was created in the 1980s and the 1990s as a result of:

- pressure of top bank clients;
- demand for new, more sophisticated banking services;
- development of information technologies, fast and trouble-free connection that allows banks to offer new products;
- expansion of the clearing interbank payment system, which is considerably cheaper and faster than correspondence payments;
- implementation of "clearing centres" within bank holdings;
- initiatives of the European Commission, which in 2004 cancelled the tax on cross-border interest payment in most EU member states and thus made the real Cash Pooling more attractive; in January 2006 charges for cross-border transactions up to 50,000 EUR were reduced as they cannot be higher than charges for inter-state transactions (in both cases this concerns interbank transactions and is valid for the states of the Eurozone).

These factors made banks able to expand the range of Cash Management products (especially its determining part – Cash Pooling) for organizations. Cash Management and Cash Pooling are offered to banks' best clients, especially:

- clients who actively show interest in these products;
- as an offer during acquisitions of the clients banks are interested in;
- to keep significant clients other banks are interested in.

2 Model of Cash Management and Cash Pooling application suitability

Based on the analysis and the conducted survey, discussions with experts in banks, authors' own experience, and SWOT analysis of Cash Management and Cash Pooling, a model was designed that allows for evaluation of Cash Management and Cash Pooling suitability for a client.

The model is not to establish exactly to what extent of the client's final ranking it is suitable to apply Cash Management or Cash Pooling, but to demonstrate a bank's expected interest in the client. Each bank has its own conditions for acquisition of clients and this model aims to make their work easier. The model design will include its testing and establishment of approximate values for the suitability of Cash Management and Cash Pooling offer and application. The model results can be used as a marketing tool for acquisition of clients; the bank can demonstrate the suitability of these applications for its clients using the mathematical model.

Further, they can be used by banks' clients as a tool that declares their attractiveness for banks and also from the perspective of their clients' interests. Due to the parameters of the correlation analysis, where individual factors are put in relation to clients' savings, the model also presents the client's suitability for application of Cash Management and Cash Pooling from their own point of view, related to cost savings.

If the conditions for Cash Management to be offered are met, conditions for Cash Pooling are tested. Some conditions are repeated, they need to be evaluated separately for Cash Pooling, where the risk of active banking trades is partially included. These can be not only operating loans and investment credits but also off-balance sheet trades on the asset side and credit cards. A complex modular method was used for the evaluation itself. The method allows us to create an evaluation model for Cash Management and Cash Pooling application suited to the current needs, while keeping the needed input parameters.

After we had studied the options modular methods provide, we chose Mařík's "Complex Modular Model", which provides the best conditions thanks to its variability. The model enables the user to change individual criteria if necessary. The significance weights within the model were established based on the results of the correlation analysis. The results of the correlation analysis reached values of correlation coefficients from 0.08975 (negligible correlation) to 0.94654 (very high degree of correlations). Correlation coefficients were used for the establishment of significance weights of individual criteria within the "Complex Modular Model".

For the evaluation of Cash Management and Cash Pooling, the following factors and criteria enter the model and are specified closer if necessary based on the division between Cash Management and Cash Pooling:

- **Factors** – basic factors that are established so that they express the suitability of a client for the application, e.g. external factors, internal factors, etc.
- **Criteria** – divide the factors; the criteria that express the necessary extent of the factor are chosen: e.g. external factors include criteria such as local interest rates, inflation, client's solvency and the sector where the client is active.
- **Value of criterion** – four values are used.
- **n** – total number of criteria within the model for Cash Management or Cash Pooling.
- **RP** – increment per one degree of significance,

$$RP = c * r_1, \text{ where:} \tag{1}$$

- $c = a^x - 1.$ (2)

- **x – degree of criterion significance** (value of criterion), this number of degrees is the same for all factors. The significance of the criteria is established so that the criterion that is of the highest quality and the most suitable for Cash Management or Cash Pooling application is marked 1 and the one which is of lowest quality is marked 4.

- **a –** coefficient of scoring range (evaluating increment) for one criterion established as follows:

$$a = \sqrt[x]{\frac{r11}{r1}} \quad = \sqrt[4]{\frac{11}{1}} \quad = 1.82116. \tag{3}$$

- **r** – the final ranking of the client within the factors, based on the degree of their significance. Their sum defines the client's suitability for Cash Management and Cash Pooling application. The lower the final ranking, the more suitable the client is for their application. The final value of client's ranking for Cash Management and Cash Pooling is between 10 at minimum and 100 points at maximum (10 points were chosen), where $r_1 = 1$ and $r_{11} = 11$, at most a client can reach a value of 10 within the final ranking of client's significance.

Individual factors, criteria, their significance and weight are designed so that they express the potential bank's interest in a client in the best possible way. They were designed using mainly:

- results of the survey in the banking sector;
- author's own experience;
- conclusions and recommendations following from discussions with employees of banks who work in departments of corporate banking.
- Factors establishment was based on:
- results of the survey in banks and the business sector;
- experience from the practice;
- simplicity of their application;
- discussions with employees of banks;
- requirements the model should meet.

Weights of individual factors were assigned based on:

- results of the correlation analysis of the relationship between individual factors and the savings achieved by application of Cash Pooling, reflected in Cash Management;
- qualified evaluation of the results of the correlation analysis: experience from the practice, results of the survey in banks and the business sector and verification by regression analysis.

3 Conclusions

The conducted analyses confirmed that the company size has generally an important position within the motivation to use Cash Management and Cash Pooling and these products being offered by banks. We used Pearson's X^2 – test to verify the associations and Pearson's coefficient to determine the degree of association. Regression analysis verified that from the perspective of client's financial savings the amount of used loans and loan costs with Cash Pooling are of the highest significance.

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Polluter Pays Principle in the Czech Republic in the Context of Public Environmental Protection Expenditures

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Abstract: *In light of the significant economic, technical, and technological growths are increasingly being implemented environmental risks. In practice, there are situations where the polluter does not have enough funds to repair and implementation of financial responsibility, which then passes to the state. Remediation of damage implemented within the environmental risks are not only time consuming but also particularly expensive. In April 2004, adopted at the European level legal standard that specifically come to life two very fundamental principle of the protection of the environment, the precautionary principle and the polluter pays principle. Introduction of the polluter pays principle (PPP) causes that savings are involved and reduce public deficits. The main objectives of article include not only analysis of the implementation of PPP in the Czech legislative framework, but especially analysis of development of public environmental protection expenditures at years 2006–2010.*

Keywords: Polluter Pays Principle, environmental risks, environmental damage, public environmental proteciton expenditures

JEL codes: G22, K32, Q58

1 Introduction

Advanced economies are trying to find the right policies, concepts and measures that encourage businesses to prevent damage to the environment or at least trying to reduce their negative impact. Currently, the much debated is environmental insurance (insurance of environmental risks and environmental damage). Economic entity producing good or providing a service may affect their activities to another entity specific external effects that are unintended. This may be a positive external effect, but also the negative effect (in the environment is a frequent effect). Its activity can cause negative externalities (environmental damage). It is followed by reduction of environmental quality.

Available data on the overall impact of environmental regulations on industrial competitiveness, say it is not likely to cause a more pronounced negative impact of externalities on the environment. As for the small and medium-sized enterprises (SME), it must be said that often cause more environmental damage than would be due to their size expected, which may be due to the lack of preventive measures, and is often related resources. The amount of funding is determined by the financial health of the company. Now in the post-crisis period, the company settled with their financial problems, while still in this period had to prepare the force of law on the prevention and remedying of environmental damage.

Given the fact that SME are causing more environmental damage than large ones, it can be assumed that companies SME impacts could be significant. Undesirable side effects, such as the increase in the proportion of damage caused by SME, it would be possible to mitigate the targeted use of national support mechanisms or mechanisms of the European community aimed at introducing environmentally friendly processes in SMEs. The proposed approach to liability for damages to the environment ensures the protection of economic entities in the financial sector, which should not bear liability unless they have operational responsibility. For this reason, undesirable adverse effects on the sector, is unlikely. Assuming that will ensure legal certainty due

to the accountability and transparency should be the impact on the insurance industry especially in the longer-term positive as it gains experience in working in that mode and will create a new market for new insurance products.

Polluter Pays Principle (PPP) has become an important component of environmental policy at both the national and international level since its adoption by the Organisation for Economic Cooperation and Development (OECD) in 1972 as one of the guiding principles of environmental policies. By Smets (1993) the PPP is recognised worldwide and is referred to in national legislation, as well as in many regional and international declarations and agreements. The Principle was introduced in 1987 in the Single European Act (1987). In 1992 by the Maastricht Treaty was confirmed the adoption of this Principle by the twelve European Union Member States. Furthermore, this principle expanded in the EU Member States in the context of the new guidelines and measures. Among the most far-reaching measures include the introduction of liability for environmental damage and the adoption of Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage (hereinafter Directive 2004/35/CE) and its transposition into national legislation was in 2008.

The importance of the impact of the introduction of PPP report Tobey and Smets (1996), followed by the PPP with regard to dealing with asymmetric information (Wirl and Huber, 1998). This paper compares the polluter pays principle with the PPP in a model of one-sided externalities and asymmetric information. Even allowing for mitigation of environmental impacts through arrangements and agreements, it will not result in perfect information social optimum. Finally, it is important to mention article Mamlyuk (2010) dealing with the critiques important conceptual and practical weaknesses of the PPP.

2 Methodology and Data

In first part of this paper will be conducted searches of articles, studies, literature, and last but not least, legislation, and not only at EU level but also in the Czech Republic. Based on the findings using the search activities will be carried out comparative analysis of the findings in the study area, then it will be a synthesis of partial knowledge. Emphasis will be placed on in-depth understanding of the studied phenomenon. Qualitative research is based on an inductive approach. In third part of this paper will be analyzed the development of expenditures for protection of the environment from central sources in years from 2006 to 2010. For this analysis will by used the following methodology: basic characteristic development and elementary statistic analysis: first and second difference, growth coefficient, growth rate, increase rate, average absolute gain and average growth coefficient. Time series for the analysis are very short, so it is not possible to perform such an analysis of time series with the prediction. Data analyzed in the third part of the article will be taken from Statistical Environmental Yearbook of the Czech Republic 2011.

3 Legislative Framework at EU and CR Level

During the development approach to environmental responsibility has been considered a number of different measures and instruments. Among the most important of them at EU level include:
- community accession to the Lugano Convention;
- mode optimized for the damage transboundary;
- action by Member States, which would follow the recommendation of the Community;
- community Directive;
- liability relating to the sector, especially in the field of biotechnology, which should be inserted provisions on environmental responsibility into existing Directives in this area.

3.1 Legislative Framework at EU Level

In 2004, the EU issued a Directive 2004/35/CE. The Directive establishes a framework of environmental liability based on the "polluter pays" principle in order to prevent environmental damage and remedy. It should be emphasized that except for Directive 2004/35/CE, which implements the concept of PPP, exist International Convention on Liability and Indemnification (outside the scope of the Directive 2004/35/CE):

- the International Convention of 27 November 1992 on Civil Liability for Oil Pollution Damage;
- the International Convention of 27 November 1992 on the Establishment of an International Fund for Compensation for Oil Pollution Damage;
- the International Convention of 23 March 2001 on Civil Liability for Bunker Oil Pollution Damage;
- the International Convention of 3 May 1996 on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea;
- the Convention of 10 October 1989 on Civil Liability for Damage Caused during Carriage of Dangerous Goods by Road, Rail and Inland Navigation Vessels.

In 1992 it was adopted by the Council of Europe Convention on Civil Liability for environmental damage hazardous activities. In April 2004, also were adopted Directive 2004/35/CE with regard to the prevention and remedying of environmental damage. The basic idea of this Directive is PPP. The economic entity, whose activity has caused the environmental damage or the imminent threat of damage, is financially responsible for the damage. It is the responsibility of the objective. Strict liability is incurred, regardless of fault or absence of liability.

Liability for environmental damage is therefore governed by European Parliament and Council Directive 2004/35/CE. EU Member States were required to transpose the Directive into their national legal systems by 30th April 2007. Insurance risk to the environment is one of the fastest growing insurance sectors in Europe, which largely contributed also Directive. On the basis of this Directive shall, with effect from 1st May 2008 Czech Republic, Act on the prevention and remedying of environmental damage. The Act also lays down a duty financial security through insurance or bank guarantees for companies whose operations are defined by this Act.

Basic principles of Directive 2004/35/CE:

- The Precautionary Principle;
- PPP;
- The principle of restitution in kind.

3.2 Legislative Framework at CR Level

The legislative framework in the Czech Republic (CR) is composed of the following legislative measures:

- Act No. 167/2008 Coll. on the prevention of environmental damage and its correction and amendment of some laws;
- Decree 17/2009 Coll. Identify and remedy environmental damage to soil (risk analysis);
- Government Regulation No. 295/2011 Coll., A method for assessing the risk of environmental damage and further conditions of financial security;
- Guideline of the Ministry of Environment to implement basic risk assessment of environmental damage (of 2nd November 2012);
- Guideline of the Ministry of Environment to carry out a detailed assessment of the risks of environmental damage (of 7th May 2012);
- Law No. 17/1992 Coll., The environment, the Act No. 114/1992 Coll., On Nature and Landscape, Law No. 254/2001 Coll., On water (Water Act), Act

No. 289 / 1995 Coll., on forests and amending certain laws (the forest Act), etc.

Below we focus on the Act No. 167/2008 Coll. and basic information about the Act:

- Efficiency 17th August (delayed beyond its scheduled 30th April 2007);
- The supervisory authority is the Ministry of Environment, CEI, the NP and CHKO;
- The law regulates the rights and duties of persons for the prevention of environmental damage and the remedy, if there has been, or is threatened immediately to protected species of wild fauna and flora in natural habitats as defined by this Act, on the water or soil;
- Fills the current legislative framework, especially Law No. 17/1992 Coll., The environment, the Act No. 114/1992 Coll., On Nature and Landscape, Law No. 254/2001 Coll., On water (Water Act), Act No. 289/1995 Coll., on forests and amending certain laws (the forest Act), etc.

The firms concerned by Act No. 167/2008 Coll.:

- operation of equipment subject to an integrated permit (IPPC);
- sewage treatment plants, water treatment plants, water plants;
- manufacturing (chemicals, etc.);
- agriculture;
- transport of hazardous substances;
- incineration of waste;
- storage and disposal of hazardous wastes, etc.

According to preliminary data, the total is about 40,000 companies in the Czech Republic (some sources say up to 80,000 companies).

New Government Regulation No. 295/2011 Coll. regulates:

- the evaluation of risks of environmental damage;
- basic assessment (screening assessment including parts A to F, where the total number of points achieved greater than 50, the operator must perform a detailed evaluation);
- detailed evaluation (consuming and costly environmental risk studies),
- assessment criteria sufficient financial security (financial means to ensure the implementation of preventive and corrective measures).
- Exception: remedy environmental damage is greater 20 million CZK or ISO 14001 or program EMAS**.**

The operator, which performs operational activity listed in Annex 1 to this Act, is obliged to provide financial security for the reimbursement of costs under this Act. The effectiveness of financial security is in force from 1st January 2013.

4 Analysis of Public Environmental Protection Expenditures

In the fourth part of this paper will be analyzed the development of expenditures for protection of the environment from central sources in years from 2006 to 2010 – firstly basic characteristic development, secondly elementary statistic characteristic of development state budget expenditure on environmental protection – namely: first and second difference, growth coefficient, growth rate, increase rate, average absolute gain and average growth coefficient.

The public environment protection expenditures in 2010 amounted to higher than the CZK 28 billion. It is important to look at the evolution of these costs in the context of the potential savings that evokes the introduction of PPP in the Czech legislation. However, the potential savings from the introduction of PPP shall see, as from 2013 onwards.

4.1 Basic Characteristic Development of Public Environmental Protection Expenditures

For calculation of basic characteristic development of time series it is necessary to analyze data about development of public environmental protection expenditures (see Table 1 and Figure 1).

Table 1 Development of Expenditures for Protection of the Environment from Central Sources in years from 2006 to 2010

Year (t)	Source of expenditures			
	State budget (in mil. CZK, current prices)	State funds (in mil. CZK, current prices)	NPF* (in mil. CZK, current prices)	Total (in mil. CZK, current prices)
2006	16 252.8	2 406.0	5 172.0	**23 830.8**
2007	18 169.1	1 700.0	6 325.0	**26 194.1**
2008	11 759.2	2 049.8	5 728.0	**19 537.0**
2009	16 481.6	2 068.7	8 466.4	**27 016.7**
2010	18 473.3	4 444.7	5 921.1	**28 839.1**

Note:
*) The National Property Fund of the Czech Republic was abolished by Act No. 178/2005 Coll. as of 1st January 2006. Both its competencies and the resources used to rehabilitate old ecological burdens are now administered by the Ministry of Finance in addition to state budget.

Source: own elaboration from CENIA (2012)

The data in Table 1 shows how the amount of total public expenditure with the exception of 2008 climb to nearly 29 billion CZK in 2010. For comparison it should be noted that total public expenditure on environmental protection amounted to more than 2.43 % of the total state budget for the year 2010 (CZECH, 2009). It would seem that this is a small percentage, but in fact it is not.

Figure 1 Development of Expenditures for Protection of the Environment from Central Sources in years from 2006 to 2010

◆State budget (in mil. CZK, current prices) ●Total (in mil. CZK, current prices)
■State funds (in mil. CZK, current prices) ▲NPF (in mil. CZK, current prices)
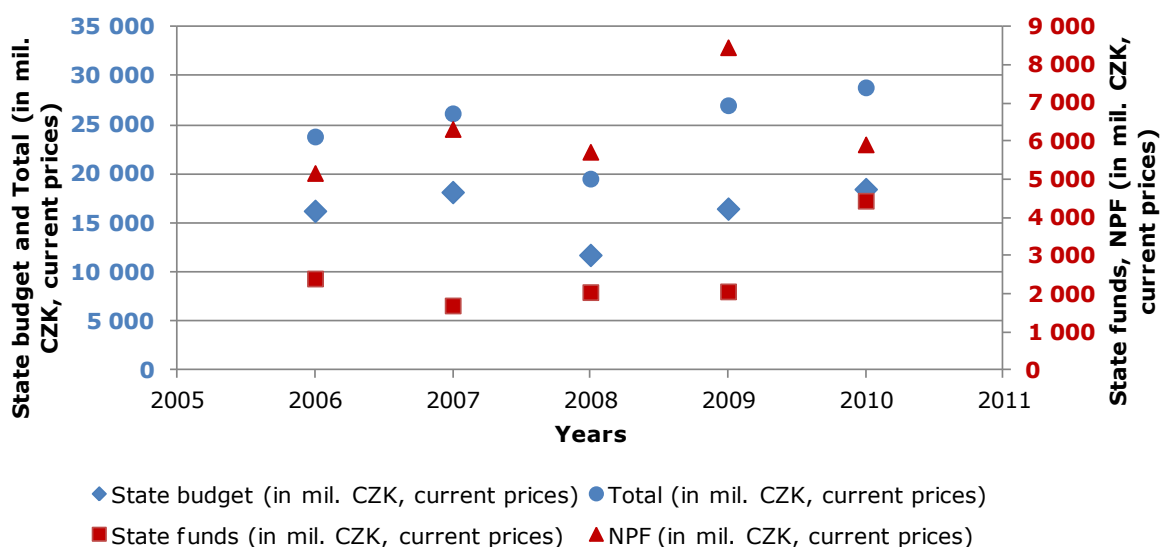
From the data presented in Figure 1, it is clear, that the development level of expenditure on environmental protection from the state budget stretches (copy it) the total amount of expenditure on environmental protection from central sources.

4.2 Elementary Statistic Characteristic of Development of Expenditures of State Budget

For elementary statistic characteristic of development of expenditures of state budget in years from 2006 to 2010 we used next six indicators near Hindls, Hronová and Novák (2000) and Tsay (2005) the first difference (absolute gain, $_1\Delta_t$), the second difference (1):

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

growth coefficient (2):

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

the growth rate (3):

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

increase rate (4):

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

are given for development of state budget expenditure on environmental protection in Table 2. In Figure 2, the development of values of first and second difference is shown.

The average absolute gain (5) and the average growth coefficient (6) are important characteristics Hindls, Hronová and Novák (2000) and Tsay (2005):

$$_1\overline{\Delta} = \frac{\sum\limits_{t=2}^{n} {}_1\Delta_t}{n-1} = \frac{y_n - y_1}{n-1}, \tag{5}$$

where n is the number of values (in this paper $n = 5$).

The results of average absolute gain is 555 125 100 CZK.

$$\overline{k} = {}^{n-1}\sqrt{\frac{y_n}{y_1}} \tag{5}$$

The results of average growth coefficient are 1.032533 (which corresponds to 3.25 %).

Table 2 Development of state budget expenditure on environmental protection in years from 2006 to 2010

Year (t)	State budget (y_t; in mil. CZK, current prices)	$_1\Delta_t$	$_2\Delta_t$	k_t	T_{yt}	δ_{yt}
2006	16 252.8	×	×	×	×	×
2007	18 169.1	1 916	×	1.117906	111.7906	11.79
2008	11 759.2	-6 410	-8 326	0.647209	64.72087	-35.28
2009	16 481.6	4 722	11 132	1.401592	140.1592	40.16
2010	18 473.3	1 992	-2 731	1.120844	112.0844	12.08

From Table 2 it is clearly shown decline in spending on environmental protection from the state budget in 2008. In 2009, the value of expenditure on environmental protection from the state budget almost back to 2006, and again in 2010, the value is only about CZK 300 million higher than in 2007. In percentage terms, the greatest decrease was monitored parameter values recorded in 2008 by more than 35 % over 2007. The biggest increase in monitored variables was recorded in 2009 by more than 40 % over 2008. Development of values of the first and second difference of these values is illustrated in Figure 2.

Figure 2 Development of values of first and second difference of state budget expenditure on environmental protection (from data of years from 2006 to 2010)
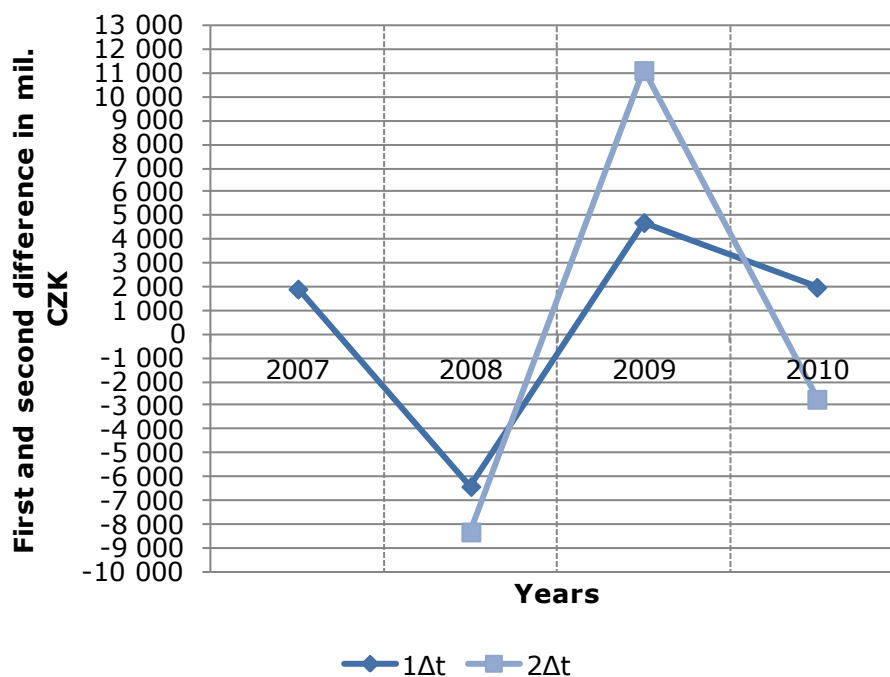
5 Conclusions

Implementation of PPP in the Czech legislative framework was in the context of regulatory measures at EU level. Gradually, therefore, leads to the empowerment of the consequences of environmental disasters from the state to the private sector. The fourth part of this paper was focused on analysis of development of public environmental protection expenditures.

The above analysis showed the evolution of public expenditure on environmental protection, focusing on detailed analysis of the development of national budgets for environmental protection. These analyzes showed that the state budget expenditure on environmental protection is still in the period grew, except in 2008. Compared with the total budget of the Czech Republic in 2010 these expenses were more than 2.43 %, which is not insignificant amount. First of all, the introduction of the principle of PPP (first-level EU, then the level of national legislation) states can save on expenditure on environmental protection from central sources several million CZK. The introduction of PPP in business practice by current legislation means for some companies mandatory financial security from 1st January 2013. The financial market in the Czech Republic deals with a mandatory financial security especially with the creation of new insurance products, commercial insurance aimed at environmental damage. For several years shows the impact of the introduction of the principle of spending from the state budget for environmental protection.

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The fundamentals of accounting for business combinations

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Abstract: Currently international accounting for business combinations is considered to be the one of the predominant features of the 21st century economy. In response to such current challenges the aim of the paper consists in an attempt to introduce the fundamentals of US GAAP and IAS/IFRS accounting for business combinations and perform their qualitative comparison. The applied methodology is based on multidisciplinary approach designed for accounting for business combinations. The conducted research indicates that for today the accounting amounts reported under US GAAP and IAS/IFRS in context of accounting for business combinations are considered to be highly relevant and comparable. Generally under both sets of Standards accounting for business combinations is realized in a sequence of four steps: first an acquirer and acquisition date are determined, then acquired assets and assumed liabilities are recognized and measured at fair value, after that a set of consolidated financial statements for combining entities is compiled, and, finally, goodwill or bargain purchase is identified and impaired. Although significant harmonization and unification have been reached in this field still some differences in accounting policies continue to remain. As the most disordered and debated topics there are considered to be accounting for goodwill, fair value measurement of non-controlling interests and impairment of intangible assets.

Key words: accounting for business combinations, US GAAP, IAS/IFRS, acquisition method, fair value measurement, consolidation, goodwill and bargain purchase.

JEL codes: M41

1 Introduction

Currently accounting for business combinations has ultimately become one of benchmarks of international accounting. Nowadays in times when world economy stroken by global financial crises and subsequent recession approaches the edge of the 7th wave of business consolidation international accounting for business combinations has become of crucial importance. For a rather long time in the financial reporting theory there has been a longstanding debate about accounting for business combinations. Such debate spread across a number of fundamental questions. The most essential ones deserve some attention.

The first question accounting society was faced with was the one about the values in terms of which the accounting for business combinations should be carried out. The proposed variants spread from simple historical values net from accumulated depreciation, through special carrying amounts and recoverable amounts, and up to fair values. The second question was about the way of presentation of combining entities' financial statements in order to promote their highest relevance, representational faithfulness and comparability. Likewise in previous case the relevant proposals varied from case to case: for some deals it was more informative and meaningful to present combining entities together as a single accounting entity with consolidated financial statements, while for others the preparation of combined financial statements was more desirable taking into account, for example, the overall unconsolidated nature preserved despite such deal. The third question was about goodwill accounting. Since accounting for goodwill emerged in a course of combination is a logical termination of fair value measurement and consolidation, the corresponding problems can be defined as derivative from the ones emerged within such primary procedures. The greatest difficulty contains in abcense of unified approach to measurement of goodwill emerged within a

business combination: although the primary sources of accounting for business combinations indicate fair value as the single amount in term of which all balance components (including goodwill) should be measured and consolidated nonetheless the original regulative framework designed for goodwill accounting indicates such values as net amount, carrying amount and recoverable amount.

In strive to find the most appropriate answers to these questions three international projects - Project on Business combinations, 1999-2008, Project on Fair value measurement, 2005-2011, and Project on Consolidation, 2010-2011- have been launched by FASB and IASB. Although Projects have substantially contributed to solution of above presented questions nevertheless they did not prosper in elimination of all existing discrepancies.

In response to current challenges for today there have been conducted numerous studies. However despite the timeliness to study the above presented problems the majority of existing studies are focused on more general issues such as the overall harmonization and convergence of US GAAP and IAS/IFRS. The findings based on works of Ampofo and Sellami (2009), Meulen et al. (2007), Rezaee et al. (2010), Zeff (2009) indicate that US GAAP and IAS/IFRS accounting generally have high value of relevance and comparability. Thus currently there is an evident lack of research dedicated to both fundamentals of US GAAP and IAS/IFRS accounting for business combinations and qualitative comparison of existing relevant authoritative pronouncements. The existing lack of such research might be explained by evident complexity and highly sophisticated nature of chosen topic.

2 Aim and Methodology

In response to current challenges the aim of the paper consists in an attempt to provide brief insight into the fundamentals of US GAAP and IAS/IFRS accounting for business combinations and perform their qualitative comparison.

The methodology for current paper is based on snowball approach comprising a number of authoritative pronouncements designed for accounting for business combinations. There are FAS 141 and IFRS 3 (R) at the core. These accounting Standards are results of 10 years of intensive collaboration between FASB and IASB and they are considered to be the primary sources of accounting for business combinations. To promote relevance, representational faithfulness and comparability of accounting information the combining entities are required to apply accounting procedures collectively known as acquisition method (FAS 141 (R), par. 1, p. 1 and IFRS 3 (R), par. 1, p. A136). Although such procedures contain the major guidance in field of accounting for business combinations, nevertheless they do not cover all aspects.

To extend and specify the basic guidance of FAS 141 (R) and IFRS 3 (R) another pair of international Standards has been chosen – FAS 157 and IFRS 13. In regard of business combinations both Standards establish complete framework for identifying and measuring the fair value of acquired assets (FAS 157, par. 5, p. 2 and IFRS 13, par. appendix A, p. 32-33). The proposed framework comprises a set of initial requirements, basic guidance for initial recognition and measurement. Thus after FAS 141 (R) and IFRS 3 (R), FAS 157 and IFRS 13 are considered to be the second major sources of accounting for business combinations.

Moving outward from the core of the imaginary snowball there can be found another pair of Standards dealing with other aspects of accounting for business combinations. To enhance the relevance, reliability and comparability of the information presented in consolidated financial statements FAS 160 and IAS 27 have been introduced (FAS 160, par. 1, p. 160-6, 160-8 and IAS 27, par. IN4, p. A705). These Standards provide basic guidance for consolidation accounting of combining entities.

The last set of questions referring to accounting for business combinations and remaining uncovered in above mentioned authoritative pronouncements constitute the scope of the

last two pair of Standards – FAS 142 and IAS 36. From the perspective of view of business combinations the Standards are aimed to provide guidance for proper accounting and reporting of goodwill emerged in a course of combination (FAS 142, par. 4, p. 8 and IAS 36, par. 2). Although opposite to previous pairs of Standards this last pair differs significantly in some accounting procedures nevertheless the overall approach for goodwill accounting is the same.

The presented above Standards are considered to be the major sources of accounting for business combinations. Here it should be stated that depending on the sequence of accounting procedures these four pair of Standards can be organized into two groups: FAS 141 (R) supplemented with FAS 157 and IFRS 3 (R) suplemmented with IFRS 13 comprise primary sources of accounting for business combinations while FAS 160 supplemented with FAS 142 and IAS 27 supplemented with IAS 36 comprise the secondary guiding notes. These pairs of authoritative pronouncements will constitute the methodology of the current paper.

3 Results and Discussion

3.1 Acquisition method

As it has been stated earlier realization of a number of mutual Projects brought substantial harmonization of corresponding accounting practices exisiting within both US GAAP and IAS/IFRS. In particular, the procedures which constitute the fisrt stage of accounting for business combinations are considered to be the best example of such harmonization and convergance. Under both set of Standards acquisition method is applied through acquisition approach, which in its turn is realized in a sequence of four steps: (1) identification of acquirer; (2) determination of acquisition date; (3, 4) recognition and subsequent measurement of identifiable assets acquired, liabilities assumed, equity transferred and goodwill or gain from bargain purchase (FAS 141 (R), p. ii-iii and IFRS 3 (R), par. IN6, IN8 p. A134).

Before these four accounting operations will take place first certain preliminary requirements have to be met. The first thing to do is to define the consolidation deal of combining entities as a business combination (FAS 141 (R), par. appendix A2-A9, p. 33-36 and IFRS 3 (R), par. appendix B5-B12, p. A154-A156). Such identification is done through meeting by both combining entities the criteria of being businesses. Other requirements for a business combination to take place are: (1) existance of the principal or the most advantageous market where an asset or a liability can be sold with the greatest volume; (2) knowledgeable and willing market participants are able to transact for the asset acquired and liabilities assumed; and (3) market price which is the most fully and non-biased reflecting the fair value of individul asset or liability (FAS 157 par. 7-11, p. 3-4 and IFRS 13, par. 8-14, p. 14-15).

Step 1. Identification of acquirer

For each business combination one of the combining entities shall be defined as an acquirer (FAS 141 (R), par. 8, appendix A10-A15, p. 36-37 and IFRS 3 (R), par. 6, appendix B14-B18, p. A156-A157). The identification of an acquirer is based on the way and structure by which the deal is taking place. In a business combination effected primarily by transferring cash or other assets or by incurring liabilities the acquirer usually is the entity that transfers cash or other assets or incurs liabilities (FAS 141 (R), par. 8, appendix A10-A15, p. 36-37 and IFRS 3 (R), par. 6, appendix B14-B18, p. A156-A157). In a business combination effected primarily by exchange of equity interests, the acquirer usually is the entity that issues its equity interests. In case of formation of a new entity to effect a business combination both Standards state that it is not necessary the acquirer and one of the combining entities that existed before the deal shall be identified as the acquirer (FAS 141 (R), par. 8, appendix A10-A15, p. 36-37 and IFRS 3 (R), par. 6, appendix B14-B18, p. A156-A157).

Additionally both Standards state that while identifying the acquirer it is necessary to take into consideration the relative size of combining entities measured by assets, revenues or earnings (FAS 141 (R), par. appendix A13, A15, p. 37 and IFRS 3 (R), par. 15a, p. A156-A157). Further the relative size of combining entities will affect the distribution of controlling power in the board of directors of newly organized entity. Thus it is another way how to determine the acquirer.

Taking into consideration above expressed approaches sometimes it is possible to define two acquirers: legal and actual. Daimler-Chrysler AG is an example. In accordance with primary legal prescriptions of both corresponding Standards the legal acquirer was Daimler-Chrysler AG and legal acquires were Daimler-Benz AG and Chrysler Corp. However, if we are talking about actual acquirer, the evaluation of the relative size of combining entities and distribution of governing power, so the actual acquirer was Daimler-Benz AG while Chrysler Corporation was the acquire and their merger turned out to be a stock swap acquisition.

Step 2. Determination of acquisition date

Both sets of Standards require the acquirer to identify the acquisition date (FAS 141 (R), par. 10-11, p. 4 and IFRS 3 (R), par. 8-9, p. A137). Generally it is considered to be the date on which the acquirer obtains control over the acquire. Technically it is the date on which the acquirer legally transfers the consideration, acquires the assets, and assumes the liabilities of the acquire. It is the date of signing the deal or the closing date. However further both Standards state that such transfer of control might be on a date that is either earlier or later than the closing date. Thus the acquisition date and the clossing date are not the same. Again Daimler-Chrysler AG might be an example. For Daimler-Chrysler AG deal the date of May 6, 1998, when Daimler-Benz AG CEO Jürgen Schremp and Chrysler Corp. CEO Bob Eaton officially signed the merger agreement to build a new entity – Daimler-Chrysler AG, granting to it the whole controlling rights of both acquires was the acquisition date. However it took another 200 days to complete the deal in regard of legal settlement. That is why the closing date is assumed to be November 12, 1998 when the first official consolidated financial report was completed on occasion of Daimler-Chrysler AG placement on NYSE 5 days later i.e. on November 17, 1998.

Step 3. Recognition of the identifiable assets acquired, liabilities assumed, and any non-controlling interest transferred

At the acquisition date according to both Standards the acquirer should separately from goodwill recognize all identifiable acquired assets, assumed liabilities and any transferred non-controlling interest in the acquire (FAS 141 (R), par. 12-15, p. 5 and IFRS 3 (R), par. 10-13, p. A137-A138).

To qualify for recognition and subsequent fair value measurement under both sets of Standards first the combining entities should meet the definitions of assets and liabilities as they are used in complience with FASB Concepts Statement No. 6, Elements of Financial Statements and IASB Framework for the Preparation and Presentation of Financial Statements.

Usually the recognition principle comprises such groups of elements as: long-term and short-term non-financial and financial assets, long-term and short-term financial liabilities, stakeholders' equity, derivative instruments, revenues and expenses [14]. The recognition in regard of: (1) long-term and short-term non-financial assets – is being compiled through depreciated and non-depreciated per asset classes in accordance with relevant Standards; (2, 3) long-term and short-term financial assets and liabilities – is being compiled through profit or loss, available-for-sale or held-to-maturity per security classes in accordance with relevant Standards; (4) stakeholders' equity – is being compiled through owner and non-owner change per equity class in accordance with relevant Standards; (5) derivative instruments – is being compiled through asset and liability per instrument class in accordance with relevant Standards; (6) revenues and expenses - is being compiled through continuing operations, discontinued operations,

extraordinary items and comprehensive income classes in accordance with relevant Standards.

Step 4. Measurement of the identifiable assets acquired, the liabilities assumed, any non-controlling interests transferred and goodwill assumed

At the acquisition date according to both Standards the acquirer should measure the identifiable assets acquired and assumed liabilities at their fair values (FAS 141 (R), par. 20-21, 59-60, p. 7, 18-19 and IFRS 3 (R), par. 18, B41-B45, p. A139, A163-A164). In regard of fair value measurement of non-controlling interests between two sets of Satndards there are some differences. US GAAP requires any non-controlling interest in the acquiree to be measured at fair value while IAS/IFRS states that for each business combination at the acquisition date the acquirer shall measure all components of non-controlling interest at either fair value or at proportionate share of its present ownership instrument in net assets acquired.

For fair value measurement under both sets of Standards there are special valuation techniques which consist with market approach, income approach and cost approach (FAS 157, par. 18-20, p. 7-8 and IFRS 13, par. 38-40, p. 23-25). The acquirer should use the most appropriate one taken into account the given circumstances and for which sufficient data is available.

Foremost fair value measurement of: (1) long-term and short-term non-financial assets - comprises general adjustments (e.g. write-offs, advance payments to suppliers) and/or adjustments referring to accumulated depreciation (e.g. amortization charges); (2, 3) long-term and short-term financial assets and liabilities - comprises only general fair value adjustments (e.g. restricted cash as asset with uncertain cash flow, long-term deferred income tax as asset with uncertain cash flow, imputed interest and discounts, customer deposits); (4, 5) stakeholders' equity and derivative instruments - comprises only general fair value adjustments (e.g. cumulative distributions to shareholders, foreign currency translation adjustments); (6) revenues and expenses – comprises two sorts of adjustments: there are general adjustments referring to restructuring of statement of change in financial position by itself and fair value adjustments referring to revaluation at fair value of particular combining entities' balance-sheet components [14].

3.2 Consolidation and Goodwill impairment

The second stage of accounting for business combinations is made up by compilation of consolidated financial statements and goodwill impairment.

Step 1. Incorporation of consolidation adjustments

In consort with relevant Standards the consolidated financial statements for any business combination are made up mainly of original assets, liabilities and business results, data on which can be derived from combining entities' pre-combination financial statements recognized and reevaluated at fair value [4, 12, 6, 11, 7, 9]. Thus such consolidated financial statements contain a number of fair value and consolidation adjustments referring mainly to: (1) intangible assets not previously recognized; (2) lease contracts of combining entities; (3) cancellation of double accounts and minority interest; and (4) restructuring adjustments.

Here it is necessary to say a couple of words about cancelation of double accounting. In accordance with US GAAP and IAS/IFRS while consolidating financial statements for business combination special attention should be paid to cancellation of double accounts. The consolidation of financial statements for business combination basically involves summing up the amounts for various financial statement items across the separate financial statements of combining entities reevaluated at fair value with adjustment the amounts resulting from such summation in order to eliminate double-counting resulting from intercompany transactions such as movements of cash, revenues, assets, or liabilities. The same cancelation should be done in regard of minority interest account of both combining entities to share in capital of each other.

Step 2. Merger modeling

In consort with relevant Standards while accounting for any business combination the merger modeling is applied. Generally it comprises: (1) determination of exchange ratio and purchase price; and (2) allocation of purchase price and goodwill impairment [7, 9, 5, 10].

The exchange ratio can be determined according to the combining entities' book or market values, earnings or some other characteristic reflecting the market power of entities. Also exchange ratio can be determined through the model made up by Larson and Gonedes (1968), which considers ex ante and ex post earnings and P/E ratios of combining entities [13].

The purchase price can be determined as the market value of capital shares of acquires converted into shares issued by acquirer. Usually such price consideration is calculated as a multiple of: (i) sales revenues; (ii) earnings before interest, taxes, depreciation and amortization; (iii) earnings before interest and taxes; and (iv) net income [14]. After the purchase price determination follows its allocation. It assumes the determination of consideration transferred by combining entities with further comparison of its value with estimated fair value of assets acquired in a course of combination and allocation to particular cash-generating or reporting units (IAS 36, par. 80-90 and FAS 142, par. 34-35, p. 16-17).

The residual value of such allocation is defined as either goodwill or bargain purchase. As it has already been stated within existing Standards there is no standardized way how goodwill emerged in a course of combination should be measured – at fair value, at net value or in terms of carrying or recoverable amount [4, 12, 6, 11, 5, 10]. The same disagreement is true for measurement and impairment of other intangibles.

Finally, the determined goodwill or bargain purchase should be further tested for impairment. Goodwill impairment refers to the procedure under which goodwill (bargain purchase) emerged in result of business combination is being tested for impairment. If the outcome of such test proves the possibility of impairment than such impairment is performed. Although testing procedures prescribed by two sets of Standards slightly differ nonetheless under both sets of Standards bargain purchase can be both impaired and amortized while goodwill can be only impaired and cannot be amortized (FAS 142, par. 18-38, p. 12-17 and IAS 36, par. 80-100).

4 Conclusions

Currently international accounting for business combinations is considered to be one of predominant features of the 21st economy. The era when accounting for business combinations was on some periphery of international accounting has gone into the past. Nowadays the world economy is on the edge of the 7th wave of business consolidation which in circumstance of world financial crisis and subsequent recession has become of crucial importance. So do the international accounting practices designed to facilitate this busines phenomenon.

The conducted research indicates that for today the accounting amounts reported under US GAAP and IAS/IFRS in context of accounting for business combinations are considered to be highly relevant and comparable. Generally under both sets of Standards accounting for business combinations is realized in a sequence of four steps: first an acquirer and acquisition date are determined, then acquired assets and assumed liabilities are recognized and measured at fair value, after that a set of consolidated financial statements for combining entities is compiled, and, finally, goodwill or bargain purchase is identified and impaired. Although significant harmonization and unification have been reached in this field still some differences in accounting policies continue to remain. The most disordered and debated topics are considered to be issues of goodwill accounting, fair value measurement of non-controlling interests and impairment of intangibles.

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Investigation of factors affecting short interest in the Australian Stock Exchange

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Abstract: *ETFs (Exchange Traded Funds) represent financial innovation that combines characteristics of mutual funds with advantages provided by continual exchange trading. ETFs shares can be also used for specific operations such as short selling or trading on margin. Because of minimal regulation the short sell interest (SI) with ETFs is several times higher than short sell interest with common stocks. There is a lack of research analyses the factors affecting the level of short sell interest with ETFs, although, we could find researches in that area focusing on common stocks. In that paper we investigate the factors that influence the level of short sell interest with ETFs in Australian Stock Exchange during the period of 2000 – the end of 2012 and if these factors change in particulars sub-periods represented before, during and after the financial crisis periods.*

Keywords: short interest, Australian Stock Exchange, short sell, ETFs, determinants

JEL codes: G10, G12, G14

1 Introduction

The ETFs represent the most active category in the family of new products called ETP or Exchange Traded Products. These products in the simple words combine advantages of continuous exchange trading with benefits that offer diversified underlying portfolio. The first ETF was introduces by the company State Street in 1993 and was called Spider or SPRD (underlying of this ETF is S&P 500 index). Nowadays ETFs are traded in all important exchanges in the Europe, Asia, Middle East & Africa and North and Latin America. State Street Company became together with iShares and Vanguard leaders in the world ETFs market.

ETFs represent open-end mutual funds that are listed in particular exchange and continuously trading during the day such as stocks. Although, the first ETFs represented particular stock index during the years they have reacted to changing market conditions. In the mid of the 2000 commodity boom emerged in markets and thus, first ETFs mimic commodities (gold, oil, silver or commodity indexes) were introduced. ETFs are also available for specific market operations like buying on margin or short sale. Short selling of ETFs is a common way of hedging or speculation in the case of pessimistic expectations. Because of lack or ETFs short selling regulation the short interest of ETFs is more than 10 times higher than for individual stocks. (Madura and Ngo, 2008)

As previous mentioned the shorting of ETFs is popular, but there is a lack of researches investigate this activity. The purpose of this paper is to identify the factors or characteristics that are attractive for short sellers and if these characteristics change during the time. The sample period is from 1st January 2000 to 31st December 2012 with the sub-periodS: 2000-2006 such as pre-crisis period, 2007-2009 for crisis and 2010-2012 such as post-crisis period. We empirically investigate these determinants in Australian Stock Exchange because represents one of ten exchanges in the world that makes information about short sale resp. short interest publicly available.

Although, there existed studies investigate why some stocks are more attractive for short sale than others, there is a lack of this investigation for ETFs. It is also important to note that ETFs must be examined in different manners because some determinants are different. Some of them are usefull in investigation of stocks but are not available or

usefull for ETFs e.g. fundamentals-to-price ratios resp. company fundamentals and on the other hand replication strategy or asset class focus must be taken into account.

Table 1 Determinants

Variable	Name	Description
SIR_{it}	Short interest ratio	The total number of shares an investor has sold short divided by the average monthly trading volume for a specific period
ASS_{it}	Assets in funds	Asset value of the ETF per month
$Price_{it}$	ETF close price	Closing price
$Volu_{it}$	Trading volume	Mean trading volume of the ETF per month
$MarCap_{it}$	Market capitalization of ETF	Mean market capitalization of ETF per month
$Shares\_out_{it}$	Shares outstanding	Total number of shares outstanding of ETF per month
$Vola_{it}$	Volatility	The 90-day price volatility equals the annualized standard deviation of the relative price change for the 90 most recent trading days closing price, expressed as percentage
$Beta_{it}$	Raw Beta of ETF	Volatility measured of the percentage price change of the ETF given a one percentage change in a representative index
$Return_{it}$	ETF rate of return	Recent performance of ETF measured as a daily return on ETF
$Price-1D_{it}$	Previous day ETF close price	Previous day closing price of ETF
$Domicile_i$	Country of domicile (Dummy variable)	1 if Australia, 0 if North American
$Replication_i$	Replication strategy of ETF (Dummy variable)	- rep_der$_i$: 1 for derivative, 0 for others - rep_full$_i$: 1 for full, 0 for other - rep_opt$_i$: 1 for optimized, 0 for others derivative: using derivatives full: physically backed - full sample optional: physically backed - partial sample
$Creation_i$	Creation-redemption process of ETF (Dummy variable)	- inkind$_i$: 1 for in-kind, 0 for others - cash$_i$: 1 for cash, 0 for others - combination$_i$: 1 for in-kind/ cash, 0 for others
$Fund\_Asset\_Focus_i$	Asset focus of ETF	- equity$_i$: 1 for equity, 0 for others - debt$_i$: 1 for debt, 0 for others - asset_allocation$_i$: 1 for allocation, 0 for others
$Fund\_Cap\_Focus_i$	Capitalization focus of ETF	- large$_i$: 1 for large, 0 for others - mid$_i$: 1 for mid, 0 for others - multi$_i$: 1 for multi, 0 for others - small$_i$: 1 for small, 0 for others

Dechow et al. (2001) suggest that stocks with low fundamentals-to-price characteristics are more attractive for short sellers. Angel et al. (2003) look at short selling on Nasdaq and introduce 6 findings. For our research three of them are interesting: (1) short selling is more common among stocks with high returns than stocks with weaker performance, (2) actively traded stocks experience more short sales than stocks of limited trading volume and (3) short selling varies directly with shares price volatility. Kot (2007) tests explanations of short-sale trading in NYSE and Nasdaq stocks during the period 1988 – 2002 with results that short-selling activity is positively related to arbitrage opportunities and hedging demand, and negatively related to previous short-term return. Further, option listing is the most dominant variable in explaining the short-selling level and the

short-selling level is more positively related to convertible debt and option listing during the bubble period because these was more space for arbitrage opportunity. McKenzie and Henry (2012) focus on determinants of short selling during the trading day in Hong Kong stock market and find out those dividend payments, company fundamentals, option trading, interest rate spread and past return are significant determinants of short selling. But not all of mentioned determinants can be taken into account in investigation of these for ETFs. For the first time short sale with ETFs examine Madura and Ngo (2008) and set determinants of short sale for ETFs in AMEX in the period 2001 - 2004. They determine that sector-based ETFs have large short interest level and international ETFs have an unusually small short interest level. This level is also larger for ETFs with higher trading volume and lower market capitalization.

2 Methodology and Data

Using Bloomberg ETPs screen by Exchange, we choose Australian Securities Exchange and limited all available ETPs only in ETFs. As of January 2013 there are 69 ETFs fulfilling the imposed criteria. We chose the base our analysis on monthly observations from January 2000 to December 2012 thus we collected 10.764 observations.

Model Specification

The investigation of determinants of ETFs short sale interest (activity) is based on the multivariate model:

$$SIR_{it} = \alpha + \beta_1 Ass_{it} + \beta_2 Price_{it} + \beta_3 Volu_{it} + \beta_4 MarCap_{it} + \beta_5 Shares\_Out_{it} + \beta_6 Vola_{it} + \beta_7 Beta_{it} + \beta_8 Return_{it} + \beta_9 Price - 1D_{it} + \beta_{10} Domicile_i + \beta_{11} rep\_der_i + \beta_{12} rep\_full_i + \beta_{13} rep\_opt_i + \beta_{14} inkind_i + \beta_{15} c\square sh + \beta_{16} combination + \beta_{17} equity_i + \beta_{18} debt_i + \beta_{19} asset\_allocation_i + \beta_{20} large_i + \beta_{21} mid_i + \beta_{22} multi_i + \beta_{23} small_i$$

Investigation is applied for the whole period for the first and then for three sub-periods corresponding with pre-, during and post-crisis periods. The models are tested using OLS regression and Breusch-Pagan test for heteroscedasticty.

Results of investigation short interest determinants are summarized in the Table 2. The main factors influencing short sale interest in the full sample represent variables: shares outstanding, inkind or cash (variable about create/redeem process), debt (variable concerns about ETFs asset focus) large and small (variable concerns about ETF capitalization focus). The variable shares outstanding is positive and significant for the full sample, short seller choose ETFs with high level of shares outstanding, in this case short sellers do not deal with recall risk with ETFs or problem of short squeeze. We founded out that that creation-redeem process is also significant. ETFs with in-kind process are positively related to short interest and ETFs with cash creation redeem process are negatively related to this dependent variable. The variable debt represents ETFs focused on debt instruments is positive and significant. The variable concerns fund capitalization focus is significant and negative for large and small capitalization. The coefficient of determination is high (89,57 % and 88.92 %, respectively).

In the sub-periods 2000-2006 and 2007-2009 are missing some results because of singularities. The coefficient beta that measures sensitivity of ETFs in a particular market index is significant in both sub-periods with inverse effect. The coefficient of determination is significant for both sub-periods (97,79% resp. 93,32% and 98,43% resp. 97,97%).

For the period 2010 – 2012 (post-crisis period) we get results similar to the full sample period analysis. Number of shares outstanding is significant and positive determinant. Similar results for creation/redeem process where in-kind created ETFs are positive and significantly related to short interest level compare to cash create/redeem process that is negative and significant. According to ETFs asset focus debt focus ETFs are significant and according to ETFs market capitalization focus large ETFs are positively related and significant resp. small ETFs are negatively related and significant to short interest level.

Table 2 Results

Variable	Full Sample	2000 – 2006	2007 – 2009	2010 - 2013
Constant	6.719e+03 (7.850e+03)	3.580e+04 (2.081e+03)	3.885e+04 (1.170e+02)	4.614e+03 (8.759e+03)
ASS_{it}	4.048e+01 (5.540e+01)	-3.999e+01 (2.910e+01)	-3.427e+00 (9.720e+00)	7.280e+01 (6.139e+01)
$Price_{it}$	9.118e+01 (5.198e+02)	-6.307e+01* (3.490e+02)	7.739e+00 (1.127e+02)	7.592e+02 (6.780e+02)
$Volu_{it}$	-7.897e-05 (4.065e-04)	-3.141e-05 (1.872e-05)	-8.6008-07 (1.281e-05)	-1.747e-04 (5.331e-04)
$MarCap_{it}$	-6.497e+01 (5.534e+01)	3.425e+01 (2.259e+02)	-4.161e-01 (9.908e+00)	-1.079e+02* (6.152e+01)
$Shares\_out_{it}$	3.058e+02*** (5.671e+01)	6.393e+01 (2.559e+02)	5.163e+02*** (3.769e+00)	8.600e+02*** (1.123e+02)
$Vola_{it}$	6.407e+01 (4.441e+01)	-4.961e+00 (1.048e+01)	2.200e+00 (1.861e+00)	3.058e+01 (8.108e+01)
$Beta_{it}$	-1,406e+03 (1.467e+03)	-1.092e+03** (4.027e+02)	4.684e+02*** (6.718e+01)	-1.068e+03 (1.815e+03)
$Return_{it}$	-6.041e+03 (1.409e+04)	1.328e+04* (6.744e+03)	3.308e+02 (2.037e+02)	-2.188e+04 (2.290e+04)
$Price-1D_{it}$	2,106e+01 (5.198e+02)	8.333e+02** (4.059e+02)	6.908e+00 (1.181e+01)	-2.657e+02 (6.705e+02)
$Domicile_i$	-	-	-	-
$Replication_i$				
rep_der_i	-	-	-	-
rep_full_i	-3.559e+03 (7.567e+03)	-	-	-8.502e+03 (8.347e+03)
rep_opt_i	-3.499e+03 (7.865e+03)	-	-	-4.280e+03 (8.637e+03)
$Creation_i$				
$inkind_i$	3.204e+04*** (1.784e+03)	-	-	1.829e+04*** (3.002e+03)
$cash_i$	-6.304e+03** (3.084e03)	-	-	-7.433e+03** (3.396e+03)
$combination_i$	-	-	-	-
$Fund\_Asset\_Focus_i$				
$equity_i$	-	-	-	-
$debt_i$	4,073e+04*** (3.921e+03)	-	-	1.970e+04*** (4.118e+03)
$asset\_allocation_i$	-3,544e+04 (5.072e+03)	-	-	-8.501e+03 (5.795e+03)
$Fund\_Cap\_Focus i$				
$large_i$	-2,297e+04*** (2.174e+03)	-	-	2.120e+04*** (2.406e+03)
mid_i	-	-	-	-
$multi_i$	-	-	-	-
$small_i$	-4,258e+03** (2.088e+03)	-	-	-5.450e+03** (2.303e+03)
R-squared	0.8957	0.9479	0.9843	0.8909
Adjusted R-squared	0.8892	0.9332	0.9797	0.8812

Note: *, **, and *** indicates significance of 90%, 95% and 99% level, respectively. Standard errors in parentheses

3 Conclusions

In the paper we examined the short sale with ETFs and the factors that influence investor activity with these products. Our analysis investigated main determinant of short interest resp. short sell activity in the Australian Stock Exchange in the period of the 2000 – 20012 and in particular sub-periods correspond with (pre-crisis, crisis and post-crisis development). We introduced basic determinants that influence the level of short interest.

Acknowledgments

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Public Contracts in Czech Teaching Hospitals - efficiency issues

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Abstract: *The average overall expenses spent on health-care services in the Czech Republic is 7.5% of the GDP. The estimated degree of inefficiency of these expenses is the serious issue in context of public finance. The goal of the text was to verify whether the efficiency can be increased in the area of public procurements in teaching hospitals by using the specific kind of public procurement procedures. Data revealed that the more transparent and more open procedures enable the higher reduction of final prices. It implicates some interesting economic and political consequences.*

Keywords: teaching hospitals, efficiency, public expenditures, public procurement

JEL codes: I18, H57

1 Introduction

Health-care systems are currently trying to resolve two basic problems: fluctuations in revenue and the continuous growth of expenses. The increasing expenses are caused by medical procedures, new medicines, the ageing of the population, increasing expectations on the part of the general public and also the ineffective spending of resources. The degree of inefficiency of the expenses spent on health-care services in the Czech Republic is estimated at 20% (Czech Ministry of Health, 2009). The average overall expenses spent on health-care services in the Czech Republic amounts to 7.5% of the GDP (it is slightly lower than the EU average), while the share of *public* expenses on health-care services in the Czech Republic is higher in comparison with EU states and amounts to 84% of the total expenses.

The goal of the text is to verify whether the efficiency can be increased in the area of public procurement in teaching hospitals. The first step leading to an increase of efficiency of the use of public resources is the identification of the factors that influence the effectiveness of public contracts represents. If a certain type of public contract will appear to be more effective and if there will be no other obstacles to its use on a more massive scale, then a practical recommendation can be expressed in the area of the structure of public contracts. Theory and the existing empirical research favour this conclusion.

2 Public contracts in Hospitals

The volume of public resources spent in health care in the Czech Republic arouses the interest of many economic subjects to participate in the use of these resources. In theory this means an increase in competition in the given area and the opportunity to increase efficiency. With regard to the aforementioned degree of inefficiency of the resources spent in health care it is evident that for reasons specific to health-care services (Arrow, 2001; Stiglitz, 1997; Williams, 1997) and due to the unsuitably configured control mechanisms, not even the considerable number of subjects in health-care services has a positive effect on the growth of competition and thus the growth of efficiency.

One of the sources of the ineffective use of public resources in health care in the Czech Republic is the public contracts implemented in hospitals. Newhouse (1970) for example, deals with the possibilities of the effective management of hospitals, stating that the management of a hospital is considered to be effective if it achieves the maximum combination of quality and quantity with the fewest possible expenses. According to Dlouhý and Strnad (1999) it is possible to evaluate the effectiveness of hospitals

according to results and outputs. The results are monitored using the QALY, DALY and ADL indicators while output can be evaluated according to performance indicators and according to financial indicators (financial analyses). A standard financial analysis is also used for evaluating hospitals, though the economic result of a hospital depends on the effect of several factors that the hospital is not able to influence (the structure of the sickness rates, i.e. the number and types of diagnoses, the structure of patients, the finances allocated from health insurance, etc.). Hospitals can, however, influence the public procurement method.

Attention has not yet been given to the theoretical reflection of public contracts in health care in either Czech or foreign trade journals. There may be a number of reasons for this:

1. The issue of public contracts in health-care services is part of the problem of public contracts.
2. The volume of funds spent on public contracts in hospital is low compared to the overall expenses in health-care services. The degree of inefficiency and the related corruption in the area of public contracts in health-care services is small due to the functioning of control mechanisms, legislation, etc. This reason does not rule out the existence of corruption in health care services, though it does not put it in direct relation to public contracts. The problem of corruption in health care services is generally a worldwide problem, though it is connected more with the preferential exploitation of health care in selected health-care facilities or with drug policies (Vian 2008; Lewis 2006; Tanzi 2002).

The importance of hospitals in health-care services can be seen from their specific function and from the fact that they consume a considerable part of the overall volume of finances earmarked for health-care services. See table 1 in for more details.

Table 1 Spending On Health-Care Services (Billions Of CZK)

Year	Total Spending	Public Spending	Spending on Hospitals from Total Spending on Health-Care in %
2006	226.810	197.027	49.9
2007	241.935	206.563	50.9
2008	264.520	218.719	51.2
2009	291.640	243.692	45.3
2010	289.035	243.281	47.7
2011	288.572	242.410	47.3

Source: Information system of public procurements (2013)

Hospitals are usually defined as institutions that are authorised to provide a certain type of health care and, that have a certain number of beds and an organised team of doctors (Dlouhý and Strnad, 1999; Mc Kee and Heally, 2003). Thanks to the absence of a profit motive (in a certain part of health-care services) not enough pressure to lower spending while increasing the quality of the services provided is placed on the management of the hospitals. Hospitals have special needs for equipment, both technical and operational, and staff. Teaching hospitals represent a specific important part of the health-care system for reasons of medical research and for reasons of providing highly-specialised health care and the high expenses related to this. There were 11 teaching hospitals in the Czech Republic up to the year 2011. In 2012 two hospitals lost the status of teaching hospital with specialised care even though they have clinics of exceptional standing. The merging of two teaching hospitals in Brno is planned for 2013, which would lead to a decrease in the number of teaching hospitals to eight. For overview see Table 2.

Health-care facilities in the Czech Republic usually have the character of "contracting authority" which means that when purchasing goods, services and fixed assets they have to adhere to the Act on Public contracts. Non-adherence to this Act, combined with the insufficient use of the contracting method, usually means that the price for the public

contract will be higher (Pavel, 2007). Increasing the transparency of the process for selecting subcontractors for public contracts can contribute to lowering the public expenditures.

Table 2 Teaching Hospitals (TH) – Overview

Year	Total Spending on Hospitals (Billions of CZK)	Spending on Teaching Hospitals (Billions of CZK)	Share of Spending on TH (%)	Number of Beds in Teaching Hospitals	Share of Beds in TH (%)
2006	113.18	39.46	34.86	16231	25.29
2007	123.14	42.74	34.71	16167	25.40
2008	135.43	46.09	34.03	16129	25.50
2009	132.11	50.33	38.10	15868	25.22
2010	138.74	52.08	37.54	15725	25.27
2011	136.49	52.79	38.68	15505	25.70

Source: Ekonomické informace ve zdravotnictví (2011)

3 Formulation of hypotheses

The objective of the analyses of public contracts realised in Czech teaching hospitals in the years from 2006 to 2011 is to determine the factors that influence the size of the final (explained variable) prices for the public contracts.

The amount of the resulting price is partly influenced "ex ante" (e.g. by the selection of qualification criteria limiting entry to the tender for a greater number of subcontractors or by choosing the type of proceedings) and partly "ex post" (the price is influenced by supplements to the concluded contracts) (Pavel and Sičáková-Beblavá, 2012). Due to accessibility of appropriate data the only the factors influencing the price "ex ante" are the subject of this text's investigation. The following hypotheses were inferred on the basis of the aforementioned considerations:

1. The tender price realised in Czech hospitals depends on the number of contractors applying for the public contract (and the type of proceedings).

2. The tender price in the expected price for the public contracts realised is influenced by the type of the contract.

Under some reasonable conditions (Pavel and Sičáková-Beblavá, 2012) the ratio of final (after a negotiation) price to initial (before a negotiation) prices (r = P1/P0) of public contracts is a good measure of efficiency of public contracts. There is some historical evidence that high negotiation power on the supply side of markets (or lower market competition level among suppliers) induces the higher final price (p1) and lower efficiency of contract (Ochrana and Maaytová, 2012). On the other hand the overall process transparency can lead to lower final price (Varian, 1992).

Type of public procurement which is depending on the procedure applied is a good proxy for the relevant market characteristics. Types of public procurement depending on the procedure applied are classified as follows (EU, 2012):

a) Open procedure contracts (dummy OPEN in analysis later) - The contracting authority invites an unrestricted number of applicants to submit tenders for the public contract. It is supposed to be most transparent with high level of competition.

b) Some kind of restricted procedures. It consists of announced contracts, negotiation without publication contracts, etc.). The contracting authority directly invites one or more suppliers to negotiations. It is supposed to be least transparent, with the low level of competition.

According to implication derived from previous literature it is suitable to divide the contracts depending on what is to be supplied. The most common contracts are the

public contracts for supplies, where the items are demanded. The public contracts for building works are those, where the performance of building work or the construction of buildings is demanded. The residual category is labelled as contracts for services and is covering everything else.

4 Description of data and basic statistical analysis

According to the Czech law all public contracts have to be recorded through the www portal to the database. The individual data are then (after some minor manipulation) ready for statistical or other analysis. The overview of analysed data is in Table 3. After initial examination of data we decided to exclude observations which seemed to be very untrustworthy. We must admit the database is not in a very good condition. It seems there is nothing like preliminary data check (verification) and we find a considerable amount of incomplete observations or observations with logically inconsistent values of tracked variables. From the whole number of 2760 observations for the period 2006 – 2011 only 1641 observations were fully described. After the pilot verification of final (P1) and initial prices (P0) we decided exclude observations with the index P1/P0 outside the interval (0,3-3). Very high or on the opposite side very low value of index P1/P0 are questionable. The final dataset consists of 1514 observations, see Table 3.

Table 3 Basic Overview of Dataset (Trustworthy Data)

Subject of tender	Supplies	Services	Buildings	Total
No. of Obs.	1231	148	135	1514
% of total	81	10	9	100
Sum in billions CZK	10.964	2.628	9.809	23.4
% of total	47	11	42	100
P1/P0 in %	90	92	99	91

Note: Lower P1/P0 indicates the success in price reduction during the negotiation. (%) means the relation to the total. "Sum" means the total value of contracts in subgroup.
Source: Information system of public procurements (2013)

Data revealed that the most often and most valuable contracts are supply contracts, followed by building contracts. Concerning the efficiency the building contracts are least efficient (measured by P1/P1). The probable reason is that the technical quality of buildings as subjects of tenders is strictly regulated by special law so the initial price if almost fixed from the beginning of negotiation. On the opposite the quality of supplies and services is more variable and the characteristics of demanded items are vaguer hence there is more place for price changes.

5 PivotTable analysis results and discussion

In accordance with the theory the variable "number of offers (applicants)" (NofOF) which is monitored in dataset should be the relevant factor. It reflects the openness of market and partly also the transparency of procedures.

We can see (Table 4) that observations (particular public tender) with higher number of offers are characterized by the lower P1/P0, hence higher number of offers the higher level of efficiency, c. p. Noticeable increase of efficiency is for "services", from P1/P0=103 % to 92%, which is average P1/P0 in the subgroup "services". Standard deviation is used to illustrate the variance of P1/P0 around its average. Note that the variable P1/P0 is with percentage as unit, hence the standard deviation have percentage points as unit too. For example – the average dispersion of P1/P0 for "services" with only 1 "offer" is 21 percentage points around the average of P1/P0 which is 103 percents. The level of variation is high so it is clear there are some other relevant variables influencing the key efficiency.

Table 4 Openness Of Legal Procedure As A Factor Of Final Prices

Oppennes and subject of tender	No. of Obs.	Obs. (%*)	Sum millions of CZK	Sum (%*)	P1/P0 (%)	St. Dev. (%)
NONOPEN	337	100	4284	100	99	17
Supplies	165	49	1576	37	96	12
Services	79	23	647	15	100	24
Buildings	93	28	2061	48	102	16
OPEN	1177	100	19117	100	89	28
Supplies	1066	91	9389	49	89	28
Services	69	6	1981	10	84	28
Buildings	42	4	7747	41	94	27

Note: (%*) measure relation to "subtotal", St. Dev. means standard deviation.
Source: Information system of public procurements (2013).

To illustrate the influence of legal procedure see Table 4. There are contracts with "open" procedures where the contracting authority invites an unrestricted number of applicants so it is supposed to be most transparent with high level of competition between suppliers. On the other hand there are also contracts with procedures which impose some restriction (EU, 2012).

We can see that (again in accordance with theory) the open procedures are more efficient (P1/P0=89% in comparison with 99% for "non-open" procedures), so the negotiation power of hospital management is significant and managers are able to negotiate lower final price. It seems to be promising for future to manage the public procurements in hospitals in a more efficient way and to share noticeable amount of public finance.

The dispersion of results is unfortunately high (due to omitting of some other relevant variables) so in the next text we employ more sophisticated methods to control for some other variables.

Based on the analysis above we can conclude that the open public contracts are more effective. However, this result must be taken very carefully – there are the logical assumptions that this kind of procedures is connected with higher level of administrative costs (Pavel, 2013) and that this production is usually characterised by only a limited number of suppliers.

6 Conclusions

The average overall expenses spent on health-care services in the Czech Republic is 7.5% of the GDP and in connection with their high degree of inefficiency can constitute a serious danger to public finance. For financially sustainable health-care services it is necessary to focus on the problem of the efficiency of the financial resources that are spent and on the partial elimination of the reasons for the inefficiency.

We find out that more transparent and open procedures (measured by the number of contractors) enable the higher reduction of final prices. The explanatory variables (number of offers) as a measure of transparency and openness of the whole process are statistically significant for majority of observations. The negotiation power of hospital management is significant and managers are able to negotiate lower final price in case the open and more transparent procedure is applied.

It implicates some interesting economic and political consequences. The support or motivation for usage of some kind of procedures can lead to significant decrease of public expenditure.

The expected value of contract was revealed as another significant factor. More expensive contracts are usually contracts, where the negotiation does not lead to the lower final price.

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Contemporary crisis and strategic management of the private banking sector in the Czech Republic

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Abstract: *This paper analyses reaction of the Czech private banking sector to the financial crisis. The change of management strategies towards external as well as internal financial market threats is described. Specific attention is paid to the role of the Czech Banking Association, including its communication strategies with individual private banks, with the governmental sector and with foreign partners. The impact of the CBA on the stability of the finance market in the Czech Republic is assessed. The authors use the approach of the crisis management, comparison on the time axis and explanation of personal experience (one of the authors is Deputy Managing Director of the CBA). The authors come to the preliminary conclusion that the reaction of the Czech private banking sector was and is adequate, well timed and it leads to successful managing of the crisis.*

Keywords: financial crisis, banking

JEL codes: G32, H12, H63

1 Introduction

The world financial crisis, which started in 2007, affected many sectors of the world economy and politics as well as national political sectors. It started huge financial political countermeasures. One of the most important actors of the anti-crisis policy is the private banking sector. In some countries, including the Czech Republic, it was able to eliminate the serious negative impact of the crisis. The reaction of the private banking sector in the CR is the object of the analysis of the paper. The role of the Czech National Bank (ČNB) as well as of the Czech Banking Association (CBA) is included in this analysis.

2 Methodology and Data

This paper uses approaches of crisis management in combination with the approach of an analysis of financial policy. The ideal type is compared with the real type in the analysis of the process of crisis management in the private banking sector. Risk assessment method and key assumption check technique are used in the context of identifying important elements of the bank policy development (U.S. Government 2009: 7-8). The descriptive method serves for characterizing the role of the Czech National Bank and the Czech Banking Association. Data for this analysis were generated from internal sources of the CNB and the CBA (Bušek and Matoušek, 2013).

Strategic and crisis management and private banking sector

The basic goal of the strategic management in private banking sector is to outline clear goals (Kruliš 2009) of banks in relation to their specific role in the financial systems and economy. In this context strategic management can be understood also as prevention of a crisis. However, if the crisis comes, the crisis management must be used. According to Antušák five main functions of the crisis management can be identified. They are divided in two levels.

The world financial crisis in 2007 started outside the territory of the Czech Republic, however, due to interconnection of world economy and financial markets, this fact was

reflected also in the policy and behavior of the Czech governmental as well as private actors.

Table 1 Antušák's levels and functions of crisis management

Levels		Functions
Risk management (the goal is to minimize the creation of a crisis)		Prevention Correction
Managing crisis (the goal is to reduce damage and to minimize duration of the crisis)	-------→	Counter-crisis interventions Reduction Recovery

Source: Antušák (2009)

From the point of view of crisis management several important assumptions and factors can be identified within the Czech private banking sector: the development of capitalization of the private banking sector (mostly in relation to capital adequacy), liquid assets, bank deposits and bank loans.

2 Evaluation of important assumptions and factors within the Czech private banking sector

Key assumptions and factors are described in the set of graphs in this chapter of this paper. Their comprehensive evaluation is elaborated in this chapter, including the assessment of the risk factors of the development.

Figure 2 Development of the capitalization of the banking sector in the Czech Republic

Source: Czech National Bank, quoted from Bušek and Matoušek (2013)

Tier 1 Kapitálová přiměřenost - srovnání 2008 a 2011 ve vybraných evropských zemích (zdroj: ECB)
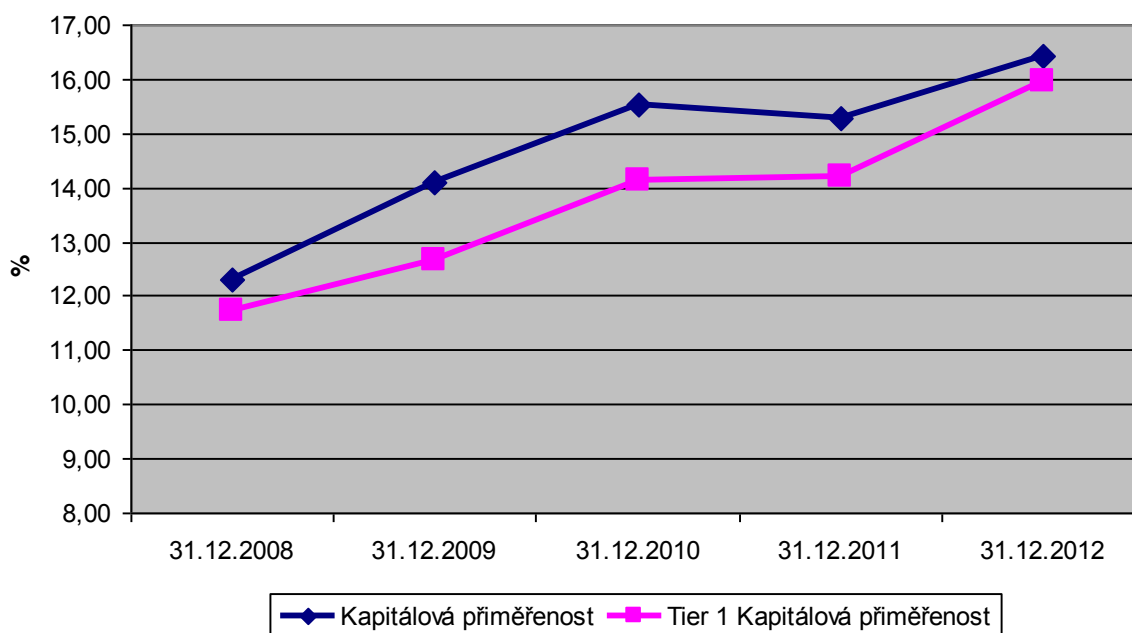
Figure 3 Capital adequacy – comparison 2008 and 2011 in selected European countries
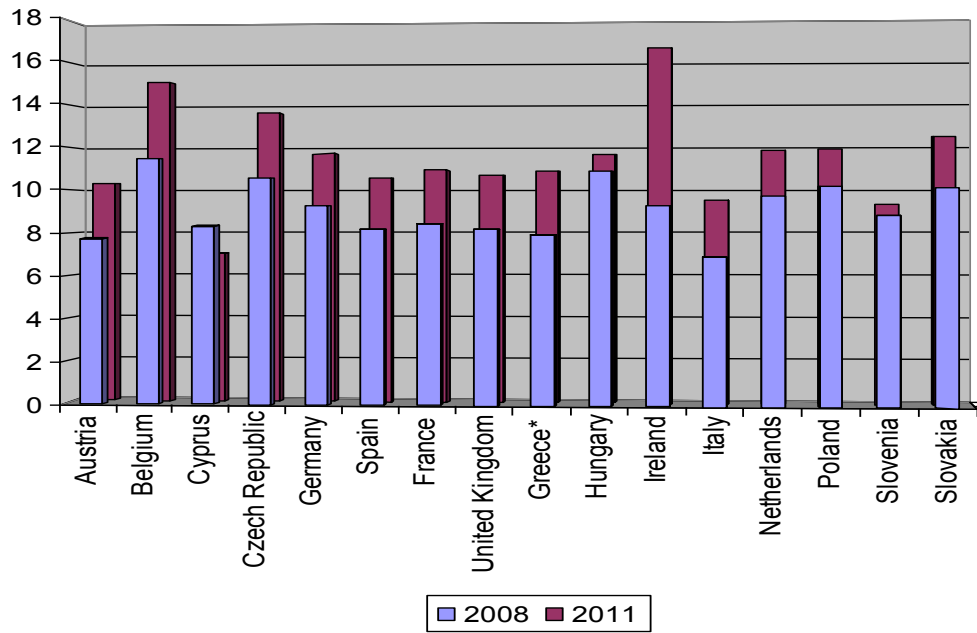
Source: European Central Bank, quoted from Bušek and Matoušek (2013)

Podíl rychle likvidních aktiv k celkovým aktivům

Figure 4 Development of highly liquid assets to total assets

Source: Czech National Bank, quoted from Bušek and Matoušek (2013)
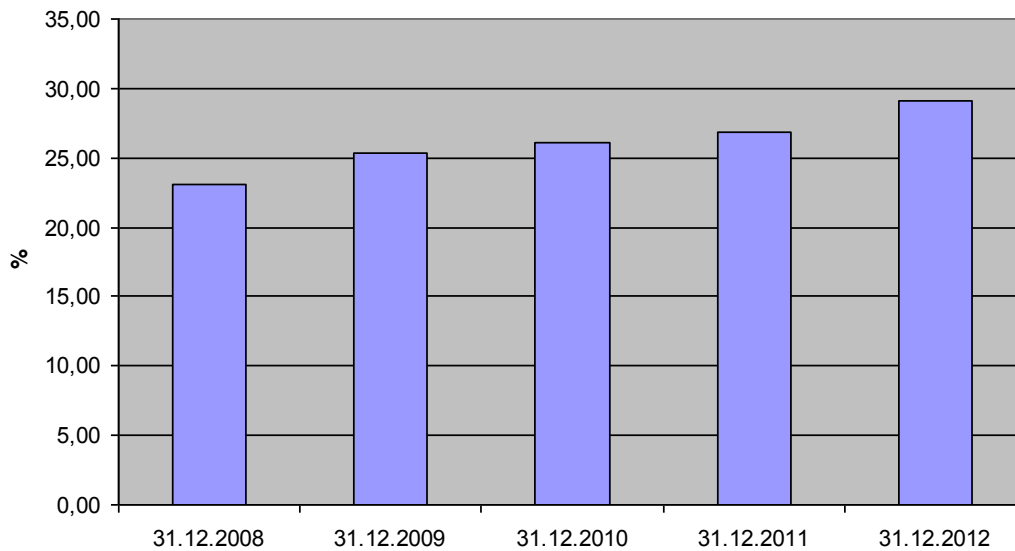
Vývoj klientských vkladů v bankách 2007-2013
Figure 5 Development of deposits in banks 2007-2013

Source: Czech National Bank, quoted from Bušek and Matoušek (2013)
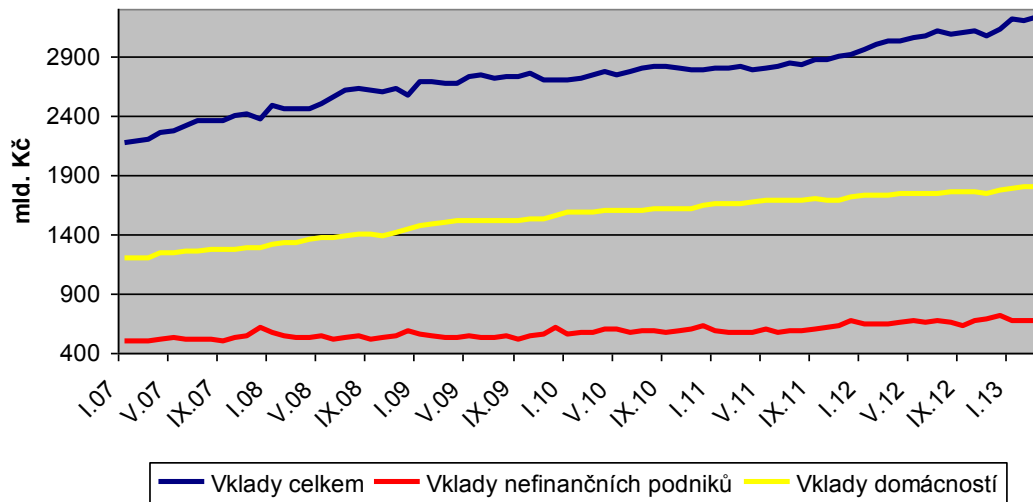
Vývoj bankovních úvěrů 2007-2013
Figure 6 Development of bank loans in years 2007-2013
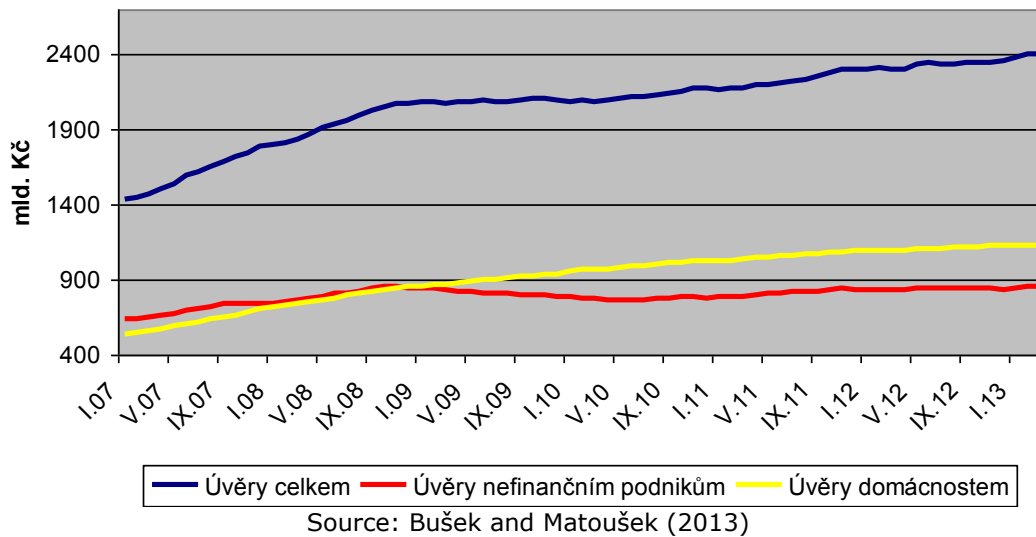
Source: Bušek and Matoušek (2013)

Podíl úvěrů v selhání na celkových úvěrech daného segmentu
Figure 7 The NPL ratio to total loans of the segment

Source: Czech National Bank, quoted from Bušek and Matoušek (2013)

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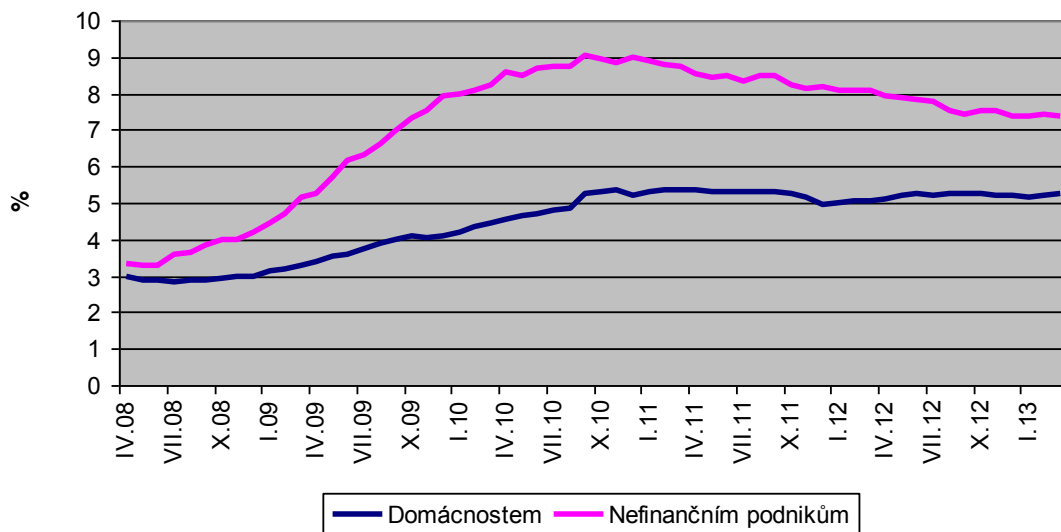
In the set of the above presented figures the following main findings can be identified:

1. The development of capital adequacy can be evaluated positively in national as well as in comparative international framework and this fact strengthens the preparedness of the Czech private banking sector towards external negative excesses of the development;
2. The impact of liquid assets on stability is strong (such assets are intermediately available and this flexibility makes the resistance against crisis development easier).
3. The rate of deposits and loans is growing (with the exception of the year 2008, the uncertainty regarding the future development was the main assumption, because financial sources were available at that time);
4. Negative development of the NPL which led to restrictive banking measures (Bušek, Matoušek 2013).

The generally strong preparedness of the Czech private banking sector for the impacts of financial crisis is weakened also by other factors, mostly by risk development of the industrial production (expected decline 14%) and by unclear impacts of European regulation (Laušmanová 2012). The high ratio of governmental bonds (72,2% in March 2013) could be evaluated as a risk in the case of wrong governmental policy (Bušek and Matoušek, 2013).

Amortization of Greek bonds in the Czech Republic is assessed at 10 000 000 000 Czech crowns, however, there are no clear statistics about this issue. It is not a significant threat to economic security in the Czech Republic. The same is valid for bonds amortization from other risk countries in Czech banks (Bušek and Matoušek, 2013).

3 The role of the Czech National Bank and the Czech Banking Association

The Czech National Bank is a governmental institution with control powers, while the Czech Banking Association is an interest group of the Czech private banking sector. Both institutions play an important role at the time of global crisis. The CNB is a "conservative regulator" with impact on the security of the banking sector. Its long-term policy has led to the fact that extraordinary financial measures are not needed (in contrast to many other countries). The only exception (with very limited response in the private banking sector) are the extraordinary liquidity-providing monetary measures introduced in October 2008 to support domestic financial market during the global financial crisis (Czech National Bank 2011).

The Czech Banking Association is carrying out a persuasive policy aimed to the public. By informing about the positive development of deposits and (mostly) loans. The spread of information within financial markets was and is very important. Monitoring and lobbing of the CBA (with the help of the European Banking Federation) at European level are helpful for private banking sectors during the time of global crisis, as well transfer of knowledge from countries with high impact of the crisis (a. o. from negotiations with Hungarian partners at the level of non-formal meeting of banking representatives from the Visegrad countries).

Conclusions

Czech private financing was and is well managed at the strategic level. From the point of view of functions and levels of the crisis management only the first level – risk management – was used in the Czech banking sector. Prevention measures and several corrections have been applied up to now. Key assumption checks of the well managed development of the banking sector are still included in this sector. The role of the Czech National Bank and the Czech Banking Association can be assessed as an important factor of the counter-crisis financial policy in the Czech Republic. However challenges of the NPL-development, unclear European regulation and the development of governmental politics and budget policy must in the future be respected in the strategic management and in the prevention anti-crisis policy of the Czech private banking sectors.

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Financial consequences linked with investments in current assets: Polish firms case

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Abstract: *Investments in financial liquidity of the firm are done thru investing money in current assets. The goal of the paper is to find if efficiency measure ROA is linked with current ratio, liquidity ratio and collection period. Paper presents a classification of financial consequences of managerial decisions in current assets investments level. There are two kinds of current assets investment influences: positive, linked with cash revenues stimulation and decreasing level of risk, and negative, linked with increasing cash expenses. Financial liquidity decisions could be considered from three perspectives: from intrinsic value of financial liquidity compared with market value of liquidity point of view, from risk sensitivity on current assets investments consequences point of view and from behavioral finance approach to financial liquidity investments point of view. The paper concerns with risk sensitivity on current assets investments consequences point of view. Discussion and classification is illustrated by empirical evidence from Polish firms data.*

Keywords: current assets, financial liquidity, risk management

JEL codes: G31, G32, G17, G02

1 Introduction

The goal of the paper is to check relation between efficiency measure ROA with current ratio, liquidity ratio and collection period. Financial liquidity investments in enterprises are made for safety purposes. Without them there is no possibility to safely manage operational cycle of the enterprise. Operational cycle is realized as main process in enterprise value creation, during which there is added value thru collecting raw materials, next thanks using enterprise fixed assets, with energy and intellectual capital of enterprise, raw materials change into final production. Finished goods are offered to an enterprise clients, and the way they are offered is also opportunity to create additional value.

Pinkowitz (2006) and Dittmar (2003) present in their study relation, which according to our point of view, is a proof for individual firm risk sensitivity on liquid assets policy (comp. Zmeskal 2010). According to Dittmar (2003) enterprises in environment with lack of protection of investors keep more liquid assets than do enterprises in protected environment. In language of our paper, we agree that it is a proof of individual firm risk sensitivity on liquid assets policy. The higher is individual firm risk sensitivity on liquid assets policy resulting from lack of investors protection, the higher level of liquid assets hold in firm should be, to balance higher risk absorption. In 2004 Kalcheva presented the study in which enterprises are painted as higher level of liquid assets holders in higher individual firm risk sensitivity on liquid assets policy resulting from discrepancy between a controlling shareholder holdings of cash flow rights against voting rights. Dittmar (2005) claims the liquid asset holdings in U.S. firms are valued more in firms with a low value of the Gompers (2003) index. That index (Gompers 2003) is lower for enterprises with higher individual firm risk sensitivity on liquid assets policy, what is an companion of fewer anti-takeover protections. That results are for Pinkowitz (2006) the proof that near the true is the hypothesis that cost for the controlling shareholders consumption is higher when the private benefits attached to liquid assets holdings and, that shareholders value liquid assets holdings less, when investors are better protected. And vice versa,

individual firm risk sensitivity on liquid assets policy is linked with liquid assets holding negatively as the protector against higher risk consequences in more sensitive case.

Current assets are important part of all steps in operational cycle. The lack of current assets in any time of operational cycle realization could stop value creation and is linked with possible long term consequences. The word *possible* is intentionally here and is linked with idiosyncratic risk of liquid assets investment level. The idiosyncratic risk of liquid assets investment level, is a probability that the returns on assets and firm value creation may decline due to an operating cycle event that could specifically affect return on assets and firm value creation process but not the branch in which firm operates as a whole.

Figure 1 IRSLAP relation to ROA creation
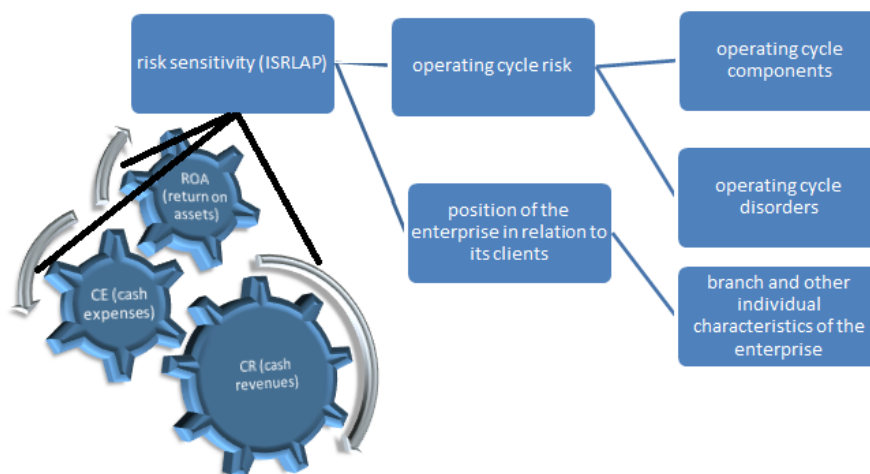
2 Methodology and Data

Pinkowitz (2006) claim that agency costs of free cash flow are an source of fact that liquid assets levels should be discounted as they are partly spent to increase the welfare of people controlling the enterprise and not maximize the benefits of all investors (comp. Michalski 2009 and Soltes 2013). Idiosyncratic sensitivity on results of policy of liquid assets management risk change, is an explanation of that phenomena. In the light of other authors examination the value of liquid assets holdings, the idea of idiosyncratic sensitivity on results of policy in liquid assets management risk. Pinkowitz (2005) uses the Fama (1998) results to explain the sources of value of liquid assets investments for U.S. enterprises. That is provided with Michalski (2012a, 2012b, 2012c, 2012d) using Zmeskal (2009), Jajuga (1986), Soltes (2013) and Polak (2011) results. Faulkender (2005) shows an approach which uses returns from assets rather than assets prices. In Paradox of Liquidity, Myers (1998) shows the paradox of fact, that liquid assets maintained by enterprise can be used privately by managements at lower cost than less liquid assets. That is case which confirms an idea that idiosyncratic sensitivity on results of policy of liquid assets management risk, works different for different firms. Some of them are no sensitivity on such results (comp. Dluhosova 2012 and Kulhanek 2012b). Some of them are strongly sensitive. To illustrate relation between current assets policy with efficiency measures, I use multiple regression analysis. Collected data for 2010 and 2011 is taken from 288 beverage Polish producers.

Model Specification

Risk sensitivity on risk is various in each enterprise. When we use firm from one branch, we notice that the level of the idiosyncratic sensitivity on risk resulting from liquid assets policy (ISRLAP) vary from sensitivity indicator (ISRLAP) for enterprise from other branch. Inside the branch, there are also differences between sensitivity risk indicator levels (ISRLAP). Figure 1 shows the idea, how the (ISRLAP) depends on liquid assets level.

Figure 2 Risk sensitivity level depending on liquid assets level and individual firm sensitivity on risk of operating cycle changes
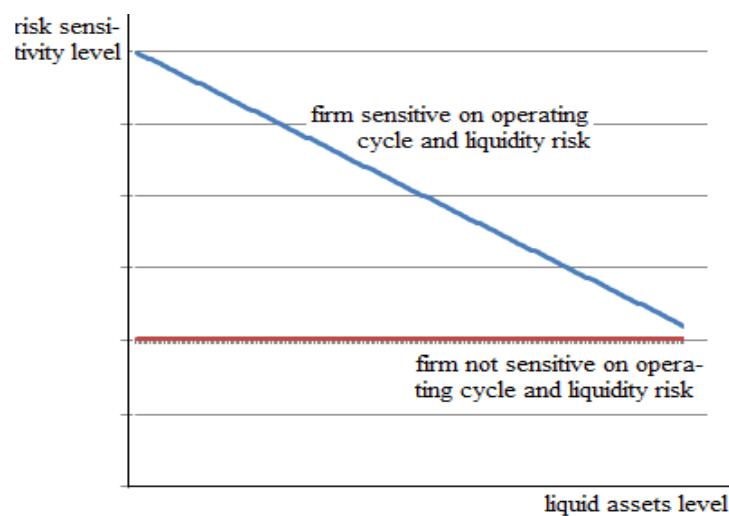
Table 1 Liquidity ratios and ROA 2010-2011

		Mean	Standard deviation	Numer of observations
CA11	Current assets 2011	5152,278	20348,90	288
CA10	Current assets 2010	5628,582	21975,27	288
CSH11	Cash and equivalents 2011	767,704	4144,92	288
CSH10	Cash and equivalents 2010	749,649	3860,94	288
WC11	Working capital 2011	2626,574	13523,25	288
WC10	Working capital 2010	2221,850	8545,63	288
NCA11	Net Current assets 2011	-331,512	10543,26	288
NCA10	Net Current assets 2010	50,509	10609,25	288
COPE11	Collection period 2011	87,810	52,89	288
COPE10	Collection period 2010	82,052	36,02	288
CUR11	Current ratio 2011	61,398	48,69	288
CUR10	Current ratio 2010	56,895	49,27	288
LIRT11	Liquidity ratio 2011	61,191	48,94	288
LIRT10	Liquidity ratio 2010	57,587	49,39	288
WCpE11	Working capital per employee 2011	91,693	37,58	288
WCpE10	Working capital per employee 2010	89,560	95,30	288
ROA11	ROA 2011	62,186	48,72	288

Source: Amadeus database

Level of liquid assets is linked with the consequences of agency theories which claim that natural is expectation of owners to avoid overinvest in liquid assets (Pinkowitz 2006, Pinkowitz 2005, Fama 1998, Dluhosova 2004, Kulhanek 2012a) and are used for analyzing the determinants of the value of cash for U.S. firms (Pinkowitz 2005). Bates (2009) shows that industrial enterprises have large, higher than doubled their cash-to-assets ratios in 1980–2006 years. That is an confirmation that such kind of the firm have higher level of sensitivity on operating cycle risk than other firms, and it is basis of our

choice to use Polish beverage producers as the illustration of that phenomenon. Paper of Kalcheva (2007) presents that insufficient protection capital owners in conditions of ineffective governance could be connected with large liquid assets maintain. Dittmar (2007) shows that decreasing of risk sensitivity (ISRLAP) by higher governing quality could reduce liquid assets levels. Work of Iskandar-Datta (2012) documents liquid assets levels as important for French and Japanese enterprises. Dittmar (2003) documented that high sensitive on risk firms operating in places with insufficient small shareholder protection, holds doubled liquid assets holdings in comparison with places in which that protection is sufficient (comp. Jajuga 2000, claims that multivariate observations precedes the determination of dissimilarities in multidimensional scaling and Jajuga 2006 findings with use of classification likelihood approach in case of each observation comes from one of several populations).

That mechanism of not-fully protected owner of the capital, works similarly with operating cycle period risk and is represented by relation between risk sensitivity (ISRLAP) and liquid assets levels.

Table 2 Liquidity ratios and ROA for 2010-2011

	CA11	CA10	CSH11	CSH10	WC11	WC10	NCA11	NCA10	COPE11	COPE10	CUR11	CUR10	LIRT11	LIRT10	WCpE11	WCpE10
CA10	0,87	1,00														
CSH11	0,55	0,42	1,00													
CSH10	0,35	0,53	0,76	1,00												
WC11	0,82	0,74	0,29	0,17	1,00											
WC10	0,54	0,70	0,30	0,50	0,39	1,00										
NCA11	-0,35	-0,43	0,14	0,11	-0,15	-0,01	1,00									
NCA10	-0,36	-0,28	0,15	0,33	-0,36	0,28	0,84	1,00								
COPE11	-0,12	-0,10	-0,04	-0,07	-0,08	-0,04	0,05	0,04	1,00							
COPE10	-0,13	-0,10	-0,08	-0,06	-0,07	-0,05	0,06	0,09	0,38	1,00						
CUR11	-0,30	-0,23	-0,19	-0,10	-0,23	-0,20	0,06	0,06	0,31	0,55	1,00					
CUR10	-0,24	-0,28	-0,14	-0,18	-0,17	-0,28	0,06	0,01	0,30	0,58	0,81	1,00				
LIRT11	-0,30	-0,23	-0,19	-0,10	-0,23	-0,20	0,06	0,06	0,31	0,55	1,00	0,81	1,00			
LIRT10	-0,24	-0,29	-0,15	-0,18	-0,18	-0,28	0,06	0,01	0,30	0,58	0,82	0,98	0,82	1,00		
WCpE11	0,05	0,04	-0,02	0,01	0,07	0,07	0,04	0,04	0,04	0,20	0,31	0,27	0,30	0,25	1,00	
WCpE10	0,04	0,14	0,04	0,23	0,04	0,20	0,00	0,01	0,10	0,11	0,21	0,13	0,21	0,14	0,33	1,00
ROA11	-0,29	-0,22	-0,20	-0,11	-0,22	-0,20	0,05	0,05	0,28	0,53	0,98	0,81	0,98	0,82	0,30	0,21

Source: Amadeus database

Using 2010-2011 data for 288 Polish firms producing beverages, we find that among liquidity strategy indicators, ROA using P/L before tax % 2011 depends on current ratio 2011, liquidity ratio 2010, collection period 2011 and current ratio 2010.

R= 0,98033871; R^2= 0,96106399; Corrected R^2= 0,96051366; F(4,283)= 1746; p<0,0000 ; Std. error of estimation: 9,6812.

$$\text{ROA (2011)} = 3,13 + 0,94 \text{ CUR11} + 0,137 \text{ LIRT10} - 0,0216 \text{ COPE11} - 0,0836 \text{ CUR10}$$
$$\phantom{\text{ROA (2011)} = } (1,197) \quad (0,02) \quad\quad (0,056) \quad\quad\quad (0,0114) \quad\quad\quad (0,0554)$$

Figure 3 Box plot
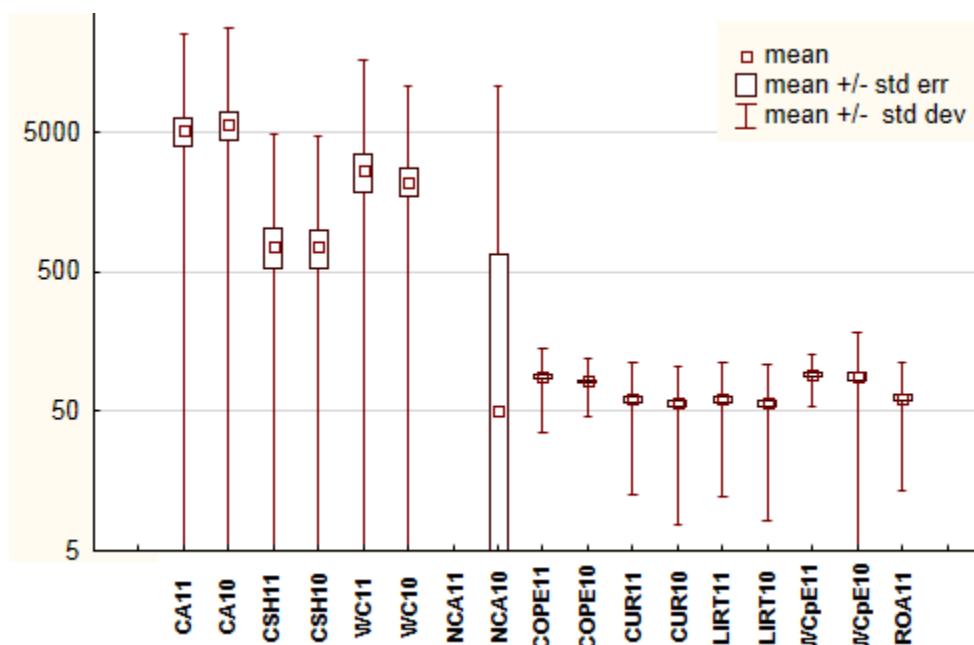
Table 3 ISRLAP relation between liquidity ratios and ROA

		Beta	std err beta	b	std err b	t(283)	p
				3,13145	1,19699	2,61611	0,00937
CUR11	**Current ratio 2011**	0,94159	0,020821	0,94208	0,02083	45,2228	0,00000
LIRT10	**Liquidity ratio 2010**	0,13851	0,057128	0,13662	0,05635	2,42462	0,01595
COPE11	**Collection period 2011**	-0,0235	0,012372	-0,0216	0,0114	-1,895	0,05911
CUR10	**Current ratio 2010**	-0,0846	0,055974	-0,0836	0,05535	-1,5111	0,13189

Figure 4 Model of relation between liquid assets indicators and ROA
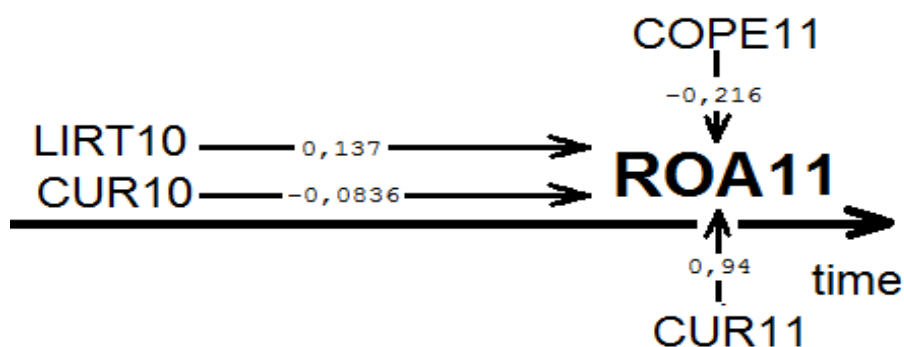
ROA (2011) = 3,13 + 0,94 CUR11 + 0,137 LIRT10 − 0,0216 COPE11 − 0,0836 CUR10

    (1,197)   (0,02)   (0,056)   (0,0114)   (0,0554)

In our results we have found that efficiency measure ROA is linked (with one period lag) with current ratio, liquidity ratio and (without lag) with current ratio and collection period.

That model confirms that firm efficiency depends on liquid assets investments.

3 Conclusions

The main goal of the paper was reached. We find an argument that risk sensitivity is an answer of the firm on risk. Empirical illustration collected from Polish firms shows that efficiency measure ROA is linked (with one period lag) with current ratio, liquidity ratio and (without lag) with current ratio and collection period. That confirms that individual risk sensitivity of the firm is an idiosyncratic answer of the firm on risk that is specific to a firm. In that context firm is understand as "portfolio of assets". When idiosyncratic risk of the firm has almost no correlation with market risk influence on firms results, the same is with idiosyncratic sensitivity on risk of liquid assets investment. Firms with higher idiosyncratic sensitivity on that kind of risk, should use adequate diversification of liquid assets or simply higher level of liquid assets, to hedge their position and efficiency of long term operational investments. That is important in context of the way idiosyncratic risk influence the firm results. When idiosyncratic risk more than systematic risk, describe most of the risk of an firm value and firm revenues over time, the individual sensitivity on risk of financial liquidity management accounts for most firm efficiency changes resulted from financial liquidity strategy.

Acknowledgments

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Influence of volatility on the value of the modern structured products

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Abstract: *For investors, volatility may be one of the investment criteria. Changes in implied volatility along with the changes in the value of the underlying assets have cardinal influence on the value development of modern structured products during their duration. This paper therefore examines the influence of volatility on the value of modern structured products and his result is a systematization of this group of investment instruments according to mentioned criteria.*

Keywords: volatility, certificates, structured products

JEL codes: G11, G12

1 Introduction

In the last decade, the modern structured products as one of the financial innovations have established themselves on the financial markets. Most often they are a compound investment instruments consisting in addition to the basic instruments such as shares or bonds of a derivative components, which are often option. Due to the number of possible combinations of basic instruments and derivative components, structured products can offer by a chosen investment horizon, by defined propensity to risk and by defined expectations of development of the value of the underlying an optimal product for each investor. The value of structured product is derived from value of underlying assets. The added value of structured products is also the ability to offer optimization of risk-return profile and their availability for the retail investor and thus made accessible investment strategies using derivative components also for this group of investors.

Structured products guarantee presented risk-return profile only at maturity. However, if an investor does not want to hold product until maturity or he intends trade in structured products, he must also consider the development of parameters that affect the value of structured products during their duration.

These parameters include the volatility. This paper also deals with volatility and examines its effect on the value of structured products during their duration.

To be able to assess the impact of volatility on the value of structured products, they must first analyze and determine the components from which each of the products consists of. Then, using deduction and the basic Black-Scholes option pricing model programmed in Visual Basic in MS Excel we want to determine the effect of increasing volatility in the value of structured products under the influence of volatility on individual components from which the product is composed.

It will be systematize the segment of structured products according to this influence – it will be create basic groups of products - products positively correlated with the increase in volatility, products negatively correlated with the increase in volatility and products uncorrelated with the change of volatility.

For structured products will herein be regarded as products marketed in the publication of doc. Svoboda (Svoboda et Rozumek, 2005), which correspond to the Derivate League - German concept of systematization of structured products (Deutscher Derivate Verband, 2011) and in which did not incorporated any exotic option.

2 Analysis of modern structured products and influence of implied volatility on value of these products

Structured products are divided according to Deutscher Derivate Verband (Deutscher Derivate Verband, 2011) and EUSIPA derivative map (European structured investment products association, 2012) into two major segments – investment and leverage products.

For investment products that do not contain exotic option will be for the purposes of this study considered index certificate, basket certificate, sprint certificate, outperformance certificate, guarantee certificate, discount certificate and reverse convertibles.

For leverages products that do not contain an exotic option will be considered plain vanilla warrants and knock-out products.

Particular structured products are certainly possible to construct by more possible ways (for example discount certificate is possible to construct as a purchase of the underlying assets – (long position) - and the simultaneous sale of a call option (short position), which value depend on the value development of the same underlying asset. Due to put call parity of option, it is clear that the same risk-return profile could be reached by investment in bond (long position) and the simultaneous sale of a put option (short position)). In the following text will be analyzed and presented structure (components) of particular structured products, which will be used in next work.

Index and basket certificates have similar and symmetrical risk-return profile. They can be designed in buying the underlying asset itself, that mean also buying stocks in the weight corresponding with weighting of individual titles in the index or basket itself. The product may theoretically not include a derivative component (an option). Their benefit for investors lies in availability for retail investors because these products are issued in ratio. The value of index certificate is derived from value of any index but due to ratio is lower then underlying asset. Investor can also with a low amount diversify his investment. By a basket certificate a benefit for retail investors lies in availability of specific actively managed investment strategies.

Outperformance certificate consists of buying the underlying asset (or other component that guarantees symmetric and fully participation in the performance of the underlying asset, which may for example be option called as LEPO (options with low or zero strike price). A second component of this product, financed by dividend yield of the underlying asset, which renounces investor to the issuer and design of this product, is long position in call option (usually only part of one call option). Due to the purchased call option then the investor can participate in the growth of the value of the underlying assets disproportionately (assuming the exercise price of purchased call option corresponds to the current value of the underlying assets by issue of the certificate).

From basics of option theory it is obvious that increasing volatility increases price of the option and it does not matter whether it is a call option or a put option. To assess the impact of volatility on the value of structured products during their duration is important rather our position in this option (long or short).

By outperformance certificate it is a long position in a call option, therefore, increased volatility will mean growth of value of contained options and thus then also increase the value of the structured product (the first component is not affected of volatility such as the just described component).

There is another situation by a sprint certificate with which the investor has the opportunity to participate on the growth in the value of the underlying assets twice, but only in a predefined range. This product is called also double chance certificate and this opportunity is possible again due to contained long position in call option on the underlying asset. Unlike outperformance certificate is buying of call option financed by selling of two call options with a strike price higher than strike price of the purchased option. A double participation in the growth of the value of underlying asset is allowed

only just in this range of exercise prices of purchased and sold call options. Here we enter into both long and short positions in the option components. The influence of two sold call options is slightly higher than that of a purchased call option; therefore with growth of volatility decreases the value of the structured product.

Guarantee certificate consists of two ground components. One of them is a zero coupon bond and this component is responsible for the guarantee of this products. A zero-coupon bond (also called a discount bond or deep discount bond) is a bond bought at a price lower than its face value, with the face value repaid at the time of maturity (Mishkin, 2006). From difference of these two amounts is financed buying of call option on some underlying asset. The long position in call option is also second component of this product. Similar like by outperformance certificate means the growth of implied volatility the increase of value of guarantee certificate due to long position in call option.

The payment profile for reverse convertible and discount certificate is identical. Both products offer a positive yield by sideways markets. While reverse convertibles come with a guaranteed coupon, discount certificates can be purchased at a price lower than that of the underlying security. The maximum returns with reverse convertibles and discount certificates are equally high if both products are based on the same underlying security and have identical strike prices and expirations. Depending on how the price of the underlying security develops, at the expiration date there is a repayment of the invested amount or a delivery of the underlying security (Julius Bär website, 2013). Reverse convertible and discount certificates differ in their structure. In comparison to reverse convertible which consists of bond and sale of a put option discount certificate contain underlying security and sale of call option. In both cases there is a short position in option, so increase in implied volatility results in a decrease in the value of the product.

Warrants are broadly speaking securitized option. The influence of volatility on value of the warrant is the same as the influence of volatility on value of the option. The essential difference between options and warrants, however, is the fact that the investor may by warrants enter only into a long position. Similar to options is then distinguished long position in a put warrant and long position in a call warrant.

Table 1 Structure of chosen structured products

Chosen structured product	Underlying/ Zerobond	Long position in call	Long position in put	Short position in call	Short position in put
Index/basket certificate	Yes	No	No	No	No
Sprint certificate	Yes	Yes	No	Yes	No
Outperformance certificate	Yes	Yes	No	No	No
Discount certificate	Yes	No	No	Yes	No
Reverse convertible	Yes	No	No	No	Yes
Guaranteed certificate	Yes	Yes	No	No	No
Call warrant	No	Yes	No	No	No
Put warrant	No	No	Yes	No	No
Knock-out products	No	No	No	No	No

Knock out products were created as an alternative product to warrants in times of high volatility. Because of this it is also known one of the first names of these products "WAVE´s" (Warrant Alternative Vehicles). These products basically work on the principle

of credit; their value is determined primarily by differences between spot price of underlying asset and strike price. Volatility has no influence on value of these products.

The following table summarizes the structure of examined structured products. Based on this table it is possible to identify positive and negative correlation (alternatively any correlation) between growth of implied volatility and change in the price of the structured product.

Figure 1 The rate of change in price of option (at the money) by growth of implied volatility by 1 percentage point for different interest rates
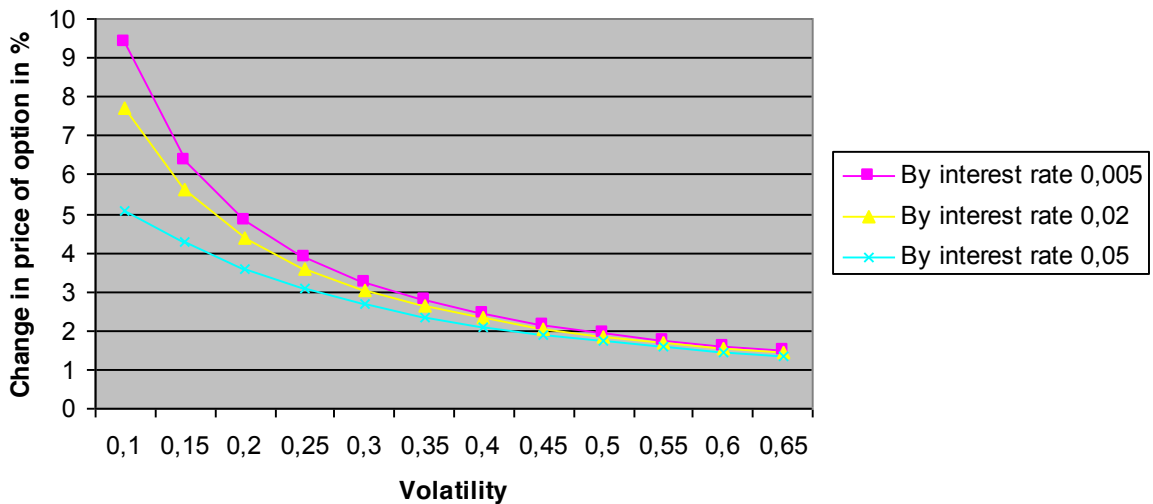
Based on the above mentioned information, we are able to identify the impact of changes in implied volatility to changes in the value of the structured product. But we are not yet able to say anything about the intensity of this influence. In this paper is shown just only an example for the potential effect of changes in implied volatility (change by one percent) on value of at-the-money call option. Such option is used by construction of outperformance certificate or guarantee certificate.

Figure 2 The rate of change in price of option (at the money) by growth of implied volatility by 1 percentage point for different times to maturity

Figure 1 illustrates the degree of impact of the increase in implied volatility of one percent from different default level of implied volatility. As already mentioned, it is an at-the-money call option one year before the maturity and it is examined the influence for

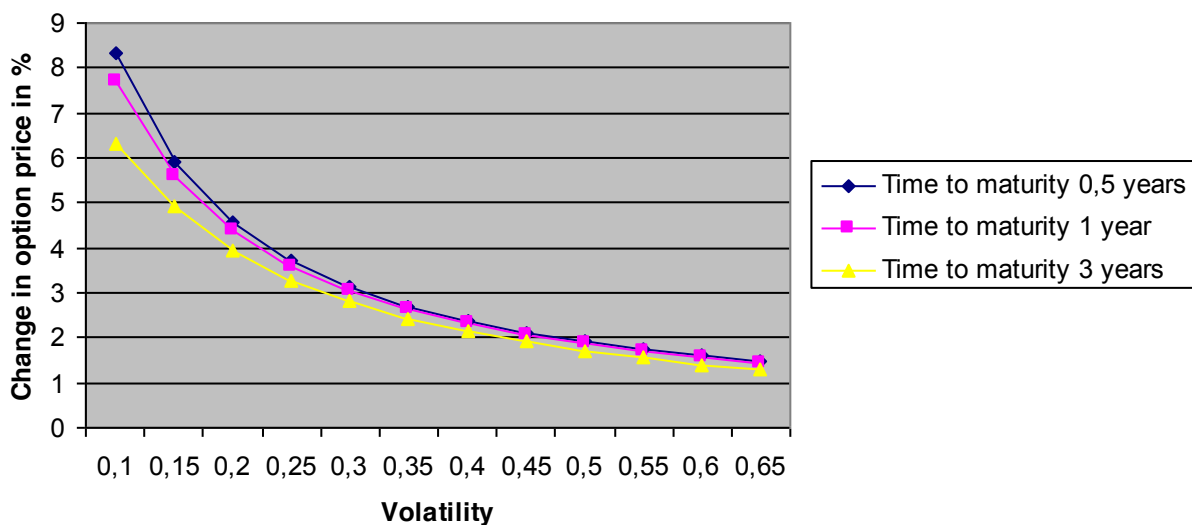different levels of interest rates. For calculation is used basic Black-Scholes option pricing model.

Figure 2 illustrates the degree of impact of the increase in implied volatility of one percent from different default level of implied volatility. It is an at-the-money call option and it is considered interest rate of 2 %. In this figure is examined the influence for different times before the maturity.

3 Conclusions

Changes in implied volatility affect the time value of the options, which are a common building element for financial innovation called modern structured products. Depending on how the changes in implied volatility affect the value of structured products it is possible divided these segment of investment instruments into three basic groups: products positively correlated to changes in implied volatility (increase in implied volatility causes increase in value of structured product and vice versa), products negatively correlated to changes in implied volatility (increase in implied volatility causes decrease in value of structured product and vice versa) and products which are not correlated to changes in implied volatility.

Due to the fact that growth in implied volatility means growth in option price is decisive for structured products, whether in the product structure is an option purchased or sold. On this basis, it is possible to systematize structured products according to criteria influence of volatility on the value of the product as follows:
- products, which are positively correlated to changes in implied volatility
  - guarantee certificate, outperformance certificate, call warrant, put warrant
- products, which are negatively correlated to changes in implied volatility
  - discount certificate, reverse convertibles, sprint certificate
- products, which are not correlated to changes in implied volatility
  - index certificates, basket certificates, knock-out products

Among the products with negative correlation to changes in implied volatility, we can find exactly products with limited return potential. These products are characterized by parameter which is called "cap". In the structure of these products it is a short position in option. Finally it must be stressed that the influence of the changes in implied volatility on value of structured products is relevant only during the lifetime of the product. The volatility does not affect the value of structured product at maturity.

Acknowledgments

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History of Financial Crises and its impact
to current regulatory development of Basel Committee

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Abstract: *This paper is summarizing all major crises and is trying to give an answer to few questions: a) what are possible mitigants of financial crises if any; b) does the new regulation help us to do that; c) what is potential impact of new regulation to the sector. In more detail this paper is summarizing the history of financial crises from 17th century to the present. Furthermore this paper is also discussing current views on the proposed regulation plus putting in place few potential outcomes how to deal with current crisis.*

Keywords: financial crises, regulation, Basel 3

JEL codes: G21, G28

1 Introduction and literature survey

Despite of the fact that it seems that there is huge amount of good literature on the topic of recent financial turmoil, and that is only partly true, because there is huge amount of literature but mostly is not good one. We are focusing on few authors one of which is Kindleberger et al. with his insight into the several market panics and manias. Obviously this is becoming a never ending story as his bestseller is in its actual sixth edition. First edition was issued in 1978 and last and current one was published in 2011. The next authors, which we bring in this paper is George Cooper and Hyman Minsky. We are also bringing view of Basel, which becomes more active on the field of the more academic papers. So at the end we are trying to utilise this two streams of literature a) more experience based literature and b) rather complicated highly technical papers from Basel and European Commission. Goal of this paper is also summarize currently known impact of regulation to the economy.

2 From Tulip mania to recent turmoil on the financial markets

In this chapter we would like to present little bit from the history of market bubbles and would like to then find common denominator.

In times of pre crisis/pre bubble bursting, countries coming into question experiencing huge inflow of capital followed by unusually high increase in the prices of the assets (ie equities/shares) and houses. Bubbles implode due to the unsustainable increase of the indebtedness. This may last for several periods ie one to few years, but not for the extended period of time. Such a increase of the flow of the money is usually connected with appreciation of the currency and increase of the assets prices mostly equities but also connected with increase of the prices of houses. (Kindleberger, Charles P. et al., 2011)

The big ten financial bubbles (Kindleberger, Charles P. et al., 2011):

1. The Dutch Tulip Bulb Bubble 1636,
2. The South Sea Bubble 1720,
3. The Mississippi Bubble 1720,
4. The late 1920s stock price bubble 1927– 29,
5. The surge in bank loans to Mexico and other developing countries in the 1970s,
6. The bubble in real estate and stocks in Japan 1985– 89,
7. The 1985– 89 bubble in real estate and stocks in Finland, Norway, and Sweden,

8. The bubble in real estate and stocks in Thailand, Malaysia, Indonesia, and several other Asian countries 1992– 97 and the surge in foreign investment in Mexico 1990– 99,
9. The bubble in over-the-counter stocks in the United States 1995– 2000,
10. The bubble in real estate in the United States, Britain, Spain, Ireland, and Iceland between 2002 and 2007 – and the debt of the government of Greece.

Just for an illustration short before the tulip mania has burst there is an example of one farmer who for one Viceroy Bulb paid following (Shama, Simon; (1992). The Embarrassment of Riches: An Interpretation of Dutch Culture in the Golden Age (pp. 358)):

- Two lasts of wheat,
- Four lasts of rye,
- Four fat oxen,
- Eight pigs,
- Twelve sheep,
- Two oxheads of wine,
- Thousands pounds of cheese,
- Bed,
- Some clothing,
- Silver beaker.

And we could be continuing listing in way how such a extraordinary values can exchanged in any type of crisis which I've listed above.

Based on illustration above we can generalise that a mania or panics involve transactions where the prices of underlying assets (i.e. stock, house etc.) are having on actual market price much higher than it can be achieved anytime in the future. It is very natural that experiencing bubble bursting usually has deep roots in changing the policy of particular segment of economy. Virtually every country has established the central bank as „lender of last resort" so potential shortage of the liquidity can be managed in such a way that potential abrupt movement in currency value can be under control plus number of insolvencies due to lack of liquidity is under control too.

„Theories based on uncertainty of the market, on speculation in commodities, on 'overtrading,' on the excesses of bank credit, on the psychology of traders and merchants, did indeed reasonably fit the early 'mercantile' or commercial phase of modern capitalism. But as the nineteenth century wore on, captains of industry ... became the main outlets for funds seeking a profitable return through savings and investments." (Hansen, 1957)

From above mentioned it seems that the financial crisis are inherent to the system. But now what we would like, is to move to see how last crisis is being seen by the Basel Committee and European Commission.

3 European Commission's view

European commission based on their recent memo, which was published on March 21st, 2013(European Commission, CRDIV/CRR – Frequently Asked Questions, MEMO/13/272 (2013) pp.1) believes that these are 3 major points which they learned from recent crisis:

1) They believe that there is necessity to enforce cooperation between monetary, fiscally and supervisory politics globally. Cross border developments were observed too late, cross border impacts were difficult to analyse

2) Capital levels seem to be inadequate. Some financial institutions appeared to be resilient to external shocks and some with similar capital levels seems to be not resilient to external shocks.

3) Cross border scope of many financial institutions became insurmountable to many national accountable authorities. European Commission puts it in these words: "The

knowledge that banks could have been resolved, also in a cross border context, would have changed the balance of power between public authorities and banks, with the former having more tools at their disposal than just the public purse and the bail-out option, and the latter not being able to enjoy the best of all worlds: privatize gains, socialize losses. This would have put a dent on bank's risk appetite. "

Furthermore these drawbacks were identified to regulatory framework valid in times of recent crisis:

- Capital was actually not loss absorbing
- Failing liquidity management
- Inadequate group wide risk management
- Insufficient governance

G-20 in its declaration from April 2nd 2009 conveyed the commitments of the global leaders to address the crisis with internationally consistent efforts to, among others:

- Improve the quantity and quality of the capital in the banking system
- Introduce supplementary non-risk based measure to contain the build-up of leverage
- Develop a framework for stronger liquidity buffers at financial institutions
- And implement the recommendations of the Financial Stability Board to mitigate the pro-cyclicality.

4 How Basel III is addressing shortcomings identified?

Current Basel III is addressing shortcomings identified these actions:

- Higher quality and more of the capital
- Capital Buffers
- Clear definition on liquidity required
- Leverage back stop
- Capital requirement for derivatives

Figure 1 Composition of capital
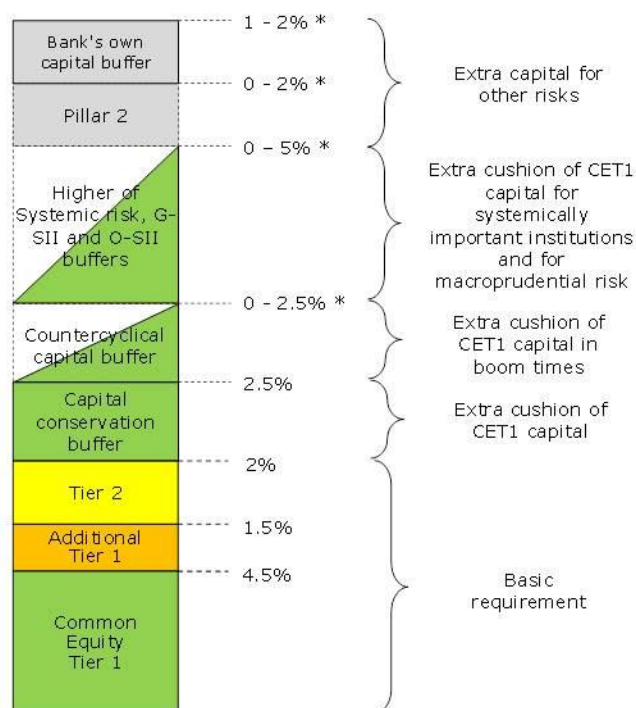
* Assumed upper bounds (values can be higher)

Source: European Commission MEMO on CRD IV/CRR Frequently asked questions from March 21st, 2013, MEMO/13/272

4.1 Higher quality and more of the capital plus capital buffers

Very briefly today, banks and investment firms are required to hold the capital at level at least of 8% of risk weighted assets. Tomorrow, while the total capital an institution will need to hold remains at 8% share that has to be of the highest quality, common equity tier 1, will increase from 2% to 4.5%. Short visual description of new capital requirement is described in Figure 1.

Newly introduced Capital Buffers:
- Capital conservation buffer
- Countercyclical buffer
- Global systemic institution buffer
- Other systemic Institution buffer
- Systemic Risk Buffer

4.2 Clear Definition on liquidity required

There are two means how to improve the liquidity

1) Improve short term liquidity by the introduction short term stress test like scenario over upcoming 30 days this is so called Liquidity Coverage ratio

2) To avoid fall of the cliff behaviour is necessity also create a longer ie medium term ratio which in Basel 3 is called Net Stable Funding Requirement this ratio is having outlook for over one year period.

Both ratios in current language of Basel 3 include the exact expectation of behavior of assets and liabilities split into the products.

4.3 Leverage

Leverage is an inherent part of banking activity; as soon as an entity's assets exceed its capital base it is levered. The Commission does not propose to eliminate leverage, but to reduce *excessive* leverage. The financial crisis highlighted that credit institutions and investment firms were highly levered, i.e. they took on more and more assets on the basis of an increasingly thin capital base. The leverage ratio is proposed as described in formula (1)

$$Leverage = \frac{Capital}{Assets} \tag{1}$$

where   *Capital*   –   Tier 1 Capital,
          Assets   –   Non-risk weighted assets.

Leverage ratio should be very simple indicator that offers a safeguard against the risk associated primarily with model risk.

4.4 Capital requirement for derivatives

The new rules increase the own funds requirements associated with credit institutions' and investment firms' derivatives that are traded over-the-counter and securities financing transactions (e.g. repurchase agreements).

5 Cost of recent crisis (European Commission, CRDIV/CRR – Frequently Asked Questions, MEMO/13/272 (2013) pp 35.)

- Crisis-related losses incurred by European banks between 2007 and 2010: almost €1 trillion or 8% of EU GDP (IMF)
- EU GDP contraction in 2009 due to the economic recession induced by the financial crisis: 6% (Eurostat)
- Approved state aid measures between October 2008 and October 2010: €4.6 trillion or 39% of EU GDP (Commission)

- State aid measures effectively used in 2008 and 2009: more than €2 trillion (Commission)
- Examples of companies where inadequate management of liquidity risk largely contributed to their failure: Northern Rock (UK), HBOS (UK), Bradford and Bingley (UK), Bear Sterns (US), Lehman Brothers (US)
- Examples of companies whose (mostly hybrid) capital instruments did not live up to the expectations as regards their loss absorption, permanence and flexibility of payments capacity (which had to be reinforced through Commission state aid decisions): RBS (UK), Bradford and Bingley (UK), KBC Group (BE), Bayern LB (DE), Commerzbank (DE), Lloyds (UK), Allied Irish Banks (IR), Bank of Ireland (IR), Cajasur (ES)

6 Basel III impact analysis

Basel Committee on Banking Supervision (Hereinafter Basel Committee) on regular basis assesses the impact of implementation on banking system. In March 2013 there was produced update on that topic under name "Results of the Basel III monitoring exercise as of 30 June 2012". This Basel Committee's paper focuses on the 210 banks divided into 2 groups. Group 1 banks are those that have Tier 1 capital in excess of €3 billion and are internationally active. All other contributing banks are in Group 2. Group 1 includes 101 banks and Group 2 includes 109 banks.

Table 1 Aggregate capital ratios and capital shortfalls

Aggregate capital ratios and capital shortfalls*						
	Fully implemented requirement, in per cent		Capital ratios, in per cent		Capital shortfalls, in bln of euros	
	Minimum	Minimum plus capital conservation buffer	Current	Basel III	Minimum	Minimum plus capital conservation buffer**
Group 1						
CET1	4.5	7.0	10.8	8.5	3.7	208.2
Tier 1	6.0	8.5	12.0	8.7	16.2	198.5
Total	8.0	10.5	14.4	9.9	61.8	222.2
Group 2						
CET1	4.5	7.0	10.9	9.0	4.8	16.0
Tier 1	6.0	8.5	11.4	9.5	1.6	7.3
Total	8.0	10.5	14.7	11.3	5.0	12.0

Notes:
*The shortfall is calculated as the sum across individual banks where a shortfall is observed. The calculation includes all changes to risk weighted assets (e.g. definition of capital, counterparty credit risk, trading book and securitisation in the banking book). The Tier 1 and total capital shortfalls are incremental assuming the higher tier capital requirements are fully met
**The shortfalls including the capital conservation buffer also include the capital surcharges for 28 G-SIBs as applicable.

Source: Results of the Basel III monitoring excercise, Bank Committee on Banking Supervision, March 2013, MEMO/13/272 Page 8

7 Potential Impacts (European Commission, CRDIV/CRR – Frequently Asked Questions, MEMO/13/272 (2013) pp.36)

Short term impact, ignoring benefits of the new measures:

- Estimated Common Equity Tier 1 (CET1) shortfall to meet the new minimum requirements and the conservation capital buffer, based on 2009 capitalisation levels:

- Immaterial in 2013 (binding only for 3 banks in the EU QIS sample) – due to transitional provisions;
- €84 billion in 2015 – due to transitional provisions;
- €460 billion in 2019 – full implementation.
- Limited impacts till 2019(after this period an superior increase in EU GDP is expected, please refer to the figures below):
- Decrease of only 0.14%-0.17% in EU GDP for each percentage point increase in CET1 capital ratio (Basel Committee, Commission services)
- Decrease of only 0.42%-0.49% in EU GDP for the above €460 billion CET1 capital shortfall (Basel Committee, Commission services)

Long-term economic impact (after 2019), considering both benefits and costs of the new measures:

- Average decrease of only 1.8% in stock of loans for 2020-2030 (Commission services)
- On Average an increase of only 0.29 percentage points in loan rates for 2020-2030 (Commission services)
- Net economic benefits (i.e., benefits less costs) increase of 0.3% - 2% in EU GDP, stemming from reduction in expected frequency of systemic banking crises (Basel Committee, Commission services)
- Reduction in the probability of systemic banking crises: within the range of 29% to 89% when banks recapitalise to a total capital ratio (including buffers) of at least 10.5% (Commission services, Basel)
- Additional systemic benefits in terms of stemmed pro-cyclicality and reduced severity of any future banking crises not captured in the above estimates.

Conclusions

Based on above mentioned it seems that understanding of the crisis is fairly good, and we personally believe that Basel Committee is doing good job to address the issues and monitor impact of proposed changes to the system. Where we feel little bit unsure is involvement of the politics into the creation of a robust control system and cooperation on global level. In that sense we never had an ambition to assess these two points. Purely from view of the Basel Committee's paper it seems that banking sector is really moving to stronger and more stable system, but only future will answer this question.

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Asset Pricing with Conditional Value at Risk

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Abstract: *We introduce a novel equilibrium asset-pricing model, which we build on the relationship between Conditional Value-at-Risk (CVaR) and the expected return. This approach of risk measure allows us to get rid of the normality condition of returns. Combining the CVaR risk measure method with our regression model, nonrealistic assumptions – such as rational and risk–averse investors, unlimited leverage opportunity and price-taker investors – of the most commonly used models can be almost entirely omitted. In our model we can define the optimal choice for every single investor. Aggregating the required returns, allows us including different leverage constraints and margins, thus we do not assume unlimited borrowing for risk-free interest rate. Furthermore, based on the anchoring effect in Prospect Theory risk-seeking behavior can be explained and implemented in our model. On the other hand, the aggregation method to calculate expected returns allows price-maker investors having great influence on price movements (in case of a block transaction or in a non-liquid market segment).*

Keywords: Behavioral Finance; Asset Pricing; Prospect Theory; Anchoring; Conditional Value-at-Risk

JEL codes: G12, G32

1 Introduction

We construct an equilibrium asset pricing model that, contrasting the standard models using Expected Utility Theory (EUT), is based on loss-averse investors described by the Prospect Theory (Kahneman–Tversky, 1979). We approximate loss-aversion by Value-at-Risk (Campbell et al., 2001; Jorion, 2007) and Conditional–Value–at–Risk (Rockafellar, Uryasev, 2000), by which we can define the expected loss weighted by its probability. We apply the assumption that in some cases investors define a reference point on their utility curve, resulting in an anchoring, thus they do not refuse risk, moreover they start to follow risk-seeking behavior to an extent (Ariely et al., 2003), since their expected utility can be maximized in this behavior. Furthermore, our regression is more realistic than standard asset pricing models from another point of view too: we do not assume the returns to be normally distributed, which is crucial in standard asset pricing, however is not true. The results we present in this paper are somewhat different from the well known models approximating expected return by standard deviation – such as the Modern Portfolio Theory (Markowitz, 1959), or the Capital Asset Pricing Model (CAPM) (Sharpe, 1964; Lintner, 1965; Mossin, 1966) –, as we change the risk parameter from standard deviation to Conditional–Value–at–Risk (CVaR). Our model omits the assumption of price–taker investors (included in the perfect market assumption of the CAPM) and allows significant price–making activity by block transactions or in non–liquid market segments. We also allow limited borrowings (the opposite of the initial assumption of Sharpe), different leverage constraints and interest rates for every single investor. Therefore, we define a more realistic and precise way to explain individual optimization method, and by approximating the expected return through the aggregation of investors' required returns, we create a model that describes expected return without using the most significant unrealistic assumptions of standard asset pricing models.

In the following chapter we introduce "rational" risk-seeking behavior based on the anchoring effect of Prospect Theory (Kahneman-Tversky, 1979) and implement it in asset pricing models, the third chapter describes the use of Conditional Value-at-Risk in our regression, in the fourth section we solve the problem of limited leverage constraints in our model, the fifth section describes the method of calculating the expected return of

assets through aggregating individual required returns and finally we summarize the most important results of this paper.

2 Risk–seeking and its implementation

With the Prospect Theory Kahneman and Tversky (1979) created a model that allows analyzing single period choices, since according to them the investor makes its choice from the zero reference point on its utility curve every time. However, in reality this is not the case every time. Proven by their research on the heuristic–driven biases (Shefrin, 2002), for different reasons – such as the anchoring effect (adjusting to a reference situation), the inclusion of sunken costs or the sticking effect (investors give up to properly manage their portfolios after a massive loss and do not sell) – investors can be motivated to fix a reference point on their utility curve and keep it at their next decision, which places them to non–zero starting point on their utility curve. This way, one can easily see that there are mathematically fair investments that result in utility growth. Therefore, investors maximizing the variance of the chosen fair investment – until an optimal value – can increase their expected utility gain for fixed expected return. Hence, this is by definition risk–seeking behavior. This situation can be seen on the Figure 1 where we used the exponential utility function for Constant Absolute Risk-Aversion (CARA, Pratt, 1964), the $(1 - e^{-ax})$. The calculation of the function is based on the following equation since the slope of the utility curve for losses is in average -2.25 times the slope for gains:

$$1 - e^{-5x} + 2.25(1 - e^{5(-0.05)}) = -2.25(1 - e^{5(-0.05)}) + 2.25(1 - e^{5(-0.05 - 0.05 - x)}) \qquad (1)$$

where *a=5* is an average measure of constant absolute risk–aversion and x = -5% is the negative return as reference point after 5% loss. Based on the results, in this case investors are risk–seeking until they are able to reach 7.72% return on the positive side.

Figure 1 Fair investment after previous loss
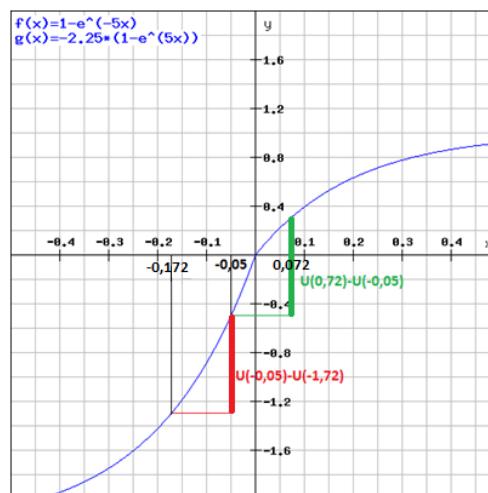
Since if *x < 0,* than *U(x) = - 2.25U(-x)* in average and the investor maximize the risk (here the variance) until the utility growth due to positive wealth change *y* is greater than utility loss due to negative wealth change where he/she becomes risk–neutral, the risk–neutral curve can be defined using the following equation. Here, we simulate a mathematically fair investment consisting of (x + y) gain and (-x - y) loss both with 50% probability. The reference point is (-x). The investor keeps following risk–seeking behavior until the utility growth and loss get to be equal, therefore:

$$U(-x) - U(-2x - y) = U(y) - U(-x) \qquad (2)$$

Through defining an alternative version of this equation we get:

$$\frac{2.25\big[2U(x)+U(y)-U(2x+y)\big]}{1.25} = U(y) \qquad\qquad (3)$$

From this equation it can be seen that due to the law of diminishing marginal utility *[2U(x)+U(y)-U(2x+y)]>0*, therefore, *U(y)* and *y* have to be positive in order to have solution for the equation. This means that a mathematically fair investment with zero expected return and $(x+y)^2$ variance produces greater utility than the same one with zero variance. According to the detailed description of risk-seeking phenomena (Timotity, 2012) the variance decreases as the expected return of the fair investment increases until that point, where the expected return equals the initial loss reference point and the variance is zero. The transition function is calculated by using the parameters of the utility curve and in case of CRRA and CARA it has negative slope. We illustrate this phenomenon in variance-expected return based coordinate system on Figure 2, where the investor having negative reference point after -x loss chooses investment A' instead of A, although A has the same expected return and lower variance.

Figure 2 Risk-seeking until risk-neutrality
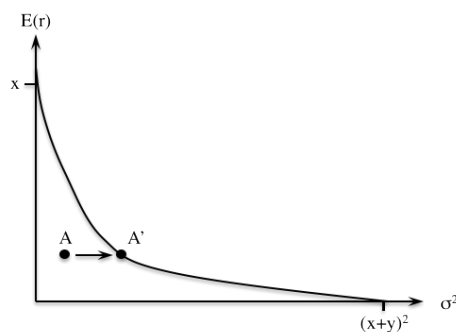
By combining the Expected Utility Theory based Markowitz model with the Prospect Theory based risk-seeking, it is clear that we can implement this behavior into standard asset pricing models too through the following method: we defined that risk–seeking has always a limit where it reaches risk–neutrality and this converges to zero variance with the growth of expected return (since it decreases monotonically in variance – expected return system).

Figure 3 Implementing risk-seeking
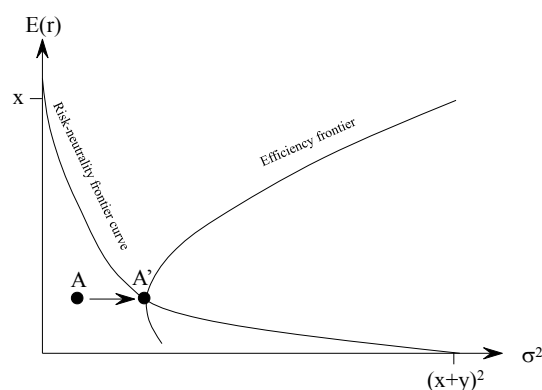
The risk–neutral curve (RNC) consists of points where investors are risk–neutral, where their utility depends only on the expected return of investments and it is not influenced by risk (here variance). Therefore, they choose the portfolio with the highest possible return on their RNC. Since this curve crosses the MPT defined curve of efficient portfolios, the efficiency frontier (EF) – given the definition of EF – the portfolio with the highest expected return – also the optimal choice – is exactly the cross of these two curves (see

Figure 3. This means that risk–seeking described above has no effect on the efficient portfolios of standard equilibrium models and this type of behavior can be implemented in these regressions.

3 CVaR risk measure in our model

One of the most compromising risk measures today is the Conditional Value-at-Risk. Although its predecessor, the VaR was able to measure the risk of non normal distributions used in standard asset pricing model, only the CVaR has developed the important characteristics of sub-additivity and convexity (Rockafellar-Uryasev, 2000). These characteristics and its possibility to measure the risk of any investment have made it the most precise risk-measuring technique today (Krokhmal-Palmquist-Uryasev, 2002), and that is why we decided to base our model on it. Furthermore, through this method we can describe the risk-seeking phenomenon with a measure applicable for any type of distribution function.

Although $CVaR_a$ is usually given by the probability weighted average of the loss function of an investment maximized with zero, we define this as the average of the worst a cases of the return distribution. Therefore, in our model it shows true value (that is negative) of the loss and we do not maximize its value at zero, hence, positive values of the return distribution also play an important role. This modification does not affect optimization methods, however, in our opinion it is easier to understand its role in our model and highlights more our results this way. For example, due to positive time preference investments with almost no risk at all may have positive CVaR at high levels of a since returns are not capped with zero. We have made Monte Carlo simulation for randomly weighted portfolios of four assets, namely the 3-month T-bill, 10-year T-bond, S&P500 index and the Coca-Cola shares. Figure 4 shows the results of the simulation where it can be clearly seen that for portfolios with the same expected return CVaR (also for 50%) is lower using historical distribution than using normal distribution.

Figure 4 Difference from normal (Gaussian) distribution in $CVaR_{0.5}$ - E(r) system
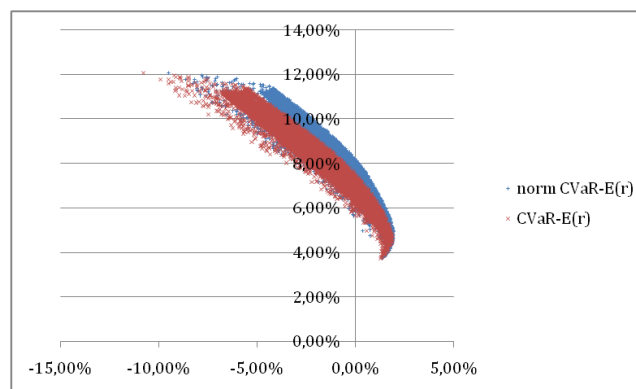
3.1 Simulating individual choice with CVaR

According to Arrow and Pratt (Pratt, 1964) the level of risk–aversion of an investor can be defined by a unique parameter, the "A" measure of risk–aversion. Since we assume that the Kahneman–Tversky utility function has the same convexity on the right side as the expected utility function in EUT, the behavior of an individual can be described in both risk–averse and risk–seeking cases with the aid of this measure, therefore, our model can define the optimal choice for every investor with the constraints that the goal is utility maximizing and the available portfolios have an efficiency frontier.

In case of risk–aversion the approximation of expected utility (Markowitz, 1959) could be used in our model too in the following method:

$$U(F) \cong E(F) - 0.5A\sigma^2 \qquad (4)$$

By solving this approximation for CVaR instead of the variance (Timotity, 2012), we get a monotonically decreasing function. This means that the convex utility function and the concave efficiency frontier of the variance-expected return models stands in CVaR based models too – which can be seen on Figure 4 too –, although, the slopes are different due to the fact that variance increases and CVaR (in our definition) decreases for riskier investments.

As for the risk-seeking behavior described in Section 2 we found solution in CVaR based asset pricing modeling also. Since the variance-based risk-seeking is applicable only in case of symmetric distributions, we had to find a risk measure that describes the true expected value of gains and losses (the true risk) for any type of return distribution. With the use of the variable Prospect (Timotity, 2012) – the opposite of CVaR – for 1-α level as the expected gain above the expected return and Conditional Value-at-Risk for α level as the expected loss below the E(r), we can define the risk-seeking phenomenon for every distribution function. Solving the risk-neutral equation (the same in equation 3 for CVaR) we get a monotonically increasing function. This means that the same situation applies for CVaR-E(r) modeling as it is in variance-E(r) based system, hence, investors choose the portfolio with the highest expected return on the risk-neutral curve, which will be the section of this curve and the efficiency frontier. Therefore, the CVaR-E(r) based efficiency frontier and the asset pricing method stays intact if we implement risk-seeking behavior too. This solution can be seen on Figure 5, where investor would choose investment A' instead of A, however, since he or she wants to maximize the expected return – being risk-neutral – the optimal portfolio will be on the efficiency frontier.

Figure 5 Risk–neutral curve and efficiency frontier
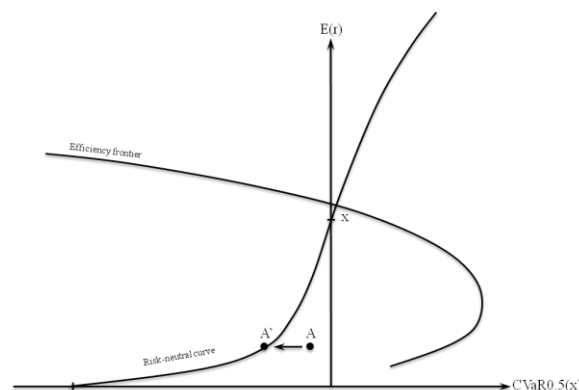
4 The effect of limited borrowings

In this section we omit one of the main, although very unrealistic assumptions of standard asset pricing models, the unlimited borrowings. Equilibrium models define the capital market line (CML) as the set of efficient investment opportunities including risk–free and risky assets that goes to infinity. However, in reality this is not true. In most of the cases there is no opportunity to invest in such positions. These assumptions cause investors gaining other advantages in exchange for paying interest rate: on one hand they get insurance "for free" due to liquidation at margin call. In this case the investor cannot lose more than its own invested money, however it would be possible through a leveraged portfolio without marginal requirements. This reduction of risk has no excess cost for him or her, however, he or she gets some of the negative risk eliminated, and thus gets higher expected return. This is described on Figure 6 and in the following equation.

$$E(r)_L = E(r)_P(1+x) - r_C x + p(r_Q < -1+f)CVaR_{Q,p(r_Q<-1+f)} - p(r_Q < -1+f)(-1+f) \quad (5)$$

where $E(r)_L$ is the expected return of L leveraged portfolio with margin requirements, $E(r)_P$ is the expected return of P unleveraged portfolio, $(1+x)$ is the leverage, $r_c x$ is the interest rate for borrowing multiplied by the borrowed quantity (the total cost of

borrowing), $p(r_Q < -1 + f)$ is the probability of Q leveraged portfolio without margin requirements producing return below (-1+f), $CVaR_{Q,p(rQ<-1+f)}$ is the Conditional–Value–at–Risk of Q portfolio at p probability.

Figure 6 Effect of leverage with margin requirements
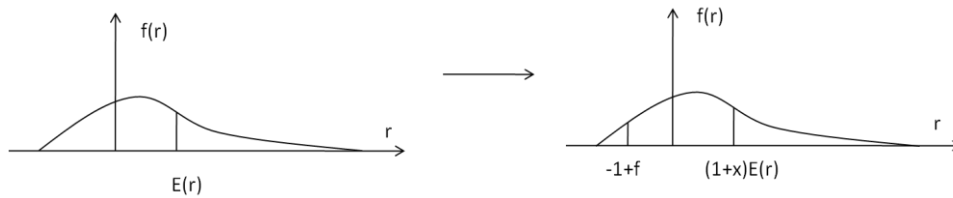
Since CVaR is always less than or equal to (-1+f) (the VaR) investors get increasing marginal expected return in case of margin requirements instead of constant marginal expected return. This means that the relation between the leverage of the portfolio and the expected return is not linear, therefore, in the function describing *CVaR-E(r)* leveraged portfolios $\frac{dE(r)}{dx}$ is not constant.

According to this situation, it is clear that asset pricing models have to specify the leverage limit and the interest rate for every investor first, than calculate the set of efficient portfolios for each of them under these conditions. Hence, individuals are optimizing their choice for different efficiency frontiers, and thus, models have to take into consideration investors' leverage limit and interest rate (that can be quite different in some cases). Figure 7 shows this optimization method, where A and B being efficient and C being inefficient for the second leverage limit (Efficiency frontier 2) may not be efficient under different conditions which produce Efficiency frontier 1.

Combining the isoutility curve (depending on the "A" measure of risk-aversion) with each efficiency frontier, the optimal choice for every investor can be identified. On Figure 7 this is represented by point O for r_c interest rate and Efficiency frontier 1. This way, our model can determine the optimal choice and so the required return for each investor. In the next section we use this individual optimization and the required returns to obtain the expected return of capital assets.

Figure 7 Individual optimization with leverage constraints
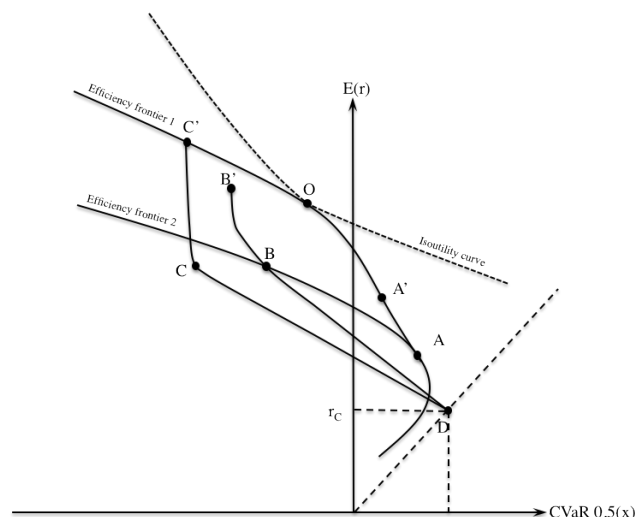
5 Defining the expected return

As mentioned above, by using three parameters– namely the CARA or CRRA, the interest rate paid and the leverage limit – optimal choice and required return can be defined for each investor. Since different conditions apply to individuals, their required returns will

not be the same. Through aggregating these choices institutions having all the necessary information can estimate the aggregate expected return of the market (which moves the prices). However, in order to have this aggregation these institutions have to have a model to describe the relation between different required returns assigned to a fixed *CVaR* risk. Since every publicly traded asset has a unique price, these required returns have to sum up to a unique expected return based on some function. In our opinion, this function could be a value–weighted aggregating function. This means that we sum up each investor's required return with weights equal to their invested value, and thus we get a unique expected return. This way, investors become price-maker as they all have effect on the market price of assets.

The weighted aggregation function is based on macroeconomic demand and supply functions. The price assigned to a portfolio is defined by the current aggregated supply and demand on the investment opportunity. Since databases allow us analyzing who wants to make transactions on the current price with what volume and what is the required return of the investor, one can define the future price (current price multiplied by the required return) and the future volume of each investor. This way the aggregated supply (AS) function can be defined. According to behavioral financial studies (Fama, 1991) the investors insist on smoothing their consumption over time, therefore, it seems to be realistic to assume that their incoming cash–flows are balanced and continuous due to diversification. Furthermore, if the future cash–flows are assumed to be fixed (which seems to be true since the price always reflects all the information about them), the aggregated demand (AD) grows in the same pace as AS, which is the required return of investors. This means that in the discounted cash–flow pricing method the exponent of the cost of alternative choice is getting smaller over time. Combining the functions mentioned above we create the AS–AD system in our model, hence one can approximate the future prices of assets and their expected returns. The illustration of this approximation is shown on Figure 8, where the initial (t_0) AS and AD functions are increased by continuous return over time (represented on axis "t"). The functions used are $P_S=2Q$ and $P_D=5-2Q$. We fixed the continuous return at fixed 20% in order to be expressive, hence the exponential growth over time can be clearly seen.

We underline that this type of approximation of the expected return is very sensitive to the input data, therefore, the bigger the used database is the more precise the regression will be. This necessary data can be extracted by analyzing the actions of clients in financial institutions or brokerage services, however, using our model at national level (such as under the supervision of the Securities and Exchange Commission) or at international level (for example with the administration of the International Monetary Fund (IMF) or the European Central Bank (ECB)) could produce fairly precise approximations of future prices of capital markets.

Figure 8 The formation of expected return
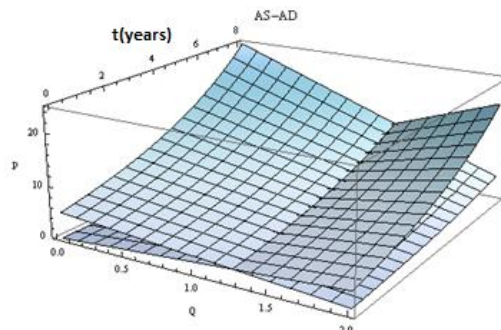
Conclusions

The use of Conditional–Value–at–Risk in asset pricing modeling seems to be more and more important since it is a much more precise measure than volatility or standard

Value–at–Risk. This can be seen in many recent papers and in statements of international financial institutions (for example the recommendation on CVaR by the Bank for International Settlements, 2012). Although there have been some models based on this risk measure before our research (Meng et al, 2011), they all have used the unrealistic assumptions of the exclusion of risk–seeking or price–maker investors and the infinite borrowing opportunity. Our model has achieved to omit these assumptions too, therefore, we could create a more general and realistic regression. The implementation of main utility functions (the ones from EUT and Prospect Theory) in *CVaR–E(r)* system allows defining the optimal choice of each individual in both risk–averse and risk–seeking situations. The inclusion of risk–seeking investors through the Kahneman–Tversky utility function has allowed omitting the first unrealistic assumption of standard models. The price–maker activity described by aggregated demand and supply functions has made the second assumption unnecessary. Although these functions have not been analyzed in this paper, there have numerous attempts to describe them with market microstructural or behavioral financial approaches; however, these theories usually focus on the short–term changes of prices, and on long–term our approximation seems to be a good solution too. Finally, the third unrealistic assumption (unlimited borrowing for fixed risk–free rate) has become unnecessary too since in our model we define different leverage limit and interest rate for every individual. Hence, our asset pricing method can define the required return and the optimal choice for each investor and under proper infrastructural conditions it can aid raising capital for companies through choosing the adequate investors, it supports individuals in trading, makes corporate financial analysis more precise (Andor-Dülk, 2013) and approximates the expected returns and asset prices without using unrealistic assumptions and limitations.

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Asset Pricing and Entropy

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Abstract: *We investigate entropy as a novel risk measure which explains the equity premium of securities and portfolios in a simpler way and at the same time with higher explanatory power than the beta parameter of the capital asset pricing. To measure the risk of an investment opportunity the portfolio theory applies the variance of the return, and show that the risk can be reduced by diversification and the systematic risk (beta) is applied as the risk measure. Entropy represents a measure of the uncertainty of a probability variable. Analogously, for asset pricing we define the continuous entropy as an alternative measure of risk. Our results show that the entropy is decreasing in the function of the number of securities involved into a portfolio similarly to the variance. In this empirical study we use the daily returns of 150 randomly selected securities for a period of 27 years. Our regression results show that the entropy has a higher explanatory power for the expected return than the CAPM beta.*

1 Introduction

We build an equilibrium model applying a novel risk measure, the entropy. Entropy characterizes the uncertainty or a measure of dispersion in a random variable, in our certain case, the uncertainty of stock and portfolio returns. In modern Markowitz (1952) portfolio theory and equilibrium asset pricing models we apply linear regressions which methodology suppose that the returns are stationary and normally distributed; however this is not the case (see Erdős and Ormos, 2009). Entropy on the other hand does not have these kind of boundary conditions, even as a starting point the density function itself has to be estimated. In the traditional asset pricing model there is equilibrium between the beta parameter, which is covariance – ratio variance between the market portfolio and the investigated investment opportunity. If the random variable is normally distributed than the entropy follows its standard deviation, thus in the ideal case there is no difference between the two risk measure. However our results show, that there is a significant difference between the standard deviation or beta and the entropy of a given security or portfolio. In this paper we show that entropy offers an ideal alternative to capture the risk of an investment opportunity, as if we explain the return of a wide sample of securities and portfolios with different risk measures; on an OLS setting the explanatory power is much higher in the case of the entropy measure of risk than the traditional ones.

2 Entropy

Entropy is a mathematically-defined quantity that is generally used for characterizing the probability of outcomes in a system through a process. Originally, it was introduced in thermodynamics by Rudolf Clausius (1867) to measure the ratio of transferred heat through a reversible process in an isolated system. In statistical mechanics the interpretation of entropy is the measure of uncertainty that remains about the system after observing its macroscopic properties (pressure, temperature or volume). The application of entropy in this perspective was introduced by Ludwig Boltzmann (1872). He defined the configuration entropy as the diversity of specific ways in which the components of the system may be arranged. He found strong relationship between the

thermodynamic and statistical aspect of entropy, the formula of thermodynamic- and configuration entropy differs in the so-called Boltzmann constant only.

There is an important application of entropy in information theory as well, which is often called Shannon (1948) entropy. The information provider system operates as a stochastic cybernetic system, in which the message can be considered as a random variable. The entropy quantifies of the expected value of the information in a message, in other words the amount of information that is missing before the reception. The more unpredictable (uncertain) messages are provided by the system, the more expected information it contains in a message. Consequently, the higher uncertainty in the messages of the system means higher entropy. Because the entropy equals to the amount of expected information in a message, it measures the maximum compression ratio without losing information.

In financial applications Philippatos and Wilson (1972) find that entropy is more general and has some advantages relatively to the standard deviation, in their paper they compare the behavior of standard-deviation and entropy in portfolio management. Kirchner and Zunckel (2011) argue that in financial economics entropy is a better tool to capture the risk reduction by diversification; however in their study they suppose Gaussian assets. Dionisio et al. (2006) argues that the entropy observes the effect of diversification and is a more general measure of uncertainty than the variance, since it uses more information about the probability distribution. The mutual information and the conditional entropy show a good performance when compared with the systematic risk and the specific risk estimated through the linear equilibrium model. Nawrocki and Harding (1986) propose to apply state-value weighted entropy as a measure of investment risk; however they are dealing with the discrete case. In all the above scholarly papers one can recognize that entropy could be a good measure of risk; however, it seems to be difficult to use it. Our main motivation is to show, that entropy based risk measure, on the one hand, more precise, and on the other hand, it is not more complicated than the use of the variance covariance equilibrium models.

3 Entropy function

3.1 Discrete entropy function

Let X^* be a discrete random variable. The possible outcomes of this variable is denoted by $o_1, o_2, ..., o_n$, and the corresponding probabilities by $p_i = \Pr(X^* = o_i)$, $p_i \geq 0$ and $\sum_{i=1}^{n} p_i = 1$

The Generalized discrete entropy function (Rényi, 1961) for variable X^* is defined as

$$H_\alpha(X^*) = \frac{1}{1-\alpha} \log\left(\sum_{i=1}^{n} p_i^\alpha\right) \qquad (1)$$

where α is the order of entropy, $\alpha \geq 0$ and $\alpha \neq 1$, and the base of the logarithm is 2. The order of entropy expresses the weight taken into account in each outcome, by lower order of entropy the more likely outcomes are underweighted, and vice versa. The most widely used orders are $\alpha = 1$ and $\alpha = 2$.

$\alpha = 1$ is a special case of generalized entropy. However the substitution of α to (1) results a division by zero, it can be shown by using L'Hôpital's rule in the limit of $\alpha = 1$, that H_α converges to the Shannon entropy:

$$H_1(X^*) = -\sum_{i=1}^{n} p_i \log(p_i) \qquad (2)$$

The case of $\alpha = 2$ is called Collision entropy or „Rényi entropy":

$$H_2\left(X^*\right) = -\log\left(\sum_{i=1}^{n} p_i^2\right) \tag{3}$$

$H_\alpha\left(X^*\right)$ is non-increasing function in α, and both entropy measures are greater than zero assuming finite number of possible outcomes:

$$0 < H_2\left(X^*\right) \le H_1\left(X^*\right) \tag{4}$$

3.2 Continuous or differential entropy function

Let X be a continuous random variable taking values from $\mathbb{R}$ with a probability density function $f(x)$. Analogously to (1), the continuous entropy is defined as:

$$H_\alpha(X) = \frac{1}{1-\alpha} \ln \int f(x)^\alpha \, dx \tag{5}$$

One can see that the base of the logarithm in (1) and (5) are different. However the entropy depends on the base, it can be shown that the value of entropy changes only in a constant coefficient by different bases. We use natural logarithm for all differential entropy functions. The formulas for special cases ($\alpha = 1$ and $\alpha = 2$) are the following:

$$H_1(X) = -\int f(x) \ln f(x) dx \tag{6}$$

$$H_2(X) = -\ln \int f(x)^2 \, dx \tag{7}$$

An important difference between the discrete- and continuous entropy is that while discrete entropy takes only non-negative values, continuous entropy can take negative values as well

$$H_\alpha(X) \in \mathbb{R} \tag{8}$$

4 Entropy estimation

Let $x_1, x_2, ..., x_n$ be the observation of continuous random variable X, and $H_{\alpha,n}(X)$ the sample-based estimation of $H_\alpha(X)$. The plug-in estimations of entropy are calculated on the basis of density function estimation $f(x)$. Assuming the probability density function is estimated as $f_n(x)$ the integral estimate of entropy is the following:

$$H_{\alpha,n}(X) = \frac{1}{1-\alpha} \ln \int_{A_n} f_n(x)^\alpha \, dx \tag{9}$$

where A_n is the range of integration which may exclude small and tail values of $f_n(x)$. We propose to select $A_n = \left(\min(x_i), \max(x_i)\right)$ $i : \{1,2,...,n\}$.

One of the simplest methods of density estimation is the histogram based density estimation. Let $b = \max(x_i) - \min(x_i)$ $i : \{1,2,...,n\}$ be the range of sample values. Partition the range into k equal width bins, and denote the cutting points by t_k. The width of a bin is constant: $h = \dfrac{b}{k} = t_{i+1} - t_i$. The density function is estimated by using the following formula:

$$f_n(x) = \frac{v_i}{nh} \tag{10}$$

if $x \in (t_i, t_{i+1})$ where v_i is the number of data points falling in the i-th bin. Based on the properties of histogram, a more simple estimation formula can be deducted for Generalized- and Shannon entropy using (9) and (10):

$$H_{\alpha,n}(X) = \frac{1}{1-\alpha} \ln \sum_{i=1}^{k} h\left(\frac{v_i}{nh}\right)^{\alpha} \tag{11}$$

$$H_{1,n}(X) = -\frac{1}{n} \sum_{i=1}^{k} v_i \ln\left(\frac{v_i}{nh}\right) \tag{12}$$

The formula for Rényi entropy can be derived by substituting $\alpha = 2$ to (11). The parameter of this method is the number of equal width bins (k). However, there are several methods to choose this parameter (e.g square-root choice, Scott's normal reference rule (1979), Freedman-Diaconis rule (1981)), the detailed description of these are out of scope of this paper. Beirlant et. al (1997) overviewes several other entropy estimation methods like kernel density estimation-, resubstitution-, splitting-data- and cross-validation methods, we focuses on the application of histogram based estimation.

5 Risk estimation

Let be given a set of data $D : \{S, R, R_M, R_F\}$. The elements are the set of securities $S : \{S_1, S_2, ..., S_l\}$ corresponding observations for each, $R : \{R_1, R_2, ..., R_l\}$, $R_i = (r_{i1}, r_{i2}, ..., r_{in})$ the observations for the market return $R_M = (r_{M1}, r_{M2}, ..., r_{Mn})$ and the observations for the risk free return $R_F = (r_{F1}, r_{F2}, ..., r_{Fn})$ where l is the number of securities, and n is the number of samples. The main goal of this paper is to apply entropy as a novel risk measure. In order to handle risk measure uniformly, we introduce κ as a unified property for securities. Let $\kappa(S_i)$ be the risk estimate for the i-th security. In the economic literature the most widely used risk measures are Capital Asset Pricing Model (CAPM by Sharpe, 1964) beta, and the standard deviation. Denote them with κ_β and κ_σ, respectively. The estimation for this risk measures for security i are the following

$$\hat{\kappa}_\beta(S_i) = \beta_i = \frac{\mathrm{cov}(R_i - R_F, R_M - R_F)}{\sigma^2(R_M - R_F)} \tag{13}$$

$$\hat{\kappa}_\sigma(S_i) = \sigma(R_i - R_F) \tag{14}$$

where β is the CAPM beta, $\mathrm{cov}()$ is the covariance of the arguments and σ is the standard deviation. Our hypothesis is that uncertainity on the observation values can be interpreted as a risk of the security, so we introduce entropy as a risk measure. Because the differential entropy function can take negative values as well $(H \in \mathbb{R})$, for a better interpretability we apply inverse natural logarithm and define the entropic risk measure by the following formula:

$$\hat{\kappa}_H(S_i) = e^{H_n(R_i - R_F)} \tag{15}$$

One can see that κ_H takes values from the non-negative real numbers, $\kappa_H \in [0, +\infty)$

6 Explanatory power

Let T be a target variable, with sample $t = (t_1, t_2, ..., t_l)$ and let E a single explanatory variable with sample $e = (e_1, e_2, ..., e_l)$. To estimate the explanatory power of variable E for variable T, we use the following method. The linear relationship between the two variables can be described with linear regression model: $T = a_0 + a_1 E$.

The parameters of model (a_0 and a_1) are estimated by ordinary least squares (OLS), and the estimation for a target value is the following: $\hat{t}_i = \hat{a}_0 + \hat{a}_1 e_i$ where $\hat{a}_0$ and $\hat{a}_1$ are the estimation of a_0 and a_1, respectively. One of the most often used estimation of the explanatory power is the R-squared (the coefficient of determination) of the linear regression:

$$R^2(t,e) = 1 - \frac{\sum_{i=1}^{n}(t_i - (\hat{a}_0 + \hat{a}_1 e_i))^2}{\sum_{i=1}^{n}(t_i - \bar{t})^2} \tag{16}$$

We are curios how efficiently the risk measures describe the expected risk premium of a security, denote this measure by $\eta(\kappa)$. Let the explanatory variable E be the risk measure of the securities, where the sample is

$$e_\kappa = (\hat{\kappa}(S_1), \hat{\kappa}(S_2), ..., \hat{\kappa}(S_l)) \tag{17}$$

and the target variable T is the expected risk premium of the securities, where the sample is

$$t_\mu = (E[R_1 - R_F], E[R_2 - R_F], ..., E[R_l - R_F]) \tag{18}$$

where κ is the unified risk measure function, and $E[\bullet]$ is the expected value of the argument. We define the estimation of the in sample explanation efficiency as the R-squared of the previously defined variables (17) (18):

$$\hat{\eta}(\kappa) = R^2(t_\mu, e_\kappa) \tag{19}$$

7 Empirical results

In our empirical analysis we apply daily returns from the Center for Research in Security Prices (CRSP) database in a period from 1985 to the end of 2011. We randomly selected 150 securities from the S&P500 index components, which were available for the full period. The market return CRSP value weighted return. The index tracks the return of the New York Stock Exchange (NYSE), the American Stock Exchange (AMEX) and NASDAQ stocks. The risk-free rate is the return of the one-month Treasury bill from the CRSP.

7.1 Characterizing the diversification effect

We investigate whether the entropy is able to measure the reduction of risk by diversification. We generate 10 million random equally weighted portfolios with different number of securities involved (at most 100,000 for each size) and we estimate the risk of each portfolio with standard deviation, Shannon and Rényi entropy by using daily risk premiums. Both types of entropy functions are calculated by histogram based density function estimation, with 175 bins for Shannon entropy and 50 bins for Renyi entropy.

Figure 1 Average value of risk and risk reduction vs. number of securities in portfolio
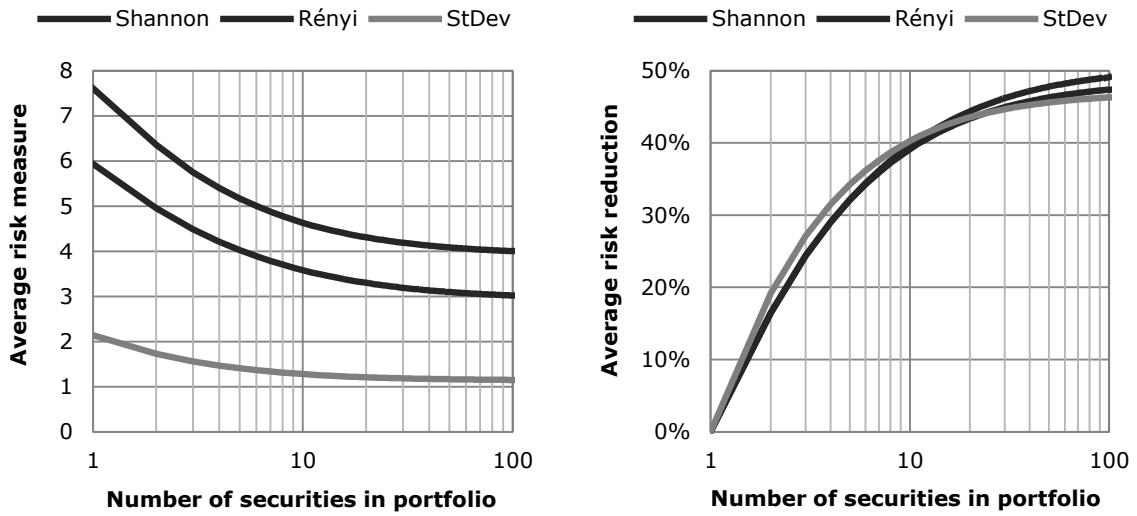
Figure 2 Explaining power of risk measures in long period
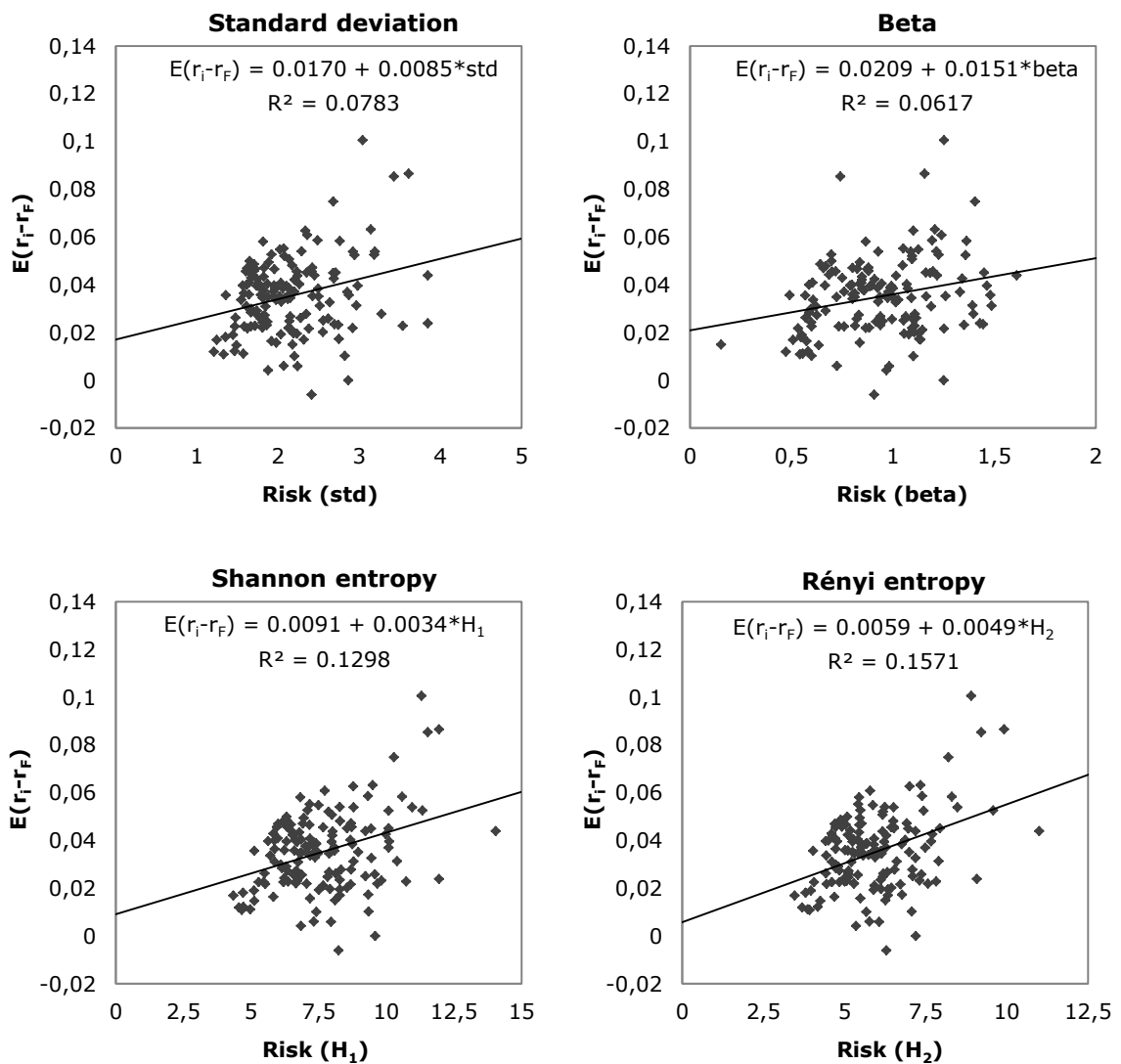
Figure 1 shows the average value of risk measures for different elements in portfolio. The diversification effect is characterized by the entropic risk measures as well as the standard deviation. By 10 random securities involved in the portfolio approximately 40% of risk reduction can be achieved comparing to a random single security portfolio based on all of the three investigated risk estimators. These results suggest that entropy shows similar but not the same behavior to standard deviation, so it can serves as a good measure of risk.

7.2 Long term explanatory power

In order to evaluate how efficiently the risk measures explain the expected risk premium in a long period, we estimate the risk for each security as standard deviation, CAPM beta, Shannon- and Rényi entropy based on the full period (denoted by *P1*). While the single explanatory variable is the risk measure, the target variable is the expected risk premium of the security. We apply the explanatory power estimation by calculating $\hat{\eta}(\kappa)$ (R-squared) for each risk measures.

Figure 2 shows the efficiency of explaining the expected risk premium by risk measure, where *X*-axis is risk measure and the *Y*-axis measures the expected daily risk premium. The CAPM beta performs the poorest with 6.17% efficiency. However the explanatory power of standard deviation (7.83%) is higher than CAPM beta, both of entropies perform significantly better, 12.98% for Shannon entropy and 15.71% for Rényi entropy. Based on the equation of linear regressions, the average unexplained risk premium (intersect on axis *Y*) for entropies (0.0091, 0.0059) is lower than the standard methods' (0.0170 for standard deviation and 0.0209 for CAPM beta).

7.3 Short term explanatory power

However, attractive results are achieved in-sample, it doesn't not necessary result high efficiency out-of-sample. Therefore we took several 10-year periods, shifting the starting years by one year from period (1985-1994) to period (2002-2011). Because the full data set consists of 27 complete years, we applied 18 10-year periods. We split each 10-year period into two 5-year short periods (*P2i* and *P2o*), where the risk measures are estimated based on the first period and the efficiency of forecasting is measured in the second period. We also examined the risk measures in-sample to compare the results with the long term ones.

Table 1 Efficiency of explaining risk premium in different samples

Risk measure	$\hat{\eta}_{P1i}$	$\overline{\hat{\eta}_{P2i}}$	$\overline{\hat{\eta}_{P2o}}$	$\sigma_R(\hat{\eta}_{P2i})$	$\sigma_R(\hat{\eta}_{P2o})$
Standard deviation	7.83%	7.94%	9.70%	0.73	0.63
Beta	6.17%	13.31%	6.45%	0.95	0.99
Shannon entropy	12.98%	13.38%	10.15%	0.67	0.62
Rényi entropy	15.71%	12.82%	9.34%	0.62	0.60

Table 1 summarizes the explanatory power of the investigated risk measures in different samples. The first column ($\hat{\eta}_{P1i}$) shows the result of the long term analysis, the second and third rows ($\overline{\hat{\eta}_{P2i}}$, $\overline{\hat{\eta}_{P2o}}$) contains the average efficiency measured in and out of short term samples, respectively, and the last two columns ($\sigma_R(\hat{\eta}_{P2i}), \sigma_R(\hat{\eta}_{P2o})$) measures the relative standard deviation of the efficiency applying in and out of sample test for short periods. While the standard deviation risk measure performs almost the same in long and short run (7.83% vs. 7.94), it's forecasting efficiency is surprisingly good (9.70%). While the explanatory power of CAPM beta in long period is low (6.17%) the average efficiency in short periods is more than twice as much higher (13.31%). Comparing the results in and out of sample, the forecasting power is relatively low (6.45%) which suggest that

the model may be over fitted for training sample. The Shannon entropy performs better in each sample versus the standard deviation and the CAPM beta. Rényi entropy shows the highest explanatory power in the long run; however in short periods Rényi performs worse than Shannon entropy. Comparing the reliability of risk estimators, the standard deviation of the in and out of sample results is the lowest for entropy risk measures, and the highest for CAPM beta.

8 Conclusions

Entropy combines the advantages of CAPM beta and standard deviation. It captures risk without using any information about the market; it is capable to measure the risk reduction effect of diversification. The explanatory power for expected return in sample is better than CAPM beta, especially in the long run which contains bullish and bearish periods; the predictive power for expected return is higher than standard deviation. Both Shannon and Rényi entropy gives more reliable risk estimation; their explanatory power exhibits significantly lower variance compared to CAPM beta or to the standard deviation.

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Analysis of phishing in the e-banking field and protection techniques against this type of fraud

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Abstract: *The subject of the paper "Analysis of phishing in the e-banking field and protection techniques against this type of fraud" is an analysis of phishing in the e-banking (internet banking, phone banking, payment cards etc.) field, an identification of warning signs of phishing, a creating of models of this type of fraud and an identification of the basic recommendations for users of e-banking services to reduce security risks connected with using of e-banking services.*

Keywords: e-banking, security, risk, fraud, phishing

JEL codes: G020, G210, G290

1 Introduction

Phishing is one of basic types of frauds in the e-banking we can meet with in the Czech Republic and all over the world. For the precision we can meet with the phishing not only in the e-banking field, but for example in the e-shopping field too (generally we can meet with the phishing by all institutions and systems that can be abused, for example we can mention PayPal). In this paper we will analyse this type of frauds in the e-banking field, it means the phishing fraud connected with internet banking, phone banking, payments cards etc. Except the phishing fraud, so called Lebanon loops, hidden cameras, touch sensors, counterfeit payment cards, skimming, pharming, spoofing, trashing and thefts of payment cards belong to the basic types of frauds in the e-banking field[1]. Relatively often particular types of mentioned frauds are combined together to obtain more sensitive information about an e-banking services user or e-banking services by a defrauder which he/she uses to increase the success probability of the fraud for a defrauder, to extend possibilities of using obtained (sensitive) information. For example, the phishing fraud can be combined with producing and using a counterfeit payment card. The ground of phishing frauds has been known for a long time and we can recognize that generally the effort to use or abuse the confidence of people, in this case of users of e-banking services, connects these frauds together. Despite the fact that the phishing fraud has been described in many scientific and unscientific publications, defrauders are successful always[2].

The aim of this paper is to analyze phishing in the e-banking field, identify warning signs of phishing, create models of this type of fraud and define the basic recommendations for users of e-banking services to reduce security risks connected with using of e-banking services. The mentioned aim is reached by using of generally science methods, primarily analysis, description, synthesis, induction, deduction and modeling. Normative and positivist methodologies have been employed to reach the aim.

2 Results

As it was recognized, generally the effort to use or abuse the confidence of people connects individual types of phishing frauds together. Anti-Phishing Working Group

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[1] Basic types of these frauds in the Czech Republic are described for example in Klufa et al. (2012)

[2] More information about phishing attacks in the Czech Republic and in the world (including statistical information) are published for example on Anti-Phishing Working Group's WWW pages in APWG Phishing Attack Trends Reports.

defines phishing as "*...a criminal mechanism employing both social engineering and technical subterfuge to steal consumers' personal identity data and financial account credentials. Social engineering schemes use spoofed e-mails purporting to be from legitimate businesses and agencies, designed to lead consumers to counterfeit websites that trick recipients into divulging financial data such as usernames and passwords. Technical subterfuge schemes plant crimeware onto PCs to steal credentials directly, often using systems to intercept consumers online account user names and passwords – and to corrupt local navigational infrastructures to misdirect consumers to counterfeit websites (or authentic websites through phisher-controlled proxies used to monitor and intercept consumers' keystrokes).*".

The common ground of phishing frauds in the e-banking field is that a defrauder addresses a payment card user, an internet banking or phone banking user etc. (generally an e-banking services user) under somebody else's identity and requests notification of sensitive information (personal data, passwords, logins, PIN codes, account numbers, payment card numbers, date of payment card expiry etc.). The defrauder gives reason for this request for example with an effort to increase safety, software updating, verifying of access functionality after a failure of the system, a failure of a required transaction, an user's account blocking or with a possibility of more advantageous conditions for using of services. In these cases the defrauder often passes off as someone else to increase the success probability of the phishing fraud. Banks, supervisory authorities, e-shops, server operators are favourites.

The phishing defrauder uses different ways to contact a potential user of e-banking services, a potential victim of the phishing fraud, sends e-mails, letters, SMS messages, calls a potential victim etc. There are many different ways of obtaining sensitive information too. Nowadays the internet belongs to the standard ways of obtaining sensitive information of the phishing fraud victim. In this case the victim logs on fraudulent WWW pages according to defrauder's instructions. These fraudulent WWW pages have been created by the phishing defrauder and they look as original WWW pages of the subject that has contacted the user of e-banking services (bank, supervisory authority, e-shop, server operator etc.). The victim fills in a form by requested (sensitive) information on these WWW pages. The phishing defrauder can obtain sensitive information about user of the e-banking services by e-mail, letter, phone call, SMS message, etc. All these ways of obtaining sensitive information about the victimized user of e-banking services have in common together that the victimized user of e-banking services believes that has been contacted by real, legitimate bank, the real supervisory authority, the e-shop etc., so the real, legitimate subject, not by a defrauder. These victimized users of e-banking do not realize that the real, legitimate subjects do not communicate with users of their services by this way and they do not ever want the sensitive information about their users of services by this way. So victimized users of e-banking services believe it is all right and they do not suspect that they have become a victim of a phishing fraud.

To increase the credibility of a phishing attack and to increase the number of victimized users of e-banking services, the phishing defrauders use some tricks. Except the mentioned look of fraudulent WWW pages which are same or very similar to the original WWW pages of the user's bank, e-shop, real supervisory authority etc., phishing defrauders use similar contact e-mail addresses (for example e-mail addresses with a transposed letter order, reduced e-mail addresses, e-mail addresses with using a supplemented symbol as "-"). By links on fraudulent WWW pages, phishing defrauders sometimes hide the WWW address line or its part to reduce the risk that a potential victimized user of e-banking services uncovers an attempt on a phishing fraud.

If the phishing defrauder is successful and the addressed user of e-banking services believes the defrauder and tells or sends him some sensitive information, it is only a question when the phishing defrauder abuses obtained sensitive information in his favor. He can use obtained information by oneself or can sell it to another person.

The gravity of phishing frauds can be seen in the fact that it is relatively easy to address many chosen (potential) users of e-banking services for a defrauder and some of them believe the defrauder and tell or send some sensitive information. If only 5 % of addressed users believe the defrauder (as Polanský and Řeháčková (2008) mention in *Practical financial handbook for everyday* for example), so by a great number of addresses potential victims, phishing is an important threat for all subjects in the e-banking field. In this connection we should not forget to mention nowadays favored social networks (Facebook, Twitter, LinkedIn etc.) when it is possible to gain a lot of information about their users. If the social network user believes the defrauder and gives some entering data as the user name and password, the defrauder can use them to gain easily much more (additional) information and the identity of this victimized, trustful user can be stolen by the phishing defrauder. As early as in year 2006, Kirk (2012) warned of the dangerous that is associated with social networks.

Figure 1 Abuse of internet/phone banking with phishing

The phishing defrauder creates fraudulent WWW pages with a form to enter sensitive information

↓

The phinshing defrauder sends an e-mail to user of internet/phone banking with the reference to the created fraudulent WWW pages with a request for filling of requested information

↓

The user of internet/phone banking opens the fraudulent WWW pages through the sent reference

↓

The user of internet/phone banking fills the form with sensitive information about his account, safety elements (including entry information as a user name or a password), etc. – the defrauder obtains sensitive information

↓

The defrauder knows necessary sensitive information

↓

The defrauder passes off as the user, logs in to the user's internet/phone banking

↓

The defrauder transfers money from the deceived user's account

2.1 Models of phishing frauds

As we have noted there are many ways for realizing of phishing frauds. One of possible ways of this type of fraud in the internet/phone banking field is represented in figure 1 "Abuse of internet/phone banking with phishing". Figure 2 "The fraud with a counterfeit payment card and with phishing" represents one of possible ways of phishing fraud in the payment card field. As we can see the ground of phishing frauds is similar.

Figure 2 The fraud with a counterfeit payment card and with phishing

```
┌─────────────────────────────────┐
│   The phishing defrauder creates │
│   fraudulent WWW pages with a    │
│   form to enter sensitive        │
│   information                    │
└─────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────┐
│   The phinshing defrauder sends  │
│   an e-mail to user of payment   │
│   card with the reference to the │
│   created fraudulent WWW pages   │
│   with a request for filling of  │
│   requested information          │
└─────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────┐
│   The user of payment card opens │
│   the fraudulent WWW pages       │
│   through the sent reference     │
└─────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────┐
│   The user of payment card fills │
│   the form with sensitive        │
│   information about the payment   │
│   card, safety elements (as a    │
│   PIN code), etc. – the defrauder│
│   obtains sensitive information  │
└─────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────┐
│   *The defrauder knows necessary*│
│   *sensitive information about   │
│   the payment card and its user* │
└─────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────┐
│   The defrauder produces a       │
│   counterfeit payment card       │
└─────────────────────────────────┘
                 │
                 ▼
┌─────────────────────────────────┐
│   The defrauder uses the         │
│   counterfeit payment card to    │
│   withdraw cash from the deceived│
│   user's account, pays for goods │
│   and services  etc.             │
└─────────────────────────────────┘
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2.2 Recommendations to reduce the phishing risk

Recommendations to reduce phishing risk are variable. As the first we should mention that users of e-banking services should not respond to e-mails, letters, SMS messages, phone calls which content a request to tell or send sensitive information. Banks as other financial institutions or payment system keepers, supervisory authorities, e-shops, server operators etc. do not communicate with their users (clients) in security questions in this way. In these cases it is very probable that it is an attempt to obtain some sensitive

information about users of e-banking services. For mentioned reason the addressed person should not visit the WWW pages by the link that the sent e-mail or SMS message contain. The user's curiosity can be dangerous because in these cases it is not possible to rule out another type of an attack in the e-banking field and the user's personal computer can be attacked. Users should always respect the recommendation that writing WWW address in the address line of an internet browser by the user is better and safer than using a link to enter WWW pages (it is valid for communication with a bank, for entering a payment system, a social network etc.). When writing WWW address, the user should be careful and should control possible mistakes because he could enter fraudulent WWW pages created by a phishing defrauder and then he could provide sensitive information to the phishing defrauder.

We can recommend to users of e-banking services not making an intended transaction or break realized transaction if the user discovers that the system does not behave standardly, as usual, it asks entering sensitive information which does not need or which it has not wanted to enter sooner or which it should not want to enter. In these cases the user should contact the bank (or another subject, according the particular case) and describe the situation. It is possible to contact the police too.

To identify the attempt of a phishing fraud the low quality level of an attack can help (we can mention in a foreign language written e-mails, SMS messages or WWW pages, with grammatical or stylistic mistakes, WWW pages with mistakes in format, used colours, contents spreading etc.). But it is true that nowadays phishing attacks are often on very high quality level which increases the success probability of this attack. To discover a phishing attack using unprotected communication of an internet browser with the server (a WWW address begins "http://" instead of "https://" in the address line). The user of e-banking services should pay attention to the beginning of the WWW address stated in the address line of the internet browser which signs the used communication regime type (protected with "https://" and unprotected with "http://").

To reduce phishing risk we can recommend a control of the WWW pages authenticity by way of the certification verifying. In this case the user of e-banking services can verify that the visited WWW pages have a certificate which has been issued for the subject whose WWW pages the user of e-banking services wants to visit and for these WWW pages. Preferably the certificate should be issued by a reputable company. The user can verify the WWW pages authenticity for example by a click on a padlock symbol (this symbol can be situated in the right bottom corner on the lath or in the address line of the used internet browser).

To reduce phishing risk it contributes when user of e-banking services knows and observes basic security rules for safe using of personal computer and internet (as using only trustworthy computers with periodically updated software (an operating programme, an antiviral and an antispyware programme etc.), using powerful firewalls, computers which the user controls, where he does not visit suspicious WWW pages, where he does not use suspicious programmes etc.). In connection with phishing we should remind common e-banking services security recommendations as "use supplementary safety elements (as sending authorisation SMS messages etc.)", "use day, week or month limits for e-banking (internet banking, phone banking, payment card etc.) 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 or a cashless transfer you have not assigned, a cashless transfer on an unknown account number, the amount of a transaction is higher than it really was), you should contact your bank, payment card issuer and complain about this transaction" too.

We can summarize that users of e-banking services have the key role to reduce phishing risk.

3 Conclusions

Phishing is one of basic types of frauds in the e-banking we can meet with in the Czech Republic and all over the world. The ground of phishing frauds has been known for a long time and we can recognize that generally the effort to use or abuse the confidence of people connects these frauds together. Usually a defrauder addresses to user of e-banking services under somebody else's identity and requests notification of sensitive information (personal data, passwords, logins, PIN codes, account numbers, payment card numbers, payment card date of expiry etc.). Despite the fact that the phishing fraud has been described in many scientific and unscientific publications, defrauders are successful always.

The gravity of phishing frauds can be seen in the fact that it is relatively easy for a defrauder to address many chosen (potential) users of e-banking services and some of them believe the defrauder and tell or send some sensitive information. Recommendations to reduce phishing risk are variable. We can highlight that users of e-banking services have the key role to reduce phishing risk. So it is very important to reduce phishing risk so that users of e-banking services know and observe basic security rules for safe using of personal computer and internet as common e-banking services security recommendations too.

Acknowledgments

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Single supervisory mechanism bank as a first step to the banking union

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Abstract: *The text focuses on the reasons for the establishment, structure, and issues with banking union in the European Union. Describes the basic element and the first step of implementation, a single supervisory mechanism bank. Includes banking entities under the direct supervision of the European Central Bank and supervision of national supervisors. Contain some problems when creating a banking union and a single bank supervisory mechanism. In final assessment provides selected for successful implementation of the project and its benefits.*

Key words: Regulation and supervision, banking sector, union bank, single supervisory mechanism, financial system stability

JEL codes: G28

1 Introduction

The first step towards a system known as Union Bank was made by the European Commission proposal for the uniform performance monitoring mechanism in banks in september 2012. Supervision of banks domiciled in countries eur area takes the European Central Bank (ECB). Countries outside the euro area may enter this system of supervision voluntarily enter. The proposal came force by agreeing to the European Parliament and all EU member states. In December 2012 was a proposal to create a banking union approved by the President and Government of the EU Member States. In march 2013 agreed MEPs emergence of banking union - create a system of banking supervision the euro area.

2 The single bank supervisory mechanism

When processing the issue of building a single bank supervision and bank Union EU in the introduction using method description, in the section describing the current processes in this area and conclusion using the methods of analysis and comparison.

Creating a systém single bank supervisory mechanism (SSM) represents the first step towards a banking union European Union. During the year 2013, the extension of supervision by the European Central Bank to Bank decisive in the financial system of the European Union, since the beginning of 2014, the supervision of banks held by the European Central Bank has at all banks, savings banks and credit cooperatives operating in euro area countries (6000 banks).

The supervision shall be exercised by the European Central Bank and the national supervisory authorities. The European Central Bank will be able to exercise supervision if your decision. Above the big banks will exercise direct supervision ECB. Oversight bodies are major banks according to their importance for the economy of the EU countries (on a consolidated basis, 150 banks):

- total assets of the bank at least 30 billion EUR;
- share of total bank assets to GDP EU countries more than 20%;
- as determined by the ECB for consultation with national surveillance;
- as determined by the ECB according to the extent of cross-border activities in the EU;
- bank requesting financial support from the European reserves;
- outside these criteria three largest banks in each Member State.

System of consolidated supervision of banks (SSM) pays mandatory for banks of the euro area, other EU Member States have the option of voluntary input. The European Central Bank will take over by Supervisors Board fundamental powers of national supervisors, the granting and withdrawal of licenses, supervision of transparency of financial operations, assessment of mergers and acquisitions and compliance capital requirements under the CRD (Capital Requi rement Directive). National supervisory authorities shall exercise supervision in consumer protection and regular supervision of banking activities.

Uniform system of bank supervision mechanism is only a first step towards a banking union of anticipated four pillars:
- single bank supervisory mechanism (SSM);
- single resolution mechanism (SRM) with a set of tools and powers in relation to banks;
- common system of deposit protection (EDIRA);
- financial reserves to cover losses of deposits and the possibility of bank recapitalization.

The single bank supervisory mechanism can be seen as a tool to achieve financial stability of the EU financial market, financial integration and maintenance of national financial policies of EU member states. The reason is the existence of a high degree of interconnectedness of financial markets and institutions European Union in need of identifying and solving problems in the financial market.

A very important reason for the creation of a single supervisory system had the possibility of recapitalization of banks without state interference. These options make assumptions decoupling between states and banks associated with their growing debt. Central banks are contemporary theory and practice of a recognized financial institutions of an integrated financial sector supervision. Therefore, you can also mark the European Central Bank as a trusted financial institution for the location of the single supervisory mechanism in European Union.

As arguments to support this solution can also provide generally accepted reasons:

- the ECB's monetary policy requires continued support financial system stability
- system macro and micro prudential supervision requires continuous interaction
- exercise effective supervision is conditional information synergies

An open question to discussion and resolution of discrepancies remain between the institutional power of supervision and responsibility of the national supervisory authorities for the financial sector.

Another problem of a single bank supervisory mechanism is the specification of the rules of their transition and supervision of major banks and banks supervised by national supervisors. Methodology division of bank supervision between EU and national supervision does not involve real risks of banks for the stability of the financial sector. Through the open problems, the new system of consolidated supervision of banks in EU system mostly positively accept.

System comes with a gradual solution still missing national mechanisms in the event of crisis situations in the financial sector, supports the creation of standard mechanisms rescue strategies in relation to financial market participants, including the protection of deposits. Elements of debilitating creation of a single bank supervisory mechanism is to be seen in the negative attitude of some countries to participation in this system, denial of national supervisory authorities and government delegation of supervisory powers to the European Supervisory Authority.

3 Conclusions

Creating a banking union is a major strategic objective gradually realized through successive step. The first one is a single bank supervisory mechanism, whose current development and addressing open issues to be considered in this context.

The stability of the financial system is fundamentally influenced by the stability of the banking sector as a major player in the financial market. This fact corresponds to the structure of consolidated supervision of banks for the stability of banks, transparency of financial operations and creating a ready and effective rescue systems in case of failure of financial markets. A single supervisory system creates a shared responsibility of the EU for financial stability, reduces problematic linking banks and the state bank recapitalization.

A fundamental prerequisite for the effectiveness and success of supervision is expertise and professionalism of its setting and implementation of the possibility of effective tools for observation of the rules of financial institutions. Continued integration of the EU financial sector towards enhance its stability is conditional upon a general understanding of these processes, their significance and broad political leaders.

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Utilization of Benford's Law by Testing Government Macroeconomics Data

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Abstract: *This article builds on research published in the article "Fact and Fiction in EU Govermnental Economics Data" (Rauch, Göttsche, Brähler, 2011). By exploring the possibilities of applying Benford´s Law as a useful instrument for detecting data manipulation, this instrument is applied to the Czech Republic, especially on monthly data of exports and imports for the period 1996-2012, which make up the trade balance. We use the Z test as the test criterion and the first and second digits are tested.*

Keywords: Benford´s law, Z test, Government data, manipulation

JEL codes: C16, E01,M42

1 Introduction

The article "*Fact and Fiction in EU Governmental Economics* Data" (Rauch et al., 2011) which was published in the German Economics Revue was one of the first applications Benford's Law on government economic data. Before aforementioned article, the articles "*On the Application of Benford´s Law of the International Macroeconomic Statistics*" (Nye and Moul, 2007) and from (Gonzales-Garcia and Pastor, 2009), which confirmed the theory (Nye and Moul, 2007). Within these, the application is focused mainly on accounting and tax issues e.g. (Carslaw, 1998); (Nigrini, 1997), mathematics (Hill, 1998), (Morrow, 2009), and examining the results of elections (Decker et al., 2011) and last but not least, the credibility of scientific results such as regression coefficients (Diekmann and Jann, 2010).

In the article "*Fact and Fiction in EU Governmental Economic Data*," the authors focused on the economic data of the EU-27 from 1999 to 2009. Instead of the convergence test with Benford's distribution, they evaluate data of states according to the extent of the deviation of their data from Benford's distribution. Within this context, the following data were tested:

- Government deficit and debt
- Government revenue, expenditure and main aggregates
- GDP and its main components
- Balance sheet, consolidated assets and liabilities

The resulting findings were that EU countries, especially Greece, show a significant deviation from Benford´s data distribution. The problems of Greek national accounting confirmed further development. Among the states collectively known as PIGS, test data revealed significant deviations from Benford's distribution only in Ireland. If we focus on the Czech Republic, the authors showed the smallest means of the chi-square test.

2 Theory of Benford's Law

The first mention of Benford's Law, originally also called the "First digit law" was made by the American astronomer Simon Newcomb in 1881 in an article entitled "Note on the Frequency of Use of the Different Digits in Natural Numbers" in The American Journal of Mathematics. The article says that the probability that the first digit being the number 1 is 0,111 (1:9 = 0,1111), as we might expect, but 0,301. This thesis was rediscovered by Frank Benford in the article "The Law of Anomalous Numbers", who dealt with this problem more systematically and surveyed more than 20,000 data samples (Barrow, 2011).

The mathematical applications of Benford's law are mainly dealt with by Theodore Hill (For further details refer to Berhger and Hill, 2011). We can consider the following fundamental theorem as being essential: "*If it is chosen as a random distribution and if from any such distribution given a random sample, significant numbers from this distribution converge to the logarithmic distribution alias Benford's distribution.*"

Probability of the first digit D1 according to Benford's distribution:

$$P(D1 = \text{d}1) = \log\left(1 + \left(\frac{1}{d1}\right)\right) \qquad d1 \in \{1\ldots 9\} \tag{1}$$

Probability of the second digit D2 according to Benford's distribution:

$$P(D1 = \text{d}1) = \log\left(1 + \left(\frac{1}{d1d2}\right)\right) \quad d1 = 1 \qquad d2 \in \{1\ldots 9\} \tag{2}$$

If we extend our analysis to the occurrence the number on n the positon, we will use this general formula:

$$P_n\{d\} = \frac{1}{\ln(B)}\sum_{k=B^{n-1}}^{B^n-1}\ln\left(1 + \frac{1}{kB+d}\right) \tag{3}$$

Table 1 Benford's distribution

Number	First Digit	Second Digit	Third Digit
0	-	0,120	0,102
1	0,301	0,114	0,101
2	0,176	0,109	0,101
3	0,125	0,104	0,101
4	0,097	0,100	0,100
5	0,079	0,097	0,100
6	0,067	0,093	0,099
7	0,058	0,090	0,099
8	0,051	0,088	0,099
9	0,046	0,085	0,098

Source: Waltrin, 2008

Other mathematical properties of Benford's law are as follows:

- Multiplication of Benford´s distribution by any constant results in the same distribution
- Can be applied to all numerical systems
- Multiplication, division, squaring, addition and subtraction of Benford´s distribution results again in the Benford´s distribution (Watrin, 2008)

Benford´s law can be used to detect these data manipulation:

- Rounding financial performance by managers, for example roundings profit from 789,000 to 800,000
- Rounding up net income and EPS (earnings per share)
- Rounding losses down (Nigrini, 1997)
- Duplication of financial figures such as invoices
- Deleting data
- Rewriting values

In order to use of Benford´s law, data should meet the following conditions:
- All the data in the file must be in the same units
- There must be a data limited the maximum and minimum values

- Data can not be numbers used for identification,and numbers and numbers which have been generated randomly
- Data should include a rather small number. "(TPA Horwath, 2011)
- It is desirable to have more data files
- Data should not be influenced by psychology, such as prices ending in the number 99

It is appropriate to use data that have a mean greater than the median, and a positive kurtosis. In general, the larger the ratio of mean and median, the more suitable the data is for Benford´s test (Durtschi et al., 2004)

In the following table are types of data, which can be use for application of Benford´s test

Table 2 Suitability of Data for Benford's test

Suitable data	Unsuitable data
Accounts payble	Numbers of checks
Accounts receivable	Numbers of invoices
Wages	ZIP Codes
Sales	Psychological prices (e.g. 999)
Expendictures	ATM withdrawals
Whole year transaction	Thefts

Source: Durtshi et al., 2004

Another limitation of Benford's law is the types of fraud which can not be detected by utilizing this procedure. Very simply Benford's law will help us determine whether the overall data set of observations were added, removed, or vice versa. Concerning transactions, which were not recorded, such as a bribe, stealing assets, or duplicate transactions, such as an invoice number, Benford's test can not be applied. Benford´s test also does not help us to detect fictitious employees or the same bank account numbers (Durtschi et al., 2004).

3 Practical part

In this section we will apply Benford´s law to data published by the Czech Statistical Office on foreign trade during the period 1996 to 2012, specifically to the export and import of goods. Their difference defines the trade balance, which can be active or passive, and explains whether the state imports or exports more. The trade balance is often mentioned by the media as one of the indicators of economic performance.

The methodology for data collection CSO is as follows:

- Export: The export value of goods sent abroad, and crossed the state border for the purpose of permanent or temporary retention abroad. Total exports consist of exports to the EU and exports to countries outside the EU.
- Import: Import value of goods received from abroad and crossed the state border for the purpose of permanent or temporary retention at home. Total imports consist of imports from the EU and imports from countries outside the EU.

The Czech Statistical Office publishes data for individual months, so the sample test data for export and import will contain 204 individual items, and a total of 408 items will be tested.

For testing convergence with Benford´s law we will use the Z test, which can be calculated as following:

$$Z = \frac{\left(I(p_0 - p_e I - ^1/_{2n}) \right)}{s_1} \tag{4}$$

where: p_0 – is the observed proportion in the dataset;

p_e – is the expected proportion based on Benford´s law;
s_i – is the standard deviation of particular digit;
n - is the number of observations (the term 1/(2n) is a continuity correction factor and is used only when it is a smaller than absolute value term).

Z-Stat shows the statistical significance of the difference between the two proportions. The significance takes into account the size of the difference (over or under), the expected proportion, and the sample size. Scores above 1,96 are significant at the 0.05 level, and above 2,57 are significant at the 0,01 level.

3.1 Results for export

a) At the 0,05 level of significance, we test the following hypothesis: H_0 = occurrence of each digit in the first place converges to the Benford´s distribution
H_1 = occurrence of each digit in the first place does not converge to the Benford´s distribution.

Table 2 Results for the first digit

Digit	Empirical	Benford	Diff.	Abs. Diff	Z stat
1	0,431	0,301	0,130	0,130	3,982
2	0,245	0,176	0,069	0,0649	2,496
3	0,00	0,125	-0,125	0,125	5,291
4	0,039	0,097	-0,058	0,058	2,667
5	0,064	0,079	-0,015	0,015	0,688
6	0,044	0,067	-0,023	0,023	1,165
7	0,069	0,058	0,011	0,011	0,500
8	0,049	0,051	-0,002	0,002	0,138
9	0,059	0,046	0,013	0,013	0,725

The test showed high levels of Z statistics in particular with the numbers 1, 2, 3, 4, which means that we must reject H_0 at this level of significance.

b) At the 0,05 level of significance, we test the following hypothesis:
H_0 = occurrence of all individual digits on the second position converges to the Benford´s distribution
H_1 = occurrence of each digit in the second place do not converge to the Benford´s distribution

Table 3 Results for the second digit

Digit	Empirical	Benford	Diff.	Abs. Diff	Z stat
0	0,147	0,120	0,027	0,027	1,097
1	0,152	0,114	0,038	0,038	1,601
2	0,103	0,109	0,006	0,006	0,157
3	0,069	0,104	-0,036	0,036	1,554
4	0,074	0,100	-0,027	0,027	1,157
5	0,103	0,097	0,006	0,006	0,184
6	0,093	0,093	0,000	0,000	0,011
7	0,078	0,090	-0,012	0,012	0,405
8	0,098	0,088	0,010	0,010	0,405
9	0,083	0,085	-0,002	0,002	0,085

Z test did not show any value above 1,96. We must accept H_0.

3.2 Results for import

a) At the 0,05 level of significance, we test the following hypothesis:
H_0 = occurrence of each digit in the first place converges to the Benford´s distribution
H_1 = occurrence of each digit in the first place does not converge to the Benford´s distribution.

Table 4 Results for the first digit

Digit	Empirical	Benford	Diff.	Abs. Diff	Z stat
1	0,529	0,301	0,228	0,228	7,035
2	0,216	0,176	0,040	0,040	1,393
3	0,000	0,125	-0,125	0,125	5,291
4	0,000	0,097	-0,097	0,097	2,761
5	0,025	0,079	-0,055	0,055	2,762
6	0,074	0,067	0,007	0,007	0,236
7	0,078	0,058	0,020	0,020	1,099
8	0,059	0,051	0,008	0,008	0,339
9	0,020	0,046	-0,026	0,026	1,620

The test showed high levels of Z statistics in particular with the numbers 1,3,4,5, which means that we must reject H_0 at the level of significance.

b) At the 0.05 level of significance, we test the following hypothesis:
H_0 = occurrence of all individual digits on the second position converges to the Benford´s distribution
H_1 = occurrence of each digit in the second place do not converge to the Benford´s distribution

Table 5 Results for the second digit

Digit	Empirical	Benford	Diff.	Abs. Diff	Z stat
0	0,172	0,120	0,052	0,052	2,175
1	0,137	0,114	0,023	0,023	0,940
2	0,137	0,109	0,028	0,028	1,197
3	0,083	0,104	-0,021	0,021	0,867
4	0,054	0,100	-0,046	0,046	2,089
5	0,132	0,097	0,036	0,036	1,606
6	0,088	0,093	-0,005	0,005	0,132
7	0,074	0,090	-0,017	0,017	0,716
8	0,044	0,088	-0,043	0,043	2,072
9	0,078	0,085	-0,007	0,007	0,211

The test showed high levels of Z statistics in particular with the numbers 0,4,8 which means that we must reject H_0 at the level of significance.

4 Conclusions

The test results show that the first digit demonstrates a significant deviation from Beford's distribution. These findings do not automatically equate to the suspicion of the manipulation of governmental macroeconomic data. When interpreting the results of the Czech case, the author inclines towards theses published in the following articles "On the Application of Benford's Law to International Macroeconomics Statistics" (Nye and Moul, 2007) and "Benford's Law and Data Quality Macroeconomics (Gonzales-Garcia and Pastor, 2010). Deviations in data from Benford's distribution may be caused by a structural economic shift during the period 1996-2012, and not by poor quality of data.

It should be also noted that the quality of data affects all macroeconomic transformations as well as seasonal adjustments. Benford's test is also recommended to be applied to larger data samples.

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Availability of Information about the Company Insurance against Natural Hazards on the Czech Insurance Market

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Abstract: *The paper deals with on one of the possible event of information asymmetry on the insurance market in the Czech Republic. The event is the comprehensiveness of information about an insurance product. The information about the company insurance against natural hazards on the insurers´ website is the subject of the research. The valuation was carried out till the date 1. 3. 2013. The valuation is focused on the possibility of looking up the insurance conditions on the website and on the formal elaboration of insurance conditions by the criterion the number of the extrinsic information of the insurance product and by the criterion the number of insurance conditions documents. The goal of the paper is to evaluate the level of the information publication of insurers about the company insurance against natural hazards. The qualitative research based on the methods of description, analysis and comparison is the substance of the paper. The result of paper is the level of information disposal, i.e. the source of information asymmetry, on the supply side of insurance market.*

Keywords: asymmetry of information, information unawareness risk, insurance market supply, formal presentation of insurance terms and conditions, company property insurance

JEL codes: D01, G22

1 Introduction

The article elaborates on common practices by insurers in regard to public information sources of particular insurance products, in this case company insurance against natural disasters. The area of information on the insurance market relates with the problem of information asymmetry. Information asymmetry is a widely discussed phenomenon of contemporary economics. It is demonstrated by accessibility and completeness of information. Hořejší et al. (2006) states that information is asymmetric, when one participant in a market knows more than other participants. One side of the market, no matter if it is the supply or demand one, has a better knowledge of something, whereas the other is not informed completely. Asymmetrical information is a consequence of undisclosed activities or information.

Why is information so important in economics? Information is crucial for every economic activity and studying it represents an effort to draw economic models to actual economic behavior and decision-making (Liška, 2012). Whenever we make decisions, we use information that we receive and then process. This means information must always be properly analyzed.

Information which is either incomplete or not supplied at all causes information asymmetry. The insurance market is one of the most prominent places where information asymmetry occurs. There are many ways to conceal the truth. Daňhel et al. (2007) points out that the insurance market can be characterized as a market with mutual information imperfection considering that neither of parties can predict the future which may bring negative financial consequences to both parties of the insurance contract, predominantly on the supply side. In the insurance market, there is no information asymmetry on the demand side, i.e. on the client's side (Daňhel, 2002). According to Tříska (2002), the customer knows his or her own risk level better but it is the insurer who masters insurance terms and conditions, e.g. circumstances under which the insurance company is entitled to refuse to pay out a claim.

Why is information in the insurance market so important for clients? Although they usually do not realize this, information is priceless for clients. Every piece of information which is either incomplete or which is not supplied at all can lead to both client's and insurer's loss. The risk of being uninformed can be especially serious when concluding an insurance contract and also in the event of a claim itself. Complete information is essential for decision making when concluding an insurance contract, the risk of financial loss can then be minimized.

The goal of the paper is to evaluate the level of the information publication of insurers about the company insurance against natural hazards. The evaluation was conducted on March 1, 2013 and was based on one particular insurance product: company property insurance against natural disasters. This article evaluates insurers offering this product. The insurers themselves were selected on the basis of an up-to-date (Dec 31, 2011) analysis of the Czech insurance market. Information is assessed according to its sources, on the particular insurance product on the Internet. The article also presents qualitative research and asks this research question: Does an insurer with high percentage of written insurance on the insurance market provide total and well-arranged information about insurance against natural disasters to clients? The research question suggests itself because it can be supposed that an insurer with a large insurance market share will maintain a trustworthy attitude to its customers. Clients can assume, not relying on their own relevant information analysis, that an insurance company with a large market share is trustworthy and it properly informs its clients and thus minimizes the risks of being uninformed.

2 Methodology and Data

The goal of the paper is to evaluate the level of the information publication of insurers about the company insurance against natural hazards. The subject of this research is relevant information on insurance against natural disasters published on websites of analyzed Czech insurers. This sort of information can often be found in insurance "terms and conditions" (TaC).

In order to reach the aim of this research, analysis of the company insurance market must be conducted. Up-to-date data was collected from individual insurers as published on Dec 31, 2011 on the website of Czech Insurance Association, in particular: total written premium, written premium of non-life insurance and written premium of property insurance. On the basis of this analysis, insurers providing company insurance against natural disasters were selected.

The first stage of research: Using the method of description, we have to compile an algorithm with relevant TaC of company insurance against natural disasters. It is also important to verify whether or not these TaC are accessible on the Internet. This means that insurers who do not publish their TaC on their websites, must be excluded from the second stage of this research.

The second stage of research: Using the method of analysis and comparison, we evaluate the algorithm. Insurers are subsequently divided into three groups:

- Insurers offering one product of company insurance against natural disasters
- Insurers offering one product of company insurance against natural disasters with an ambiguous search for TaC.
- Insurers offering more products of company insurance against natural disasters.

Criteria for dividing insurers into these groups are: the algorithm of search for relevant information on company insurance against natural disasters and the number of company insurance against natural disasters products which are offered by the insurer. The larger number of insurance products, the more difficult it is to find relevant TaC on the insurer's complex website. Also, this research was conducted on condition that the business organization is interested merely in the company insurance against natural disasters.

The third stage of research: TaC are evaluated according to their formal presentation. The criteria for this step are in the number of irrelevant information found and the

number of documents representing the TaC. TaC may sometimes include information on other property insurance products which can lead to the delusion that the insurance coverage is much larger. This criterion is thus of high importance. The other criterion (number of documents representing the TaC) can make clients overlook some documents so they may also overlook some important relevant information.

3 Analysis of the company insurance against natural disasters market

In order to evaluate availability of information, an analysis of the market with company insurance against natural disasters must be conducted. In this analysis, we use data published in the Individual results of Czech Insurance Association (ČAP) members in 2011. The insurance market of ČAP members in non-life insurance got to 71 447 131 000 Czech crowns in 2011. According to the statistics published by Czech National Bank (ČNB), the insurance market of all insurers in non-life insurance got to 83 083 478 000 Czech crowns in 2011. The share of ČAP members in the written benefit of the Czech Republic in 2011 was 86 %. Company insurance against natural disasters is marketed by 13 insurers as shown in the summary below (Table 1).

Table 1 Summary of insurers offering company insurance against natural disasters

#	Insurer	Abbreviation
1.	Allianz pojišťovna, a.s.	ALLIANZ
2.	Česká pojišťovna a.s.	CP
3.	Česká podnikatelská pojišťovna, a.s., Viena Insurance Group	CPP
4.	ČSOB Pojišťovna, a. s., a member of the ČSOB holding	CSOBP
5.	Generali Pojišťovna a.s.	GP
6.	Hasičská vzájemná pojišťovna, a.s.	HVP
7.	HDI Versicherung AG, affiliate branch	HDI
8.	Kooperativa pojišťovna, a.s., Vienna Insurance Group	KOOP
9.	MAXIMA pojišťovna, a.s.	MAXIMA
10.	Slavia pojišťovna a.s.	SLAVIA
11.	Triglav pojišťovna, a.s.	TRIGLAV
12.	UNIQA pojišťovna, a.s.	UNIQA
13.	Wűstenrot pojišťovna a.s.	WUST

Source: Data processed according to ČAP's results (www.cap.cz, 2013)

Total written premium, non-life written premium and company property written premium in 2011 (the most recent data refer to March 1, 2013) are presented in Table 2. The chart arranges subjects according to their percentage in the insurance market (with company property insurance) in 2011 (PIM). It is obvious that arranging subjects according to their total written premium (in insurance against natural disasters) shows different results than arranging them by total written insurance. This difference is however not substantial. ČP ranks first in all categories of written insurance, KOOP ranks second. The insurance company GP ranks third with its company insurance but not with its general insurance and non-life insurance. In that case, GP ranks fourth before ALLIANZ.

4 Results

This part elaborates on research results based on the method described above. Firstly, insurers with TaC unavailable on their website are excluded from further research. Remaining insurers are divided into three groups. Within these groups, formal presentation of their TaC is evaluated. The term "TaC" refers to TaC of business insurance against natural disasters.

Table 2 Written insurance in 2011

Insurer	Total written insurance (thou CZK)	Non-life written insurance (thou CZK)	Company property written insurance (thou CZK)	Percentage in the market with company property insurance (%)
CP	31 331 985	20 161 703	3 864 165	33.09
KOOP	22 754 328	16 755 494	3 055 741	26.17
GP	8 438 854	5 859 411	1 402 659	12.01
ALLIANZ	9 444 750	7 307 604	1 165 961	9.99
CSOBP	7 382 076	4 026 397	692 386	5.93
UNIQA	5 180 134	3 994 092	618 861	5.30
CPP	5 841 549	4 678 864	402 120	3.44
HVP	491 942	482 809	181 257	1.55
HDI	316 154	316 154	159 827	1.37
SLAVIA	762 063	762 063	49 588	0.42
TRIGLAV	674 546	674 546	41 772	0.36
MAXIMA	316 849	316 849	40 470	0.35
WUST	323 112	323 112	1 791	0.02
Total	**93 258 342**	**65 659 098**	**11 676 598**	**100.00**

Source: Data processed according to ČAP's results (www.cap.cz, 2013)

Table 3 Evaluation of accessibility of TaC

Insurer	Can TaC be found?	Path to relevant TaC	Number of products
ČP	YES	www.ceskapojistovna.cz → firmy → majetek →pojištění majetku	1
KOOP		Will be dealt with in the following section.	**More than 1**
GP		Will be dealt with in the following section.	**More than 1**
ALLIANZ		Will be dealt with in the following section.	**More than 1**
ČSOBP	YES	www.csobpoj.cz → pojištění firmy → pojištění podnikatelských rizik → živelní pojištění	1
UNIQA	YES	www.uniqa.cz → podnikatelé → podnikání I → živelní pojištění	1
ČPP	**Only partially**		1
HVP	YES	First path: www.hvp.cz → podnikatelé → pojištění staveb Second path: www.hvp.cz → podnikatelé → pojištění movitého majetku	1
HDI	**NO**		
SLAVIA	**NO**		
TRIGLAV	YES	www.triglav.cz → pojištění podnikatelů → živelní pojištění	1
MAXIMA	YES	First path: www.maximapojistovna.cz → pojištění majetku → pojištění podnikatelů a průmyslu → pojištění firmy Second path: www.maximapojistovna.cz → pojištění majetku → pojištění podnikatelů a průmyslu → pojištění živelní	1
WUST	**NO**		

Source: Data collected from insurers' websites

4.1 Availability of TaC on insurers' websites

When searching for TaC, clients search for terms as: business insurance, property insurance, insurance against natural disasters. The following chart describes steps clients have to take in order to find relevant information. Also, the chart presents numbers of insurance products or insurance programs against natural disasters. The number of insurance products (or programs including insurance against natural disasters) is closely connected with how difficult it actually is to find relevant TaC. This could represent a problem for decision making clients when searching for complete information.

Table 3 shows that TaC of insurance against natural disasters cannot be found on websites of CPP, HDI, SLAVIA and WUST. These insurers were excluded from further research.

Remaining insurers are, for the sake of our research, divided into three groups:
- Insurers CP, CSOBP, UNIQA and TRIGLAV offer one insurance product against natural disasters
- Insurers HVP and MAXIMA do not provide unambiguous path to such a product
- Insurers KOOP, GP and ALLIANZ offer more insurance products against natural disasters

4.2 Evaluation of insurers CP, CSOBP, UNIQA and TRIGLAV

The chart below presents results based on given criteria. CSOBP and TRIGLAV are insurers whose TaC include information on insurance against natural disasters only. UNIQA and TRIGLAV compile all information into a single TaC document.

Table 4 Evaluation of CP, CSOBP, UNIQA and TRIGLAV

Insurer	Criterion: number of irrelevant products	Criterion: number of documents
CP	1	3
CSOBP	**0**	2
UNIQA	5	1
TRIGLAV	**0**	1

Source: Data collected from insurers' websites

CP presents three TaC documents of insurance against natural disasters. TaC include information which is irrelevant and fall under other products. For the sake of completeness it is important to say that the insurer also offers special insurance programs to business organizations. These programs are presented on a separated clearly arranged website. For this reason, these insurance programs were not evaluated. **CSOBP's** insurance against natural disasters is presented in two TaC documents. These do not include information about other insurance products. Clients might not realize that there are also general TaC which are located elsewhere than TaC of insurance against natural disasters itself. **UNIQA** presents one TaC document with insurance against natural disasters. These TaC contain five insurance products which do not fall under insurance against natural disasters. UNIQA divides business insurance into two parts: "Business I" and "Business II." The "Business I" insurance contains also insurance against natural disasters. This scheme is however very well arranged and searching for information is unambiguous. **TRIGLAV** presents only one TaC document with information on insurance against natural disasters. This information is related only to insurance against natural disasters. On the basis of our analysis it is possible to summarize that the process of searching for relevant information on TaC is simplest on the website of TRIGLAV. This insurance company's formal presentation of TaC ranks first as well. TRIGLAV presents only one document with TaC and it includes merely information on insurance against natural disasters. CSOBP ranks second, CP third and UNIQA fourth.

4.3 Evaluation of insurers HVP and MAXIMA

The process of searching for TaC was ambiguous and misleading in case of HVP and MAXIMA. For this reason, these insurance companies are evaluated separately. These insurers do not offer other insurance programs for business organizations. **HVP** presents three individual documents with TaC of insurance against natural disasters. These documents contain merely information on insurance against natural disasters. There are two ways to find information on TaC of insurance against natural disasters. TaC for immovable property are to be found in the section "stavby" (buildings). There are two documents in this section, TaC of damage insurance and TaC of buildings. TaC of movables are to be found in the section "movité věci" (movables). Again, there are two documents, TaC of damage insurance (identical with the building insurance) and TaC of movables. Clients have to search for information using two different links on the website and might overlook some documents. TaC of **MAXIMA** are presented in two separate documents related merely to insurance against natural disasters. The process of searching for relevant information does not seem very logical. The path is mentioned in the chart 3. When clients open the section "Pojištění podnikatelů a průmyslu" (Business and Industrial Insurance), they have to choose from four options: "Pojištění firmy" (Business Insurance), "Pojištění odpovědnosti za škodu podnikatele" (Business Liability Insurance), "Pojištění strojů a elektroniky" (Machinery and Electronics Insurance) and "Živelní pojištění" (Insurance against natural disasters). To be able to open this last option, clients need to click on the link "Živelní pojištění" (Insurance against natural disasters) where TaC of insurance against natural disasters can be found. However, these TaC are not the only valid TaC of insurance against natural disasters. Other TaC must be searched for in the section "Pojištění firmy" (Business Insurance) where another TaC document is located. This document contains general TaC for all property insurance policies. This seems disorganized and poorly arranged. Also, clients might overlook one of these documents.

Table 5 Evaluation of HVP and MAXIMA

Insurer	Criterion: number of irrelevant products	Criterion: number of documents
HVP	0	3
MAXIMA	0	2

Source: Data collected from insurers' websites

Based on our analysis, it is more difficult to find relevant TaC on websites of insurers HVP and MAXIMA. Both insurers present only relevant information in their TaC. It can be stated that both insurers, with respect to formal presentation of their TaC, rank equally.

4.4 Evaluation of KOOP, GP and ALLIANZ

The chart below shows the number of insurance products offered within insurance against natural disasters and the process of searching for TaC.

KOOP offers two products for business organizations, namely: "Pojištění malých a středních podnikatelů" (Small and Medium Business Insurance) and "Pojištění průmyslu a podnikatelů" (Industrial and Business Insurance) (as shown in the chart above). Both of these include insurance against natural disasters. TaC of industrial and business insurance are not available. Considering that the insurance company KOOP does not publish TaC of industrial and business insurance, our further research will analyze the insurance product TREND because this is suitable for small and medium businesses. There are six irrelevant products which fall under TaC of the product TREND. **GP** offers two products to their business clients: "Pojištění podnikání" (Business Insurance) and "Pojištění individuálních rizik" (Individual Risks Insurance). The Business Insurance program contains three products (as shown in the chart above). Individual risks insurance is intended directly for industrial organizations. It is possible to find TaC here but there are also some irrelevant pieces of information included. Our research will further analyze TaC belonging to the individual risks insurance program because it is

more general. **ALLIANZ** offers two insurance options to their clients: "Pojištění individuálních rizik a průmyslu" (Individual risks and Industry Insurance) and "Majetek a odpovědnost" (Property and Liability). Within the Property and Liability program, the insurer offers also some other insurance products (as shown in the chart above). "Pojištění individuálních rizik a průmyslu" (Individual risks and Industry Insurance) is aimed at industrial organizations. It is possible to find TaC here but there are also some irrelevant pieces of information included in them. These TaC will be further analyzed.

Table 6 Evaluation of KOOP, GP and ALLIANZ

Insurer	Can TaC be found?	Path to relevant TaC	Number of products
KOOP	YES	www.koop.cz → Pojištění malých a středních podnikatelů → TREND or STARD PLUS or ORDINACE	3
	NO	www.koop.cz → Pojištění průmyslu a podnikatelů → pojištění majetku → pojištění živelní	1
GP	YES	www.generali.cz → individuální rizika → pojištění průmyslových rizik → požární pojištění majetku	1
	YES/ NO in case of MENU	www.generali.cz → majetek → pojištění podnikání → TOP GEN or DROBNÝ PODNIKATEL or MENU	3
ALLIANZ	YES	www.allianz.cz → Firemní klienti → majetek a odpovědnost → Pojištění PRO PODNIKATELE or NOE PLUS or SPECIÁLNÍ NABÍKDY	3
	YES	www.allianz.cz → Individuální rizika a průmysl → Pojištění majetku a přerušení provozu	1

Source: Data collected from insurers' websites

Table 7 Evaluation of KOOP, GP and ALLIANZ

Insurer	Criterion: number of irrelevant products	Criterion: number of documents
KOOP	6	1
GP	1	1
ALLIANZ	1	1

Source: Data collected from insurers' websites

On the basis of our analysis, it can be summarized that the insurance companies GP and ALLIANZ rank equally as far as the formal presentation of their TaC is concerned. Both of them included an irrelevant product in their TaC. In case of GP and ALLIANZ, a product suitable directly for industrial insurance was selected. The situation is different with other products because these are more general. KOOP presents all information in one TaC document but there are six irrelevant products. Another problem is that the insurer KOOP does not publish TaC of Industrial Business Insurance. This research analyzed the product TREND. All of these insurers' websites are distinguished by rather complicated navigation.

5 Conclusions

This article dealt with the nature of information on business insurance against natural disasters which is connected with demonstrations of information asymmetry on the supply side of the insurance market. This article is based on qualitative research using the method of description, analysis and comparison. It evaluated sources of information, i.e. terms and condition available on insurers' websites. The goal of the paper is to evaluate the level of the information publication of insurers about the company insurance against natural hazards. In connection with the target which had to be reached, this research asked this question: Does an insurer with high percentage of written insurance on the insurance market provide total and well-arranged information about insurance against natural disasters to clients? The article assessed the accessibility of TaC

and formal presentation of TaC based on two criteria. The first criterion was the amount of irrelevant information (products) within TaC. The other criterion was the number of TaC. Insurers were, on the basis of algorithm analysis of the process of searching for TaC, divided into three groups and then evaluated according to the given criteria. The research did not include insurance companies which do not publish TaC on their website at all. These are CPP, HDI, SLAVIA and WUST.

The first group of insurers is represented by CP (percentage in the insurance market /PIM/: 33.09%), CSOBP (PIM 5.93%), UNIQA (PIM 5.3%) and TRIGLAV (PIM 0.36%). These insurers offer one insurance product within business insurance against natural disasters and the process of searching for TaC is clearly arranged. CP has the largest percentage in the insurance market and ranks third within this group. The reason for this position is: irrelevant information within one insurance product and three TaC documents. The highest ranking company is TRIGLAV which has, however, a relatively small share in the market.

The second group of insurers is represented by HVP (PIM 1.55%) and MAXIMA (PIM 0.35%). These insurers should improve the arrangement of their websites as far as searching for TaC is concerned. Formal presentation of TaC is considered excellent. TaC do not contain any irrelevant information.

The third group of insurers is represented by KOOP (PIM 26.17%), GP (PIM 12.01%) and ALLIANZ (PIM 9.99%). These insurers have the largest percentage in the insurance market. Their websites, however, are not very well-arranged, especially because they offer more insurance programs. The insurance company KOOP ranks last in this group because it does not publish TaC of industrial and business insurance. It also ranks last with regard to formal presentation of its TaC because these contain six insurance products which are irrelevant for business insurance against natural disasters.

The summary, based on methods and criteria which were described, is as follows: CP ranks very high. On the other hand, KOOP provides information which is not complete. It is important to mention TRIGLAV, whose market share does not even reach 0.5% but which ranks very high because of the simplicity of navigation when searching for information and because of formal presentation of its TaC. We cannot summarize that an insurance company with a significant percentage in the insurance market always provides complete transparent relevant information. Clients cannot rely on the fact that a large share in the insurance market guarantees complete and well-arranged information on the insurer's website.

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Commodity Markets Financialization and its Impact on the World Economy

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Abstract: This paper deals with the financialization of contemporary world commodity markets and its influence on the economy. Firstly, it defines the ways in which this current trend shows itself and then analyzes its impact on the economy. Concurrently the paper tries to find out in what way is the effect positive for the economy as well as in what is negative. The aim of the analysis is also to confirm or refuse the hypothesis that financialization of commodity markets is one of the factors which has contributed to the emergence of modern "financial" crisis and helps its prolongation. The closing part of the paper focuses on the question if this process is beneficial or harmful for the further development of the world's economy or whether is appropriate to matter in this process or rather waits for the result of the spontaneous development itself.

1 Introduction

Important changes are currently being realized at commodity markets. Especially after the appearance of technological bubble in the year 2000 and its subsequent burst, investors started to seek further possibilities of investment to ensure wider diversification of investment portfolios and new ways of speculation. Formation of so called commodity boom that has been influencing not only commodity markets, but financial markets as well, is dated to this time; it has been strongly influencing world economy functioning, too.

The aim of the paper is to define and characterize the process of financialization of commodity markets theoretically, and subsequently to analyze its outcomes and impacts on world economy functioning. And last but not least, it enables to evaluate, based on acquired knowledge, whether this process is beneficial or harmful, what the benefits or harms are and whether it would be suitable to commence more strict regulation.

2 Definition of „financialization" of commodity markets

In the past, commodity investment instruments were differentiated from financial investment tools by the fact, that, due to their weight, they could not be traded promptly in bigger extent, or in another words, the deals could not be settled immediately. Financialization of commodity markets has significantly changed this fact. As it has become an important worldwide development trend, it seems to be unnecessary to analyze it in more details.

Financialization of commodity markets can be, before all, characterized as extreme growth of volume of commodity market, that is not settled physically, but they are settled financially. This way of trading is performed, before all, by speculators, for whom financial settling in commodity markets is suitable. It is simpler for them and, on top of that, they are not threatened by the fact that they would have to deliver or take particular commodity physically. Another characteristic of commodity markets

financialization is the fact that commodities are more and more often used as a part of portfolio of investment and share funds or, they become, together with commodity market index, foundation assets of many various sorts of newly constructed synthetic so called "structured products". This includes structured term deposits, various sorts of structured bonds, collective investment structured funds securities or various sorts of so called securitized lever derivatives (Rejnuš, 2011). Factors, leading investors to this way of commodities trading include diversification of their investment portfolios, existence of (often very high) financial lever in case of speculation. As far as issuers of structured products are concerned, foundation commodities or commodities trading indices enable further developing of variety of constructions of synthetic products, created by them.

3 Analysis of impact of commodity financialization on economy

Financialization of commodity markets and its progressive propagation show a number of different ways that need to be analyzed in details.

3.1 Analysis of influence of commodity financialization of price lever and volatility on price of commodities

In connection with financialization of commodities market, the influence of increased share of so called "financial investors" and their business strategy on contemporary level of commodities price in comparison with historical prices and contemporary extremely high volatility of commodities are being discussed. These topics are based on two basic theories.

The first one, so called "fundamental theory" assumes that the prices of commodity assets are determined almost solely by fundamental factors and that all commodity market users, making their business and investment decisions, assume development of offer and demand on spot markets. This theory is based on prerequisite of effective markets theory that commodities markets instantly and correctly absorb all available fundamental information and expectations. Provided that uninformed users of commodity markets assess the price of commodity incorrectly, well informed businessmen would take advantage of it and the price of respective commodity would get back to balance of "fundamental values" (Staritz, 2012). It shows that prices of commodities should not be influenced by "financialization" but they should be determined by real fundamental factors that are the cause of increased volatility of commodities prices. This opinion is advocated for example by Pirrong (2008), Hong and Yogo (2010), Power and Turvey (2011) or Singleton (2011).

Second, so called "financial theory" assumes that volatility of commodities prices is influenced not only by fundamental factors, but that it is significantly influenced by expectations, behaviours and interaction of individual market users; they include not only so called "informed investors", but so called "uninformed investors" as well. The difference between behaviours of these two groups of investors is based in the fact that "uninformed investors" follow trends, excessively respond to good and bad news and utilize various methods of technical analysis. This may launch so called "herd effect" (UNCTAD, 2009). And vice versa, the second group of "informed investors" utilizes statistical techniques for their decision making. Both these groups of market users can, due to their behaviours, considerably deflect the price of commodities from their fundamental values (Staritz, 2012).

3.2. Analysis of development of traded volumes of commodity terminated derivative instruments

Commodity derivatives are highly volatile instruments; some authors consider them to be one of the most risky forms of investment ever (Kline, 2001) and they can be traded in different ways. Basic form of stock exchange trading is traditional trading with commodity futures or, as the case may be, with stock exchange options (usually stock exchange options on commodity futures).

Figure 1 shows the development of the number of traded commodity derivative contracts at world commodity stock exchanges from 1993 to 2011. These data, although individual sorts of contracts are not specified in details, unambiguously show the importance and consequences of financialization of commodity markets. And what is especially important, their rapid growth can be seen even in the pre-crisis time, since the end of 2005. Beside this, there are contractually concluded (mostly via OTC market) forward, swaps and contractually concluded options.

Figure 1 Derivative transactions at world commodity stock exchanges
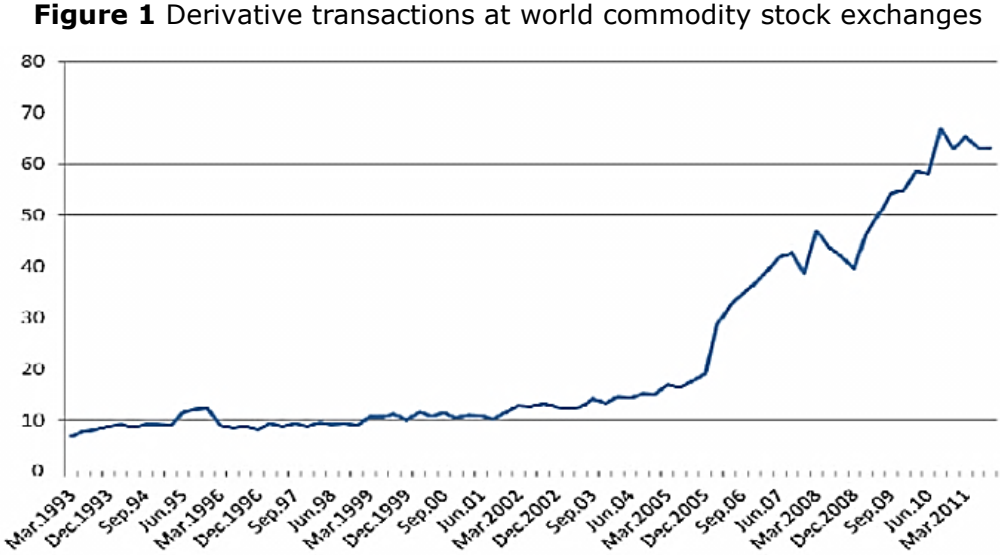
Source: BIS, Quarterly Review, December 2011 /millions of contracts/

3.3. Analysis of mutual interconnection of commodity and financial markets

Investments into commodity indices that are generally considered to be overall indicators of price development at commodity markets are a very popular form of "investments into commodities". These are investments that can be done in many different ways, not only by means of term derivative instruments, but by means of collective investment funds or by means of various sorts of structured products. Various commodity indices that differ from each other by their construction, covered commodities or by weights that are matched to them, terms of rolling of individual contracts (this means replacing current contract with approaching date due by a contract with more distant date due) etc. can be used for these purposes. Most important commodity indices used as underlying assets include for example Standard & Poor's – Goldman Sachs Commodity Index (S&P-GSCI), Dow Jones - UBS Commodity Index (DJ-UBSCI), Deutsche Bank Liquidity Commodity Index (DBLCI), etc.

Using commodity indices as underlying assets is often discussed by professional public. Some authors consider them to be a source of fundamental imbalance of commodity markets (Tang and Xiong, 2010; Gilbert 2010). When investing into futures derived from commodity indices, the investors in most cases speculate on growth of rate, which means they enter long positions. This causes growth of commodities prices unless they are physically settled.

Tang and Xiong (2010) pay attention to commodities indices with respect to more and more tight fitting correlation with revenues from shares. In their book Index Investment and Financialization of Commodities the authors say that financialization of commodity markets in the US is caused by considerable number of, before all, institutional investors. This leads to increased volatility of commodity markets and to tighter correlation of revenues with those of share indices – see below Figure 2. It shows the fact that the trend of approximation of the correlation of revenues between commodity index S&P GSCI and share index S&P 500 is the most considerable after the Lehman Brothers

bankruptcy in 2008, which concurrently proves the tendency to moving commodity and financial markets closer to each other.

Figure 2 Correlation of revenues S&P 500 and S&P GSCI
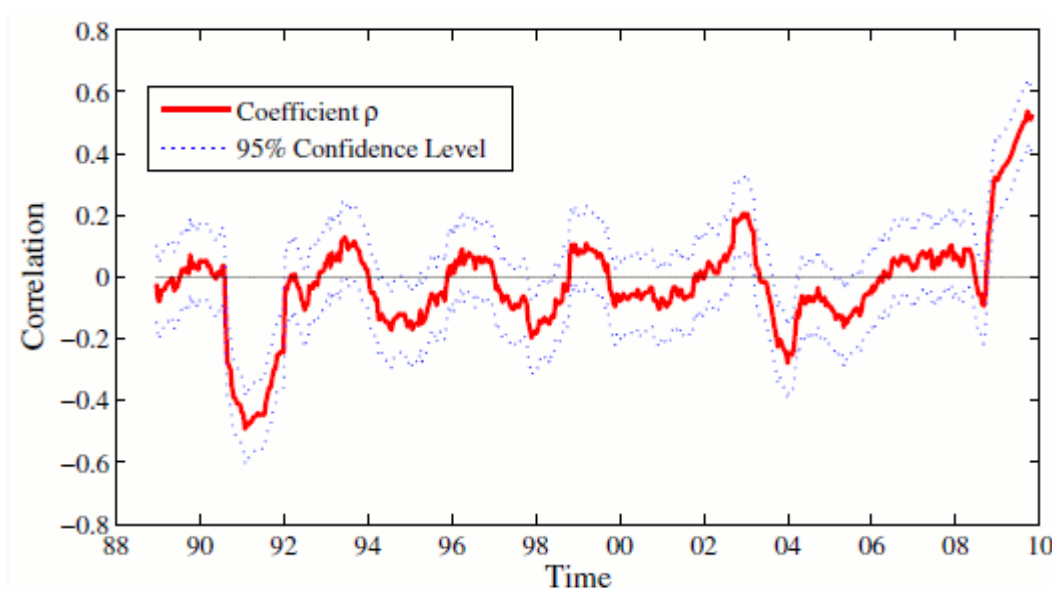
Source: Tang, K., Xiong, W. Index Investment and Financialization of Commodities (August 2010)

3.4 Analysis of diversification of investment portfolio as a stimulus to financialization of commodity markets

In 1950's, Harry Markowitz established basic principles of portfolio theory and defined the advantages of mutual diversification of financial and real assets, based on such allocation of individual assets that brings maximal expected revenue to the investor, while the level of risks is on the same level. In this case, the investor considers characteristics and correlation of individual assets (investment instruments) that influence the revenue and the risk of the whole investment portfolio. As the prices of commodity assets influence different factors than those that are influenced by financial investment instruments, it appears to be highly suitable for diversification of investment portfolio. And last but not least, they are adequately liquid.

Many authors have dealt with the problems of the importance of commodities in the investment portfolio. The most important of them include publications by Gorton and Rouwenhorst (2005), who find commodity assets to be an attractive class of assets suitable for diversification of investment portfolio and investment into commodity assets move, from the point of view of modern portfolio theory, closer to so called effective border. Except for above mentioned ones, investment into commodity assets were dealt with by many other authors (Gordon, 2006; Stoll a Whaley, 2009).

In connection with modern portfolio theory, two basic variables of this theory are subsequently assessed: historical revenue and volatility (decisive deviation that represents the risk of the investment) in the interval from Jan. 1st 1998 to Nov. 19th 2012. These variables are assessed for various sorts of commodity assets and compared with investment instruments – shares, bonds, and financial market tools. Data used in this analysis show total monthly revenues of individual commodity indices provided by S&P Dow Jones Indices (indices S&P GSCI). Apart from composite commodity index S&P GSCI Total Return (including collateralized revenues and revenues or losses caused by positions rolling) similarly constructed indexes of energies, precious metals, industrial metals, agricultural products and livestock are analysed. Share S&P 500 Price Return Index, Barclays US Aggregate Bond Index and saving account with the interest rate of 2/12 % per month – which is considered to be riskless asset for this purpose, are

compared. The initial investment of 1 US dollar was used for this calculation and transaction costs and taxation were abstracted from. In case of saving account, cash deposit was added monthly with the assumption of composed interest. Results of the analysis made by software Smartfolio are shown in Figure 3 and Table 1.

Figure 3 Graphic assessment of revenue appreciation into various sorts of investment assets
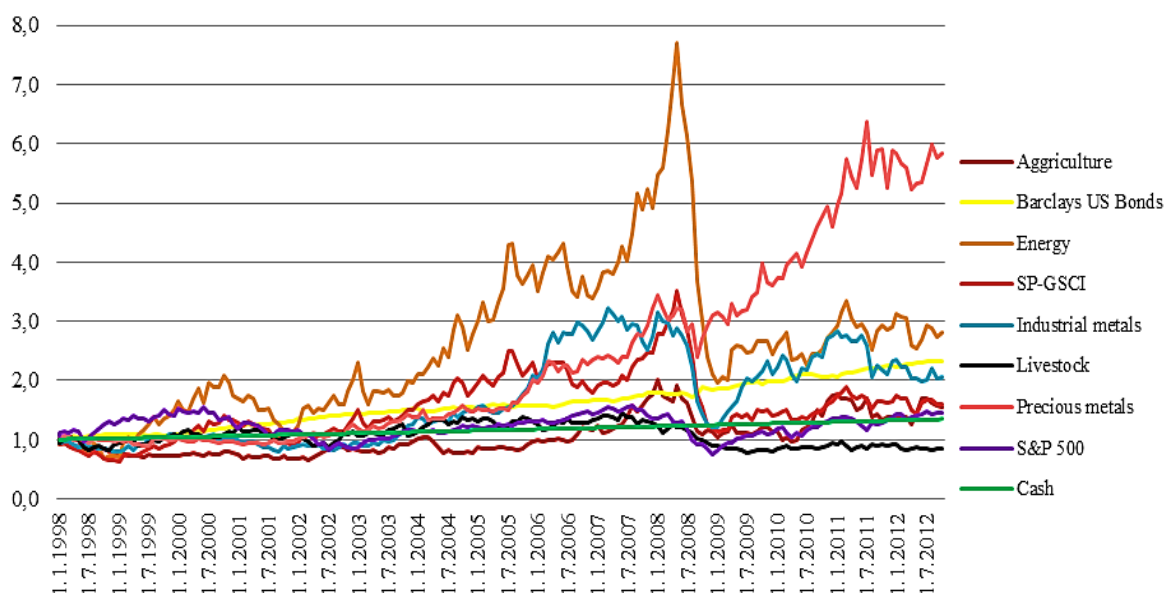
Source: Processed by K. Smolík, based on data available at S&P Dow Jones Indices, Barclays Capital and finance.yahoo.com

Table 1 Historical yearly profitability and volatility of chosen sorts of investment assets

Asset type	Average return	Volatility
Agriculture	5,33	21,98
Barclay US Aggregate Bond	5,72	3,55
Energy	12,37	32,80
S&P GSCI	6,20	24,67
Industrial Metals	7,41	22,40
Livestock	0,18	15,94
Precious Metals	13,48	18,02
S&P 500	3,83	16,49

Source: Processed by: S&P Dow Jones Indices, Barclays Capital and Yahoo Finance

Achieved results of graphic assessment of investment revenue and values of historical average yearly revenue, shown in a chart show that all commodity indices (except for livestock index) were more profitable than stock exchange index S&P 500 and riskless saving account in the monitored period. Volatility values of commodity indices are more distinct as well.

It is necessary to point out that, within mentioned analysis, test of normality of division of determinant deviation; this would be necessary to do when evaluating the risk by means of this variable within the framework of investment portfolio compiling. In this given case, this represents so called "Annual Returns" in the monitored period from 1998 to 2012.

3.5 Analysis of existence of financial lever as a stimulus of commodity markets financialization

As already ascertained, financialization of commodity markets brings financial and commodity markets closer together. This finding has one more important dimension. As the prices of term derivative instruments (in this particular case, before all, stock exchange futures) relate to their underlying assets, it is apparent that term and prompt prices influence each other.

This is connected with the fact that so called "paper commodities", or more precisely manipulation with prices of contracts of futures, derived from commodities of commodity indices, can influence their own prompt prices. This is done e.g. by shorting, entering so called "intelligent stock exchange orders" , by trading based on technical analysis etc. Furthermore, big institutional investors, e.g. hedge funds or Exchange traded funds /ETF/ buy, within business, large amounts of commodities. As they only pay margin in this case, they can control large amounts of fundamental commodities with "little money" and in case of financial settling, they do not even need to close their positions. This artificially increases demand for commodities that often represent production inputs, but in this case this does not mean traditional fundamental demand, when relevant commodity is used or stored on a short-time basis within reserves. The whole development trend is, according to many economists, (e.g. Gensler, 2010) enabled by insufficient regulation of commodity markets.

4 Conclusions

This analysis shows that the process of financialization of commodity markets has both its pros and cons.

The positives include effortless settling of term trading of commodities¨; this makes trading easier. Furthermore, it enables to trade commodities in smaller lots; this makes accessible trading of commodities for less important (and smaller) investors. This subsequently improves liquidity of commodities market as well as total traded volumes. Facilitating of diversification of investment portfolios of not only big investors, but those of the smaller ones brings additional positive factors.

On the other side, there is a number of negative influences of financialization of commodities market. First of all it is possible purpose-built manipulation with prompt commodities prices; this is connected with the growth of their volatility, and, last but not least, prevailing impact on growth of commodities prices. This is rather dangerous especially in case of food commodities or production input commodities. An as it is possible to manipulate with prompt prices of commodities, it can purposely influence the values of all synthetic structured products derived from them, which can seriously violate functioning of the worldwide financial market as well as the development of world economy.

Above mentioned facts show that regulation of commodity markets proves to be necessary and the representatives of most economically developed countries are aware of it. Nevertheless it is clear that due to existing close interconnection of commodity and financial markets, it is necessary to perform all regulatory measures jointly for both markets and it is impossible to divide them strictly from each other.

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The Impacts of Basel III onto the European Banking Sector

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Abstract: The European Commission and the European Parliament finalized the implementation of Basel III. From 01.01.2014, the relevant rules of CRR and CRD have to be fulfilled. But what effects do these rules have onto the banks, their strategies and profitability? This article discusses the main new aspects, their impacts onto the banks – and offers a strategy, how banks should deal with Basel III. Finally, the question if Basel III leads to a more stable banking system is answered.

Keywords: Basel III, LCR, NSFR, Solvency

JEL codes: E58, G21, G24

1 Introduction

Basel III was created as a direct reaction onto the Financial Crisis in 2008. On September 12th, 2010, the Basel Committee on Banking Supervision published first ideas according to Basel III (see BCBS 2010.09). Nearly three years later, on April 16th, 2013, the European Parliament published the final rules for Europe (CRR 2013).

After a short presentation of the main aspects of Basel III, this article analyses the impacts of Basel III onto the European Banking sector on the basis of existing literature. In the final conclusion, some hints for a strategic repositioning are presented and a conclusion, whether Basel III makes the banking system more stable, is given.

2 Description of Basel III

2.1 Main Aims of Basel III

Basel III offers several main new aims that have to be fulfilled. These aims are structured and shown in Table 1.

Table 1 Main aims of Basel III

Aspect	Capital ratios	Liquidity ratios	Leverage Ratio	Parts of equity	Modifying Risk Weighted Activa
Classification	Higher	New	New	More restrictive	More detailed
Valuation at a first glance	☺	☺	😐	☺	☹

Source: based on Hartig (2012)

At a first glance, most of the requirements of Basel III seem to be positive, but the European implementation process and the impulses for the banking sector lead to several difficulties.

2.2 Implementation Process

Basel III contains several aspects that might influence the Banking sector. Derived from the main BCBS publications (see BCBS 2010.08, BCBS 2010.09, BCBS 2010.12, BCBS 2011.06, BCBS 2013.01), the European Parliament finalized the CRR (Capital Requirements Regulation). This regulation (CRR) and the resulting CRD IV (Capital Requirements Directive) can be defined as the implementation of Basel III into European law, the BCBS papers do not have a binding character. So the main focus of this article is laid on the CRR and the CRD. While the CRR is obligatory after publishing it into the Official Journal of the European Union, the CRD IV has to be transformed into e.g. Czech or German law. All banks have to fulfill these requirements from January 1st, 2014, even though some transitional rules are offered.

Table 2 Main aspects of Basel III in European implementation

Aspect	Description	Date	CRR	CRD IV
Quality of equity	As a consequence of the financial crisis, the equity of banks has to consist of more stable components. The definition of Tier I and Tier II equity as well as the required quality and deductions from the equity parts are described. The basic 8% of total capital ratio remains constant compared to Basel II, but the Common Equity Tier 1 has to be at to be at least 4.5% and the Tier 1 capital ratio has to have a level of 6% (For further explanation see Deutsche Bundesbank 2011, p. 19).	01.2014 – 12.2017	Art. 23-86 Art. 87-89 Art. 451-461	---
Quantity of equity: buffers	An additional countercyclical capital buffer has to be implemented. Further, banks have to fulfill a Capital Conservation Buffer of Common Equity Tier 1. Both buffers can increase up to 2.5%. Even system risk buffers might occur.	01.2014 – 01.2019	---	Art. 122-132, 149
CCP and CVA underlying	According to EMIR (European Market Infrastructure Regulation, described in detail in Reuse/Svoboda 2013, pp. 583), central counterparty risk has to be covered with equity as well. Further, the credit value adjustment risk (CVA) is added.	01.2014	Art. 294-300 Art. 371-375	---
Large exposures	Requirements concerning large exposures become stricter. In practice, the aggregation of creditors to a large exposure will lead to more and/or higher large exposures.	01.2014	Art. 376-392	---
Liquity	Banks have to fulfill liquidity coverage requirements (Liquidity Coverage Ratio, explained in Bučková/Reuse 2011, pp. 7) and stable funding (NSFR, Net Stable Funding Ratio).	LCR: 60%: 2015 100%: 01.2018	Art. 400-415 Art. 444	---
Leverage Ratio	In addition to the risk weighted activa (RWA), a leverage ratio is introduced. This number has to exceed 3%.	01.2014 –	Art. 416-481	---
Remuneration policy	Banks have to fulfill several remuneration policies, they have to be published as well.	01.2014 –	---	Art. 88-91a

Source: based on CRR (2013) and CRD IV (2013)

2.2 Main Aspects of the European Implementation

Based onto the CRR publication, Table 2 defines and describes the main aspects of Basel III, mentions dates of implementation and offers sources of the CRR/CRD.

In addition, the EBA (European Banking Authority) has to work out several binding technical standards that make some of the abstract rules of CRR and CRD more concrete. In addition, the local implementation of the CRD IV has to be considered. This leads to the consequence that banks have to fulfill several rules, hoping that these rules will be consistent on January 1st, 2013.

In addition, CRR and CRD IV will lead to several changes in the banking sector. These changes are discussed in section 3.

3 Impacts onto European Banks

3.1 Impacts onto Customer Business

Customers will feel the impacts of Basel III as borrower and investor. First, the borrower side has to be discussed. A higher capital conservation buffer leads to higher regulatory equity costs. They increase from 8 to 10.5%. Even though capital reservation for classical small- and medium sized companies (SME) especially in Germany remains constant (see CRR 2013, Art. 26a; DSGV 2013), the implementation of the countercyclical buffer leads and the fact that the 8% of Art. 77 CRR must consist of higher quality leads to additional equity costs as well. This effect will occur especially in banks where the leverage is relatively high. In addition to the costs of a credit, some banks have to delever. An example is the Commerzbank (see Commerzbank 2012). This bank reduces RWA, often concerning classical customer business. Classical savings institutions e.g. in Germany will not have to do this, their equity is c.p high enough. Nevertheless, a partial scarcity of loans especially at high levered big banks might be a consequence.

In the other side of a bank's balance sheet, the investors might get a price advantage. As the retail deposits of private customers are only weighted with 5% according to Art. 409 CRR. As a consequence, this will lead to a price battle for these retail deposits (see Reuse 2012). Customers will get a higher interest rate for their deposits.

To the opinion of the authors, the effect on the liability side of the banks will be much higher than the additional equity costs on the asset side. Banks have to care and optimize their risk management and strategy.

3.2 Impacts onto Risk Management

Looking into the future and concerning the low interest rate structure especially in Germany banks normally will simulate a lower interest rate margin. Combined with the margin effects of section 3.1, classical earnings will decrease. In addition, the battle for the so called high liquid assets according to Art. 404 CRR will increase. Looking at German Sovereign bonds – they fulfill the requirements – it becomes clear that the yield resulting from such an investment is quite low.

Banks have to face the problem, lower earnings lead to a lower risk bearing capacity. Banks should decrease their risks in a calm way in order to prevent having too much risks in the next years. But they have to be carefully, no impacts onto their core business model must occur.

Further it might help to increase quality of the risk management. The better the methods and models are, the more valid the results become, the more risk bearing capacity might be quantified. Further, a good risk management might lead to a better quality of the RWA which might be reduced as a consequence of data quality improvement (See Frère/Reuse 2010).

Mid-sized banks should again analyse, whether an IRB approach (Art. 137 CRR) is better than the standard approach and leads to lower RWA. In this case it has to be considered that internal ratings have to be implemented in a very extensive way.

3.3 Impacts onto the Strategy

The last but most important field of impacts is the strategy of a bank. Since 2008 it becomes clear that banks primary have a strategic problem. What is their core business model? Frère/Reuse/Svoboda (2008, pp. 25) have shown that banks often do not concentrate onto their core business but invest into every field where additional earnings seem to be possible. This was one of the main mistakes that lead to the financial crisis in 2007/2008.

Deleveraging, reducing risks and focusing on the core competences of a bank must be the consequence. Outsourcing, cost reduction and an optimized but concentrated portfolio mix (Frère/Reuse/Svoboda 2008, pp. 29) combined with a focus onto a sustainable customer relation with stable earnings is a solution to survive the next years. As the market for banks is completely distributed, a crowding out might occur. To the opinion of the authors, the number of banks will decrease in the future.

Banks have to face these strategic risks early in order to have enough time to react. Basel III becomes completely valid in the beginning of 2019 – changing a strategic model takes at least this time.

4 Conclusions

4.1 Summing up the Main Results

Basel III has several influences onto the banks. Table 2 sums up the main aspects and values them according to their relevance in the European banking sector.

Table 3 Main results and impact of Basel III in Europe

Hypothesis	Valuation	Relevance
1. Basel III makes loans more expensive for companies and communes	true	mid
2. Decreases possibility to grant loans	discussable	low
3. Increases to demand for AAA sovereign bonds	true	high
4. Supports short-term culture according the loan side	true	mid
5. Discriminates SME-financing	false	low
6. Increases battle for retail deposits	true	high

Source: based on Hartig (2012)

Table 3 shows the main risks and problems of Basel III. It becomes clear that retail deposits and the investment into "risk-free" sovereign bonds are the most important impacts of Basel III. But how can a bank solve the problems resulting from Basel III?

To the opinion of the authors, the best way for *big banks* to react onto Basel III is a deleveraging strategy combined with a risk reduction and an optimization of the RWA, perhaps doing a capital increase in order to generate additional Tier 1 capital.

Small and medium sized banks shall focus onto the core competences and disestablish peripheral areas as e.g. the investment banking. They should generate synergies by concentrating back office capacities in an outsourcing project. Only economies of scale in these areas help to solve the cost problem all banks face nowadays.

4.2 Does Basel III make the Banking System more stable?

Finally, the question if Basel III makes the banking system more stable has to be analyzed critically. First, Basel II has to be analyzed. It is often was stated that it was not able to prevent the crisis. This is partially right – but Basel II was introduced too late, it became valid in 2007/2008, but the mistakes were made before the crisis (see Lippert 2012).

Coming back to Basel III, the argumentation is as follows. On the one hand, Basel III offers positive aspects, e.g. the countercyclical capital buffer in order to prevent higher volatility the market. The idea to focus onto liquidity – the crisis has shown the problems here – has to be judged positive as well. Increasing equity ratios might help to stabilize the banking sector – if it is implemented worldwide and not only in Europe (See Haasis, 2011). Especially the USA often fail to implement Basel rules in time.

On the other hand, several disadvantages of Basel III have to be stated. It took about 4 years to complete this work – from 2010 to 2014. But what is the result? CRR and CRD have about 1,600 pages (it might be up to 60,000, see Zeranski 2013, p. 10), the banks in Europe are regulated very hard and the requirements become very high and cost a lot. The danger exists that banks retire from too much business areas. This will have an impact onto the economy.

Last, the primary quantitative-based approaches of Basel III are not enough. The critical success factors are a high qualitative risk management and a good qualitative banking supervision. To the opinion of the authors, many of the problems in the financial crisis might have been prevented, if the supervisors would have been critical enough. Even Basel I/II offered a strong regulatory background to uncover these mistakes. Only a critical but not disproportionate supervision which considers regional circumstances in the EU combined with banks that have a clear strategy and a good risk management have a chance to prevent a further crisis. The future will show if EBA and ECB will be able to solve this complex task.

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Outsourcing in Insurance

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Abstract: *In relation to the impact of the financial and debt crisis, commercial insurance companies operating not only at the insurance market of the Czech Republic but also in global market conditions are looking for possible ways to make their activities more efficient as well as the ways to decrease the costs of insurance service provision. One of the effective ways to increase efficiency and decrease costs is outsourcing. The aim of this paper is to evaluate the current state of outsourcing in the insurance practice in the insurance market in the Czech Republic. This paper presents the theoretical background of the issue of outsourcing. It is based on the study of literature and the findings of research by PricewaterhouseCoopers. At the same time, it shows the outsourcing in the current insurance practice at the insurance market of the Czech Republic with an emphasis on human resources and payroll, accounting, business, claims management and assistance services.*

Keywords: outsourcing, insurance industry, insurance market, commercial insurance company, costs.

JEL codes: G22

1 Introduction

The development of each society is dependent on not only internal but mainly external influences. Commercial insurance companies operating at the insurance market of the Czech Republic reflect the development of the Czech society brought about by the transition from the totalitarian system to the market system. The acceptance of Act on Insurance, in 1990, provided basic conditions for the development of the insurance industry. The further development has responded to the changes in the society and the insurance companies themselves. The first half of the 1990s can by simply characterised as a period of development and higher costs, the second half is typically looking for savings and decreasing costs. The turn of the century and the Czech Republic accession to the European Union brought another optimistic initiative for the development and a smaller attention to some cost items. However, the financial and debt crisis has forced the commercial insurance company managements to find the ways to make their activities more efficient and decrease costs. First attempts at using outsourcing came in financial groups, i.e. also insurance companies, at the beginning of the new century, i.e. in 2000. The tendencies have been even more pronounced since 2010, in response to the financial crisis.

The usage of outsourcing also brings some negative experience in the insurance practice. This is mainly manifested in the commercial activities – insurance companies released some of their former employees and transferred them to mediation activities in compliance with the Act on Insurance, the Act on Insurance Mediators, and the Act on Trade, which meant a loss of direct influence on these persons.

The consequences include a decrease in the quality of provided insurance services and a chase for commissions at the expense of the quality of advisory and mediating services. A special phenomenon is a creation of 'independent networks', who demand special insurance products from the insurance companies and unusually high commissions. They

threaten to draw their clients to other insurance companies otherwise. As a result, the managements of the insurance companies are at a loss and do not have a solution.

2 Methodology and Data

The subject of this paper is an analysis of the use of outsourcing in the insurance practice of selected commercial insurance companies operating at the insurance market of the Czech Republic. The description method was used to process the theoretical approach to this issue. The content analysis method was used to clarify the use of outsourcing in the insurance practice. The theoretical part was created using resources gained from the study of relevant literature. The analytical part was created based on annual reports and web pages of the insurance companies. Moreover, presentations of an insurance practice expert given within the subject Economics and Insurance Company Management, discussions with experts from insurance companies and the author's personal experience were used for this latter part.

3 Results

The term outsourcing involves all the processes a company decides to contract out to an external service provider. These are serious strategic decisions related to expectations of substantial cost savings or a higher quality of the selected business activities in the hands of specialised companies, providing a competitive advantage of concentrated know-how in the field.

According to Rydvalova and Rydval (2007), we can see outsourcing as a project in which a company gains complex services from the supplier. Outsourcing is a long-term relationship, exclusively with an external supplier, concerning providing services in one or more fields of the company activities. To put it simply, outsourcing includes those cases when the suppliers are able to provide several related services at a time, or they concentrate on provided complex service 'packages'.

Greaver (1999) defines outsourcing as an act in which some repeated internal activities and decision rights are transferred to an external contractor on a contractual basis. He emphasizes that the transfer concerns not only activities but often also factors of production and decision rights. By factors of production he means people, equipment, facilities, technologies and other assets that enable the activities to proceed. By decision rights he means responsibility for decisions within some fields of the conducted activities. PWC (2007) experts define outsourcing as a transfer of trade activities or functions to a third party, usually together with people or even know-how.

Although the reasons for outsourcing differ, according to opinions of representatives of various functional positions in a company, the most significant reasons related to advantages of outsourcing can be derived from professional literature (Greaver, 1999):

Organizationally driven reasons:

- Effectiveness enhancement by focusing on what the company is the best at (the core business).
- Flexibility increase and thus increased adaptability to the changing business conditions, demand for products and services, and technologies.
- Organization transformation.
- Increase in the value of products and services, customer satisfaction and shareholder value.

Improvement driven reasons:

- Improvement of operating performance.
- Gaining expertise, skills and technologies that would not be available otherwise.
- Improvement of management and control.
- Improvement of risk management.
- Gaining innovative ideas.

- Improvement of credibility and image by cooperation with excellent providers.

Financially driven reasons:

- Reduction of investment in assets and release of these resources for other purposes.
- Generation of cash by transferring assets to the provider.

Revenue driven reasons:

- Gaining market access and business opportunities through the provider's network.
- Expansion acceleration by using the provider's developed capacity, processes and systems.
- Expansion of production and sales capacity during periods when such expansion would not be possible otherwise.
- Commercial exploitation of the current skills.

Cost driven reasons:

- Reduction of costs through the provider's performance and the provider's lower cost structure.
- Transformation of fixed costs into variable costs (service fees depend on the changing range of the provided service).

Employee driven reasons:

- Giving employees more opportunities for career development.
- Increase in loyalty and energy in the field auxiliary to the core business.

Based on the latest survey of PWC (2007), the most frequently stated reasons for outsourcing are:

- Lower costs.
- Gaining access to talent.
- Selecting activities that others are able to do better.
- Flexibility increase.
- Improvement of customer relationships.
- Development of new products.
- Expansion within the market development.
- Geographic expansion.

The impulse for outsourcing is seen as strategic when it corresponds with the company's long-term strategy (Greaver, 1999). It means typical benefits related to outsourcing are expected within several years and the results, both positive and negative, will be significant for the organization.

Strategic outsourcing moves outsourcing into higher levels by asking questions about the importance of outsourcing for the organization from the perspectives of:

- Vision of its future.
- Current and future core competencies.
- Current and future structures.
- Current and future costs.
- Current and future performance.
- Current and future competitive advantages.

A price for a wrong understanding or implementation of outsourcing can considerable affect the future existence of an organization (Greaver, 1999). For example, a premature contract termination (worse if it is long-term and strategic) together with a refusing attitude of the original employees and technical specialists of the original organization will lead to substantial problems as the employee count has to be regained or a new provider has to be found. Both of these represent substantial costs. The problem will escalate if the provider has been transferred the necessary assets in which the

organization will have to invest again. Similarly, an incorrect identification of the core company competencies will lead to a loss of future opportunity to increase the competitive edge and the related profits.

Figure 1 The most frequently outsourced fields
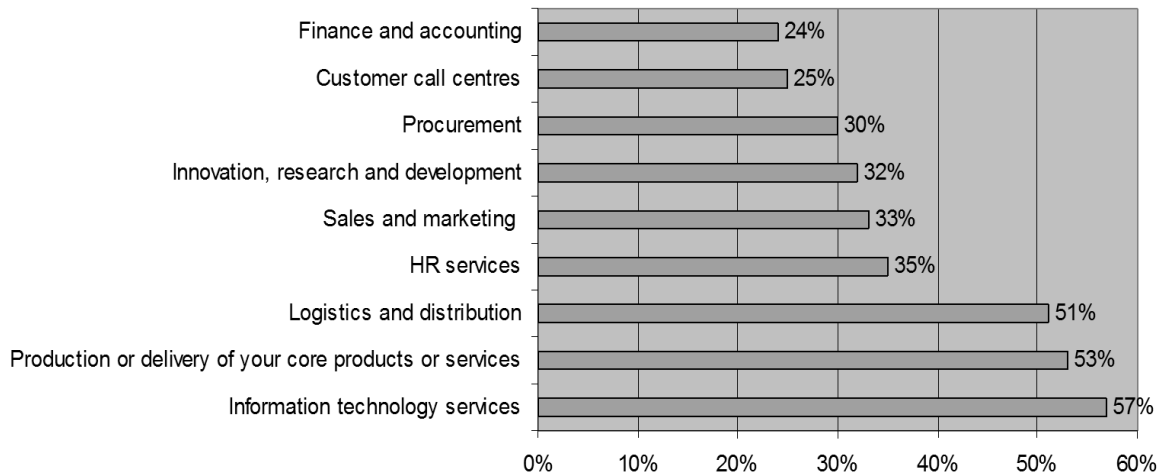
Source: Mochnáč (2008) based on PWC (2007)

The attention is currently devoted to outsourcing within the insurance practice at the insurance market of the Czech Republic in relation to the implementation of European guideline Solvency II. According to Art. 6, section 4, of Act no. 277/2009 Coll., on insurance, a domestic insurance company, a third party insurance company, a domestic reinsurance company or a third party reinsurance company is entitled to conclude contracts with the purpose of permanent or temporary transferring or dividing of some activities with exception of assuming insurance risks into insurance or reinsurance risks into reinsurance, either within the entire range or partially, to another party (hereinafter "contract on activity selection") unless accounting is distorted or stability of the company's economy is endangered. This is also valid for contracts concluded with another person in the group, its subject being sharing of costs of activities common for all these persons (hereinafter "contract on cost sharing"), and transfer of activities outside the Czech Republic (hereinafter "activity transfer"). The contract on activity selection, the contract on cost sharing, or the activity transfer do not interfere in the insurance or reinsurance company's reliability for its activities and duties stipulated by this act towards the Czech National Bank.

The basic fields where outsourcing can be used by commercial insurance companies are accounting, human resources and payroll administration (Brown and Wilson, 2007).

Advantages:

- Decrease in costs related to activities of a payroll accountant (elimination of costs of trainings on the continuous updating of norms, guidelines and laws), professional growth provision and know-how development.
- Elimination of investments in specific applications and hardware, and their updates.
- Distribution of risks related to correct calculations and their administration.
- Timely provision of necessary activities (e.g. accountant's sick leave is compensated for, especially in the time of the closing dates, etc.). The problem of their replaceability solved.
- Standard in the quality of provided services.
- Gaining complex services, including tax consultancy, audit, communication with the financial authority, accounting reports (also in foreign languages), etc.

Disadvantages:

- – Separation of the supplier from the organization's operations, the risk of time discrepancy between the acceptance of vital operational information and its reflectance in the system.
- – Relocation of relevant materials and documents between the organization and the supplier.
- – The supplier does not follow the organization in the context of its internal development and market development.
- – The provided service cannot be measured clearly and it is thus complicated to analyze the corresponding price.
- – The related field is highly sensitive as regards the processed data; there is a high risk of their misuse.

The experience from the insurance practice confirms that in the second half of the 1990s, insurance companies started moving a part of their human resources and payroll administrative work to external contractors, which processed e.g. payrolls based on the delivered documents. When finding potential employees, insurance companies have used the services of employment agencies, which help them organize selection procedures and interviews. However, the responsibility for the employee selection itself lies with the insurance department manager in charge.

Another field insurance companies outsource is accounting. Currently, there are a high number of companies focused on accounting and reporting. The formation of this kind of specialized services has been motivated by the dissatisfying and unstable legal system characterized by constant changes in acts and regulations. As soon as at a time of an act publishing, usually other partial changes of the act are being proposed. Students of the Faculty of Economics and Administration prefer to find work in companies concentrated on audit or accounting and taxes to work in banks and insurance companies – they react to the development of the labour market in the Czech Republic where financial institutions dismiss their employees, while auditing, accounting and tax companies search and hire them.

Figure 2 The fields of outsourcing in the close future
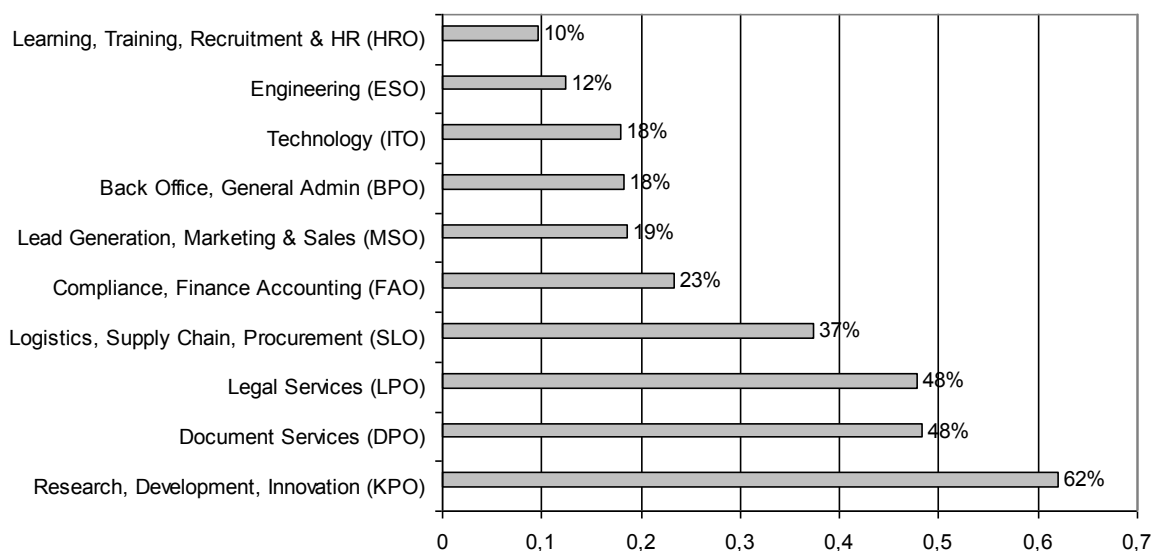
Source: Mochnáč (2008) based on Brown and Wilson (2007)

Although releasing of trade service employees occurred in insurance companies at the insurance market of the Czech Republic as soon as in the second half of the 1990s, this practice remarkably expanded after 2004, when the act on insurance mediators and loss adjusters became valid. At present, a substantial part of the trade activities and loss adjusting is provided by external co-operators of the insurance companies. Some of them

work as freelance insurance agents (entrepreneurs), some of them work within independent networks, still some, mainly those focusing on insurance for entrepreneurs and industries, work as insurance brokers. The disorganization and heterogeneity of the "traders" at the insurance market and the large amount of entities bring about considerable errors in the provided services.

A separate chapter within the effort at better quality of insurance services by means of outsourcing is provision of assistance and auxiliary services. In this field, the insurance companies cannot do without a close cooperation with external companies who offer specific services. However, the risk of wrong selection of the assistance service provider may lead to dissatisfaction with the insurance company itself, which is responsible for the quality of the provided services, regardless of the actual supplier.

According to experts from Capgemini (Capgemini, 2008), the top global consulting agency in the field of outsourcing, the period of classical outsourcing is over. Usage of outsourcing is not only a matter of lowering costs; it has become a tool to harmonize individual activities with the business goal. It is necessary to focus on the solution of the current problems and ensure a future growth. Multisourcing, outsourcing model for the future, can shift the competitiveness to a higher level.

4 Conclusions

Which insurance activities can be provided by outsourcing and which should remain within the hands of the insurance company management - this is a subject of theoretical explorations and discussions in the insurance practice. There is no clear and guaranteed guide ensuring effectiveness of the provided services and lower costs.

Based on the study of relevant literature, the analysis of the insurance practice, and the above mentioned facts, we can conclude that the decision about the range of outsourcing usage in each particular commercial insurance company has to be made by the management of the company themselves. The experience with the insurance practice shows that the most frequently outsourced fields used by commercial insurance companies are accounting and taxation, human resources and payroll work, trading activities, loss adjusting, and providing of assistance and auxiliary services.

The most troublesome field seems to be the trading activity. There is a high amount of entities providing this. Their expertise can be very low. Tests or examinations in compliance with law conducted in the past were inefficient as the examiners' demands were very low. As a result, the provided services are of low quality, motivated by the commission mainly and there is a race for concluding as many insurance contracts as possible. Cancelling of insurance contracts or problems with payments of the prescribed premiums are not penalized sufficiently. A possible solution of these negative phenomena can be harder professional examinations leading to a more significant selection of insurance mediators at the insurance market of the Czech Republic as well as the insurance companies' and inspection authorities' control.

Acknowledgments

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Restructuring of the Czech Banking Sector −
Influence of Mergers on Selected Financial Indicators

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Abstract: Transformation of the Czech banking sector to market conditions was finished by a privatization of large banks in years 1998–2001. Banks with problems stopped their activities and new banks quickly adapted to the new conditions. The banking sector stabilized and a gradual restructuring of the sector followed, adequate to the needs of the developing economy. A typical feature of the restructuring was the increasing share of foreign companies in the Czech banking market by means of acquisitions and mergers. The structural changes were manifested not only in the fast growth of the group of foreign bank branches, but also in connections of banks into larger units as well as transformations of subsidiaries into branches and organization components of foreign banks. Besides financial stability, restructuring should bring economic benefits to owners. To prove a positive effect of mergers, we analysed the development of selected economic indicators in the period before and after the changes in the Czech banking sector in 2003–2012. The regression models of indicator development curves of merging banks were compared with the values reported by the entire banking sector. The results of the regression analysis show a positive effect of mergers on the financial stability of the transformed banks in two years after the merger as well as the value created for the owners.

Keywords: banking sector, restructuring, mergers and acquisition, regression and correlation analyses

JEL codes: G21, G28, M21

1 Introduction

The transformation of Czech banks to a form of stock trading companies was related to the transformation of the Czech economy from centrally controlled to market-oriented. After the dissolution of Czechoslovakia in January 1, 1993, it was necessary to constitute a new banking sector, able to provide financing to companies in the conditions of market economy. The existing one-level banking system was changed to the two-level banking system with separate issuing and trade banking. The newly emerging commercial banks did not have sufficient staff, technical facilities or network of branches to provide services in the market economy, the suitable legal environment was missing. Moreover, they were loaded with old bad loans that were transferred to them during the transition to the two-level banking system as well as new non-valuation assets in consequence of support for businesses in a transforming economy, with a low level of their own capital. New bad loans appeared in balance sheets of even newly emerging banks, increasing the risk of moral hazard of banks when providing loans, and budget limitations were created in economy for many entities (Horvátová 2008, Kocmanová and Šimberová 2011, Stunguriene 2010, Steker and Otrusinova 2012, Beranová and Martinovičová 2010). An increase in new bad loans led to a deterioration of the financial situation of large banks and the stability of small banks was endangered. It was necessary to consolidate and recover the banking sector to support the on-going economic transformation, e.g. by purchase of non-valuation liabilities, increase in their basic capital by the current stockholders or investors, or by installation of receivership, withdrawal of banking licence, and ending their activities or selling problematic banks. The transformation of the banking sector finished in 1998–2001 by a privatization of large banks. The development of the bank structure in this transformation period is presented in Table 1.

Table 1 Ownership structure of banks in the Czech Republic (1993–2002)

Form of ownership	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
State monetary institutions	1	1	1	1	1	1	1	1	1	1
Banks with state participation	4	4	6	6	6	5	4	4	2	2
Banks with a decisive Czech participation	28	28	25	18	15	14	10	8	10	9
Banks with a decisive foreign participation	12	13	13	14	15	15	17	16	17	17
Branches of foreign banks	6	8	10	9	9	10	10	10	9	9
Banks in receivership	1	1	0	5	4	0	0	1	0	0
Active banks in total	52	55	55	53	50	45	42	40	39	38
Banks with cancelled licences	0	1	3	2	4	8	3	2	3	1

Source: Revenda 2001, CNB – reports on bank supervision 1993-2002

After state shares of large banks were purchased by strategic foreign investors, the Czech banking sector stabilized and in 2002 only one bank ended its activities. Restructuring of the banking sector took place in the group of small banks mainly. The withdrawal of a large number of small banks from the Czech banking market was gradual – in contrast to the fast transformation, this had the advantage that it did not cause a more considerable decrease in economy or employment rate. Problematic banks were continually replaced with new ones, financed predominantly by foreign capital. The capital was increased by new investors or by selling the banks with the assumption of a future inclusion of the acquisition in the structure of the purchasing bank. The increase in the basic capital had a form of an even participation of the current owners in new issues of stocks. Especially the group of foreign subsidiaries fully owned by renowned foreign banks was strengthened. Foreign capital, mainly from the EU countries (Germany, France, Austria and Netherlands), was in the background of newly emerging branches or organization components of foreign banks. As follows from Tab. 1, 38 banks and branches remained at the Czech market after acquisitions and mergers. These were financially sound and sufficiently equipped with foreign capital mainly. We can assume that a further development of the Czech banking sector will proceed adequately to the needs of the economic development in the field of providing financial sources and in dependence on the behaviour of financial markets. We are mainly interested in economic consequences (Brealey and Myers and Allen 2006, Režňáková and Karas 2012, Bohušová and Svoboda and Nerudová 2012, Malíková and Brabec 2012) of the following restructuring in the Czech banking sector. The aim of our research is therefore to quantify the economic effects of mergers and acquisitions (Bruner 2004, Sedláček and Hýblová and Křížová 2011) implemented at the Czech banking market in 2003–2012.

2 Problem Formulation

Strengthening of the influence of foreign owners is a typical feature of the development of the Czech banking sector also in the period of the past ten years. Acquisitions and mergers in this period brought a considerable increase in the number of branches and organization components of foreign banks, while the number of banks in Czech hands decreased. 14 new banks came to the banking sector and 9 banks left, as their licence ended and they finished their activities. The development trend of the total number of banks active in the Czech banking sector was reversed: from a dropping trend (see Tab. 1) to a growing one, as shown in Table 2.

A closer analysis of the processes and motivations of new banks entering the market shows that they are direct investments of foreign banks (except for the Czech Fio banka) aiming at gaining a larger share of the Czech banking market. The selected form is branches or organization components, which are subject to regulations and the Czech

bank supervision to a limited extent only. For this reason, two banks transformed the existing subsidiaries (Caylon Bank Czech Republic, a.s. a Citibank, a.s.) to branches. In total, 5 mergers were implemented in the monitored period (out of which one in the group of large banks and one in the group of small banks), one takeover of assets and one change of legal form (see Table 3).

Table 2 Development of the Czech banking sector and the ownership structure 2003–2012

Form of ownership	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
State monetary institutions	1	1	1	1	1	1	1	1	1	1
Banks with a decisive Czech participation	11	9	9	8	9	8	7	8	8	8
Banks with state participation	2	2	2	2	2	2	2	2	2	2
Banks with a decisive foreign participation	17	17	15	16	15	13	14	14	15	15
Branches of foreign banks	9	9	12	13	14	16	18	19	21	21
Active banks in total	37	35	38	39	39	37	39	41	44	44
Number of new banks in the period	0	0	2	1	2	1	3	2	3	0
Number of dissolved banks in the period	2	0	1	0	2	3	1	0	0	0

Source: CNB – reports on bank supervision 2003-2012

Table 3 Ownership transformations at the Czech banking market in 2003–2012

Transformation type	Dissolved companies	Successor companies	Year
Merger while no new company is formed	BAWAG International Bank CZ	BAWAG Bank CZ, a.s.	2005
Merger while no new company is formed	Živnostenská banka, a.s.	HVB Bank Czech Republic, a.s.	2006
Merger while no new company is formed	IC Banka, a.s.	Banco Popolare Czech Republic, a.s.	2007
Takeover of assets	HVB Reality CZ, s.r.o.	UniCredit Bank Czech Republic, a.s.	2008
Merger while a new company is formed	eBanka, HYPO stavební spořitelna	Raiffeisenbank a. s.	2008
Merger while no new company is formed	BAWAG Bank CZ a. s.	LBBW Bank CZ a. s.	2008
Change of legal form	Fio, družstevní záložna	Fio banka, a.s.	2010

Source: CNB – reports on bank supervision 2003-2012

To be able to assess the economic effects of mergers, we use the method of financial analysis – ratio indicators out of which temporal series are created. This concerns the following indicators:

– return on assets (ROA)
– return on equity (ROE)
– equity share (ES)
– retained earnings to assets (REA)

We assume growth for all the indicators. The temporal series capture the development of indicators of the banks participating in mergers one year before the decisive day of merger and during five years after the merger (t-1 till t+5). The methods of correlation and regression analyses are used (Valouch and Konečný 2011). A specific regression

function suitable to describe the dependence of both quantities was selected based on empirical analysis. The high quality of the agreement with data is shown by the linear function (1).

$$y = b_0 + b_1 x \tag{1}$$

where: b_0, b_1 - parameters of the theoretical regression function

x - independent variables

Regression functions of indicators of merging companies are compared with the temporal development of the banking sector as a whole (indicators indexed s - sector). The mutual dependence between the development trends described by both regression curves is measured by the Pearson correlation coefficient.

$$r_{XY} = \frac{\sum_{i=1}^{n}(X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^{n}(X_i - \bar{X})^2 \ \sum_{i=1}^{n}(Y_i - \bar{Y})^2}} \tag{2}$$

where: r_{xy} - selected correlation coefficient (Pearson)

X, Y - random quantities

i - number of random quantities $i \in \langle 1, n \rangle$

Our hypotheses assume a growing character of the regression graphs of indicators in the period after the decisive day in the banks that implemented a merger. If the mergers were successful, the indicators of the participating banks should reach the values at the level of sector after the merger.

3 Problem Solution

The temporal development of the indicators calculated for the banks that participated in a merger and for the entire Czech banking sector in the period before and after the merger is expressed in graphs, Figures 1–4. The character of the development of indicators is described by regression equations, which confirm or deny the hypotheses. The agreement of the regression model with the data is expressed by the value of R^2.

The equations of regression lines of the ROA indicator show a growing character.

$$y = 0.0371x + 1.1486; R^2 = 0.0338 \text{ (ROA)} \tag{3}$$
$$y = 0.0018x + 1.2614; R^2 = 0.0012 \text{ (ROA}_S) \tag{4}$$

Figure 1 Development Graph of Indicators ROA before and after the Mergers
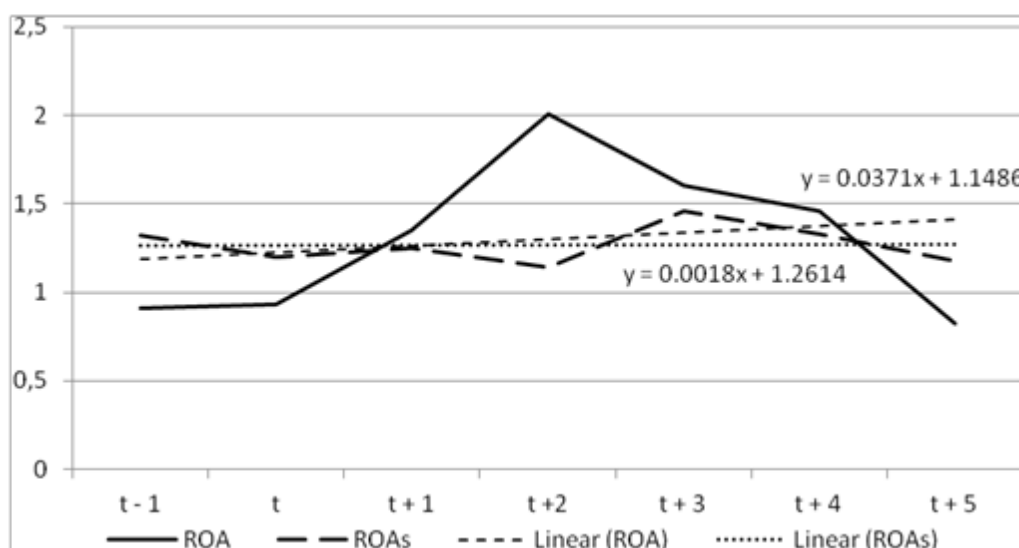
The slope of the regression line of a merging company is steeper than that of the entire sector, which could be considered positive. However, Fig. 1 shows that the value of the

indicator dropped fast after the culmination in the second year after the merger until it fell below the sector value in the fifth year after the merger. The development graphs of both indicators ROA and ROA $_S$ differ substantially, as proved by the low value of the Pearson correlation coefficient r_{XY} = 0.079509.

The negative slope of both the regression lines of the ROE indicator (5 and 6) indicates a decreasing character of the development. As Figure 2 shows, the value of the indicator of companies after the merger approached the sector value at its highest point but did not exceed it. Our hypothesis of a growing character of both graphs and their contact has not been confirmed. The mutual dependence measured by the correlation coefficient r_{XY} = 0.293949 is weak.

$$y = -0.6296x + 12.483; R^2 = 0.2237 \text{ (ROE)} \qquad (5)$$
$$y = -0.1643x + 17.2; R^2 = 0.0565 \text{ (ROE}_S) \qquad (6)$$

Figure 2 Development Graph of Indicators ROE before and after the Mergers
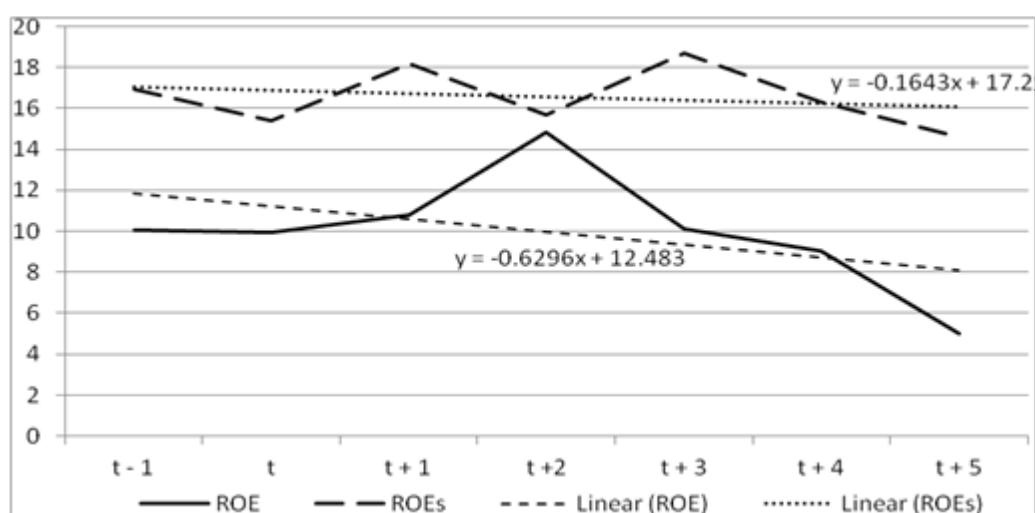
The development of bank financial stability indicators calculated as the share of capital in total liabilities is presented in Figure 3. Both curves have a changeable progress similar to the previous indicators. In the banks that implemented a merger there is a two-year drop followed by growth. The equations of regression lines (7, 8) confirm the growing character of both functions but the merging group has a steeper slope. There is a direct mutual dependence between the curves, very high, correlation coefficient r_{XY} = 0.781629. The regression analysis confirmed the hypothesis of a positive development of the ES indicator after the merger.

$$y = 0.1736x + 8.7357; R^2 = 0.4824 \text{ (ES)} \qquad (7)$$
$$y = 0.0975x + 7.2886; R^2 = 0.1922 \text{ (ES}_S) \qquad (8)$$

The positive effect of mergers has also been confirmed for the REA indicator, expressing the level of the preservation of assets in the form of undistributed earnings which increase the internal value of the bank. The development graphs of the REA indicator presented in Figure 4 and their regression functions described by equations (9) and (10) confirm a growing character. Although there is a very high correlation r_{XY} = 0.865614, the growth is more dramatic in the group of merging banks. This result means that banks that participated in a merger are more careful and postpone capital consumption until later.

$$y = 0.2521x + 2.9257; R^2 = 0.7006 \text{ (REA)} \qquad (9)$$
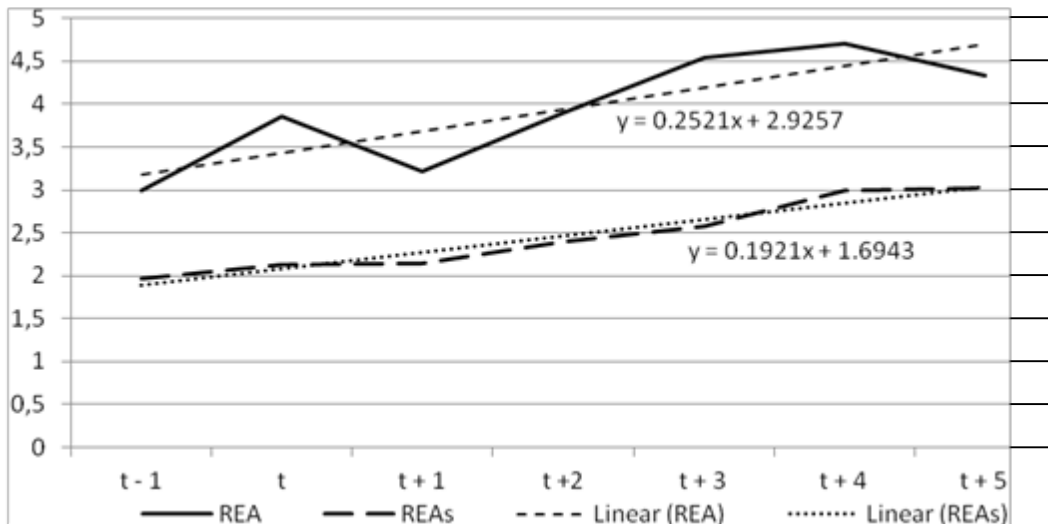$$y = 0.1921x + 1.6943; R^2 = 0.9477 \text{ (REA}_S) \qquad (10)$$

Figure 3 Development Graph of Indicators ES before and after the Mergers
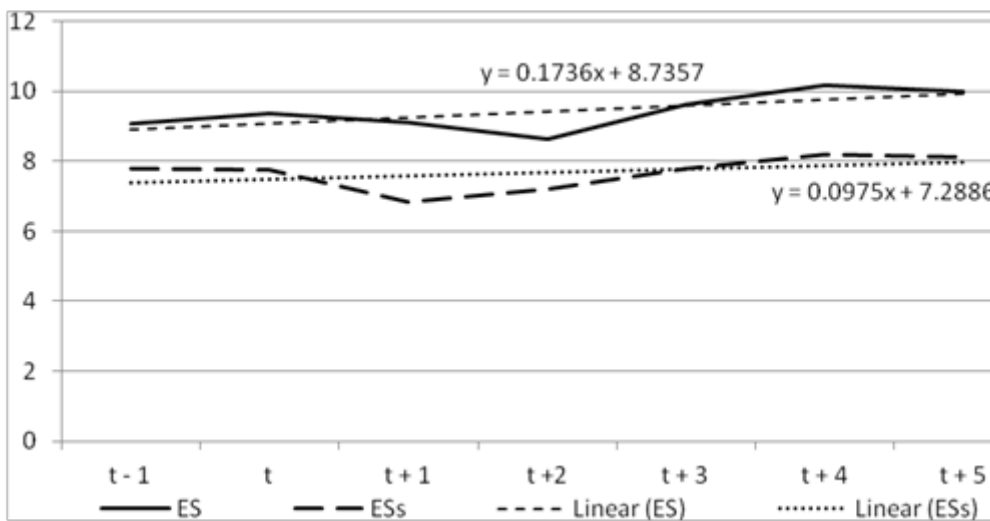
Figure 4 Development Graph of Indicators REA before and after the Mergers

4 Conclusion

Restructuring of the Czech banking sector in the past decade had a form of acquisitions, mergers, takeovers of assets, changes of legal forms or only changes of positions within a consolidation unit. Acquisitions and mergers represent external forms of company development and they should bring a faster growth. Analyses performed for banks that have participated in mergers confirmed a positive effect of mergers on the profits of the banks (ROA and ROE indicators) in the period of two years after the merger. This indicates a fast integration of the participating companies and implementation of new technologies, organization, management and culture. In the following years, these indicators dropped below the sector level, which is probably related to the (in)ability of the transformed banks to increase the value of their assets and change them into new, more profitable ones. An important factor is also the influence of the external environment as the development tendencies of profitability in both groups were manifested negatively. As regards indicators of stability (ES and REA), our hypothesis about the growing character of the graphs after the merger has been confirmed. Moreover, it has been proved that successor companies achieve higher equity amenities and preservation of their assets than the entire banking sector. Although studies of business entities conducted by auditing and counselling companies have shown that a

majority of mergers do not achieve the expected effects and often end in failure, this has not been confirmed for mergers in the banking sector.

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Perspectives of the Monetary Development of EU

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Abstract: *The article analyses the consequences of the monetary integration project especially from the perspectives of convergence and divergence within the EMU countries. The development background in EMU, present arrangements of the ECB and governments of EU countries are assessed. The main aims of this article are to estimate the possible monetary development in the future and to propose arrangements in the area of monetary policy and other EU policies.*

Keywords: Monetary integration, Convergence, Divergence, Economic and Monetary Union (EMU), Monetary policy.

JEL codes: E42, E52, F33

1 Introduction

The idea of a monetary union is obviously a conflicting matter. Its conflicting character has two aspects. The first one is of a scientific nature: a creation of a monetary union is a completely unique and new issue, which means it lacks a background of either economic theory or experience. The other aspect concerns political reality and interests. However, the first aspect, theoretical or scientific, of the process is of more relevance. There is no historical precedent for the European monetary integration and a single currency project in its current form of Economic and Monetary Union (EMU). This project, as a "currency without a state", in which a group of fiscally sovereign countries share a single currency and a single central bank, is a very different arrangement in many respects. This article sets out to show that, however innovative the Eurozone set-up is, it was not and will not be able to escape economic reality and the principles of economics.

The article generally analyses the consequences of the monetary integration project, especially from the perspectives of convergence and divergence within the EMU countries. The article aims to estimate the possible monetary development in the future and to propose arrangements in the area of monetary policy and other EU policies.

The article has a nature of applied research focused on the field of integration processes. The subject of research is the monetary concept of European integration. This issue is explored at two basic levels. The first can be defined as informative and documentary and its main aim is to map and explain the content and phenomena of the processes that have progressed in the field of integration in West European countries so far. The other dimension contains analytical views of partial issues of monetary cooperation and formulates synthetic viewpoints based on multi-criteria exploration.

2 Legitimacy of EMU creation

A monetary union can be characterized as an area where national currencies of member countries are replaced with a single currency and where responsibility for the monetary policy is transferred to a supranational institution. This step can bring many benefits to the involved countries on the one hand; on the other hand, it can bring an increase in costs. A transfer to a single currency is economically legitimate if the total benefits exceed possible losses.

From an economic point of view, the legitimacy of the monetary union is first of all based on the ever closer connection of European financial markets. This is a phenomenon that has started developing dynamically after the irreversible removal of all controls of capital

movement in Europe (July 1990) and finishing of the internal market of financial services (January 1993).

Advocates of the monetary union refer to Walter Eucken's text (Eucken, 1952) concerning 'the interdependence of orders'. Eucken emphasizes that in an ideal case the area of monetary policy effect is identical with the limits of the financial space. If there are independent national central banks (each with one national currency), it is not possible to have an effective monetary policy in the financial space integrated in this way. The existing Europe-oriented arrangement of financial markets can thus be only matched to the united European monetary space that will be created by the monetary union. Flexible as well as regional fixed exchange rates represent an inconsistent solution, which leads to the existence of the united financial space and independent spaces of national currencies. This creates a potential tension, which was mainly evident during the 1990s. The tension can only be removed by a monetary union. With fixed exchange rates, since 2002 the single European currency, financial and capital flows will only be dependent on the advantages of the individual investment options. Expectations of changes in exchange rates will cease to be determinants of international portfolio decisions. According to the theory of interdependence of orders, the economic necessity of the monetary union is in a close direct relation with the strengthening integration of financial markets in Europe.

The advantage of the monetary union when compared to the system of regional fixed exchange rates is the fixation of exchange rates, or the single currency, which prevents all disturbances that could occur due to speculations at foreign-exchange markets. By contrast, in the case of the European monetary system, we would have to expect speculative attacks testing the reliability of the established parity values. Restrictive monetary measures then have to be taken to defend this system.

In the case of an internal market with flexible exchange rates, we would have to consider that speculative waves can come accompanied by strong deviations of exchange rates, considerably exceeding the national differences in the development of salaries and prices. Local companies would be disadvantaged within the international economic competition in the country with the appreciated currency although their technological performance or labour costs would remain. By contrast, the international competitiveness of local producers would be enhanced in a country with the depreciated currency although their productivity would not increase or their labour costs decrease. It means a wrong control of the flexible exchange rate may lead to considerable changes in international competitiveness. These disturbances would be highly significant at the European internal market as it has a high degree of foreign trade interconnectedness of economies of EU member countries. The main advantage of the monetary union is therefore the fact that it would remove business risks related to the place of production and those conditioned by changes in exchange rates within the EU. From this perspective, only the monetary union will allow Europe to use the advantages of the internal market fully. In the case of serious disturbances of the economic competition caused by wrong fluctuations of exchange rates, we could not rule out possible protectionist tendencies in individual countries. Moreover, due to the strong pressure on currency appreciation, there could be efforts to limit capital movement, which would also put the existence of a united internal market at risk. While currency shocks in the system of regional fixed exchange rates mean negative macroeconomic effects, in the system of flexible rates they mainly affect the international distribution of work and are of microeconomic nature. Therefore, the internal market can be accepted only if the functionality of market mechanism is not put in doubt at goods markets by speculative movements of the capital (Sponer, 2000).

3 (Non)Functioning of EMU

The first decades of EMU created an impression that it is a functional and successful project. The exchange rate risk between Eurozone member countries was eliminated and the other benefits were not doubted. Transaction costs decreased and international trade grew within EMU. Interest rates of the member countries converged significantly and

loans crossed borders in growing volumes. The monetary integration went in a fast rate. This meant a fast growth for the countries of the southern periphery.

The strength of any economic project naturally becomes clear not in good times, but in bad times. Only bad times will reveal the strength of the structure that is meant to bear the project and carry it into future better times. The effort put into laying the foundations of any project is therefore certainly a sensible investment.

EMU was not an optimum monetary area when created neither did it head towards one, unfortunately. Differences among individual countries remained. Capital flowed into economies that offered higher evaluation, but at a price of a higher risk. The easy access to relatively cheap loans motivated a fast growth of private and public expenditures, which led to increasing deficits of current accounts. The influx of foreign capital at low real interest rates, in the countries with higher inflation, caused overheating of these economies.

The belief that EMU membership will lead to a better discipline of economic policies proved to be an illusion. Most of the member countries did not use the favourable conditions of economic growth for consolidation of public finances. EMU contributed to overheating of weaker economies, which has covered structural differences between the member countries, insufficiencies of the institutional framework and insufficient fiscal discipline.

Besides the rules defined in the Stability and Growth Pact, the convergence criteria for joining the single currency area, the prohibition of monetary financing of governments and the seeking or taking of improper instructions by the ECB, a key safeguard and deterrent against free riding is the current Article 125 of the Lisbon Treaty, which forbids governments of EMU member states from bailing each other out. Apart from the overemphasis on nominal criteria and the overlooking of key real convergence criteria at the birth of the Euro, it must have been quite surprising for inside and outside observers to see how weak all these safeguards subsequently proved to be in preventing free riding and how quickly the no bail-out clause in primary EU law turned out to be dynamically inconsistent.

This clause was supposed to prohibit fiscal transfers in any form, and until 2010, this was formally indeed the case. However, during the first financial crisis in the EMU, such transfers became possible and admissible via bilateral loans and the temporary European Financial Stability Facility (EFSF). After the launch of the permanent European Stability Mechanism (ESM), such transfers will become the norm. And if any sort of common bond is introduced in the EMU, they will in fact become obligatory within EMU. What an incredible change to have happened in just two years.

The Eurobond idea is deeply flawed, as it increases moral hazard and reduces the willingness to reform the policies that gave rise to this burden, which the weak want to put on the shoulders of the strong. What is more, it reduces the future incentive for even the strongest to behave in a financially responsible way. But this does not mean that it will not be introduced, because in a union where such issues are put to a vote and the stability camp is in a minority, such a decision can be postponed, but not prevented.

As summarized by Issing (2008), a prerequisite for the success of the Euro was that it had to be established and maintained as "depoliticised and hence stable money" with a central bank enjoying genuinely independent status like the German Bundesbank. The question is, however, whether this idea is or ever could have been sustainable. As recent and not-so-recent history shows, politically generated rules are very often dynamically inconsistent. And the more economically important they are, the more inconsistent they often get. In contrast, the only strong rules are those that remain dynamically consistent over time.

The ECB's biggest advantage over the US Federal Reserve System is that it does not have a government. This should be the best safeguard of the ECB's independence. The

ECB at times has to stand against all 17 governments of the EMU member states. This, paradoxically, can put it in a more difficult situation than other central banks.

4 The Debt Crisis and its Consequences

The crisis of the Eurozone is usually perceived as a currency crisis. However, it is mainly a crisis of the state debt and a banking crisis. European banks hold over a billion EUR of the Spanish debt. This shows that the European crisis of state bonds is closely related to a banking crisis.

Introduction of Euro in 1999 brought a radical constriction of the interest rate differential. This generated a real estate bubble in countries such as Spain, Greece, and Ireland. Instead of economic convergence stipulated by the Maastricht Treaty, the economies of these countries grew faster as well as their trading deficits. By contrast, Germany, which controlled the increase in labour costs, became more competitive, the proof being the chronic surplus of the German trade balance. Some countries of the southern periphery created state budget deficits exceeding the limits set by Maastricht. In spite of this, the discount ability of ECB allowed them to make loans under practically the same conditions as Germany, which exempted them from any pressure to remedy their excesses.

When the financial crisis started in 2008, financial markets began distinguishing between state bonds of individual countries and their revenues grew rapidly. Financing of public debts at the financial market became too expensive, or even impossible, for some countries, and the debt increase threatened to get out of control. In some EMU countries the fiscal policy became an additional source of shocks, instead of contributing to their dampening.

5 Risks Related to Further Development

Although the state budget deficits started to decrease after 2009, government indebtedness is still increasing and will be increasing in the future. Public finances of some EMU member states are so bad that governments of these countries are forced to prioritize their consolidation over the anti-cycling effect. Further budget cuts support the negative impact on the economic development, they decrease tax incomes, increase the unemployment rate and exacerbate the debt/GDP ratio. This development indicates one of the deficiencies in EMU. It is expected that member countries will meet convergence criteria without an adequate coercive mechanism in operation. In the present, when a majority of the countries have abandoned the Maastricht criteria, it is obvious that there is no regulation or escape mechanism. It is only expected that these countries will start obeying the criteria again, although this step will bring about a deflationary spiral. The pressure leading to the decreasing of budget deficits can throw the Eurozone or the entire EU into a long recession, which may have significant political consequences. The crisis of Euro may endanger the political cohesion of the European Union. Therefore, very high risks of negative feedback between indebted public finances, economic stagnation and vulnerable financial system remain in the Eurozone.

6 Possible Solutions

Anyone who believed that monetary integration as a political decision would in itself automatically cause different economies to converge, enforce structural reforms, and bring the EMU economies closer together through a single monetary policy alone, was bound to be disappointed. It is clear that monetary policy cannot create wealth in the long term or substitute for structural reforms in any economy – it could not and cannot do so in the Eurozone either. A country can exist in any currency and exchange rate system and not form imbalances as long as its other economic policies and remaining adjustment mechanisms adjust to that monetary system.

The single monetary policy increases the likelihood of excessively low risk premium and a pro-cyclical behaviour of real interest rates, which might temporarily slow down or even destabilize the structural adjustment process. This is precisely what has happened.

During good times, the Euro has not enforced structural reforms. On the contrary, it has enabled the structurally weakest to live for a time off a transfusion of credibility from the strongest economies. This has amplified and prolonged the growth phase of the cycle and deferred adjustment. The single monetary policy has not only petrified certain long-term structural problems, it has even started to exacerbate them, because it has in fact reduced the cost of financing unsustainable policies in some countries. All this has implications for competitiveness and ensuing further imbalances as well as for the indebtedness of individual sectors of the economy (Hampl, 2012).

No complex solution of the Eurozone crisis has been submitted. However, it is evident that the debts of some member states will become unsustainable without economic growth, just as EMU itself. Therefore, for the nearest future it will be essential that the dilemma of adequate phasing of fiscal consolidation is solved so that at least a slight economic growth is maintained with low expenses of the public debt administration. Deficit countries need to be allowed to refinance their debts under adequate conditions and with some rules. The rules need to make a gradual decrease in indebtedness possible as well as allow the countries with a high unemployment rate to administer their own budget deficits. Thanks to this, both aims and cyclically adapted deficits can be achieved. On the other hand, if the rules are not observed, the economy will be left to its fate. Together with the gradual fiscal consolidation, it is necessary to introduce structural reforms. Only the fiscal consolidation and structural reforms of individual economies are the real solution of the Eurozone crisis causes. The purchase of state bonds by the European Central Bank (Outright Monetary Transactions) only means a decomposition of the crisis impact through the ECB balance and the creation of stabilization funds (EFSF and ESM) represents a decomposition of the debt crisis impacts on other countries through fiscal transfers.

Further, bank deposits need to be protected in order to solve the Eurozone crisis and prevent collapse of its financial system. If savers lose their Euros deposited in Cyprian or Greek banks, the Euros deposited in Italian banks will be of a lower value than Euros in German and Dutch banks. Significant banks in deficit countries need to be protected so that these economies are protected against collapse. The European banking system should then be recapitalized gradually. This is the only way out of the current crisis of the Eurozone. The effort to develop European integration "at all costs" by means of a created political union and signing a new EU Treaty that would make a new single budget possible bears the risk of the European Union disintegration.

7 Conclusions

Although the hottest issue now is the debt crisis, the main trouble of EMU is its structural inconsistency, unsatisfactory institutional arrangement and insufficient respect for rules. The common monetary policy now contributes to the deepening of differences between the member countries, especially the countries of the southern periphery and the core of EMU. Preservation of EMU in its current form is currently based on non-standard policies of ECB, loans and fiscal transfers, as well as solidarity of member countries (not only EMU but the entire EU). The EMU project with its ambition to speed up its growth to the level ensuring global competitiveness has not brought the growth. Moreover, there is the risk of its collapse with potentially disastrous consequences, not only for the economies of EMU countries. The question whether it is an advantage to have the single currency is not topical nowadays. EMU and Euro exist and their fall would cause immense damage. The current EMU crisis does not consist in the opportunity of some members to part with it; it consists in the preservation of the current way of its (non)functioning.

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The choice of portfolio based on the theory of cooperative games

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Abstract: *The theory of games as a domain of mathematics is one of the methods proper for making decisions in the world of economics when we do not know how the other subjects are going to act. It seems to be a suitable tool for gambling on the stock exchange. During gambling on the stock exchange the problem of the choice of proper portfolio appears. The player wants both great profit and low risk. It is reasonable to limit the choice only to portfolios which belong to the effective set. Then the decision of choice of a particular portfolio is individual and depends on the player and his aversion to the risk. In this article this problem is presented as the game that is, the inner conflict of the player. On the one hand he is expecting a great profit, yet on the other hand he is expecting a low risk. Which portfolio should be pointed out to give the satisfaction to the player? The solution of this problem presented in this work is based on the theory of games, which treats the search for a proper portfolio as two - person game. The suitable game was formulated and described. The analysis of the game as a cooperative one was performed. There is also provided an example of explaining the way of acting with data coming from the stock exchange in Warsaw.*

Keywords: portfolio, cooperative games, player

JEL codes: C70, C71, G11

1 Introduction

The theory of games as a domain of mathematics is one of the methods for proper decisions making in the world of economics especially when we are not certain of how the other subjects are going to act. It seems to be a suitable tool to gamble on the stock exchange, for example it is possible to use infinite games for strategy of shares purchase or sale (Sroczyńska – Baron, 2008). So it can also help us to construct a portfolio. One of the most important tasks of a market player is the proper choice of shares for portfolio. When the expected profit and the level of the risk are known, the market player has to choose one portfolio which appears to be the best for him. He wants to find a portfolio with the expected profit as high as possible and concurrently the risk as low as possible. The problem lies in finding such a portfolio which gives satisfaction in respect to both profit and risk. One can met with this problem in previous works (Sroczyńska–Baron, 2009). The solution of this problem presented in this work is based on the theory of cooperative games, which treats the search for a proper portfolio as two - person game. Standard deviation and expected rate are taken as measures of the risk and profit. The analysis of the game as a cooperative one is also performed.

The main aim of this paper is to show how it is possible to use the theory of cooperative games for the construction of a portfolio. The method of acting of the market player based on the theory of games will be exemplified in this work. Data will come from the stock exchange in Warsaw. The portfolio which consists of shares of three different companies will be built. It will be shown that the method of the construction of portfolio is proper irrespective of taken measure for both profit and risk by market player.

Nowadays, when economic crisis affects more and more people – including market players - it is reasonable to use every possible tool to limit unnecessary risk and raise profit. So the method for optimal portfolio based on the cooperative games seems to be worth considering and helpful for people who wants to invest on the stock exchange.

2 Methodology

In this work Markowitz model is the base for later consideration. Standard deviation is taken as a measure of risk and expected rate of return is taken as a measure of profit by a market player. Cooperative games are used to solve the examined problem. A special game called "portfolio – game" is constructed and solved by one of the tools of cooperative games – Zeuthen's and Harsanyi's method.

2.1 Markowitz model - some remarks

In Markowitz model the expected rate of return is taken for a measure of expected profit and standard deviation is taken for a measure of risk for shares (Markowitz, 1966). When the n historical rates of return for shares are known, one can calculate the expected rate for share "i" as

$$Er_i = \frac{\sum\limits_{k=1}^{n} r_{ik}}{n} \tag{1}$$

where r_k – rate of return in period "k", n – number of historical observation.

The standard deviation can be calculated according to the formula

$$s_i = \sqrt{\frac{\sum\limits_{k=1}^{n}(r_{ik} - Er_i)^2}{n}} \tag{2}$$

When the expected rates and standard deviation for shares are known, one can calculate the expected rate for portfolio as

$$E(r_p) = \sum\limits_{i=1}^{m} x_i Er_i \tag{3}$$

where x_i – weight of share "i" in portfolio, m – number of shares in portfolio.

The standard deviation is described as a root extracted from the sum of the following products

$$\mathrm{cov}(r_i, r_j) \cdot x_i \cdot x_j, \quad i, j = 1, \ldots, m, \tag{4}$$

where $\mathrm{cov}(r_i, r_j)$ means covariance

$$\mathrm{cov}(r_i, r_j) = \frac{\sum\limits_{k=1}^{n}(r_{ik} - Er_i)(r_{jk} - Er_j)}{n} \tag{5}$$

When the expected rate of return and standard deviation for portfolios are known, the player is obliged to make a decision and choose one. The best portfolios satisfy the effective set of Markowitz model, where the effective portfolio has the highest possible expected rate of given risk and the lowest possible risk of given expected rate (Haugen, 1993). When it is suggested to choose portfolio which does not belong to this set, it is always possible to propose a portfolio which is better in respect of the risk or profit. So, where the set of portfolios is limited to the effective set, the decision of the choice of one particular portfolio belongs to the player and depends on his aversion to risk. One of the common method is to determine the curves of indifference and find the point of contact between them and the effective set. It gives us the portfolio of maximal expected utility - marked as portfolio Z on picture 1 (Jajuga, 1997).

Figure 1 The choice of portfolio of maximal expected utility
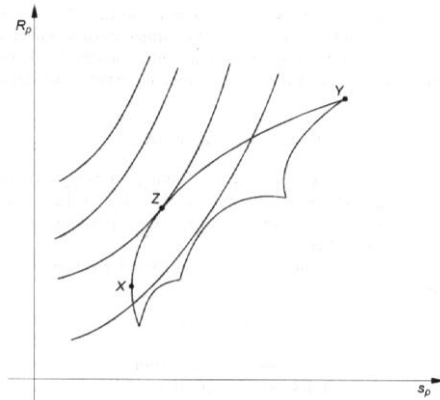
Source: Jajuga (1997)

Unfortunately, a big problem lies in constructing the curves of indifference for the player in reality, so the described method poses many troubles.

2.2 Cooperative games

Two person cooperative games are the model of game where players can communicate before the game and commonly choose one solution. The traditional area of payment can enlarge by associative randomized strategies (it means every randomized strategy fixed by two players together). When the players cooperate they can reach every point of the created set. However, they limit this area to the set of jointly undominated outcomes, where point (α, β) is jointly dominated by (α_1, β_1) if $\alpha_1 \geq \alpha$ and $\beta_1 \geq \beta$. This set is called a joint maximum set. At this moment the preferences of the two players become completely inverse and the players can no longer cooperate to gain common benefits. Neumann and Morgenstern noticed that it was hard to demand from players to agree and choose the strategy which gave them worse payment then this one which they could guarantee themselves. When we limit the joint maximum set in this way we are given the area of negotiation of the game. It is just the solution by von Neumann and Morgenstern of cooperative game. However, in some particular cases it is reasonable to assume that the players are ready to give up a part of their profits to get a solution satisfying the both of them. Therefore it can be assumed that the solution has to belong to the joint maximum set and we should find an arbitrage solution there. One of the methods is the way of acting showed by Zeuthen and Harsanyi (Luce, Raiffa 1958). The player I pursues (α_1, β_1), and the player II pursues (α_2, β_2). The relative losses of the players are the following:

$$\frac{\alpha_1 - \alpha_2}{\alpha_1}, \qquad \frac{\beta_2 - \beta_1}{\beta_2} \tag{6}$$

The player, whose relative loss is smaller, gives in. The first player should resign if

$$\frac{\alpha_1 - \alpha_2}{\alpha_1} \leq \frac{\beta_2 - \beta_1}{\beta_2} \tag{7}$$

The second player should resign if

$$\frac{\alpha_1 - \alpha_2}{\alpha_1} \geq \frac{\beta_2 - \beta_1}{\beta_2} \tag{8}$$

The loosing player can only offer the point without further concessions. The obtained solution is equal to Nash's solution of the market problem.

2.3 The game – portfolio

When we know the expected rates for shares and risk level connected with them we can try to construct an optimal portfolio for the player. The player is obliged to make a decision. Knowing the particular value of the risk, he knows how big the expected winning can be. Yet, it can be stated, that the task of the market player is to find a portfolio with the highest possible profit at the lowest risk. It is commonly known that each player dreams about great profit yet, with the lowest possible risk not want to take large risk. And so the question arises of how to point to a portfolio, which is the best?

Let us try to find a solution, based on the theory of games, in which we treat the search for a proper portfolio as a two - person game. The first player will be the part of our nature responsible for "caution and deliberation". The second player will be the part of our nature responsible for the so called "lust for profit". The game payments of player I ("caution and deliberation") are different values of the risk for portfolio and the game payments of player II ("lust for profit") are different values of expected profit for portfolio. The first player desires a low risk, while the second one desires a big profit. This situation is not an antagonistic game because a strategy good for player I is not always a bad one for player II. It is possible to find a portfolio with a high risk and a low profit which none of the players finds worth going for. Of course, it is very unnatural to treat the game of inner conflicts as a non cooperative game so we will try to find the solution based on cooperative game. Additionally, the order of negotiation is imposed. It is justifiable to assume that the players are ready to give up a part of their profits, to get a solution satisfying the both of them, when it is the inner conflict of the market player. Therefore it can be assumed that the solution has to belong to the joint maximum set and we should find an arbitrage solution in this set.

3 The researches

3.1 Data

Data used for researches come from Polish Stock Exchange in Warsaw. Let us take a standard deviation as a measure of a risk and an expected rate of return as a measure of profit. The task of the player is to construct a portfolio, which consist of three types of shares. The companies: KGHM Polish Copper SA, PKN ORLEN SA and KREDYT BANK SA were chosen – as three companies from index WIG 20 from different branches to ensure the risk diversification. One can use any method to choose companies for consideration, for example the synthetic measure of development in the stock selection (Węgrzyn, 2007, 2008). The necessary values for calculating are the following (based on data coming from Stock Exchange in Warsaw from 31.01.2010 till 30.06.2011 as monthly rates)

Table 1 Market data KGHM Polish Copper SA, PKN ORLEN SA and KREDYT BANK SA
(01.2010 – 06.2011)

Company	Expected Rate	Standard Deviation
KGHM SA	0,0468	0,0988
PKN ORLEN	0,0277	0,0712
KREDYT BANK	0,014	0,0424

3.1 Run of the researches

First, the expected rates and standard deviations for different portfolios depending on the participation of three kinds of shares in portfolio were calculated and the results in portfolios are presented on Figure 2.

Of course, it is reasonable to limit this set only to portfolios which satisfy the efficient set of Markowitz model (the periphery of the set from A to B on the picture 1). This set consists of the best portfolios. When it is suggested to choose portfolio which does not belong to this set, it is always possible to propose a portfolio which is better in respect of

the risk or profit. For example, it is pointless to pursue the portfolio: $S_p = 0,0489$ and $E(r_p) = 0,026$ (it means 10% of KGHM, 65% of PKN Orlen and 25% of Kredit Bank shares) because of the possibility of portfolio: $S_p = 0,0489$ and $E(r_p) = 0,032$ (it means 42% of KGHM, 31% of PKN Orlen and 27% of Kredit Bank shares). At this moment, the decision of the choice of one particular portfolio belongs to the player and depends on his aversion to risk. One of the common method recalled earlier is to determine the curves of indifference and find the point of contact between them and the effective set. Because of a big problem to determine them for a real player, we will try to find the solution of the problem how to find the best portfolio for the market player who desires on the one hand big profit, but on the other hand small risk with the use of the theory of games.

Figure 2 The set of portfolios of KGHM Polish Copper SA, PKN ORLEN SA and KREDYT BANK SA, 30.06.2011

Figure 3 The set of all possible payments of portfolio - game (KGHM Polish Copper SA, PKN ORLEN SA and KREDYT BANK SA, 30th June 2011)
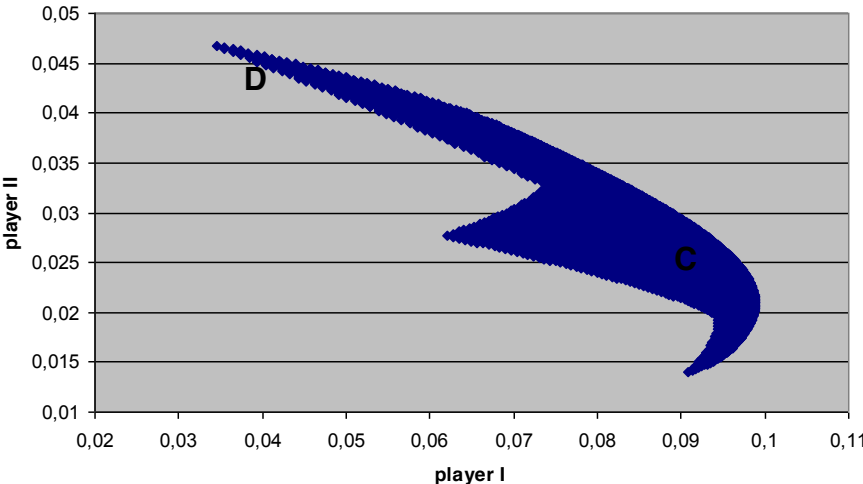
3.2 Solution

Let us look at the Figure 2 as the set of all possible payments of one game. Of course, one transformation should be done to obtain a normal form of a game (till now, the first player desires as low as possible payment – standard deviation). On the figure 3, there is shown the set of all possible payments of the portfolio game after the transformation. Now, both players desire as high as possible payment. The first player desires a high transformed risk, while the second one desires a big profit.There is just shown the

opportunity set on the picture 3. When the players cooperate they can reach every point of the presented set. However, they limit this area to the set of jointly undominated outcomes and obtain a joint maximum set. It is showed on the figure 3 as a periphery of the set from C to D.

The portfolios from the set of jointly undominated outcomes satisfy the effective set of Markowitz model. One can say that a joint maximum set in the terminology of the theory of games is just the effective set in the terminology of Markowitz model. Both of them consist of the same portfolios. At this moment the preferences of the two players become completely inverse and the players can no longer cooperate to gain common benefits. The player I pursues the solution $(0,0987;0,0217)$ whereas the player II pursues the solution $(0,0345;0,0468)$. Let us use the Zeuthen's and Harsany's method to find the solution of this problem. So, player I proposes the point $(0,0987;0,0217)$ and player II proposes the point $(0,0345;0,0468)$. The relative loss of the player I is

$$\frac{\alpha_1 - \alpha_2}{\alpha_1} = \frac{0,0987 - 0,0345}{0,0987} = 0,65 \tag{9}$$

The relative loss of the player II is

$$\frac{\beta_2 - \beta_1}{\beta_2} = \frac{0,0468 - 0,0217}{0,0468} = 0,54 \tag{10}$$

The relative loss of the player II is smaller so he must give in. He should resign but he can offer the point without further concessions, for example $(0,07;0,0379)$. Now, the relative loss of the player I is

$$\frac{\alpha_1 - \alpha_2}{\alpha_1} = \frac{0,0987 - 0,07}{0,0987} = 0,29 \tag{11}$$

The relative loss of the player II is

$$\frac{\beta_2 - \beta_1}{\beta_2} = \frac{0,0379 - 0,0217}{0,0379} = 0,43 \tag{12}$$

The sollution of portfolio - game

Figure 4 Optimal portfolio in a sense of cooperative games of KGHM, PKN Orlen and Kredit Bank 30[th] June 2011
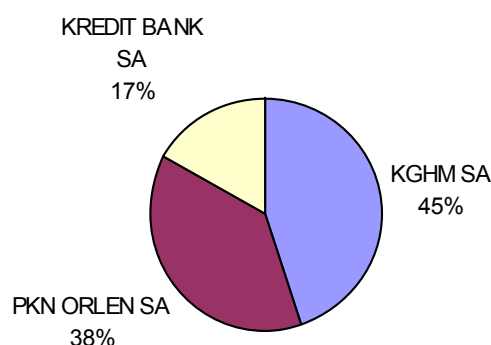
The relative loss of the player I is smaller so he must give in. Continuing in this way, after calculations with the use of computer program, the players will gain the point $(0,08;0,034)$ in the end. Then both players will have to agree. It is the solution of the game – portfolio by Zeuthen's and Harsany's method. Thus, the real solution is the point (before the transformation): $S_p = 0,0532$ and $E(r_p) = 0,034$. It means that the portfolio

should consists of 45% of KGHM shares, 38% of PKN Orlen and 17% of Kredit Bank shares (Fig. 4). It could be called – universal portfolio of maximum utility.

Of course, it is possible to use any other method of cooperative games, for example Raiffa's method or the boundary average of payments.

4 Conclusions

When the market player knows sufficient description of the strategies (possible risk and profit), he is able to gamble with the aid of the theory of games. The method of the choice of portfolio of shares based on the theory of games is presented and exemplified in this work. The Markowitz model was determined as one game (the inner conflict of the player) solved with the tools of the theory of games. The measures of expected profit and the level of risk used in this work are expected rate and standard deviation. However, it is visible that one can act in the same way when other measures of profit and risk will be taken. The method is irrespective of taken measure for both profit and risk by market player. What is more, it is irrespective of number of taken companies for consideration. Market player acts in the same way when he wants to construct portfolio which consists of two, three or as many as he wants companies. Calculations would not become harder at any case.

The presented method could help market players to make decision and find portfolio which gives satisfaction in respect to both profit and risk. Every tool helpful for market player seems to be important nowadays, when one must exist during the crisis all over the world.

Of course, it seems to be impossible to describe the stock exchange as one big game because of too many relations and connected with them questions, problems and doubts. However, it is a dead certainty that one can use some tools of the theory of games to solve partial tasks of the market player. The example of how to do it, was presented in this work.

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Lessons Learned from the 2013 Banking Crisis in Cyprus

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Abstract: *The Cypriot banking crisis in 2013 led to closing commercial banks, capital controls and economic as well as political instability. The Troika has agreed with the Cypriot government on a plan that should resolve the problems in banking sector and stabilize the economic and financial environment. This paper overviews the specifics of the Cypriot banking system and puts them into relation with the crisis. The rescue program and its individual components are examined and adequacy of the bail-in approach is discussed. The paper concludes that Cyprus suffers from the status of being too small to be equal while having banking sector too big to save. Moreover, the way of bank resolution approved for Cyprus could be a wrong example how banking crises in the euro area should be sorted out in future as the bail-in approach increases systemic risk. The appropriate strategic solution for the euro area would be a proper banking union with common supervision, deposit insurance scheme and bank resolution proceedings.*

Keywords: banking crisis, Cyprus, bailing-in, crisis resolution

JEL codes: F34, F36, G01, G21

1 Introduction

Based on the recent data on borrowing conditions for governments, ratings on sovereign debt or internal financial balances in the Eurosystem, the euro area has been gradually returning to stability. Unfortunately, these positive signs could be outweighed by the crisis in Cyprus and difficulties to sort it out. Cyprus is a small economy (only 26[th] largest in the EU) with a huge banking sector whose assets are eight times higher than the country's GDP. Hence, serious problems in banking sector automatically lead to economic instability and intensive pressures on Cypriot public finance. Total financial needs to resolve the Cypriot crisis are estimated to 17 billion euro, which equals to an annual GDP. Financing the solution through a loan from the European Stability Mechanism and/or other creditors would push government debt to unsustainable level of around 200% of GDP.

If the problems in Cyprus are not sorted out properly, one could only hope that it will not have a systemic impact on the euro area, given the small relative size of Cyprus (5% of the financial support provided to Greece). Nevertheless, design of the rescue program and character of the measures adopted can be considered as a groundbreaking in a way how banking crises have been resolved in the euro area so far. Therefore, it is worth to analyze the Cypriot banking system and the entire rescue plan in more details. The aim of the paper is to define key aspects of the banking system in Cyprus, examine the agreed process of bank resolution and highlight potential effects of the current development in Cyprus on national economy and the euro area as a whole.

2 Stylized Facts on Banking System in Cyprus

The size of the banking system in relation to the economy distinguishes Cyprus from most members of the EU and the euro area. Assets of the entire banking sector exceeded the Cypriot GDP more than eight times in 2011. Figure 1 depicts size of banking system in selected EU countries and Switzerland (SUI) measured as the ratio of total banking assets on GDP. It is evident that the Cypriot banking system has gained its extended size over the last five years when the annual rate of growth was highest in the EU. Fairly behind Luxembourg (almost 2200% of GDP), Cyprus stood in 2011 on the second place followed by Ireland (720% GDP), UK (515% GDP), Netherlands (415% GDP) and the EU

average of 360% GDP. Stephanou (2011) argues that the expansion of the Cypriot banks and banking system has been part of the broader push to promote the island as an international business centre with efficient financial infrastructure, attractive tax policy and favorable business climate.

Figure 1 Size of banking system (total banking assets on GDP, in %)
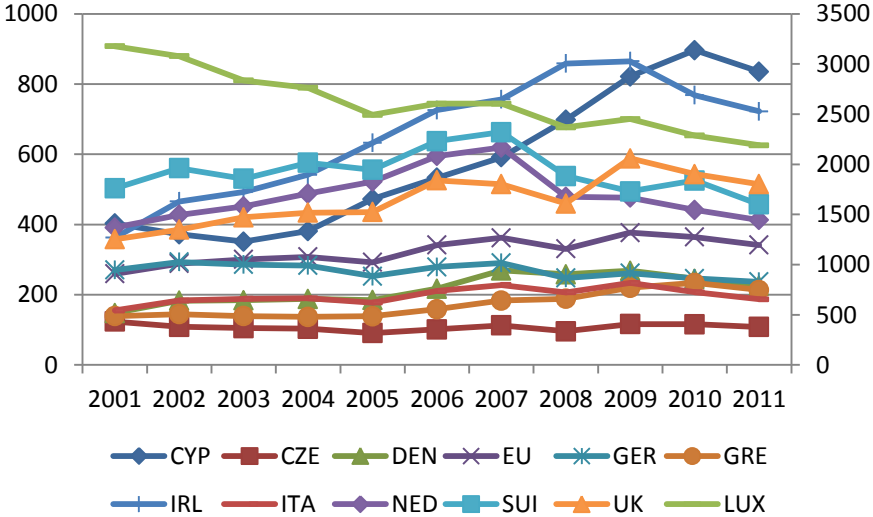
Source: Helgi Library (http://www.helgilibrary.com/indicators/index/bank-assets-as-of-gdp)
Note: Luxembourg is on the right axis.

Behind these aggregate figures one shall search for other aspects that make the Cyprus's banking sector special. First, domestic financial institutions (commercial and cooperative banks) play a dominant role in the system. Domestic commercial banks own 61% and cooperatives 12% of total assets. The rest of assets is in balances of subsidiaries of foreign banks (23%) and branches of foreign banks (4%). Furthermore, commercial banks' sector is highly concentrated as the two largest banks (Marfin Laiki Popular Bank and Bank of Cyprus) comprised nearly 88% and the three largest banks (plus Hellenic Bank) almost 98% of commercial banks' assets. It is not common in the EU that the three largest banks manage assets that account for 500% of the country's GDP.

Figure 2 Structure and volume of deposits in Cypriot banking system (mln EUR)
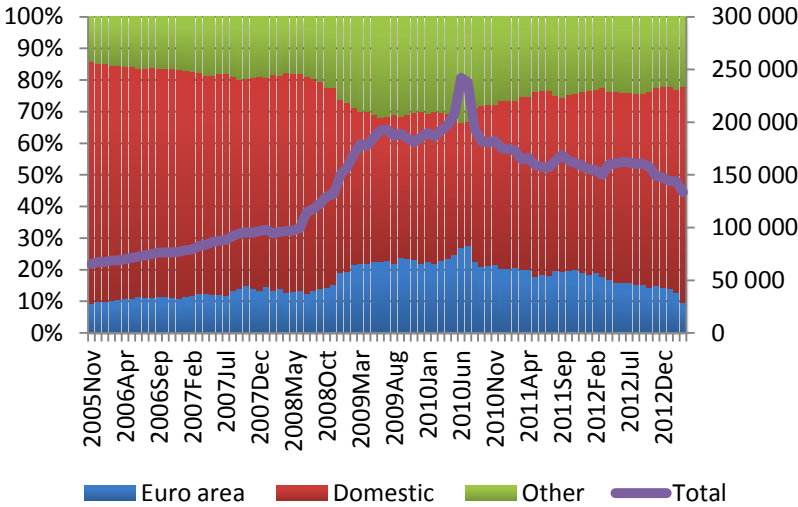
Source: European Central Bank (http://sdw.ecb.europa.eu/browse.do?node=bbn3193)
Note: Total deposits are on the right axis.

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A next important characteristic of the Cypriot banking system is that the resources of Cypriot banks consisted to a very large extent of deposits. Figure 2 shows geographical composition of deposits along with development of the total volume. It is evident that bank deposits were substantially rising principally in the period of 2008Q2 – 2009Q2. One short-term and temporary upsurge also occurred in summer 2010. Geographical composition of deposits reveals that any increase of total deposits was usually powered by inflow of foreign deposits from other euro area countries as well as non-EU countries (Saiyid et al., 2011). Deposits raised in Greece represen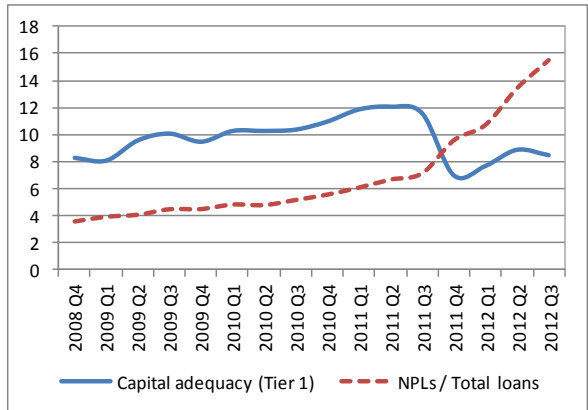t the core of funds from other euro area countries. On the other hand, the most deposits from non-EU countries came to Cyprus from Russia and other countries from the Commonwealth of Independent States.

Interests paid on deposits in Cyprus were constantly significantly higher than in the rest of the euro area. Enjalbert and Vincent (2013) illustrate this on deposits from households with agreed maturity up to one year. While the average interest rate in Cyprus was 4.5% in January 2013, the euro area average was 2.6%. Figure 3 shows that customer deposits constituted almost sufficient pool of funds for lending activities of Cypriot banks. The loans/customer deposits ratio has been close to 100% until the end of 2010. Deteriorating macroeconomic conditions have led to a pickup in arrears on loan portfolios and increasing share of non-performing loans (NPL) that was above 15% in 2012Q3 (Figure 4). Since the macroeconomic conditions in Cyprus and Greece are not likely to improve in near future the share of NPL may skyrocket considerably above 20%. At the same time, the country's two largest banks exhibited the share of NPL of 27.4% and 17.1% respectively.

Figure 3 Customer deposits and total loans in Cypriot banking system (mln EUR)
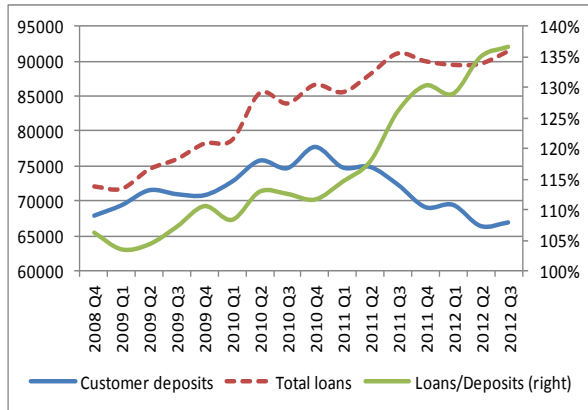
Figure 4 Non-performing loans and capital adequacy in Cypriot banking system (%)

Source: International Monetary Fund (http://elibrary-data.imf.org/Report.aspx?Report=4160276&Country=423)

Cypriot banks have a high exposure to Greece. Substantial portion of assets are allocated in Greek government and bank bonds and direct loans to Greek enterprises. In October 2011, Cypriot banks held Greek government bonds in volume that amounted to 27% of GDP. According to Saiyid et al. (2011) it is the highest exposure to Greek government bonds of any country's banking system. The only part of the Cyprus's banking system which is primarily exposed to the local economy is the segment of cooperative banks. These institutions have been traditionally serving particularly Cypriot residents offering them both deposit and loan products. Enormous exposure to Greece can be considered as the major risk hidden in Cypriot banks' balances. The Private-Sector-Involvement (PSI) debt restructuring process in Greece shook the Cypriot banking system to its roots. In October 2011, the EU council decided to wipe out about 80% of the Greek debt held by private sector. For Cyprus, the write-down of Greek debt resulted in a loss between 4.5 and 5 billion euro, which is substantial burden for a country with a 17 billion euro GDP.

All developments and structural aspects jointly affected profitability in the Cypriot banking system. In 2011, six of seven largest Cypriot banks recorded loss. Most notably, Laiki Bank lost more than 5 billion euro (12.2% of assets, 162% of equity) and Bank of Cyprus lost 1.7 billion euro (3.6% of assets, 67% of equity). Profitability of the entire banking system measured by the Return on Assets (RoA) and Return on Equity (RoE) is portrayed in Figure. A sharp decline at the end of 2011 was caused by the Greek haircut. Although the development has stabilized, profitability is still negative and the prospects are gloomy.

Figure 5 Profitability in Cypriot banking system (%)

Source: International Monetary Fund (http://elibrary-data.imf.org/Report.aspx?Report=4160276&Country=423)
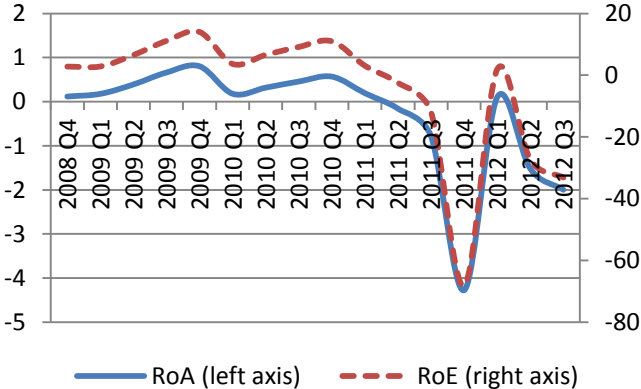
3 Rescue Program for Cyprus

When it comes to banking crisis there is always serious discussion on how the problems should be sorted out and how the rescue plan should be designed. One of the key questions that must be addressed is whether a bail-out or bail-in kind of program shall be implemented. This issue has attracted considerable attention in literature (see e.g. Öther-Robe et al. (2011), Zhou et al. (2012) or De Grauwe (2013)). However, there is no consensus on the possibility of bailing-in bank shareholders and lenders of troubled banks and forcing investors to take losses, or relying on public finance and tax payers to take the hit. Legal rules along with elementary economic principles such as idea that claims should be priced according to their risk and expected repayment in case of failure should be reflected in creditor ranking applied in bank resolution. Principally, equity holders take a hit before junior debt holders that are followed by senior creditors and uninsured depositors. Last, if at all, insured depositors should take a hit (Beck, 2013).

In June 2012, all three major rating agencies downgraded Cypriot sovereign bonds below investment grade. This automatically made the government debt not eligible as collateral for borrowing from the eurosystem. The ECB decided not to suspend this rule as it had done in case of Greece, Portugal and Ireland. Although the Cypriot government formally asked the Troika for assistance immediately, the government did not actively negotiate until November when the ECB warned that if Cyprus did not engage in negotiations, the ECB would consider cutting off liquidity. A structural program consisting of major reductions in pension benefits, wages and salaries for broader public sector, privatization of state-owned enterprises and suspension of living adjustments was negotiated and agreed with the Troika in December. However, this program did not include any action needed in banking sector. The new Cypriot president took over 1 March 2013 and wanted to complete the structural adjustment program that had been delayed. He participated on the European council on 15-16 March 2013 and expected program revisions similar to those faced by other countries in trouble.

However, the meeting took place in time when it was evident that recapitalizing the Cypriot banks will cost 10 billion euro (56% of GDP). Furthermore, the public sector needs 7 billion euro to cover its financial needs over the next three years. If the amount of 17 billion euro were lent, Cyprus's public debt would be set on an unsustainable trajectory. Hence, a group spearheaded by the IMF and creditor countries called for a more radical plan to put forward. The final version of the rescue plan considered the following sources of financing: (i) 10 billion euro from the European Stability Mechanism, (ii) 1 billion euro from the IMF, (iii) 5.8 billion euro from a tax on deposits. In addition, the following measures were also considered: (i) corporate tax rate to be raised from 10% to 12%, (ii) bail-in of junior debt, (iii) commitment to downsize the local banking sector to around 350% of GDP, (iv) adoption of fiscal-consolidation measures amounting to 4.5% of GDP, (v) privatization program expected to contribute 1.4 billion euro.

This first version of the rescue deal was very in favor of bail-in approach. Unfortunately, it violated in many aspects the creditor ranking mentioned above and, hence, a spirit, if not a letter of law. It was decided to impose a one-time wealth tax on deposits in Cypriot banks: 6.75% on deposits below 100.000 euro and 9.9% on deposits above this threshold. Involving insured depositors into rescue package was an extraordinary decision that was not necessary and could undermine a trust in deposit insurance schemes across the euro area. It is definitely unfair that insured depositors would suffer a haircut while uninsured depositors still maintain a large share of their claims (Beck, 2013). As Darvas (2013) points out, the second major drawback of the plan was the silence about senior bank bondholders. Although issued bonds are just fraction of the banks' sources taxing small depositors while exempting senior bondholders is unjust.

Shortly after the rescue program was announced, a massive wave of indignation and rejection broke over the whole EU. The Troika has to bring forward a revised version of the plan. An agreement between European and Cypriot authorities was finally reached on 25 March 2013. The two irrational defects of the initial version have been eliminated. The new deal fully protects insured deposits in all banks and it bails-in all banks' bondholders and shareholders. The complete rescue program consists of the following measures:

I. Marfin Laiki Popular Bank (second largest bank) will be resolved immediately with full contribution from shareholders, bondholders and uninsured depositors. The implementation will rely on the Bank Resolution Framework. Losses for uninsured depositors could range from 20% to 40%.
II. Laiki Bank will be split into a "good bank" (performing loans and insured deposits) and a "bad bank" (non-performing loans and uninsured deposits). The bad bank will be run down over time. The good bank will be folded into Bank of Cyprus (largest bank). Uninsured deposits in Bank of Cyprus will remain frozen until recapitalization has been effected, any may subsequently be subject to haircuts.
III. Bank of Cyprus will be recapitalized through a full contribution from shareholders, bondholders and a deposit/equity conversion of uninsured deposits.
IV. All insured depositors in all banks will be fully protected.
V. The Troika's program funds (10 billion euro) will not be used to recapitalize Laiki Bank and Bank of Cyprus.

4 Effects of Cypriot Crisis and Bank Resolution

The recent crisis in Cyprus and the manner how the crisis is going to be resolved will affect Cypriot economy as well as measures and solutions that will be taken in the euro area to sort out banking crises.

Cyprus is a small economy that has built up the prosperity and economic growth on being an offshore centre in Europe, and, lately, in the EU and the euro area. Cyprus has attracted money from Russia and elsewhere offering exceptionally high interest rates. Furthermore, foreign companies pay a flat tax rate of just 10%. Such a strategy has led to creation of an extremely sizeable financial and banking industry. The island has also a flourishing tourism sector and serves as an international shipping hub. On the other hand, the Cypriot economy is the least industrialized in the euro area. Manufacturing

industries generate less than 6% of GDP, compared to the euro area average of 16%. The banking crisis and ending of its tax-haven and offshore centre status will force Cyprus to revamp its economic strategy and to rebuild the economy on a new basis.

With no doubt that, after such a severe shock, the Cypriot economy will be pushed into a harsh recession. Experience from other countries that have recently gone through a banking crisis (Iceland, Ireland, Latvia) tells that a GDP fall of about 10% should be taken for granted. Latvia and Ireland also suffered from massive employment losses, which is likely to happen in Cyprus, too (Iceland could proceed with substantial currency depreciation, which helped to alleviate unemployment pressures). Most probably, economic recession in Cyprus will take more than couple of quarters. It is so because replacing the banking sector as the main growth engine by other economic activities will not be an easy task for Cypriot government and enterprises.

Although the extent of Cyprus's problems is relatively small from the European perspective, the crisis in Cyprus offers a good guide to understanding how future banking crisis would be resolved in the euro area. The statement of the Eurogroup's president, the Dutch finance minister Jeroen Dijsselbloem, is unambiguous. He declared that the case of Cyprus would be the new "template" for the future. It means that existing rules and procedures of bank resolution have been altered and a line has been crossed.

The new bail-in approach assumes that future bail-out operations will involve depositors. Yet, of the 147 banking crises since 1970 tracked by the IMF, none inflicted losses on all deposit holders, irrespective of the amounts they hold and the banks they are with. Now depositors in weak banks in weak countries have every reason to worry about sudden raids on their savings. Having in mind serious problems in Italy, Spain or Slovenia, every time the fear arises in a country, a bank run will occur because depositors will want to prevent the loss of their deposits by withdrawing them from the bank. Hence, this new bail-in doctrine enforced by creditor countries like Germany and Netherlands will increase the systemic risk in the euro area and will contribute to a more frequent occurrence of banking crises.

Proponents of the bail-in approach often argue that it is victory of common sense (see e.g. Darvas, 2013). They emphasize that tax payers are protected against paying for private-sector losses. Another argument in favor of bailing-in is that uninsured depositor simply took a risk that has been in Cyprus awarded by high interest revenues and low taxes. An ex post taxing of deposits is only one of possible manifestations of higher risk.

On the other hand, it must be stated that the benefit for taxpayers is only temporary and goes exclusively to taxpayers in Germany and other creditor countries. Taxpayers in Cyprus now and taxpayers in other countries in future will pay the full price of deep economic depression that will follow the banking crisis and collapse of banks (De Grauwe, 2013). The argument on legitimacy of bailing-in uninsured depositors is also wrong. Deposits are not like other investment such as shares, bonds or CDOs. Therefore, a traditional investment dilemma between return and risk cannot be applied. Bank deposits constitute the basis for payment system and source for financing a day-to-day business activities and living of households. An abrupt taxation (confiscation) of deposits wipes out large segments of business and household sectors and creates a huge damage of economy.

The Cypriot crisis could not only be an important precedent for thinking and decisions of European authorities how to deal with future banking problems but is also has relevant implications for a banking union. A banking union should contain three elements: a single supervisor, a common resolution authority and a credible system of deposit insurance. The case of Cyprus holds lessons on all three accounts. The ECB as a single supervisor would never have allowed Cypriot banks to attract huge amounts of deposits by paying above-market interest rates and then to invest substantial portion of assets to Greece. The ECB would also take over the role of common resolving authority. Even now a bank in difficulties cannot survive if the ECB does not grant or renew emergency liquidity assistance (ELA). Moreover, the ECB is independent institution with enough financial

resources to be used for an orderly resolution of even large banks. The revolt of small Cypriot depositors and economists across the Europe when the rescue program initially included a special tax on all deposits indicated that leaving deposit insurance scheme exclusively at the national level is no longer an option. A credible system common for the entire euro area shall be proposed and implemented.

5 Conclusions

The aim of the paper was to define key aspects of the banking system in Cyprus, examine the agreed process of bank resolution and highlight potential effects of the current development in Cyprus on national economy and the euro area as a whole. The Cypriot banking significantly differs from systems in other euro area member countries. It is extremely large in relation to the national economy as the total bank assets amount to 850% of GDP. The banking sector is highly concentrated, which makes the banks too big to fail and too big to save from public resources. Deposits attracted in domestic market as well as abroad represent most of the banks' liabilities. Strong business and political relations to Greece are reflected in dangerously high share of Greek assets in banks' portfolios. When Greece imploded, these investments went sour and the banks in Cyprus were insolvent.

Banking crisis will definitely slow down the Cypriot economy and increase unemployment. In addition, Cyprus must necessarily reshape its economic model and find new sectors and industries that will restart the economy and ensure sustainable growth.

These specifics in combination with extent of problems and financial needs led the Troika to propose a new type of rescue plan, which bails-in bank shareholders, bondholders and depositors. This decision completely rewrote the rules that had been followed in the euro area to resolve banking crises. We argue that involving depositors to the bail-out operations is not optimal and this approach would increase systemic risk in banking systems across the euro area and particularly in countries where symptoms of potential crisis can be perceived.

The Cyprus's banking crisis also showed how far the euro area is from creating the banking union and how much the banking union is needed. It is evident that the troubles would have never been so intensive and the rescue program so surprising and controversial if the banking union had been put into practice. There was no euro area supervision of large Cypriot banks, no transnational approach to put them into controlled bankruptcy, no common deposit insurance and no flow of bank rescue funds from abroad. If anything is good on Cypriot crisis it is the possibility of being an impulse to resume negotiations about banking union in the euro area.

Acknowledgments

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Microeconomic factors influencing impaired loans and credit derivatives prices

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Abstract: *The article analyses relationship of microeconomic factors with the portion of impaired loans in selected commercial banks. There is multiple regression used for quantification of relationship. For the analysis have been used banks of key euro area countries. Our first hypothesis is based on the presumption of strong correlation among main microeconomic indicators in EU17. We focused on correlations within EU. It focuses on searching for correlation between factors and the ratio. Final result should be econometric model that quantifies this relationship and selects significant factors among less important factors.*

Keywords: microeconomic factors, impaired loans, multiple regression, derivatives

JEL codes: G32

1 Introduction

Microeconomic factors depend on the nature of banking operations. Bank has mainly one basic objective – to generate profit, so that it tends to use credit derivatives in cause of its non-financial indicators.

The first important distinguishing sign is a reason why banks use the credit derivatives. According to Fitch Ratings study from 2010 the banks use derivatives in 43% for trading, 38% for hedging (credit risk management) and 32% for brokering or market-making activities. European banks use derivatives according to ECB for trading and hedging.

A bank has two reasons for selling credit protection according to Dias and Mroczkowski (2010).Key motivation is risk diversification and the second reason is a need to find more profitable investments. Furthermore, these products contributed to extend the products offered to clients and to optimize economic capital. Credit derivatives have been important instrument for risk protection according to ECB (2009) because the European banks have been clear buyers of credit derivatives unlike US banks.

According to Ashraf et al. (2006) who is interested in bank motivation of using derivatives, there are determinants that have bank in common. He found out, after observation of 56 banks using them in 1997-2004, that the probability that a bank participates in credit derivatives market is positively influenced by size of a bank, using other types of derivatives (mainly currency) and the existence of general strategies for derivatives risk management and negative barriers of entry management. The most significant determinants are according to them the size and portfolio diversification. Geographic diversification is not considered to be a positive determinant according to them. Outside these considerations is possible to involve also negative determinants like profitability (interest margin), deposits and loan commitments.

According to Minton study, the banks use credit derivatives mainly for trading. From this point of view there are instruments for credit risk management the most significant. They mean securitisation and selling the loans, size, foreign currency loans, commercial and industrial loans for big clients, using other derivatives, stronger transparency of derivative information, the existence of relationship between creditor and debtor (that can partially can limit using credit risk Instruments use). There are also negative determinants like loans secured by real estates or other assets, equity, profitability (net

interest margin) and from accounting point of view the unability to apply accounting methods for hedging (they are specific in cause of high volatility of hedging operations).

Mahieu and Xu (2007) dealt with determinants of credit derivatives use in relation to hedging (not trading). There are size, loan trading engagement and securitisation distinguished from negative factors like interest margin and total deposits indicator.

2 Methodology and Data

We created a relationship of selected factors and portion of impaired loans for analysis of microeconomic factors impact on use of credit derivatives. The factors have been selected according to literature and own opinion.

- – Cash & Near Cash Items
- – Total Loans
- – Total Assets
- – Total Equity
- – Tier 1 Risk-Based Capital Ratio Total Risk-Based Capital Ratio
- – Net Interest Margin
- – Net Revenue

Quantitative data was drawn up from Bloomberg for observed bank – Deutsche Bank. For modeling the relationship was used stepwise regression. It includes regression models in which the choice of predictive variables is carried out by an automatic procedure. I used one of the often used approaches – backward selection – because it involves starting with all variables in the model, trying out the variables one by one and including them if they are statistically significant.

3 Results

Results of observation of microeconomic factors and impaired loans

Table 1 Deutsche Bank - Microeconomic factors and impaired loans

Parameter	Estimate
CONSTANT	-0,0103117
Total Loans	-1,18457E-7
Net Interest Margin	0,0825636

Table 2 Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	0,00135974	2	0,000679871	12,69	0,0070
Residual	0,00032144	6	0,0000535733		
Total (Corr.)	0,00168118	8			

Portion of impaired loans:
DB = -0,0103117 - 1,18457E-7*Total Loans + 0,0825636*Net Interest Margin

Results of observation of microeconomic factors and CDS prices

Table 3 Deutsche Bank - Microeconomic factors and CDS prices

Parameter	Estimate
CONSTANT	-42,8469
Total Equity	0,00883867
Net Revenue	-0,00773047

Table 4 Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	29127,0	2	14563,5	22,03	0,0010
Residual	4627,98	7	661,14		
Total (Corr.)	33755,0	9			

Prices CDS:

DB = -42,8469 + 0,00883867*Total Equity - 0,00773047*Net Revenue

As the observation of the microeconomic factors is a part of wider study, we can conclude that microeconomic factors have at least stronger impact on impaired loans and selected credit derivatives prices in comparison with macroeconomic factors.
CDS prices have been selected in cause of high amount of this credit derivative being traded. It has a long history and almost all the banks disposes of some amount of them in the portfolios.

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Can tax policy co-cause the crisis?

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Abstract: *Although taxes have not generated the crisis, some aspects of tax policy may have led to increased risk-taking and indebtedness of banks, households and companies. Tax incentives may indeed the behavior of economic agents, leading them to wrong economic decisions. The aim of the paper is to review main channels through which the tax policy can affect financial markets and financial stability. Attention is focused on last and current development of tax reliefs for housing and capital gains, tax benefits for corporate debt financing and taxation of financial institutions Conventional scientific methods such as analysis, induction, comparison and synthesis are used in the paper.*

Keywords: crisis, corporate debt financing, housing, taxation of financial institutions

JEL codes: G01, G10, G20, G30, H20

1 Introduction

There is a general consensus that the 2008 financial crisis is the worst economic crisis since the Great Depression of 1929. As Hemmelgarn and Nicodeme (2010) mention, it has been characterized by a housing bubble in a context of rapid credit expansion, high risk-taking and exacerbated financial leverage, leading to deleveraging and credit crunch when the bubble burst. Economists and researchers have tried to identify causes which have caused or co-caused the crisis. This effort has a very simple and logical reason – identifying and understanding problems can help to prevent future crises. Lloyd (2009) emphasizes that root causes of the financial crisis can be identified at two levels: global liquidity policies (especially low interest rates in particular nurturing a strong credit expansion with cheap leverage and bubble tendencies in asset prices); plus a poor regulatory framework, which not only failed to prevent the growth of asset bubbles but actually contributed to their growth and concentration into the specific areas, such as mortgage securitization, where the credit bubble eventually burst with such damaging consequences. More immediate causes of the crisis can be categorized as follows:

- a high appetite for yield and a high tolerance of risk;
- lack of transparency;
- insufficient regulation;
- lack of adequate corporate and fiscal governance.

The discussion has focused also on the tax policy and measures. The complexities of national tax codes, and the international interaction between them encouraged the use of complicated financial instruments and international tax planning, reducing transparency. Slemrod (2009), Keen et al. (2010), Guily (2010), Ceriani et al. (2011) and others have tried to answer the question whether taxation and tax policy can play any role in precipitating the financial crisis. They have considered as the most important elements of the tax system affecting financial crisis: the tax preference for corporate debt financing, the taxation of financial institutions, tax competition, tax reliefs for housing and for capital gains, the incoherence of capital income taxation (tax arbitrage, tax clienteles, and derivative securities), the use of tax havens for creating tax efficient securitization instruments and the tax preference of the performance-based remuneration.

The aim of the paper is to review main channels through which the tax policy can contribute to the crisis. Attention of the paper was focused (due to the length of the article) only on tax reliefs for housing and capital gains, tax benefits for corporate debt

financing and taxation of financial institutions. The paper examines development and also possible tax measures and regulation.

The paper employs standard methods of scientific paper. In the theoretical part, mainly the methods of description and induction are used; next the methods of comparative analysis, deduction and synthesis will be applied.

2 The Tax Treatment of Housing

We start with the tax treatment of housing as housing, and in particular the collapse of the housing price bubble, has been singled out as a triggering cause of the crisis. Tax policy can affect two key aspects of housing markets: house prices and households' leverage. These are interrelated, as high house prices encourage removing equity through increased borrowing, the availability of cheap loans drives up house prices, and the expectation of price increases raises the expected return on borrowing to acquire housing. There is a considerable diversity of housing tax regimes across countries. Definite international comparison is difficult due to the complexity of tax codes and differences in terms of deductions, exceptions or threshold limits.

Study of IMF (2009) points out the risks in distorting a market so central to financial stability reinforce long-standing efficiency and equity arguments for more neutral taxation. Taxation of capital gains is needed to match the capital gains tax liability on other financial assets; and deductibility of mortgage interest is needed to match the taxation of the interest available from investing in other assets. From a theoretical point of view, the non-taxation of the rental return to owner-occupied housing, coupled with the deductibility of mortgage interest and home equity loan interest for itemizers and especially favorable statement of capital gains on housing, adds up to a substantial tax preference. Unfortunately, tax systems are not neutral. Owner-occupation is tax-favored with respect to renting in many countries, and with respect to most forms of return on personal savings.

In practice, imputed rents and capital gains on primary residences are rarely taxed, creating a general bias towards housing that mortgage interest relief is likely to reinforce. Very few countries bring imputed rents into the income tax (the Netherlands, Belgium and Switzerland being exceptions). Some tax capital gains on owner-occupied housing, but typically more lightly than other income or only beyond a high threshold (or both). Even in the absence of distortions on the financing side, these features would tax-favor owner-occupation relative to renting. And mortgage interest costs attract tax relief, subject to limits, in a number of countries (e.g. Denmark, France, Italy, Spain, Italy, France, U.S., UK, Ireland, Netherlands, Czech Republic). Since borrowing to acquire other assets is generally not deductible, this makes investment in housing even more favored. Look at Ceriani et al. (2011) or Taxes in Europe database for details.

Mortgage interest relief would not tax-favor mortgage finance if the alternative to borrowing were investing less in fully-taxed assets and other interest were also deductible. If alternative investments were fully taxed, mortgage interest deductibility would mean that the opportunity costs of acquiring housing by borrowing and by running down other assets would in each case be the after-tax interest rate—so mortgage finance would not be tax -favored. Many countries, however, tax other forms of saving (such as pensions) at reduced rates. In that case, if the return on those assets matches the pre-tax interest rate on mortgage debt, there is an arbitrage gain from leveraging against housing and investing own-funds in the non-housing asset. And while interest on loans used to finance consumption is generally not deductible, home equity loans have provided (within limits) just such a tax-favored way to borrow and spend.

The distributional impact of mortgage interest relief can be complex, but deductibility likely favors the better off. Higher income individuals may be more likely to face constraints on their access to tax-favored assets (since this is often subject to caps), so that their opportunity cost of investing in housing is the after-tax return. This creates an argument for some tax relief to ensure that the less well-off also pay an after-tax rate.

Against this, however, deductions are worth more to the better-off as they take them against a higher marginal rate of tax. The second effect would be avoided if relief were provided—as many countries do—not as a deduction but as a credit.

Noord and Heady (2001) and next Noord (2005) have stated that the deductibility of mortgage interest, by reducing the user cost of ownership, decreases the price elasticity of demand; it therefore increases the volatility of the housing market. In general, the price sensitivity of demand for housing is inversely related to the extent of preferential tax treatment for housing and to the expected rate of house price appreciation. Moreover, Keen et al. (2008) note that mortgage interest tax relief encourages the build-up of gross housing debt and there is evidence that countries offering more favourable tax treatment for home ownership do indeed have higher ratios of mortgage debt. There is also evidence that mortgages fell significantly relative to home value (in UK and U.S.) after reforms reduced the value of mortgage interest relief (e.g. in Scandinavian countries).

Ownership or occupation and transaction taxes also play an important role. Many countries charge substantial recurrent taxes based on ownership or occupation. These have potential appeal both in serving as user charges reflecting the value of local public services and, to the extent that these and other features are location-specific, as being less vulnerable to interjurisdictional tax competition than the corporate income tax and other taxes on more mobile bases. Johansson et al. (2008) have presented evidence that such taxes (along with consumption taxes) have significantly less adverse effects on growth than income taxation. Also Hilbers et al. (2008) have highlighted that economic activity somehow related to housing accounts for an important share of GDP. In Europe, this share is estimated at between 5 and 10 per cent. Next, Lutz et al. (2011) have identified five main channels through which the housing market affects public finances: property tax revenues, transfer tax revenues, sales tax revenues (including a direct effect through construction materials and an indirect effect through the link between housing wealth and consumption), and personal income tax revenues. They found that property tax revenues do not tend to decrease following house price declines and concluded that the resilience of property tax receipts is due to significant lags between market values and assessed values of housing and the tendency of policy makers to offset declines in the tax base with higher tax rates. The other four channels have had a relatively modest effect on state tax revenues and public finances. It is necessary to have on mind that a shortfall in public revenue may cause a debt problem.

Moreover, investors paying tax on interest income at a rate higher than that at which they can offset capital losses benefit by pooling assets to pay interest at a rate which reflects the expected losses. Investors facing the same rate on both, on the other hand, do not care about the mix of interest and gains. Bringing the two types together creates scope for tax arbitrage from which both can benefit. Eddins (2009) developed this argument.

The search for new ways to allocate risk has encouraged to the development of new financial instruments, in particular the technique of securitization. The most common securitizations (in relations to the housing) are mortgage-based securities (MBSs) whereby the claims of thousands of mortgages are pooled together in a Special Purpose Vehicle (SPV), which is a legal entity outside of the balance-sheet of the financial institution, allowing them to bypass capital ratios regulations. Tax issues raised by securitization include: whether any gains on assets placed in the SPV by the originator are taxable; whether the SPV itself is taxable; and whether payments to holders of the securitized assets will be taxed as interest or dividends. MBSs can be divided between commercial MBSs (CMBSs), secured by commercial and multifamily properties, and residential MBSs (RMBSs).

But IMF (2009) highlights that a lack of clarity in the tax treatment of new instruments can lead to further complexities through the use of strategies aimed at assuring tax minimization: one way to trying to ensure that SPVs themselves—which are just

intermediating receipts —are not subject to additional layer of tax, for example, is by locating them in low-tax jurisdictions.

3 Tax Benefits for Corporate Debt Financing

Tax is one of many determinants of corporate financial policies. Although the theory expects the existence of complete markets, perfect information, and no taxation, the reality is otherwise. Informational imperfections introduce considerations that can lead to a determinate choice and parceling of returns between equity and debt has real consequence. As Lloyd (2009) mentions, one longstanding issue is that there is an overall bias in many countries' tax systems which work to encourage corporate leverage. Changes in investment patterns and cross-border financial flows brought about by the twin forces of globalization and financial innovation may have significantly increased the impact of this bias in recent years. A systemic bias in favor of corporates financing themselves with debt (as opposed to equity) results from treating interest as a business cost in arriving at corporate profits, and so deductible for tax purposes against annual corporate profits, while treating returns to equity finance as a distribution of corporate profits, and not deductible in computing those. As a result profits may be taxed both at corporate and personal level when they are distributed as dividends.

According to Alworth and Arachi (2012), the greatest tax distortions in favor of debt financing will be in situations where there is no compensating increase in taxation at the level of the investor, compared with the taxation of dividends or capital gains on shares. Such a compensating increase could in theory arise if tax systems systematically compensated for the bias to corporate debt through reduced taxation of dividends and capital gains on shares. In practice, the distortion is greatest when the investor is tax exempt, or when tax is evaded, or when hybrid structures are used to achieve either a double deduction ("double dip") for the interest expense or relief for the interest expense with no corresponding taxation. Double-dip financing is a tax-planning strategy in certain cases involving the use of conventional debt, depending on the effective tax rate on interest income in the home country, compared with the effective tax rate on profit in the host country.

From a financial stability point of view, the key problem with high levels of leverage is that this makes companies more vulnerable to economic shocks and increases the probability of bankruptcy. Specifically, highly leveraged companies are particularly susceptible to volatility in profits (since they will be required to make interest payments irrespective of profitability) and–unless they have hedged–to volatility in currency or interest rates. If leverage levels become unsustainable and lead to a credit crunch, firms and households are left without access to the credit they need, leading to a collapse in demand. As the study of IMF (2009) concludes, this tax distortion has gained more attention recently as the crisis has highlighted the fact that many companies have too high leverage ratios. This could lead to liquidity constraints, especially in times when banks tend to restrict their credit supply.

Hemmelgarn and Nicodeme (2010) show that current corporate tax system in Europe favor debt financing over equity financing. While, in general, interest payments on corporate debt are deductible from the corporate tax base, return on equity is not. This leads to a higher leverage for firms since financing investments through debt is tax-favored. This tax distortion has gained more attention recently as the crisis has highlighted the fact that many companies have too high leverage ratios. This could lead to liquidity constraints, especially in times when banks tend to restrict their credit supply.

A well-designed tax base that reduces the distortion of the leverage could make companies less vulnerable to a short-term reduction in credits available on the capital market. There is indeed empirical evidence that the leverage of companies is indeed influenced by taxes. Several studies have analyzed this issue and find that debt policy is consistent with tax considerations (e.g. Desai et al., 2004 or Huizinga et al., 2008). Huizinga et al. (2008) have found for instance that for stand-alone companies, an increase in the effective tax rate by one percentage-point increases the ratio of debt to

assets by 0.18%. The impact is larger for multinationals as it reaches 0.24% for two equal-size companies (with one foreign subsidiary) within the same group.

In principle, two opposing measures exist that might eliminate this distortion by treating both sources of finance in the same way: an allowance for corporate equity (ACE) or a comprehensive business income tax (CBIT). The ACE would grant a similar deduction for return on equity than for interest paid. This would abolish the tax advantage of debt. At the same time, ACE reduces the tax burden on marginal investment. ACE would also lead to a narrower tax base. In order to collect the same amount of tax revenue either the statutory corporate tax rate or other taxes have to be increased to finance such a reform. The CBIT, on the contrary, broadens the tax base by disallowing a deduction for interest payments on debt. If the tax rate remains unchanged, this leads to an increase in tax revenue. The additional revenue can be either used for a reduction in the statutory corporate tax rate or of other taxes if the reform is supposed to be revenue neutral. The tax neutrality of the financing decision is the same as in the ACE case since equity and debt financing are equally treated. ACE and CBIT have been discussed extensively in the economic literature as evidenced by Devereux and de Mooij (2009). Both systems are appealing due to their efficiency properties with regard to the financing decision of companies; however, there is no clear recommendation on which system is most favorable and there are key trade-offs when designing a reform towards any of these pure systems. While in the context of open economies ACE is more prone to profit shifting (in particular when its narrow tax base is accompanied by higher corporate tax rates), CBIT might lead to increased distortions of the marginal investment.

Recently, Lierse (2012) has pointed on evidence of the tax bias to debt encouraging higher levels of gearing by companies, and banks have tended not only to gear up to the levels of debt allowed under regulatory capital rules but also to issue hybrid, equity-like, forms of debt, rather than ordinary share capital, where that satisfied both the regulators and the conditions for a tax deduction.

We can find an unclear premise concerning the tax incentive to debt financing. Generally, it presumes that, in order to obtain the credit and thus tax advantages of interest deductibility, corporations must change the risk profile of their obligations to the providers of capital. This may not be true, though, if a corporation can obtain the tax advantages without altering the character of its obligations. In principle this could be done by issuing hybrid instruments such as convertible debt obligations. Moreover, Shaviro (2009) notes, corporations often favor hybrid financing that qualifies as debt for tax but not for accounting purposes, thereby generating deductions against taxable income but not against financial statement earnings.

4 The Taxation of Financial Institutions

Although James Tobin first conceived the Financial Transaction Tax over 40 years ago, wider discussions about a possible taxation of the financial institutions has appeared after the financial crisis in 2008. According to Alworth and Arachi (2011), financial institutions face qualitatively the same tax considerations in balancing equity and debt finance as non-financial corporations. Banks have traditionally been able to sustain very high debt ratios by virtue of having relatively safe assets, and implicit or explicit deposit guarantees reinforce this. Besides, the high profitability of financial institutions in recent years will have made debt more attractive for them than for many non-financials, since the low probability of tax exhaustion it implies means a high effective corporate income tax rate. IMF (2009) has presented the tax bias to debt runs counter to regulatory objectives. Banks face both an explicit tax advantage of debt and, through regulatory requirements, an implicit penalty—with evident risk of policy incoherence. Tax incentives towards high leverage may have undercut the effectiveness of regulatory requirements. The tension between regulatory objectives is reflected in the emergence of already mentioned hybrid financial instruments, which are treated like debt obligations for tax purposes (i.e., interest payments are deductible), but they are treated as capital rather than liabilities under banking regulations.

Hasman et al. (2011) have analyzed the effectiveness of different government policies to prevent the emergence of banking crises. They have studied the impact on welfare of using tax-payers money to recapitalize banks, government injection of money into the banking system through credit lines, the creation of a buffer and taxes on financial transactions (the Tobin tax). Whilst the Tobin tax is an emergency policy (applied when a banking crisis is imminent), the creation of a buffer is a preventive one.

Acharya et al. (2011) have stressed the negative externalities of large, complex financial institutions and recommended that policy makers quantify their systemic risk and tax their contributions to this risk. Systemic risk can be broadly thought of as the failure of a significant part of the financial sector –one large institution or many smaller ones – leading to a reduction in credit availability that has the potential to adversely affect the real economy. As stated by Slemrod (2009) the tax should be implemented through capital requirements or deposit insurance fees, rather than by trying to apply a tax directly to a base associated with the negative externality.

European Commission also has focused its attention on a possible taxation of the financial sector and has concluded that EU should introduce a system of levies or taxes on financial institution. On September 28, 2011, the European Commission formally proposed a plan to implement an EU-wide financial transactions tax (EC, 2011). In October 2012, after discussions failed to establish unanimous support for an EU-wide financial transactions tax (FTT), the European Commission proposed that the use of enhanced cooperation should be permitted to implement the tax in the states which wished to participate. The proposal, supported by 11 EU member states representing more than 90% of Eurozone GDP. The European Parliament resoundingly approved the plan in December 2012. On February 14, 2013 the European Commission adopted a proposal for an 11-nation financial transactions tax and it will come into force after being approved by the participating member states and the European Parliament. The target starting date is January 1, 2014 (EC, 2013).

The tax would be levied on all transactions on financial instruments between financial institutions when at least one party to the transaction is located in the EU. It would cover 85% of the transactions between financial institutions (banks, investment firms, insurance companies, pension funds, hedge funds and others), but not affect citizens and businesses. House mortgages, bank loans to small and medium enterprises, contributions to insurance contracts, as well as spot currency exchange transactions and the raising of capital by enterprises or public bodies through the issuance of bonds and shares on the primary market would not be taxed, with the exception of trading bonds on secondary markets.

The European Commission itself expects the FTT to have the following impact on financial markets and the real economy:

- up to a 90 per cent reduction in derivatives transactions;
- negative or positive effect on economic growth;
- an effective curb on automated high-frequency trading and highly leveraged derivatives;
- an increase in capital costs, which could be mitigated by excluding primary markets for bonds and shares from the tax
- the real economy could be protected by ensuring the tax is levied only on secondary financial products, thus not affecting transactions such as salary payments, corporate and household loans (Hagelüken, 2012) .

However, there is not unambiguous consent that FTT on its own would prevent financial crises. The authors like Griffith-Jones and Persaud (2012) argue that FTT would somewhat reduce systemic risk, and therefore the likelihood of future crises, as prudent macroeconomic policies and effective financial regulation as well as supervision also have a major role to play in crisis prevention. However, by significantly reducing the level of noise trading in general and reducing (or eliminating) high frequency trading in

particular, the FTT would make some contribution to the reduction of severe misalignments and hence the probability of violent adjustments. Moreover, in financial crises "gross" exposures matter more than the net ones, and financial transaction taxes will reduce the gap between the two.

5 Conclusions

The aim of the paper was to review the main channels through which the tax policy can contribute to the crisis. We can conclude that the most important elements of the tax system affecting financial crisis are: the tax benefits for corporate debt financing, the taxation of financial institutions, tax competition, tax reliefs for housing and capital gains, the incoherence of capital income taxation like tax arbitrage, tax clienteles and derivative securities, the use of tax havens for creating tax efficient securitization instruments and the tax prioritization of the performance-based remuneration.

There is evidence that the tax system played a major role in triggering the tax crisis. On the other side, a number of special taxes have been introduced and proposed to recover the cost of the —bailout. There is a bias that in many countries tax systems encourage corporate leverage. Changes in investment patterns and cross-border financial flows brought about by the twin forces of globalization and financial innovation may have significantly increased the impact of this bias in recent years. A systemic bias in favor of corporates financing themselves with debt results from treating interest as a business cost in arriving at corporate profits, and so deductible for tax purposes against annual corporate profits, while treating returns to equity finance as a distribution of corporate profits, and not deductible in computing those. As a result profits may be taxed both at corporate and personal level when they are distributed as dividends.

The debate has highlighted that taxation may be used as corrective instrument to complement prudential regulation of the banking sector. Financial transaction tax has been adopted as a tool to stabilize financial markets and improve their functioning because a large number of transactions are either speculative or of no social use.

It should be stressed that many of the defining elements of the pre-crisis financial sector were global in scope. The main root causes of the crisis, e.g. cross-border debt balances, exploitation of differences in regulation and in market prices and the market for the highest-yielding investments, were also global. In spite of that, there is a tension between global integration of markets and nationally based regulation. But in a globally competitive market, market players will seek the most advantageous regulatory environment for financial transactions and exploit differences in national regulations, so the regulatory activities must also be global.

Acknowledgments

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Stress testing in relation to the financial crisis

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Abstract: According to experts, the causes of the global financial crisis can be found on the poor management of banks and other institutions of financial intermediation, also on failure of credit rating agencies in the assigning credit ratings as well as misunderstanding or their poor interpretations. The cause lies in the absence of crisis scenarios and inadequate risk assessment by using stress testing. The purpose of paper deals with stress testing at national and international level, stress test scenarios, their results and impact on individual economies.

Keywords: stress testing, stress test scenarios, crisis scenarious

JEL codes: G21, G01

1 Introduction

At the time of the global financial and economic crisis, which has affected the whole world, the credit rating agencies are in some circles considered to be one of the main culprits of the crisis The main reason is that they gave high ratings to certain structured finance products, as well as financial institutions. These ratings had to be revised after the outbreak of the crisis. Following the downgrading some securities became nearly worthless and illiquid. This had a negative impact on the financial institutions that hold these securities in the portfolio. Therefore, the rating became unreliable and it was necessary to find an alternative to it.

Many specialists from national and international supervisory authorities argue that one of the causes of the current crisis lies in the absence of crisis scenarios and inadequate risk assessment using stress testing. In response to the problems caused by the financial crisis, lack of credibility of risk assessment through rating and inadequate risk assessment using stress testing, the first stress testing was made in the 2009 at European level. This test should show how banks would respond to scenarios created and whether in the case of the occurrence of situations that European banks were stable or not.

The aim of the paper is to analyze the stress tests that were carried out at national and international level, to find out whether those stress tests administered realistic picture of the condition in the banking sector and to draw on that basis conclusions wheather stress testing is an effective and credible.

2 Theoretical basis of stress testing

Stress tests are an important tool for the management of the bank, because they provide useful information about the reliability of the internal system of financial institutions. This is a simulation technique which aims to determine how certain crisis scenarios affect the value of the portfolios of individual banks. Stress tests are used by the banking supervisory authorities as well as central banks to assess the reliability of the financial systems of banks in case of extreme, but still acceptable shocks. (Quagliariello, 2009)

Stress testing is the process of identifying events that are very unlikely but still possible. These events may have a significant adverse impact on the financial health of banks and it is necessary to know to quantify their impact. Stress testing is usually based on the creation of stress scenarios and evaluating their impact on costs and revenues and the resulting bank profit. Outcome of a process is the estimation the impact of simulated market situations affecting the economy and position of the bank.

"Stress-testing at the level of individual institutions has been widely applied by internationally active banks since the early 1990s." (Sorge, 2004) "System stress tests can complement stress tests conducted by individual institutions, and act as a cross-check for other types of analysis. The information provided by system stress tests can also help to identify weaknesses in data collection, reporting systems, and risk anagement." (Jones – Hilbers – Slack, 2004)

In the stress test is one of the most important steps creating stress scenarios. We can say that in general there are several ways of making them. In the most common we could include historical and hypothetical stress scenarios. Hypothetical scenarios based on possible fluctuations in the measured parameters. Historical scenarios modeled in turn, that there is fluctuation in the measured parameters, to the extent that they have ever occurred in the past. In both methods of scenario we can distinguish two types of usage. The first method consists in applying changes only to one parameter, and determines the impact of changes in the banking portfolio. The second method consists in quantifying the impact of change in several parameters simultaneously, as in the economy generally no change does occur separately, but by the rule it is accompanied by a change of several other parameters.

Stress scenarios are designed to be able to evaluate the relative importance, as both credit and market risk in the financial companies. Since this is a relatively comprehensive estimate of the development in the financial sector, depending on the selected stress scenarios, it is necessary to adopt a relatively large number of assumptions. Therefore it is important to note that the results of stress tests are used rather to the relative comparison of the types of risks in financial companies, or for the relative comparison of different companies within the financial sector, rather than for the absolute quantification of potential gains / losses in various scenarios. (Klacso, 2011)

Stress testing works at national and as well as international level. At the EU level the European Banking Authority (EBA) is responsible for stress testing. The EBA was established at 2011 and has taken over all existing and ongoing tasks and responsibilities from the Committee of European Banking Supervisors (CEBS). At the national level is responsible for stress testing the national supervisory authorities of each country.

3 Stress tests on international and national level

The first stress test on European level was in 2009 and was coordinated by The Committee of European Banking Supervisors (CEBS) in cooperation with the European Commission and European Central Bank (ECB). This EU-wide forward-looking stress test of the banking system was built on common guidelines and scenarios. The sample considered of 22 major European cross-border banking groups, which represents 60% of the total EU banking sector on a consolidated bases.

The outcome of this test was on aggregated basis. Under the baseline scenario, reflecting current macro-economic predictions, the banks' aggregate Tier 1 capital ratios will be well above 9%. According to Basel, a requirement was at least at 4%. Under the second – more adverse scenario the aggregate Tier 1 ratio for the banks in the sample would remain above 8% and no bank would see its Tier 1 ratio falling under 6%. This was because the financial position and expected results of banks are sufficient to maintain an adequate level of capital also under such negative circumstances.

The next stress test coordinated by CEBS was at 2010. The scope of this test has been extended to include the major EU banking groups and also key domestic credit institutions in Europe. The sample has been built by including major banks in country to

cover at least 50% of the national banking sector. Stress scenario was applied at 91 banks, which represent 65% of the EU banking sector.

Banking groups have been tested on a consolidated level, so subsidiaries and branches of an EU cross-border banking group have been included in the exercise as a part of the test of the group as a whole. Banks in Slovak banking sector, which are subsidiaries or branches of cross-border banking groups based in the EU, are included in the stress test only as part of these banking groups as a whole. Slovak subsidiaries of foreign banking groups that were included in the stress tests represent 78% of the assets of the Slovak banking sector (CEBS's press release on the results of the EU-wide stress testing exercise, 2009)

The EU-wide stress test exercise is a "bottom-up" exercise, where commonly agreed scenarios and key assumptions have been applied to institutions' internal risk parameters and portfolios, with the aim at better assessing the specificities of institutions in the sample for the exercise. The results should provide information about the vulnerability of the European banking sector on overall economic decline and movement of external variables such as interest rates, GDP, consumer price index and unemployment. Like the previous test, also this was based on commonly agreed macro-economic scenarios (basic and adverse) for 2010 and 2011, designed in close cooperation with the ECB and the European Commission. The result was that most of the tested financial groups should not have a problem with equity. Stress testing has not undergone only seven of the 91 banks that have undergone testing.

A wave of criticism withstand for this "round" stress tests after a few months, given by the problems of Irish banks. Neither of troubled banks did appear in "a seven" which did not pass stress tests. Although, Ireland had to take help from the EFSF to save the country and banks from bankruptcy. Therefore, stress test had tougher criteria in 2011 to be credible. Banks of this testing were selected based on the same parameters as has been previously tested. Indirectly, Slovak banks were also selected and tested on a consolidated basis.

The scenario evaluated against the bank's devaluation, which would occur under the influence of a significant change compared to the base forecast of main macroeconomic indicators such as GDP, unemployment and housing prices. The test also took into account interest rate changes and spreads on government bonds because they have an impact on funding costs for banks in "stress". The test was conducted on the basis of verification in three rounds and EBA relied on the quality of national supervisors and the internal processes of banks in assessing areas such trends were earnings, asset quality, modelling results and the extent of the impact on assets and liabilities. The result was that only eight banks during the stress test did not fulfill the limit of 5% over two years, representing a deficit of 2.5 billion. And EUR 16 banks reached Tier 1 between 5% and 6%.

Among the seven banking groups that have subsidiaries in Slovakia, which was part of the stress test showed six banking groups in the stress tests adequate capital adequacy stress tests did not pass one banking group Oesterreichische Volksbank AG (Core Tier 1 ratio dropped at the end of the stress period to 4.5%, slightly below 5%). Stress-test results showed relatively strong banking sector resilience to adverse macroeconomic scenario, but for mitigation of adverse scenario, the banks have to prepare for a wide range of measures such as the use of countercyclical provisions, divestments, sales, capital growth. (CEBS's press release on the results of the EU-wide stress testing exercise, 2011)

However it have to be said, that on the basis of EBA test has recommended to national banking supervision to carry out the banks with a decrease in Core Tier 1 ratio under 5% detailed analysis of capital and at the same time take measures so that the shortcomings found in the stress test were immediately removed. It was mainly the fact that national supervisors ensure that the banks submit measures to restore the capital position of at least 5% of the reference values.

The stress test has been conducted In the Slovak Republic at national level of financial sector annually since 2005, and its results have been published in the Analysis of the Slovak Financial Sector.

In 2007, when the subprime crisis erupted in the U.S., the National Bank of Slovakia shall submit the banking sector in Slovakia to stress test risk of decline in real estate prices. The reason for this test was high housing price growth in the last five years. The subject of stress testing was a direct connection of the banking sector on the real estate market through the use of property as collateral for a loan. In this section the indicator LTV - loan to value (value of the loan-to-value) examined. Stress scenarios were constructed for 30% and 50% drops in real estate prices. Household's loans (secure housing) and business sector loans (secured by commercial real estate) were tested separately. The output of this model was the quantification of the lending costs which represented a loss from a decline in real estate prices. These costs have an impact on the Bank's equity and therefore it can be stated impact of the fall in real estate prices on the capital adequacy of banks. Based on this test it was concluded that the impact of changes in real estate prices on the banking sector is weak. For this result we owe conservative policy's of banks as well as the continual dynamic growth in real estate prices. (Lintner – Rychtárik, 2007)

Recent testing of Slovak banking sector took place in 2012. In this test, banks were tested under three scenarios, which imply the 2.5 year period from the end of the first half of 2012 to the end of 2014. The baseline scenario is based on the official medium-term forecast of the National Bank of Slovakia (NBS). Negative developments are expected in the real economy, which will also be reflected in the financial markets. It is further assumed depreciation of the euro against the dollar, the increase in credit margins when interest rates in the money markets, even if government bond yields. All this will result in a fall in the domestic economy and the consequent increase in unemployment.

The negative development of the scenario "economic downturn" should be in the scenario "crisis states" strengthened by intensifying sovereign crisis in the euro area, and it should come up and pronounced deterioration of market indicators as in the previous scenario. As a result of these developments was, decline of domestic economy, rising unemployment and increased inflation. The development would have been worse than in the previous scenario.

Impacts of scenarios on the banking sector in the Slovak Republic are as following:

– Resistance of banking sector compared to the previous stress test slightly worse. In previous stress testing of the end of 2011, the results were aggravated due to losses from Greek bonds. In the current stressed the impact of in-depth stringent stress scenarios, as well as taking account of bank levy in its present form during the entire period of testing.
– High capital cushion continues to help the banking sector to withstand adverse developments. Given the high capital adequacy of banks operating in the Slovak Republic, neither of which shows the capital adequacy of less than 12.5%. Under the baseline stress scenario would neither bank finished below the 8% capital adequacy it in scenario "economic downturn" by just under 2 banks ended up with a scenario "crisis states" 3 banks.
– The ability to generate net interest income is the second most important factor in helping to cushion the negative impact of stress test scenarios.
– The most important risk is credit risk. The biggest impact it have losses on corporate lending, further losses on loans to households.
– An important risk is becoming a market risk and systemic risk.
– A potential risk is the outflow of profits.

4 Conclusions

The global financial and economic crisis has caused mistrust to credit rating agencies, as well as to the entire financial sector. To restore confidence in banks, EU leaders decided to seek the possibility of a comprehensive assessment of risks in the banking sector, which led to the subjugation of bank stress test by the European Union as well as national levels. The methodology of the stress tests is evaluated by the scientific community is very positive, but the results of stress tests are the most heavily influenced by just setting appropriate testing parameters such as economic development but also other variables such as unemployment, interest rates etc..

Stress testing was also under a wave of criticism when, after testing in 2010 were in trouble Irish banks and none of them has been evaluated in the test as risky. The answer to the question of how the banks could pass the test and then get into trouble we can find the the setting of stress scenarios.

Regarding testing at the national level, it can be concluded that the stress test parameters are set tighter as in testing conducted by EBA. It should be emphasized that the setting of stress testing parameters at the transnational level is more difficult, since the banks in different economies also influenced by various factors

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Influence of a merger on the EBIT of merged companies in the Czech Republic

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Abstract: *The aim of this paper is to assess whether mergers of companies in the Czech Republic influence the value of the EBIT of merged companies in the period of three years after the merger. The effect of the merger on the value of EBIT of merged company within 3 years after the merger compared with the sum of EBIT of merging companies at the date of the merger is analyzed on the sample of 309 merged companies in the Czech Republic in the years 2001–2010.*

Keywords: Mergers, EBIT, sample, companies

JEL codes: G34, K22, M41

1 Introduction

Investigations of merger efficiency at a global scale is not new: a number of researchers have explored this (Lang, 2003; Cassiman and Kolombo, 2006; Werner and Thompson, 1992). However, this is not the case of the Czech Republic. The development of the number of mergers in the last years and their structure have been explored (Hýblová and Sedláček and Křížová, 2012; Sedláček and Valouch and Hýblová, 2012; Sedláček and Valouch and Konečný, 2011; Skálová and Tumpach, 2010; Špatná, 2010) but the economic impacts of mergers have not been given sufficient attention yet. Therefore, the project of the Czech Science Foundation no. P403/11/0447 - The Analysis of Taxation and Accounting Practices during Mergers implemented at the Department of Finance, Faculty of Economics and Administration, Masaryk University concentrates on merger efficiency in the Czech Republic. In the past years, several parameters of economic efficiency of mergers were evaluated as well as the possible reasons for merger implementations in the Czech Republic in 2001–2010 (Sedláček and Valouch and Konečný, 2013; Sedláček and Kuhrová, 2012; Valouch and Králová, 2012, Konečný 2009); now this part of the project is further developed as the impact of mergers on the value of EBIT of merged Czech companies in 2001–2010 is assessed.

2 Methodology and Data

The aim of this paper is to assess whether mergers implemented among businesses headquartered in the territory of the Czech Republic in 2001–2010 had an influence on the value of EBIT of the merged company, three years after the merger (or after the decisive day), in relation to the sum of EBIT values of the merging companies as of the decisive day. The period of the three years after the merger was chosen for the reason that the effect of some accounting methods is diminished within the three years; moreover, it is expected that the three-year period is sufficient to exclude short-term effects of mergers caused by the necessary new settings of business processes in the merged company that occur immediately after the merger and can thus have an essential impact on the assessment of economic parameters of the merger during its preparation and immediately after its implementation.

The data from the Trade Bulletin and the Trade Register of the Czech Republic showed that 2,396 mergers in total were implemented in the territory of the Czech Republic in 2001–2010. Out of these, 2,255 mergers are of the type in which no new company is formed and only 141 mergers of the type in which a new company is formed. The analysis demanded us to gain the financial statements of the merging companies as of the decisive day (or the day preceding) and the financial statements of the merged company in the following 3 years after the decisive day. Although these accounting units are obligated to publish their financial statements in compliance with Art. 21a of Act no. 563/1991 Coll., on accounting, by inserting them in the collection of documents of the Trade Register, only 314 companies, i.e. only about 14% of the merged companies, met this condition in the demanded years. Five more companies were excluded for the reason that some data in their financial statements were missing, which made their complex analysis of EBIT impossible. As a results, the statistical evaluation of the influence of mergers on the value of total assets used data of 309 companies that met their legal obligation and published all necessary data in the financial statements in all the demanded periods necessary for the EBIT indicator calculation. This fact needs to be taken into consideration when interpreting the conclusions. When interpreting the p-values of undermentioned tests it is essential to bear in mind the fact that the sample of 309 companies cannot be considered completely random as it purely consists of merging companies that published their financial statements in all 4 demanded periods in compliance with the Act on accounting.

The actual statistical evaluation of the influence of mergers on EBIT of merged companies 3 years after the merger proceeded in three stages. At the first stage, we inspected whether a merger influences the EBIT of a merged company 3 years after the merger regardless of its size. At the second stage, we explored the question whether the merger influence on the EBIT of a merged company 3 years after a merger is affected by the size of the merged company. Last but not least, we examined whether a merger influenced the EBIT of a merged company 3 years after the merger based on its size. For these purposes, we divided the 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 $\alpha = 5\%$.

3 Results

For the analysis of the influence of a merger on the EBIT of a merged company three years after the merger, the following pair of hypotheses were formulated:

H_0: The merger has no influence on the value of EBIT of the merged company three years after the merger.

H_1: The value of the EBIT of a merged company three years after the merger is higher than the sum of EBIT of merging companies at the moment of the merger.

The following table shows the results of descriptive statistics for the entire sample of companies regardless of their size:

Table 1 Descriptive statistics for variable EBIT

Variable	Descriptive Statistics (Merge.sta) Exclude cases: 43;888						
	Valid N	Mean	Median	Minimum	Maximum	Variance	Std.Dev.
EBIT	311	85343,0	9344,00	-53793	345170	1,265486E+1	355736,
EBIT 3 yrs after merger	309	80563,5	12165,00	-149039	301332	1,172979E+1	342487,
EBIT difference	309	-5613,7	478,00	-476230	343893	2,218454E+1	471004,

Table 1 shows that the mean value of EBIT of a merged company three years after the merger dropped while the median went up. This is caused by some outlying values which are however still worth retaining in the analysis. These outliers does not affect results of further performed test which is based on median rather than on mean. The aim of the test is to find out whether the merger leads to the increase of the EBIT or its effect on the EBIT is insignificant.

The EBIT difference variable (the difference between the EBIT of the merged company three years after the merger and the sum of values of EBIT of merging companies as of the merger date) does not have normal distribution; therefore, it was necessary to use non-parametric tests to test the hypotheses. The histogram for this variable (see Figure 1) can be considered symmetric so the Wilcoxon test was used as also other assumptions for its application were met - continuous distribution in all size categories and an acceptable assumption of symmetry around the median.

Figure 1 Histogram of the EBIT difference variable
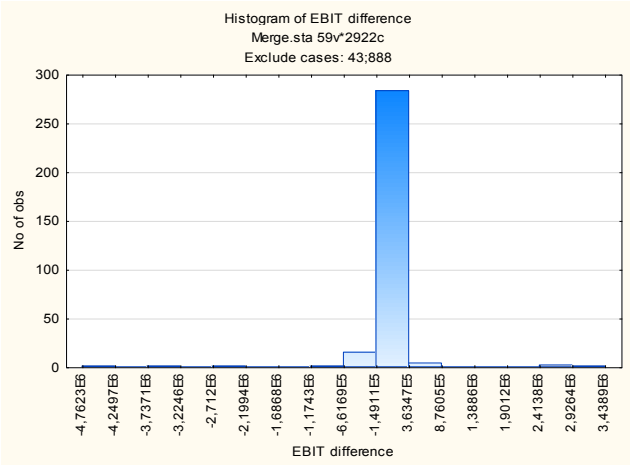
The results of the Wilcoxon matched pairs test are presented in the following table:

Table 2 Results of the Wilcoxon matched pairs test

| Pair of Variables | All Groups Wilcoxon Matched Pairs Test (Merge.s Marked tests are significant at p <,0500 Exclude cases: 43;888 | | | |
	Valid N	T	Z	p-value
EBIT & EBIT(3 years after the decisive day)	309	22698,5(	0,79462(	0,42683;

The p-value of the two-tailed alternative of the Wilcoxon test is about 0.4268. In the one-tailed alternative, testing whether the value of EBIT of a merged company three years after the merger increased, is 0.4268/2 = 0.2134. These results show that the Wilcoxon matched pairs test at a significance level α = 5 % did not prove that a merger leads to a statistically significant increase in the EBIT of a merged company three years after the merger.

At the second stage, we explored the question whether the influence of a merger on the value of EBIT of a merged company 3 years after the merger is affected by the size of the company. Also in this case, the assumption of normal distribution of data was rejected for each of the three groups based on size and non-parametric tests had to be used. Moreover, the sloping of the histograms differs so the median test was used. The following pair of tested hypotheses were formulated:

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H_0: The company size expressed by the amount of total assets does not affect the influence of a merger on the EBIT of a merged company.

H_1: The company size expressed by the amount of total assets affects the influence of a merger on the EBIT of a merged company.

The following table shows the results of descriptive statistics for particular size categories of the companies:

Table 3 Descriptive statistics by size categories of companies

Variable	size=large Descriptive Statistics (Merge.sta) Exclude cases: 43;888						
	Valid N	Mean	Median	Minimum	Maximum	Variance	Std.Dev.
EBIT difference	116	-19270,6	9658,500	-4762302	343893	5,922185E+1	769557,3

Variable	size=medium Descriptive Statistics (Merge.sta) Exclude cases: 43;888						
	Valid N	Mean	Median	Minimum	Maximum	Variance	Std.Dev.
EBIT difference	119	882,2857	17,00000	-72493,0	189822,0	1,002841E+0	31667,67

Variable	size=small Descriptive Statistics (Merge.sta) Exclude cases: 43;888						
	Valid N	Mean	Median	Minimum	Maximum	Variance	Std.Dev.
EBIT difference	74	5347,824	248,5000	-50399,0	175906,0	950493265	30830,07

The above mentioned descriptive statistics show that the medians of the difference between the EBIT of a merged company three years after the merger and the EBIT of a merging company at the moment of a merger are positive for all size categories, indicating that the EBIT of a merged company three years after the merger increased. In the case of medium companies, the EBIT difference median is positive, but only slightly, and in the case of large companies, there is a positive EBIT difference median but the mean value of the difference dropped. The reason is some outliers in the sample; therefore, we can say that the results of the median are more relevant but the increase is not very considerable even in this case. The median test, whose results are presented in the following table, tested whether the size of company does influence the merger's effect on the value of the EBIT.

Table 4 Results of the median test

Dependent: EBIT difference	Median Test, Overall Median = 478,000; EBIT difference (Mer Independent (grouping) variable: size Chi-Square = 2,665153 df = 2 p = ,2638 Exclude cases: 43;888			
	small	medium	large	Total
<= Median: observed	42,00000	61,0000	52,00000	155,00000
expected	37,11974	59,6926	58,1877	
obs.-exp.	4,88026	1,3074	-6,1877	
> Median: observed	32,00000	58,0000	64,00000	154,00000
expected	36,88026	59,3074	57,8123	
obs.-exp.	-4,88026	-1,3074	6,1877	
Total: observed	74,00000	119,00000	116,00000	309,00000

The median test conducted at the significance level α = 5 % shows that it was not proved that an influence of a merger on the EBIT of a merged company is affected by its size, which is confirmed by the resulting p-value of the median test of 0.2638.

Due to the resulting p-value of the test (which is not less than 0.05 but still small), we further analysed the influence of a merger on the EBIT separately for small, medium and large companies. For this part of analysis, the following pairs of hypotheses were tested, separately for small, medium and large companies:

H_0: The merger does not influence the EBIT of a merged company in the particular size category three years after the merger.

H_1: The value of EBIT of a merged company in the particular size category three years after the merger is higher than the sum of EBIT of merging companies at the moment of merger.

The analysis itself was again performed using the Wilcoxon matched pairs test and its results are presented in the following tables.

Table 5 Results of the Wilcoxon matched pairs test for particular size categories of companies

	large Wilcoxon Matched Pairs Test (Merge.s Marked tests are significant at p <,0500 Exclude cases: 43;888			
Pair of Variables	Valid N	T	Z	p-value
EBIT & EBIT(3 years after the decisive day)	116	3109,00(	0,78239	0,43398!

	medium Wilcoxon Matched Pairs Test (Merge.s Marked tests are significant at p <,0500 Exclude cases: 43;888			
Pair of Variables	Valid N	T	Z	p-value
EBIT & EBIT(3 years after the decisive day)	119	3341,00(	0,60726!	0,54367(

	small Wilcoxon Matched Pairs Test (Merge.s Marked tests are significant at p <,0500 Exclude cases: 43;888			
Pair of Variables	Valid N	T	Z	p-value
EBIT & EBIT(3 years after the decisive day)	74	1330,00(	0,30976(	0,75673!

The null hypothesis that a merger has no influence on the EBIT of a merged company could not be rejected in any of the size categories of companies at the significance level α = 5 %.

Should we want to prove that the EBIT of large companies grows after a merger, the p-value of the Wilcoxon test is 0.434/2 = 0.217. It means we could not prove a statistically significant increase in the EBIT of a merged company three years after the merger.

The same analysis conducted for medium companies yields similar results because the p-value of the one-tailed alternative of the Wilcoxon test equals 1 − 0.5437/2 = 0.7282. Neither in this case could a statistically significant increase in the EBIT of a merged medium company three years after the merger be proved.

And finally, as regards small companies: the p-value of the one-tailed alternative of the Wilcoxon test is 0.7567/2 = 0.3784, meaning that even in the case of small companies a statistically significant increase in the EBIT three years after the merger could not be proved.

4 Conclusions

When planning and implementing a merger, one of the main motives is the effort to increase the efficiency of company processes and the overall profitability of the company. The question that has remained unanswered though is whether the merged companies in the Czech Republic are able to achieve this expected aim. The analysis performed using a sample of 309 Czech companies merging in 2001–2010 shows that if we take the EBIT of the companies as the indicator of their profitability, this aim is statistically not achieved. Based on the conducted statistical evaluation of the influence of mergers on the EBIT of merged companies three years after the merger (or after the decisive day of the merger), we can conclude that there is no statistically significant increase in the EBIT of the merged companies when compared with the sum of EBIT of merging companies as of the date of merger. This conclusion is valid both for the entire sample of analysed companies and when we divide the sample based on size into small, medium and large companies. No statistically significant increase in the EBIT of a merged company three years after the merger was found in any of the cases. Even when considering the above mentioned limitation of the information capacity of the analysis, it seems that mergers of Czech companies in the past decade did not lead to one of the essential aims of mergers, i.e. increase in profitability (naturally, this aim was achieved in individual cases). This leads to the conclusion that if the increase in profitability is the only motive for a merger implementation, we cannot recommend companies to merge as we can see that this aim is usually not met. However, this may not be the main and certainly not the only motive for mergers so we cannot deny that mergers find their use for other motives. Our conclusion is a partial result reached through an analysis of a separate economic indicator of profitability, even though this one is considered one of the most important in the practice. That is why it is devoted great attention in financial analyses of companies.

Acknowledgments

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Assessing the progress of the implementation
of the Solvency II regulation

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Abstract: The main aim of the paper is to present the findings of the analysis of some aspects in relation with the implementation of the Solvency II, the coming regulatory regime for insurance industry of the European Union within the commercial insurance companies in the insurance market of the Czech Republic. In accordance with its design, the presented scientific paper focuses on methodological aspects in relation to the realization of the fifth quantitative impact study (QIS5) and its importance for the Czech insurance market. Furthermore, the paper deals with the evaluation of the QIS5 and possible impacts in the context of the implementation of Solvency II. The scientific paper describes partial results reached within the research project of the Faculty of Business and Economics of the Mendel University in Brno MSM 6215648904 / research 02 following the aims and methodology of the given research project.

Keywords: insurance industry, Solvency II, regulation, quantitative impact study, capital requirement

JEL codes: F36, G22, L51

1 Introduction

In the year 2001, the European Commission started to work on a solvency project in order to improve current solvency regime as well as to harmonize the insurance sector within the EU Member States (Doff, 2008). The project called Solvency II is realized in three phases. Different international organizations and associations, and national supervisory authorities are involved in developing Solvency II regime in a professional way.

The first phase included an analysis of the existing situation, discussion of the concepts and construction of the general conditions (Doff, 2008). It started in May 2001 and was completed with the document of European Commission on September 19, 2003.

In the second phase, which is a follow-up to the first one, technical details and implementation rules are developed. European Commission involved four workgroups of the CEIOPS[1] for creation of the proposals. In July 2007 the Solvency II Framework Directive was published already with respect to three quantitative impact studies that had been made. Quantitative impact study QIS1 was carried out from July to December 2005, QIS2 from May to August 2006 and QIS3 from April to July 2007.

The third phase focuses mainly on the implementation of Solvency II to the national legislations. Quantitative impact studies QIS4 (from April to June 2008) and QIS5 (from August to November 2010) investigate the last discrepancies in modeling, standard formula and calibration of models and parameters.

The former date when Solvency II was supposed to come into force was October 31, 2012. However in January 2011, the European Commission published a proposal for Omnibus II Directive which postpones Solvency II implementation deadline until January 1, 2013. For the firms, the Solvency II requirements would be binding from January 1, 2014. Omnibus II amended the Solvency II Framework Directive, to bring it in line with the Lisbon Treaty (Herboczková, Beránková, 2012). Negotiations on the Omnibus II

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[1] CEIOPS - Committee of European Insurance and Occupational Pensions Supervisors (until December, 2010).

Directive are still stretching. Therefore, in September 2012 a Directive called "Quick Fix" was adopted, which moves the transposition of the Solvency II to June 30, 2013 and the date of its effectiveness to January 1, 2014. In the meantime, negotiations on the Omnibus II Directive have to be completed so that regulatory and supervisory framework becomes effective from January 1, 2014

2 Aim of the Paper, Methodology and Data

The main aim of the paper is to present the findings of the analysis of implementation of the Solvency II within commercial insurance companies in the insurance market of the Czech Republic. The presented paper focuses on the realization of the fifth quantitative impact study QIS5 and its importance for the Czech insurance market. Furthermore, the paper deals with the evaluation of the QIS5 and possible impacts in the context of the implementation of Solvency II.

In order to achieve the aim of the paper, methods of description, analysis and comparison are used. Graphs and tables are elaborated utilizing relevant sources and own calculations.

A quantitative impact study (QIS) is a field-testing exercise, run to assess the practicability, implications and possible impact of specified approaches (Baranoff, 2012) to insurers' capital setting under Solvency II. Usually participating in a quantitative impact study asks the national supervisors to invite different types and different sizes of undertakings to participate in completion of a spreadsheet and a questionnaire based on their financial position at the end of the previous year. They are intended to assist with such requirement with which insurers must comply under Solvency II (Gatzert, Wesker, 2012).

There have been five quantitative impact studies so far. They are requested by the European Commission and run by EIOPA[1] which is responsible for a delivery of an advice on the development of Solvency II. The summary reports as well as other specifications can be found and downloaded from the EIOPA website. While searching for the information concerning QIS's the web-site of EIOPA and the Summary Reports of QIS1 – QIS5 were very useful. On the other hand, the particular national reports for the Czech Republic were difficult to find.

3 Results and Discussions

So far the last quantitative impact study QIS5, the fifth in a row, took place from August to November 2010 after the European Commission had published a Call for Advice and technical specifications on July 6, 2010. It was necessary to verify the proposed calibration which had been often discussed due to the financial crisis. It provided an excellent opportunity to the insurers to assess the likely financial impact of the new regime and to assess their practical readiness, by checking systems, processes and its senior management. The European Commission set out a target participation rate of 60% for solo undertakings. This objective has been outperformed and only in the Czech Republic the 23 participating companies represented 99.5% of life undertakings and 94.4% of non-life undertakings (CNB, 2011) as measured by premiums written. Numbers of participating insurance companies in the Czech Republic are shown in Figure 1.

According to the EIOPA Report on the fifth Quantitative Impact Study (QIS5) for Solvency II, which was published on March 14, 2011 the participation rate indicates that Solvency II is a priority to all insurers, regardless of size and that insurance and reinsurance undertakings and groups are striving to be ready for the implementation date. According to EIOPA (2011), 2520 insurers of 30 countries participated in the QIS5, out of them 1512 small commercial insurance companies, 791 medium insurance companies and 217 large insurers. In the Czech Republic, no insurance company belongs

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[1] EIOPA – European Insurance and Occupational Pensions Authority (since January 1, 2011)

to the category of large insurance companies by EIOPA definition, i.e. Czech participants were small and medium insurers only.

Figure 1 Participation of Czech insurance companies in QIS5
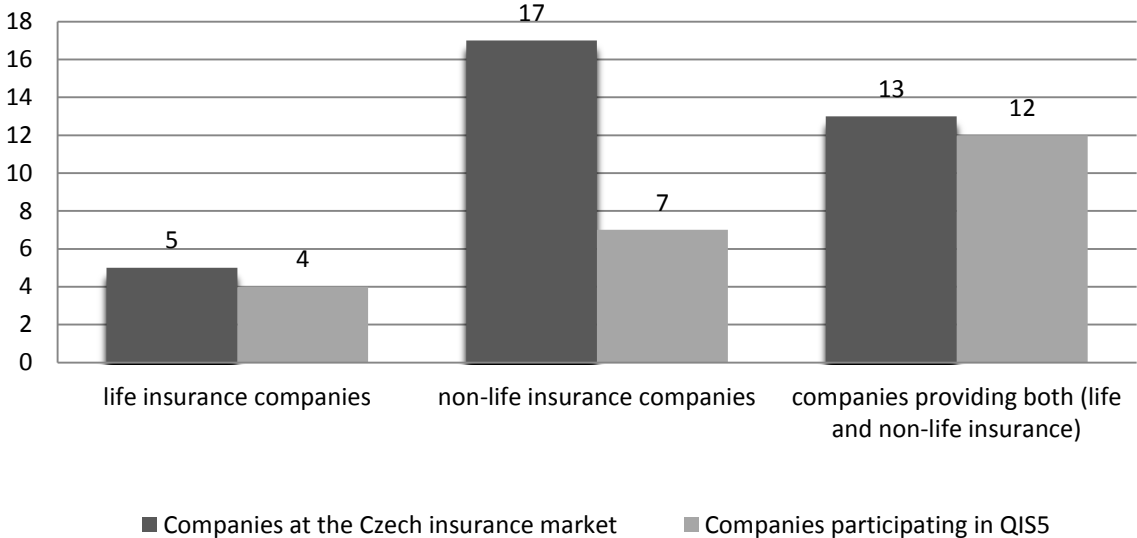
Source: based on Justová and Kotaška (2011)

The results of QIS5 are driven by the difference of valuation of the assets and liabilities (for more see Zweifel and Eisen, 2012) while there is a fundamental change in calculation of technical provisions. According to the obtained data a decrease in technical provisions can be expected, about 24% lower amount than the current prudent level of provisions in the Czech insurance companies. The decrease will be reflected in a relative increase in the amount of eligible own funds, up to 52% in the Czech Republic, and an increase in capital requirements. The difference in technical provisions under current accounting and Solvency II regime is represented in the graph in Fig. 2.

Figure 2 Technical provisions of Czech insurance companies (in billions CZK)
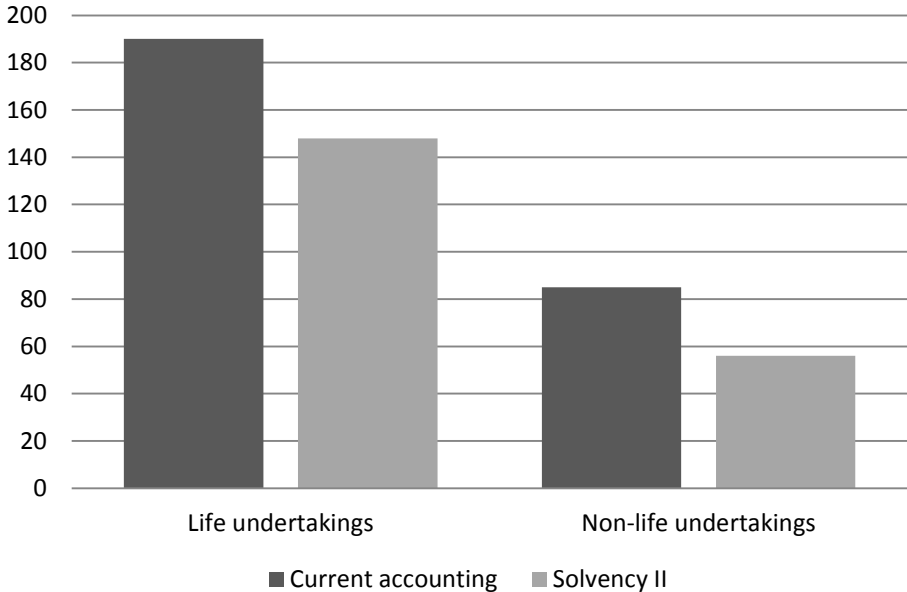
Source: based on CNB Report (2011)

Approximately 92% of available own funds has been classified as being the highest quality (Fabozzi, Neave, Zhou, 2012), i.e. Tier 1[1]. This feature had been the same in the previous quantitative impact studies. Even though the own funds saw an increase, average solvency ratio decreased due to solvency capital requirement (SCR) increase. For the Czech Republic, the SCR is about 2.5 times higher than the current solvency requirement. The overall outcome of these changes leads to a mild increase of available own funds for the Czech insurers (CNB, 2011) as seen on the chart in Fig. 3.

Figure 3 Capital requirement in QIS5 (in millions CZK)

Source: based on CNB Report (2011)

The following graph completed on Fig. 4 indicates the relative proportion of the distribution of different risks in the calculation of SCR. In the Czech Republic, the highest share is represented by non-life underwriting risk where the most significant segment stands for the floods. However, this phenomenon was later commented in the qualitative part of the quantitative impact study QIS5. QIS5 highlighted the ne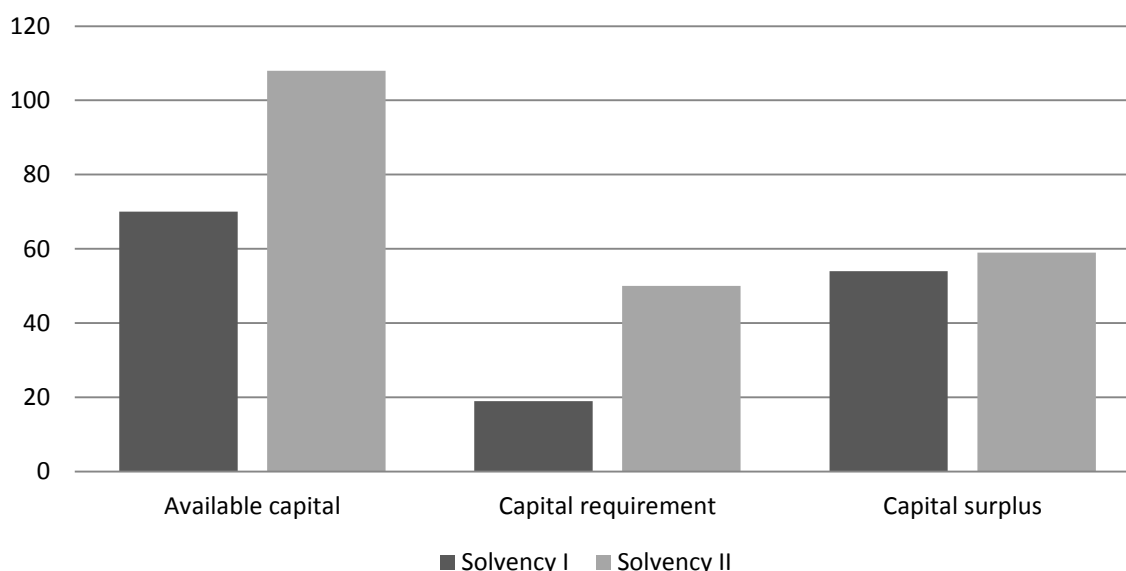ed to adjust the design and calibration of the catastrophe risk sub-module. Central European countries expressed concerns about the complexity and limitations of the structure for catastrophe risk which produces a capital level that does not appropriately reflect the underlying risk of each type of man-made or natural catastrophe (Gatzert, Wesker, 2012). Market risk and life underwriting risk are also significant (see Table 1).

Table 1 Calculation of SCR in QIS5 (in per cent)

Insurance companies providing life and non-life insurance	Calculation of SCR (in %)
Non-life underwriting risk	31,29
Life underwriting risk	25,43
Market risk	25,25
Counterparty default risk	16,55
Health underwriting risk	1,21
Intangible asset risk	0,28

Source: Kvardová (2011)

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[1] Tier 1 - The best and at the same time in Czech banks the most important part of regulatory capital. The dominant components of Tier 1 are capital, retained earnings and statutory reserve funds.

Figure 4 Relative proportion of risks in the calculation of SCR in QIS5 (in per cent)
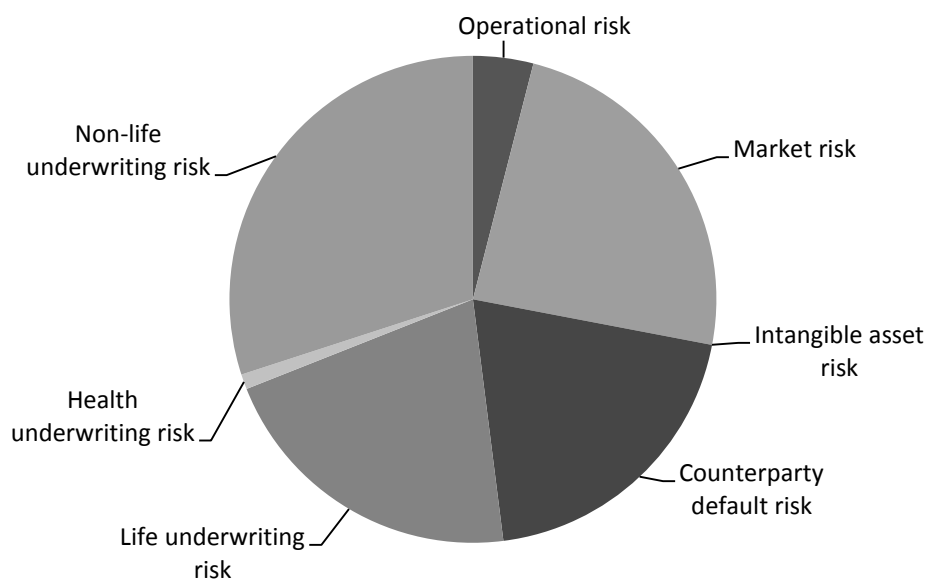
Source: based on CNB Report (2011)

About 10% of all participating insurance companies submitted the internal model calculations. Across solo respondents the SCR results were very close to those derived by applying the standard formula. The most significant difference between standard and internal model was observed among groups. There the internal model results showed a capital requirement of about 0.8 times the size of the capital requirement based on the standard formula calculation.

In this paper more emphasis is put on the findings in insurance companies in the Czech Republic. However, these are not very different from the European average (EIOPA, 2011). Some difference may be noticed in the amount of guidance of quantitative impact studies provided by the national supervisor. EIOPA explains this by the variation in ability of undertakings in different countries to complete the spreadsheets. Some supervisors helped the companies overcome problems by providing a pre-specified stress test, others required the data and made the calculation themselves, or there was very little to no guidance (Gatzert, Wesker, 2012).

4 Conclusions

One of the most discussed questions on the European insurance market is the date of launching the new regulatory and supervisory regime set out in the Solvency II Directive. The legislative process at the European level has not been finished yet. The pressure on the implementation of Solvency II as of January 1, 2014 is very strong. However, the negotiations have not been closed yet and the implementation date may change. The circumstances of ongoing negotiations are changing rapidly, which causes a great uncertainty for both legislators and especially the market.

There are still open issues with a potentially strong impact on the capital positions of European insurers. According to Herboczková and Beránková (2012), the most relevant topics for the Czech insurance market are calibration of the catastrophe module within standard model proposals, where calibration of some natural disasters such as flood was considered an overestimate from the position of the Czech Insurance Association. In addition, definition of man-made catastrophe where insurance companies do not have all required data available. Another important issue under discussion, which can have a major impact on available capital, are contract boundaries. It is the definition of

cashflows from contract which can be taken into account in technical provisions calculation and future profits can be part of available capital.

More authors evaluate regulatory measures adopted or drafted in response to the financial and economic crises (Baranoff, 2012; Fabozzi, Neave, Zhou, 2012). According to Zweifel and Eisen (2012) and Daňhel and Ducháčková (2012), perhaps the fundamental idea is that the regulatory measures and consumer protection should have certain limits. It is always necessary to take into account the impact of these measures on insurers and on the efectiveness of their operations.

Acknowledgments

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Some specifics of the valuation of bank stocks

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Abstract: *There are three main reasons that cause difficulties in the valuation of bank stocks. The first reason is the nature of the business activities of banks, in consequence of which it is hard to define debt and reinvestment, and therefore it is difficult to make an estimation of future cash flows and it is inappropriate to use valuation models with the weighted average cost of capital. The second reason is the fact that banks are strictly regulated and changes in the regulatory requirements and rules can significantly affect the stock value. The stringent regulatory requirements restrict competition and contribute to the formation of an oligopolistic industry structure. The third reason may be the fact that banks cyclically respond to developments in the economy.*

Keywords: stock, valuation, dividend discount model, excess return model, required rate of return

JEL codes: G12, G32

1 Introduction

Fundamental stock analysis, as Musílek states (2011, p 333), focusses on finding overvalued and undervalued stocks. To identify these stocks, it is essential to calculate their intrinsic value, which is a sort of "right price" at which, taking into account the fundamental macroeconomic, sector and corporate factors, the stocks should be traded. To establish which stocks are undervalued and which are overvalued, it is necessary to compare the calculated intrinsic value with the current market price of the stocks. It is clear that the calculation of intrinsic value plays a key role in fundamental analysis, as Veselá points out (2011, p 335).

The standard valuation models and methods of fundamental stock analysis used to calculate the intrinsic value of stocks are always based on certain assumptions, which are generally correct when stable, mature or steadily growing or declining firms are being valuated. If, however, analysts have to valuate a new, starting-up firm, a loss-making firm or a firm with a specific activity, some of the assumptions of the valuation models cease to apply. Some valuation models can then not be used to value stocks, or it may be necessary to amend fundamentally the input data for those models.

In the process of valuing stocks, the analyst may be faced with particular problems caused by the specific character of the company being valuated. Most of these problems can be solved. Nevertheless, in order to maintain the utility of intrinsic value, it is always necessary, when calculating the intrinsic value of stocks, to take those problems into account. Damodaran (2002, 2010), Tregler (2005) and Veselá (2011) deal with the specific analytical problems of stock valuation in greater detail.

The aim of this contribution is to point out the specific features of banking institutions, and to indicate how these features can be dealt with and considered in the process of valuating banking stocks.

2 The specifics and problems of valuating banking stocks

As has already been indicated, banks, in comparison with ordinary industrial firms, display distinct differences and typical features. The object of their business activity is highly specific. Banks generally attract the interest of analysts and investors. Their stocks are usually publically tradable on the capital markets.When analyzing and valuating bank stocks, it is necessary to take into account the specific financial structure of banking

institutions, the high degree of regulation and supervision in the banking sector, the market structure typical for the sector, the difficulties in determining reinvestments, and the banking sector's sensitivity to the economic cycle.

The specific financial structure of banks

Banks work with a large amount of loan capital. The share of loan capital in banking institutions exceeds 85%, and is therefore much greater than the share used by industrial companies. This capital, as used by banks, should be regarded as a "raw material" or "material" which is an indispensable input for the activities of banks, as it enables them to provide financial products and services and thus create profit. The basic rules and principles for managing the financial structures of industrial firms cannot be used for banking institutions. When calculating the intrinsic value of stocks from an analytical point of view, one can regard only equity as capital whose use within in a company is linked to certain risks and costs. When setting the value of a bank as a firm, analysts therefore set the value only from the shareholder's point of view. They apply the "value of equity" approach. On the other hand, when valuating a bank, analysts do not set the value of the bank as a firm for shareholders and creditors together, meaning that they do not apply the "value of firm" approach.

Strict regulation and supervision in the banking sector

The banking sector is subject to very strict regulation and supervision. The reasons for this and the mechanisms used to enforce it are mentioned by Musílek (2002, chapter 3). The regulatory and supervisory bodies set relatively strict boundaries for banking activity, thereby setting boundaries for the profitability and profit that banks can achieve. On the other hand, the strict regulation of the entry of new subjects to the banking sector allows banks to achieve stable and above average profits. The regulation of new subjects in the sector can protect the existing banks from increased risk. However, any changes to the regulatory rules and requirements lead to increased risk and uncertainty. At the same time, it is very difficult to predict the impact of changes in regulation. The stricter regulations and conditions which were adopted as a reaction to the crisis of 2008 mean restrictions and interventions into the commercial and investment activity of banking institutions and increased costs arising from the implementation of the new rules. These changes may have a negative impact on the economic results of banks and even negatively affect their clients.

The oligopolistic structure of the banking sector

Subjects entering the banking sector must obtain permission – a licence to operate – from the regulatory and supervisory body. This fact presents a certain barrier or obstacle to entry into the sector, which, however, can be overcome. The existence of this barrier, together with the large amount of capital required and the necessity for specialised qualifications, is one of the factors that generally give the banking sector the character of an oligopoly, as only a few large firms operate within the sector. The remaining subjects in the sector merely play a supplementary or marginal role. In an oligopolistic sector, the large, mature banks enjoy stable profits. That stability can, however, be disturbed by the cyclical fluctuations of the economy. The considerable economic strength of the large banking institutions often allows the banks to achieve above average profits, even when they have large costs. The lower level of competition in the sector can then have a negative impact on the clients, for example in the form of high or senseless charges.

Problems in determining reinvestments

If the cash flow model is used when valuating stocks, it is essential to determine the size of reinvestments and the rate of growth of reinvestments in the company being valued. Both figures represent significant factors determining the value of a firm. When determining the size of reinvestments and their rate of growth, it is essential to start from the depreciation of fixed tangible assets, from investment expenditure on the renovation and expansion of fixed tangible assets, changes in working capital and operating earnings before tax and the payment of interest. A detailed calculation process

is presented by Damodaran (2002), Pinto et al. (2010) and Veselá (2011). In comparison with industrial firms, banks have a smaller volume of fixed assets, and therefore also have smaller depreciations and investment expenditure. As a result of this, the level of reinvestments can be a negative figure. A typical feature of banks is a high level of intangible assets and large investments in human capital. However, standard valuation models do not directly take those items into account. Working capital, which contains items of short-term assets and short-term liabilities, is very volatile in banking institutions, which complicates or even makes impossible the prediction of the level of reinvestments and the rate of cash flow growth. When valuating banks, it is possible, with regard to the specific features mentioned above, to classify as reinvestments investments in regulatory capital, which can replace investment expenditure and the problematic change in working capital. At the same time, it is also possible to classify as reinvestments expenditure on training and the education of human capital. Nevertheless, it is difficult to ascertain this figure from accounting statements. These amendments to the method are subjective and certainly represent a modification of the standard cash flow valuation method. On the other hand, however, they are an attempt to eliminate the negative impact of the specific features of banking institutions on the value of a firm.

The sensitivity of the banking sector to the economic cycle

The banking sector displays considerable sensitivity to the economic cycle. During a boom, when the economy is growing, banks achieve their greatest profits, while in a recession, bank profits fall, and banks may often even make a temporary loss. While banks' greatest profits are made during a boom, this is only true for the middle or late phase of the boom. Banks react with a certain delay to developments in the economic cycle. In that respect they differ from the construction sector or the automotive industry, which is why it is very important for an analyst to be aware that although some of the above mentioned factors stabilise bank profits, the cyclical nature of the banking sector conversely destabilises the development of bank profits. When predicting the future development of banking shares, it is therefore essential to take into account the outlook for the economic cycle and to carry out the so-called adjustment of profits to the expected course of the economic cycle. The alternative in this situation is to carry out so-called profit normalisation, which means excluding extraordinary events which will not reoccur in the new future.

3 Methods and models suitable for valuating bank stocks

From the large number of methods and models for valuating stocks, the only suitable options for bank stocks are dividend discount models, earnings models, historical models, some combined models, such as the excess return model, or, to a certain extent, the free cash flow to equity (FCFE) model.

For the valuation of banks, it is totally unsuitable to use the FCFF model (free cash flow to firm), the APV model (adjusted present value), or a model using the EVA (economic value added) indicator. These models work with the figure for weighted average cost of capital (WACC), which is problematic in the case of banks and difficult to determine, because it considers the capital structure of a company and the price not only of the company's equity, but also of loan capital. When valuing bank stocks, it is more appropriate to use only those models which emphasise only the risks and return from own capital, because banks have a significant share of other loan capital and it is viewed in a different way from that of a standard industrial firm.

Banking institutions often have a high return potential, which is why the use of balance sheet models to value bank stocks may not be completely appropriate or accurate. Balance sheet models derive the value of a firm mainly from its assets, which may not always take into account the full extent of a firm's return potential. Nevertheless, the use of balance sheet models to value bank stocks is possible under certain conditions.

The dividend discount model is often recommended for valuating bank stocks, because banks generally pay sizeable dividends and display considerable stability in the

development of their dividend payout ratio. Out of the various existing versions of the dividend discount model, which differ in the number of dividend growth rates they use and the presumed model for their development, the most suitable for valuating bank stocks tends to be Gordon's one-stage dividend discount model. This model assumes an unlimited period for holding stocks, a single, stable rate of growth (or decline) of dividends, and a stable required rate of return or cost of equity. These assumptions correspond, to a large extent, to the specific features of banking institutions regarding the size of an institution, the level of competition in the sector, the higher level of regulation and the stability of dividend policy. Only if a bank is reacting to the development of the economic cycle (the alternation of recession and boom), is it necessary to use multi-stage models, of which the most practical has proved to be the H-model.

Banks, especially in the model of the global banking sector, are big institutions, and it is therefore not possible to envisage for them a long-term above average growth rate, but rather an average or slightly below average growth rate, which is, however, stable. If there are a few big players in the sector, which is typical for its oligopolistic structure, we cannot at the same time expect an above average growth rate for dividends and earnings, but rather stable, average development. Stable and unchanging regulation therefore supports a stable growth rate for dividends and earnings. The existence and tightening of any regulatory barriers increase the growth rate. However, changes in the regulatory mechanisms and measures tend to destabilise the rate of growth.

The dividend policy followed by banks is usually characterised by its relatively high dividend payout ratio. Banks generally pay out a significant part of their net earnings in the form of dividends. As Damodaran (2012) states, the average dividend payout ratio of banks ranges globally between 50 and 60%, while among industrial firms it averages at around a mere 20%, although there are, of course, deviations from the norm. The greater part of net earnings paid out by banks in the form of dividends is made possible by their lower investment expenditure and, at the same time, the above average earnings achieved by those institutions. Another reason for the high payout ratio of banking institutions is the historical experience of investors and a certain tradition, which lead to an expectation among investors of a higher dividend payout ratio in the future too. An interesting feature and typical characteristic of bank stocks which has been observed and presented by Damodaran (2012) is the fact that the historic sequence of dividends is, in the case of banking institutions, more correlated with the future, which enables a more accurate prediction of the rate of growth based on the use of historical data. While the correlating coefficient for banks, which quantifies the mutual connection in the historical sequence of dividends, has, according to Damodaran (2012), an average value of +0.35, the same correlating coefficient for other firms has an average value of only +0.17. It is apparent that the mutual connection between the development of dividends is stronger among banking institutions than is the case among other firms. A highly appropriate model for determining the growth rate of dividends for banking stocks is the sustainable growth model, in which the growth rate of dividends is calculated as the sum of the return on equity (ROE) and the rate of retained earnings at a corporate level. ROE here expresses the yield value of capital deposited in the bank by shareholders. The influence of the problematic item of loan capital is completely eliminated in this model.

An appropriate valuation model for banking stocks is also provided by most earnings models which work with the quantity of net earnings. Earnings models are based on similar principles and assumptions to the dividend discount models as they are derived from those models. Earnings models may be used directly to calculate the intrinsic value of stocks, or they may be used to derive the favourite indicators of the capital market which are known as the P/E ratio, the P/BV ratio or the P/S ratio. With regard to the fact that banking institutions are generally traded publically on the capital market, the indicators of P/E (price/earnings ratio), P/BV (price/book value ratio), P/S (price/sales ratio) and, in some cases, D/Y (dividend/yield) are very popular and highly sought-after by analysts and investors. When banking stocks are being valued, there is no problem in

using the indicators of P/E ratio, P/BV ratio or D/Y ratio. The P/S ratio, however, should not be used, because banks do not have revenue from sales in the strict sense of the word.

Damodaran (2012) recommends the excess return model as a very appropriate valuating model for bank stocks. This model can be classified as a combined model. It is a model which derives intrinsic value from the accounting value of stocks, that is, from the balance sheet model in combination with the yield model based on the difference between return on equity and the required rate of return. The great advantage of this model is its relative simplicity as well as the fact that it is not negatively affected by the specific characteristics of banking institutions.

It is also possible to use the FCFE model to valuate banking stock, following certain necessary modifications. Nevertheless, in this case the analyst must solve the problems connected with marked changes in working capital. Low investment expenditure and depreciations and the problematic development of working capital can be replaced by investments in regulatory capital, which, in the case of a global or commercial bank, are set as the difference between the sum of capital adequacy and the volume of credit and loans provided in the previous year. To those loans and credit could be added other banking products provided by the bank. Expenditure on training and educating human capital may be included as investment expenditure. Because of considerable fluctuations in the quantity of working capital, it is not often possible to calculate the growth rate of cash flow by the standard method using the quantity of the growth rate of reinvestments, as it is not possible to capture statistically the tempo or character of the development of working capital or its reaction to selected financial or economic quantities. If analysts do not want to use investments in regulatory capital, they can subjectively estimate the growth rate of cash flow on an ad hoc basis taking into account the expected development of earnings. Alternatively, is it possible in some cases to use the historical development of the value of cash flow or of return on capital to estimate the growth rate of cash flow.

All the above recommended models and methods for valuating bank stocks have one common input value, which is the required rate of return. As most banks are publically traded, the CAPM model may be seen as an appropriate method for determining the required rate of return. The beta factor, as the only independent variable in the CAPM model, is, in this case, generally set as a regressive beta factor on the basis of historical data on the return rates of given stock and the return rates of the share index. The regressive beta factors of banking institutions tend to be much more stable than those in other sectors, which is the result both of stricter regulation and of the greater homogeneity of the capital structure of banking institutions and the similar characteristics of the objects of their business activity. The function of the risk-free rate of return is fulfilled by the return rate of state bonds, whether short-term or medium-term. The market return rate can be derived from the development of the domestic share index, which fulfils the function of a benchmark for the domestic market. Alternatively, the extensive American databases can be used as a starting point and, using the rating of a given country and the volatility of its capital market, a specific premium for the country's domestic risk may be included in the calculation. This process is described in greater detail, for example by Veselá (2011 pp 430-433). According to Damodaran (2002), as well as the CAPM model, processes for determining the required rate of return include the APT model or the dividend discount model.

4 The valuation of Komerční banka stocks

In the previous chapter the following models were suggested as suitable for valuating banking stocks: the dividend discount model, earnings models as P/E and P/BV ratio, the excess return model and the FCFE model. The basis of these models is explained in greater detail by Damodaran (2002), Veselá (2011) and Musílek (2002). The models will now be applied to Komerční banka stocks. The FCFE model will be modified, as the low

level of investment expenditure and depreciations will be replaced by investments in regulatory capital.

The valuation of the stocks will be carried out according to the situation as of 30.04. 2013. On the basis of a comparison of the calculated intrinsic values and the current rates as of 30.04.2013 it will be established whether the stocks in question are undervalued or overvalued, and a recommendation of investments will be derived from this. Publically available data from the websites of the company Patria Direct, ČNB (the Czech National Bank) and the Prague Stock Exchange (BCPP) will be used.

Table 1 Input date for the valuation of Komerční banka stock

Input data	Numerical value of the data
Common dividend	230 Kč
Number of shares issued	38 009 852 ks
Current market price (30.04.2013)	3 744 Kč
Beta factor	1.02
Risk-free rate of return	0.5 %
Market rate of return (PX index)	10.53 %
Required rate of return (using CAPM model)	10.73 %
Return on equity (ROE)	14.27 %
Return on capital using gross profit (ROC)	2.55 %
Total net earnings	13 953 mil. Kč
Net earnings per share	367.09 Kč
Dividend payout ratio (p)	62.65 %
Retention ratio (retained earnings per share- b)	37.35 %
Growth rate of dividend or earnings (ROE x b)	5.33 %
Total gross profit	20 076 mil. Kč
Investments in regulatory capital - I_{RC}	8 169.68 mil. Kč
$FCFE_0$ total KB	11 906.32 mil. Kč
$FCFE_0$ per share	313.24 Kč
Growth rate of cash flow derived from ROC	2.55 %
Book value per share	2 573.23 Kč
Current P/E ratio (P_0/E_0 ratio; 30.04.2013)	10.20
Current P/BV ratio (P_0/BV_0 ratio; 30.04.2013)	1.45

Source: website Patria Direct, ČNB, BCPP

Table 2 Valuations of Komerční banka stocks

Model used	Intrinsic value of stocks
Dividend discount model (Gordon's model)	4 486.28 Kč
P/E ratio model (V_0/E_0 ratio)	12.22
P/BV ratio model (V_0/BV_0 ratio)	1.74
Excess return model with growth	4 350.04 Kč
FCFE model	3 927.0 Kč

The comparison of the calculated intrinsic values of Komerční banka stocks and the current market rate clearly shows that the bank's stocks are undervalued. We can expect their value to rise, and, on the basis of that fundamental analysis we can recommend their purchase.

5 Conclusions

Banking institutions are typified by their cyclical nature, their large share of loan capital, their particular concept and view of the use of loan capital within the firm, their specific structure and their development of depreciation, investment expenditure and working capital, as well as strict regulation and the oligopolistic structure of their sector. These

specific characteristics determine, to a large extent, the choice of a valuation model for bank stocks and may also require the adjustment of input data for this model. When valuating bank stocks it is necessary to use dividend discount models, earnings models, the excess return model or the FCFE model. Use of the FCFE model, however, requires the subjective adjustment of input data to determine the level of reinvestments, as a bank's depreciations and investment expenditure are too low and the quantity of working capital fluctuates considerably. The FCFF model, the APV model and models using the EVA indicator or the P/S ratio indicator are completely unsuitable for valuating bank stocks.

Acknowledgments

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Stock selection based on financial ratios on the Warsaw Stock Exchange. Analysis between 2001 and 2010

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Abstract: *The process of a portfolio optimisation is preceded by a stock selection. The article is concentrated on using the synthetic measure of development in the stock selection. The synthetic measure of development proposed by Hellwig (Hellwig, 1968) is one of the methods of linear arrangement. It enables the classification of companies in relation to the set variables, that are financial ratios. The purpose of the article is to study if one of five quantile portfolios is systematically giving higher rate of return than the benchmark portfolio. Companies are chosen to quantile portfolios due to their position in the ranking that is constructed on the base of the synthetic measure of development. The synthetic measure of development is computed using the financial ratios. The author uses data of companies listed on the Warsaw Stock Exchange between 2001 and 2010. The rankings and portfolios are built separately for each year. As a result, it can be stated that the second portfolio of the ranking systematically gives higher rate of return than a benchmark portfolio.*

Keywords: financial ratios, stock selection, synthetic measure of development

JEL codes: C38, G11, G32

1 Introduction

A stock selection is an important part of a portfolio construction. There are many methods that allow to choose stocks and one of them is the method based on the synthetic measure of development. The synthetic measure of development was proposed by Hellwig (Hellwig, 1968). Tarczyński (Tarczyński, 1994) is the first one who proposed using the synthetic measure of development in order to construct securities portfolio on account of their financial strength. He introduced the notion of the TMAI that is Taxonomic Measure Attractiveness of Investment (Tarczyński, 2002). The possibility of using the TMAI was examined in details by Tarczyński (Tarczyński, 2002) and Łuniewska (Łuniewska, 2003). They use the chosen financial ratios as the set variables. Their results are in accordance with other researches that pointed out the accounting-based market anomalies (Subramanyam & Wild, 2009, p. 45).

Węgrzyn proposed to use financial ratios that describe each of four areas of a company activity as a set variables for the synthetic measure of development (Węgrzyn 2007a; Węgrzyn, 2007b). These four areas of companies activity are measured by profitability ratios, turnover ratios (asset utilisation and efficiency ratios), liquidity ratios, leverage ratios (capital structure and solvency ratios) (see Subramanyam & Wild, 2009; Bodie, Kane & Marcus, 2008).

The purpose of the article is to point out the best quantile portfolio constructed on the base of the synthetic measure of development. The synthetic measure of development is computed on the base of chosen financial ratios. Companies are linear arranged by the value of the synthetic measure of development. Then, companies are selected to one of five quantile portfolios by the position in the ranking. The quantile portfolios are not optimised. Their performances are compared with the performance of well-diversified proportional portfolio that contain all analysed companies. The study is performed in the period between 2001 and 2010.

The purpose of the article is not to construct optimal portfolios that lie on the efficient frontier. Such portfolios can be constructed on the base of Markowitz portfolio theory

(Markowitz, 1952). Moreover, Sroczyńska-Baron point out the possibility of using the game theory in order to construct the optimal portfolio (Sroczyńska-Baron, 2009). The game theory can be used in case to optimise the process of purchasing and selling stocks (Sroczyńska-Baron, 2008). The optimised process of purchasing and selling stocks can improve the profit produced by the portfolio.

2 Synthetic measure of development

The synthetic measure of development is one of the methods of linear arrangement. It enables the classification of companies in relation to the set variables (Hellwig, 1968). In case of companies' analysing, the value of the synthetic measure of development points out the financial strength of companies (Tarczyński, 2002).

The synthetic measure of development for a given company is computed using the procedure described in the monograph (Tarczyński, 2002):

$$TMAI_i = 1 - \frac{d_i}{d_0} \tag{1}$$

where: d_i – Euclidean distance between the company and the model object given by the formula:

$$d_i = \sqrt{\sum_{j=1}^{m} \frac{1}{m} \cdot \left(z_{ij} - z_{0j}\right)^2} \tag{2}$$

z_{ij} – value of the j^{th} variable for i^{th} company (after standardisation)
z_{0j} – value of the j^{th} variable for the model object:

$$z_{0j} = \max_{j=1}^{m} \left(z_{ij}\right) \tag{3}$$

d_0 – the norm that guarantees the value of TMAI between 0 and 1:

$$d_0 = \max\left(d_{0j}\right) \tag{4}$$

As it can be noticed from the equation (2), it is assumed that each financial ratio has the same weight in the synthetic measure of development.

Variables (financial ratios) are divided into stimulants and destimulants. Stimulants are those financial ratios for which an increase is assessed positively. Whereas destimulants are those financial ratios for which an increase is assessed negatively. Then variables are standardised.

3 Financial ratios

Into the construction of the synthetic measure of development, the following financial ratios are used:

A. Profitability ratios:

- ROE – return on equity (Jerzemowska, 2006),
- ROA – return on assets (Jerzemowska, 2006),
- ROS – return on sales (Jerzemowska, 2006),
- Mzbs – gross profit on sales (Jerzemowska, 2006),
- Mzop – operating profit on sales,
- Mzb – gross profit margin (Helfert, 2003),

B. Liquidity ratios:

- Wpb – current ratio (Jerzemowska, 2006 and Helfert, 2003),
- Wps – quick ratio (Jerzemowska, 2006 and Helfert, 2003),
- Wpp – acid test (Jerzemowska, 2006),

- RGS – operating cash flows on sales (Waśniewski & Skoczylas, 1996),
- RGZ – net profit on operating cash flows (Waśniewski & Skoczylas, 1996)

C. Asset turnover ratios (activity ratios or efficiency ratios):

- RA – asset turnover in days (Helfert, 2003),
- RNal – receivables conversion period (in days) (Jerzemowska, 2006),
- RZap – inventory conversion period (in days) (Jerzemowska, 2006),
- Cop – operating cycle (in days) ,
- RZob – payables conversion period (in days) (Jerzemowska, 2006),
- CKG – Cash Conversion Cycle (Jerzemowska, 2006),
- RMO – current assets turnover in days (Jerzemowska, 2006),

D. Financial leverage ratios (debt ratios):

- Szo – debt ratio (Waśniewski & Skoczylas, 2002),
- WPM – equity to fixed assets,
- WOZ – sum of depreciation and financial costs to net profit (Jerzemowska, 2006),
- WPZ – current liabilities to sum of annual interest expense and depreciation.

4 Data and Assumptions

In the study the nonfinancial companies are included that are listed on the WSE between 04.2001 and 04.2011. They are included, in the end of March for a given year, in one of the following indexes: WIG20, mWIG40[1] or sWIG80[2]. From among such companies the following are excluded:

- banks, insurances companies and lease companies,
- companies included in the following sectors: finance or finance–other,
- companies for which there is no full financial statements for a previous year[3],
- companies that in balance (that is used in order to compute financial ratios) have negative value of the shareholders equity,
- companies that in the income statement (that is used in order to compute financial ratios) have value of revenues from sales equal to zero.

As the result in the consecutive years there are between 95 and 118 companies qualified for the study. The number of companies qualified for the study for a given year is shown in the Table 1.

For each company qualified for the study in a given year the ratios described in the section 3 are computed. In order to compute the financial ratios the financial statement for a previous year is used. The values of financial ratios are used to the construction of the synthetic measure of development. The synthetic measure of development is used in order to conduct a linear arrangement of the companies in analysed year. The position of the company allows to assign it into one of five quantile portfolios in the following way:

- into the first portfolio 20% of companies with the highest position are put,
- into the second portfolio next 20% of companies with the highest position are put that are not included in the first portfolio,
- into the third portfolio next 20% of companies with the highest position are put that are not included in the first or second portfolio,
- into the fourth portfolio next 20% of companies with the highest position are put that are not included in the first or second or third portfolio,
- into the fifth portfolio remaining companies are put.

As the result five equipotent portfolios are constructed. Each portfolio is bought during the last session in the first week of April a given year and sold during the last session in the first week of April a next year. In each company 10.000 PLN is invested, quantity of

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[1] If there was not an index mWIG40 then an index midWIG is used.
[2] If there was not an index sWIG800 then an index WIRR is used.
[3] In the study are used financial statements from the following data bases prepared by the Notoria Serwis: 1(39)/2003, 3(45)/2004, version 18.30 may 2010.

stocks is rounded down to integer. The quantity of stocks is constant during the investment period.

Table 1 The number of companies qualified for the study in the consecutive years

Year	Number of companies
2001	96
2002	95
2003	97
2004	102
2005	108
2006	105
2007	106
2008	113
2009	117
2010	118

In the study the financial companies like banks, insurance companies and lease companies are not included. As the result, index WIG or any other index cannot be a benchmark. The benchmark portfolio is constructed like other portfolios. In the benchmark portfolio all companies qualified for a study in the given year are included. In each company 10.000 PLN is invested, quantity of stocks is rounded down to integer. The quantity of stocks is constant during the investment period.

Assessment of each portfolio is done by:
- average geometric rate of return for a ten years period of investment,
- standard deviation of logarithmic rate of return,
- investment rate of return,
- a Sharpe ratio (Sharpe, 1966).

5 Results

There are investment rates of return for each constructed portfolio between 2001 and 2010 in the Table 2. The comparison of the returns achieved by each portfolio with the return for a benchmark portfolio points out that the Portfolio 2 the most frequently gives the rate of return that is higher than the rate of return for the benchmark portfolio. That situation is 7 times during 10 years. The opposite situation is in case of the Portfolio 5. This Portfolio 3 times gives higher rate of return than the benchmark portfolio.

Table 2 Investment rate of return for constructed portfolios

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Benchmark portfolio	-12%	-6%	187%	16%	143%	83%	-28%	-55%	61%	7%
Portfolio 1	-48%	-37%	**278%**	**25%**	123%	**106%**	-46%	-57%	42%	**28%**
Portfolio 2	-26%	**-2%**	**193%**	8%	**343%**	**95%**	**-11%**	-57%	**83%**	**8%**
Portfolio 3	**-6%**	-7%	148%	**26%**	91%	65%	**-26%**	-54%	**68%**	-7%
Portfolio 4	**11%**	**7%**	**207%**	8%	67%	81%	-29%	**-54%**	52%	3%
Portfolio 5	5%	**11%**	113%	12%	101%	28%	-29%	**-51%**	59%	4%

Note: Bold font is used for values that are higher than they are for the benchmark portfolio.

In the Table 3 there are cumulated rates of return and geometric average rates of return. The analysis of data from the Table 3 points out that the Portfolio 3 gives the highest geometric average rate of return, that is 10 percentage points higher than the geometric average rate of return for the benchmark portfolio. As the result, the cumulated rate of return for the Portfolio 3 is more than 2 times higher than it is for the benchmark portfolio. The second portfolio in terms of the value of the geometric average rate of return is the Portfolio 4. The geometric average rate of return for that portfolio is lower that it is for the benchmark portfolio by 1,5 percentage points.

Table 3 Cumulated rate of return and geometric average rate of return

	Cumulated rate of return	Geometric average rate of return
Benchmark portfolio	583,0%	21,2%
Portfolio 1	203,1%	11,7%
Portfolio 2	**1 407,8%**	**31,2%**
Portfolio 3	352,6%	16,3%
Portfolio 4	504,7%	19,7%
Portfolio 5	306,6%	15,1%

Note: Bold font is used for values that are higher than they are for the benchmark portfolio.

Table 4 The portfolios' risk and the average risk

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Average risk
Benchmark portfolio	14%	10%	22%	16%	23%	24%	27%	30%	17%	13%	19,6%
Portfolio 1	20%	19%	31%	25%	32%	33%	36%	34%	27%	19%	27,5%
Portfolio 2	17%	17%	28%	21%	54%	28%	28%	30%	18%	16%	25,8%
Portfolio 3	15%	12%	23%	18%	**16%**	**22%**	31%	31%	18%	15%	20,1%
Portfolio 4	15%	12%	26%	18%	**17%**	28%	**23%**	**29%**	**16%**	**12%**	19,6%
Portfolio 5	15%	15%	22%	**14%**	**22%**	47%	**26%**	33%	18%	**11%**	22,4%

Note: Bold font is used for values that are higher than they are for the benchmark portfolio.

There are portfolios' risk (measured by the standard deviation) in the Table 4. It can be noticed that the Portfolio 4 has the lowest risk. The risk of Portfolio 4 is equal to the risk of the benchmark portfolio. This Portfolio has 5 out of 10 times lower risk than the benchmark portfolio. The Portfolio 2, that has the highest geometric average of return, has the second highest value of the risk. The portfolio 2 has no one time lower value of risk than the benchmark portfolio.

Table 5 The Sharpe ratio for constructed portfolios

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Benchmark portfolio	-2,06	-1,49	4,54	0,55	3,53	2,33	-1,40	-2,85	2,48	0,17
Portfolio 1	-4,06	-3,01	4,06	**0,66**	2,28	2,08	-1,81	**-2,69**	1,14	**1,07**
Portfolio 2	-2,62	**-0,67**	3,58	0,09	2,59	2,20	**-0,58**	-3,07	**3,10**	**0,21**
Portfolio 3	**-1,45**	**-1,41**	3,69	**0,96**	**3,69**	2,08	**-1,14**	**-2,68**	**2,61**	-0,79
Portfolio 4	**-0,34**	**-0,23**	4,05	0,12	2,72	1,96	-1,68	-2,89	2,31	-0,14
Portfolio 5	**-0,71**	**3,41**	3,19	0,35	2,91	0,44	-1,48	**-2,32**	2,33	-0,06

Note: Bold font is used for values that are higher than they are for the benchmark portfolio.

There are the Sharpe ratios for constructed portfolios in the Table 5. It can be noticed that:
  – the benchmark portfolio 6 out of 10 times has the positive value of the Sharpe ratio,
  – the Portfolio 3 in case of 7 years has higher value of the Sharpe ratio than it is for the benchmark portfolio. While the positive values of the Sharpe ratio are studied then the Portfolio 3 in case of 3 years has higher positive value of the Sharpe ratio than it is for the benchmark portfolio. The opposite situation is also in case of 3 years,
  – the Portfolio 4 (with the lowest value of the average risk) in case of 2 years has higher value of the Sharpe ratio, but each time it is in case of negative value of the Sharpe ratio,
  – the Portfolio 2 (with the highest average geometric rate of return) in case of 4 years has higher value of the Sharpe ratio than it is for the benchmark portfolio.

While the positive values of the Sharpe ratio are studied then the Portfolio 2 in case of 2 years has higher positive value of the Sharpe ratio than it is for the benchmark portfolio. The opposite situation is in case of 4 years.

6 Conclusions

The article is an attempt to assess the possibility of using the financial ratios to choose stocks to the portfolio. Each company is described by financial ratios. In order to arrange them the synthetic measure of development is used. The companies are selected to the one of five quantile portfolios by their position in the ranking. As a result, it can be stated that the Portfolio 2 is the best one in terms of the average geometric rate of return. Moreover, the Portfolio 2 is better than the benchmark portfolio in terms of the average geometric rate of return. However, no one of constructed portfolios is better of the benchmark portfolio in terms of risk or the Sharpe ratio.

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Decoupling hypothesis and the financial crisis

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Abstract: *The purpose of the paper was to present the decoupling hypothesis which says that the performance of the emerging economies becomes relatively independent from the changes in advanced economies, and to empirically verify this hypothesis. The Christiano-Fitzgerald band-pass filter and spectral analyses have been applied to examine the hypothesis. On the basis of obtained results, if one compares the deviations of GDPs from their long-term trend, it seems that the synchronization of cycles between emerging and advanced economies was already high before the crisis. The last global crisis, especially if time shifts between the countries are taken into account, even increased the synchronization of the economies. Therefore, this paper presents evidence against the decoupling hypothesis, and at the same time it raises doubts whether the high GDP growth rates in emerging economies can be sustainable in the presence of the slow-down in the advanced economies.*

Keywords: decoupling, business cycle synchronization, spectral analysis, emerging economies

JEL codes: F44, C32, O1

1 Introduction

The decoupling hypothesis has its origins in the spectacular successes of the economies of China and India, whose high growth rates do not seem to be influenced by the parlous state or the shocks sustained by them. Some years ago it appeared as if the decoupling hypothesis could be applied, not only to certain Asian countries but it can also used to describe the performance of certain Latin American countries too, for example, Brazil. Indeed, some Latin American countries started to grow faster than the U.S. economy and their growth path now appear to have become independent of the economic situation in the U.S. However, the decoupling can mean different things, and it can be measured in different things. As it is stressed by Dervis (2012), firstly it can mean the divergence of the GDP long-term path of emerging economies and advanced economies. However, according to many macroeconomic models, for example the Solow model, catching-up economies should have higher rates of growth. Hence, higher long-term growth rates in emerging economies are not indicators of growing differences between advanced and emerging economies. Secondly, the decoupling can mean growing differences between business cycles and growing differences in reaction to global shocks. Dervis (2012) calls it also a delinking of cyclical movements, and it the most common meaning of the decoupling.

The decoupling hypothesis has become a very popular topic since the beginning of the last global financial crisis, and many articles in business newspapers and magazines have written about it (Decoupling 2.0, 2009, is a good example of such a publication). However, very seldom can one find comprehensive statistical and econometric studies on it. One can find some studies on business cycles synchronization between emerging European countries and the EU (Adamowicz at al. (2009), Konopczak (2009), and Skrzypczyński, (2010)) but there are few publications on the decoupling hypothesis which include wider selection of emerging markets and long time series. Kose et al.

(2008), Kose and Prasad (2010), *World Economic Outlook* (2007) and Wälti (2009), in the opinion of the authors of the paper, are the best examples of such publications.

Research conducted before the last global financial crisis did not provide an answer as to whether the decoupling hypothesis was valid or not: in fact, research papers were almost equally divided between confirming and rejecting this hypothesis. The most often quoted paper supporting the hypothesis is that of Kose et al. (2008), who examined the degree of synchronization in 106 economies during the years 1960-2005. In this study, a sample of countries was divided into three groups: advanced economies, emerging market economies and other developing economies, and three time series were taken into account: GDP, investment, and consumption. The variances of the time series were decomposed into variances of three factors and an idiosyncratic component. The following factors were taken into account: the global factor, which was related to fluctuations in all countries; the group factor which characterised the fluctuations of every group of countries; and finally the country specific factor. Kose et al. (2008) reported that their most important finding was that synchronization of cycles increased independently for advanced and emerging economies in the years 1985-2005. On the other hand, according to the authors, the impact of the global factor decreased when periods 1960-1984 and 1985-2005 were compared, and this finding is supposed to show that a decoupling of advanced and emerging economies had taken place. The theses of Kose et al. (2008) were reiterated by Kose and Prasad (2010) for longer time series.

Their results were supported by the IMF's *World Economic Outlook* (2007, p. 139-143), but the authors of this report grouped countries, not according to level of development, but according to certain regional criteria. Table 1 presents the results of variance decomposition into global, regional, country-specific, and idiosyncratic factors. The report then claims that in the years 1985-2005 regional, and not global, factors were more important for GDP fluctuations (table 1).

Table 1 Contributions to output; unweighted averages for every region; percentages

	Global factor	Regional factor	Country factor	Idiosyncratic
1960–2005				
North America	16.9	51.7	14.8	16.6
Western Europe	22.7	21.6	34.6	21.1
Emerging Asia and Japan	7.0	21.9	47.4	23.7
Latin America	9.1	16.6	48.6	25.7
1960–85				
North America	31.4	36.4	15.7	16.5
Western Europe	26.6	20.5	31.6	21.3
Emerging Asia and Japan	10.6	9.5	50.5	29.4
Latin America	16.2	19.4	41.2	23.2
1986–2005				
North America	5.0	62.8	8.2	24.0
Western Europe	5.6	38.3	27.6	28.5
Emerging Asia and Japan	6.5	34.7	31.1	27.7
Latin America	7.8	8.7	51.7	31.8

Source: World Economic Outlook (2007, p. 14)

Similar conclusions, yet concerning only the real part of the economy (not the financial sector) can be found in the 2012 World Bank's working paper by Yeyati and Williams. Independently on the conclusions stated in the paper the authors calculations confirmed a positive, statistically significant and stable in time beta coefficients between real GDP changes (cyclical parts) of the emerging economies and the G7 group (Yeyati, Williams, 2012).

A study by Wälti (2009) is one of the most important papers which rejected the decoupling hypothesis. Conducting calculations for thirty four emerging markets and 29 advanced economies, he examined GDP deviations from its long-term trend and compared them for a different time shift. The emerging market economies came from

four different regions of the world: eight East and South Asian economies, nine Latin American countries, thirteen Eastern and South European economies, and four other economies from Africa and Middle East, and. Advanced economies were grouped in four ways: all advanced economies, a European group, the G7 group, and the United States alone. The Hodrick-Prescott filter and spectral analyses were used for the period 1980-2007. The results presented by Wälti (2009) refuted the decoupling hypothesis – the strength of ties for countries from different continents turned to be similar to that between advanced and emerging economies.

Doubts about decoupling became even more pronounced aftermath of the subprime crisis when practically all countries (from all regions, both rich and poor) were affected by the crisis. Certain economists (for example, Skrzypczyński, 2010, Rose, 2009, Krugman, 2010, and Dervis, 2012) say that the decoupling has never existed, and others (for example, Korinek et al., 2010) suggested that the change in the economic conditions occurred, and we faced the phase re-coupling after the phase of the decoupling (in other words, after the phase of low synchronization of business cycles we could see re-synchronization of business cycles between advanced and emerging economies, and between economies from different continents).

The aim of the paper is to verify the hypothesis whether the changes which occurred during and after the global crisis should be treated as a kind of re-coupling or whether the whole decoupling hypothesis should be rejected. Poland is used as a reference country for the purpose of the calculations carried out.

2 Methodology and Data

The time series analysis used in this paper is based on the approach described in Hamilton (1994), who gives a comprehensive description of these methods (an interesting discussion about practical application of the methods can be found in Skrzypczyński (2010)). Firstly, time series (in our case: GDP growth rates calculated on the basis of data from the World Bank database) had time trends and (if applicable) drifts removed and then the resulting time series were subjected to the Christiano-Fitzgerald filter, and finally to spectral analysis. The methods are briefly presented below.

An outline of the Christiano-Fitzgerald band-pass filter

As it has already been mentioned, the Christiano-Fitzgerald band-pass filter is used to extract the cyclical part of the time series. The filter was chosen because of its applicability to almost all time series and its advantages over other methods (it takes into account stochastic structure of the decomposed variable, removes all non-seasonal fluctuations, etc.). The Christiano-Fitzgerald filter requires testing of the stationarity of time series (time series can be: stationary I(0), trend stationary or non-stationary I(1)). The filter requires the removal of time-trend (if it is present) and for processes stationary at I(1) one must remove a drift (if it is present) (Skrzypczyński, 2008, p. 13-14).

The idea of calculating the cyclic component $\hat{y}_t^c$ in the band pass filter is based on the following formula (Nilsson, Gyomai, 2011, p. 7−8):

$$\hat{y}_t^c = \hat{B}_t(L)y_t, \text{ where } \hat{B}_t(L) = \sum_{j=-(T-t)}^{t-1} \hat{B}_{j,t}L^j \text{ for } t = 1,2...,T. \tag{1}$$

In the formula, L stands for the lag operator of y and B represents a set of parameters (weights) (Christiano, Fitzgerald, 1999, p. 2). The set of weights $\hat{B}_{j,t}$ is the solution of the equation:

$$\min_{\hat{B}_{j,t}, j=-(T-t),\dots,t-1} \int_{-\pi}^{\pi} \left| B(e^{-i\omega}) - \hat{B}_t(e^{-i\omega}) \right|^2 S_y(\omega) d\omega \quad \text{for } t = 1,2,\dots,T. \tag{2}$$

For the CF filter for the I(1) series there is an additional (limiting) condition that:

$\sum_{j=-(T-t)}^{t-1} \hat{B}_{j,t} = 0$ for t = 1, 2, ...T, which provides for removal by filter of a stochastic trend. Operation of the filter, which involves the removal frequencies which are too low or too high to be treated as part of the business cycle, is based on the function $B\left(e^{-i\omega}\right)$, which is defined as follows:

$$B\left(e^{-i\omega}\right) \equiv \begin{cases} 1 \ for \ \omega \in \left[-\overline{\omega}, -\underline{\omega}\right] \cup \left[\underline{\omega}, \overline{\omega}\right], \\ 0 \ for \ \omega \in [-\pi, -\overline{\omega}) \cup \left(-\underline{\omega}, \underline{\omega}\right) \cup (\overline{\omega}, \pi], \end{cases} \tag{3}$$

where: $\omega = 2\pi/\tau$ is the frequency expressed in radians with a period equal to τ. Figures $\underline{\omega} = 2\pi/\tau_U$ and $\overline{\omega} = 2\pi/\tau_L$ ($0 < \underline{\omega} < \overline{\omega} < \pi$) determine the lower and upper frequency of the filter, which causes the filter to cut off fluctuations with a period longer than τ_U and less than τ_L. The calculations assumed $\tau_U = 32$ and $\tau_L = 6$.

An outline of a single spectrum analysis method

The origin of spectral analysis is based on the idea of representing time series as the sum of sinusoids at various frequencies (cycles). Spectral analysis of cyclic data requires the Fourier transform, which is used to transform the time domain representation of the series into the frequency domain representation of the series. In order to determine the significance of different frequencies in data one calculates a spectrogram. A spectrogram displays the power of a signal as a function of both: time and frequency simultaneously.

According to Skrzypczyński (2008, p. 16): "power spectrum of a stochastic process with discrete time $\{y_t\}_{t=-\infty}^{+\infty}$ with a zero mean and stationary covariance function is defined as the Fourier transform of autocovariance series $\{y_k^v\}_{k=-\infty}^{+\infty}$ of this process and is given as:

$S_y(\omega) = \frac{1}{2\pi} \sum_{k=-\infty}^{+\infty} \gamma_k^y e^{-i\omega k}$ for $\omega \in [-\pi, \pi]$, where $\omega = \frac{2\pi}{\tau}$ is the frequency corresponding to

the period τ". Due to the fact that the spectrogram calculated by using the above method is very "fuzzy", certain methods are used to reduce this variability (smoothing methods), and one of the most popular of which is the Parzen window. The power spectrum estimator then takes the form (Skrzypczyński (2008, p. 17) quoting Chatfield (1996, p. 115)), where empirical autocovariances are

$$\hat{S}(\omega) = \frac{1}{2\pi} \sum_{k=-H}^{H} w_k \hat{\gamma}_k^y e^{-i\omega k} = \frac{1}{2\pi}\left[w_0 \hat{\gamma}_0^y + 2\sum_{k=1}^{H} w_k \hat{\gamma}_k^y \cos(\omega k) \right], \tag{4}$$

$$\hat{\gamma}_k^y = \frac{1}{T} \sum_{t=1+k}^{T} (y_t - \bar{y})(y_{t-k} - \bar{y}) \ for \ k = 0,1,...T-1, \tag{5}$$

and Parzen window weights are:

$$w_k = \begin{cases} 1 - 6(k/H)^2 + 6(|k|/H)^3 \ for \ |k| \leq H/2, \\ 2(1 - |k|/H)^3 \ for \ H/2 \leq |k| \leq H, \\ 0 \ for \ |k| > H. \end{cases} \tag{6}$$

Maximum allowable lag time for Parzen window, called the truncation lag is chosen according to the rule $H = \text{int}(2\sqrt{T})$.

Outline of the cross-spectral analysis

"Cross spectral analysis allows one to determine the relationship between two time series as a function of frequency. Normally, one supposes that statistically significant peaks at the same frequency have been shown in two time series as that we wish to see if these periodicities are related with each other and, if so, what the phase relationship (time shift) is between them (Hartmann, 2008, p. 165)". One may do cross spectral analysis even in the absence of peaks in the power spectrum because even without common peaks there might be coherent modes at particular frequencies. In this paper, however, attention will be paid to common peaks in two time series.

There are several methods of calculating the cross-spectrum, one of which is given by Bloomfield (1976, p. 210-212). The time series X and Y can first be "combined" in the time domain (before the Fourier transform) by calculating the lagged cross-covariance function. The resulting function is then subjected to a Fourier transform and a cross spectrum periodogram is obtained. Cross-covariance can be written as:

$$c_{x,y,r} = \frac{1}{n} \sum x_t y_{t-r} \text{ , where t and t-r = 0, 1, 2, ..., n-1,} \tag{7}$$

and r means a time lag of one series relative to the other.

The Fourier transform is then carried out to obtain the cross-spectrum periodogram:

$$I_{x,y}(\omega) = \frac{1}{2\pi} \sum_{|r|<n} c_{x,y,r} e^{-ir\varpi}. \tag{8}$$

Similarly to the single spectrum periodogram (spectrogram), the cross-spectrum periodogram is also smoothed, e.g. by a Parzen window.

For cross-spectrum analysis, one usually calculates the following three measures: squared coherence, gain value and time shift between the series. Squared coherence measures strength of association between two series, gain (value) estimates magnitude of changes of one time series in relation to the other for a certain frequency, phase shift estimates to which extent each frequency component of one series leads the other.

To quoting Skrzypczyński (2008, p. 17-18) once again: "if we assume that a stochastic process with discrete time $\{x_t\}_{t=-\infty}^{+\infty}$ with zero mean and stationary covariance function is an independent variable, whereas the process $\{y_t\}_{t=-\infty}^{+\infty}$ of the analogous properties is the dependent variable, then the cross power spectrum (cross-spectral density, cross-spectrum) of these variables is defined as the Fourier transform $\{\gamma_k^{yx}\}_{t=-\infty}^{+\infty}$ of the cross-covariance series of these variables and is given by the formula:

$$S_{yx}(\omega) = \frac{1}{2\pi} \sum_{k=-\infty}^{+\infty} \gamma_k^{yx} e^{-i\omega k} = c_{yx}(\omega) - iq_{yx}(\omega) \text{ for } \omega \in [-\pi, \pi], \tag{9}$$

where:

$$c_{yx}(\omega) = 2\pi^{-1} \sum_{k=-\infty}^{+\infty} \gamma_k^{yx} \cos(\omega k) \tag{10}$$

is called co-spectrum and is a real part of cross-spectrum, while

$$q_{yx}(\omega) = 2\pi^{-1} \sum_{k=-\infty}^{+\infty} \gamma_k^{yx} \sin(\omega k) \tag{11}$$

is called the quadrature spectrum, is a negative imaginary part of the cross-spectrum. It is possible to define three cross-spectral statistics on the basis of cross power spectrum: gain value ($G_{yx}(\omega)$), phase shift ($\varphi_{yx}(\omega)$), and squared coherence ($K^2_{yx}(\omega)$):

$$G_{yx}(\omega) = \frac{\left(c^2_{yx}(\omega) + q^2_{yx}(\omega)\right)^{\frac{1}{2}}}{S_x(\omega)} \; for \; \omega \in [-\pi, \pi], \tag{12}$$

$$\varphi_{yx}(\omega) = \tan^{-1}\left(\frac{-q_{yx}(\omega)}{c_{yx}(\omega)}\right) \; for \; \omega \in [-\pi, \pi], \tag{13}$$

$$K^2_{yx}(\omega) = \frac{c^2_{yx}(\omega) + q^2_{yx}(\omega)}{S_y(\omega)S_x(\omega)} \; for \; \omega \in [-\pi, \pi], \tag{14}$$

where: $S_x(\omega)$ means power spectrum of the process $\{x_t\}$, while $S_y(\omega)$ means power spectrum of the process $\{y_t\}$".

3 Results

The strength of the relationship between cycles (in addition to the length of the business cycle) of a particular country with other countries may indicate a strong relationship between their economies. In the case of spectral analysis, the strength of the relationship between cycles is measured by the squared coherence: the higher the coherence, the stronger the relationship.

Tables 2 and 3 show the squared coherences calculated by the authors. The bold numbers indicate very high coherences (80-100%), and the coherences between 60 and 80% can also be treated as quite high. As can be seen in tables, when the squared coherences for different frequencies (lengths of cycles) are considered, business cycles all over the world were quite similar even before the global financial crisis, and it is more evident for longer and very short cycles. The results are presented from Poland's perspective and it can be seen that countries on one continent do have strong connections with each other. In this case, Poland's business cycle is very similar to other European countries cycles. Nonetheless, when long business cycles are considered, Poland had a stronger coherence with the United States than with any European country, even its main economic partner, Germany, which became especially visible during the global economic crisis. Also, assuming high coherences with small Asian countries irrelevant, Poland had a relatively high coherence with another huge economy - of China. When short business cycles are to be considered, Poland's economy visibly belonged to the group of the European countries, especially, members of the EU.

When the Tables 2 and 3 are compared, it seems that the relations of Poland with the richest European countries have become even stronger for the last years, so one cannot say that the decoupling has occurred in the case of Poland. The financial crises could influence the results, but on the other hand during the crisis Poland was doing quite well. It was the only EU country with positive rate of growth in 2009 when there as a fall of GDP in rich European countries. Other emerging European economies have also stronger ties with advanced European economies than with new members of the EU.

According to the results from Tables 2 and 3 the synchronization of cycles between Poland and emerging economies from Asia and Latin America has increased for the last years. Not presented in the paper (for the sake of its brevity) other diagrams and calculations also suggest that real GDP deviations from the long-term trend in the above mentioned countries became more similar. The diagrams unanimously show that during the crisis all economies slowed down and the short-term real GDP curves bent down from the trend. It seems that all emerging countries succumb to external global shocks, and

therefore the decoupling of the real economies can hardly be acknowledged. The defenders of the decoupling hypothesis can argue that it was only one time event, but such an argument does not seem to be very strong: emerging economies seem to exhibit high sensitivity to global shocks. They reacted similarly to other global shocks, no matter where there was the origin of the shock, either in advanced or developing economies. One can enumerate the Asian crisis of 1987 or the current situation in the EU.

Table 2 Coherence coefficients between business cycle in Poland and other countries (different cycle length); calculations for years 1995 – 2006, grouped by continents

Europe

Country	24	16	12	9.6	8	6.90	6
Austria	**85.5%**	56.7%	30.7%	59.7%	49.2%	51.4%	50.8%
Belgium	**83.3%**	59.6%	43.9%	**83.8%**	**87.0%**	74.9%	51.9%
Croatia	**83.3%**	55.6%	68.2%	79.1%	63.8%	62.6%	52.5%
Czech Rep.	**86.3%**	44.6%	4.9%	6.4%	46.5%	70.6%	73.4%
Denmark	**81.6%**	49.1%	24.7%	10.4%	5.9%	10.2%	5.8%
Estonia	26.6%	6.7%	15.5%	32.2%	51.4%	62.4%	44.1%
Finland	**85.4%**	67.3%	60.7%	34.2%	8.3%	5.6%	23.6%
France	**92.5%**	**81.8%**	64.7%	59.0%	44.5%	58.3%	68.3%
Georgia	15.4%	7.2%	8.8%	4.8%	14.5%	7.2%	55.8%
Germany	**87.3%**	65.1%	50.0%	33.2%	35.1%	66.4%	59.0%
G. Britain	**93.2%**	**80.8%**	62.9%	34.7%	45.6%	62.5%	55.4%
Hungary	76.4%	41.1%	28.7%	28.8%	17.9%	42.2%	29.3%
Iceland	26.8%	5.1%	16.2%	54.6%	79.6%	65.9%	48.4%
Ireland	**83.1%**	53.5%	45.6%	31.9%	26.3%	28.9%	41.8%
Italy	**87.5%**	76.2%	68.2%	61.0%	39.8%	45.2%	72.4%
Latvia	61.7%	22.4%	16.7%	34.2%	37.0%	56.1%	62.4%
Lithuania	1.6%	6.6%	12.2%	41.1%	48.6%	47.4%	31.7%
Netherlands	**94.3%**	77.7%	48.8%	27.3%	26.7%	57.1%	59.9%
Norway	10.9%	10.4%	19.1%	70.2%	**81.0%**	64.2%	48.2%
Portugal	**90.7%**	59.2%	8.4%	46.6%	57.0%	75.0%	71.3%
Russia	**94.7%**	**81.5%**	79.6%	74.7%	72.0%	73.7%	**80.0%**
Slovakia	51.1%	56.8%	49.1%	65.0%	**84.1%**	66.5%	17.8%
Slovenia	79.9%	42.8%	40.5%	38.7%	4.4%	5.9%	30.1%
Spain	**92.0%**	68.1%	53.3%	72.1%	66.3%	56.4%	67.5%
Sweden	**87.1%**	62.2%	50.4%	53.3%	46.1%	32.9%	40.7%
Switzerland	**84.8%**	64.9%	64.0%	75.2%	48.0%	4.8%	4.7%
Turkey	67.6%	48.4%	63.3%	49.7%	32.7%	2.0%	20.4%
EU 27	**90.3%**	73.3%	62.7%	47.6%	45.2%	63.2%	71.0%
Euro 17	**90.1%**	73.2%	62.9%	52.0%	48.5%	65.8%	78.6%

North and South America

Country	24	16	12	9.6	8	6.90	6
Argentina	64.6%	28.4%	54.0%	28.5%	13.2%	27.7%	54.2%
Bolivia	60.2%	32.8%	18.3%	64.9%	67.4%	39.6%	31.9%
Brazil	**81.0%**	65.4%	40.8%	24.3%	2.0%	12.4%	24.8%
Canada	**88.5%**	69.4%	66.8%	45.3%	2.6%	15.3%	20.5%
Chile	2.2%	16.7%	38.6%	73.7%	**81.5%**	**83.6%**	76.2%
Colombia	58.2%	35.1%	49.6%	78.2%	**83.3%**	**84.6%**	62.0%
Mexico	**80.3%**	58.9%	59.1%	37.4%	34.8%	50.5%	45.9%
Peru	49.8%	7.6%	48.4%	62.5%	19.5%	2.8%	11.5%
USA	**94.3%**	**81.6%**	62.1%	23.2%	7.3%	16.3%	7.6%

Asia

Country	24	16	12	9.6	8	6.90	6
China	62.3%	27.3%	19.1%	3.2%	29.6%	48.0%	58.0%
Hong Kong	68.7%	51.2%	42.0%	51.0%	30.1%	35.4%	39.7%
India	63.9%	32.2%	0.9%	26.6%	34.0%	57.6%	71.1%
Indonesia	68.5%	24.2%	15.7%	63.7%	79.0%	72.9%	64.1%
Iran	53.0%	11.4%	7.7%	15.4%	37.2%	30.0%	15.4%
Israel	**87.6%**	**86.3%**	73.1%	55.7%	34.6%	2.7%	26.7%
Japan	61.8%	49.1%	36.3%	5.5%	12.7%	6.7%	16.4%
Malaysia	38.8%	22.0%	52.0%	72.5%	65.4%	70.0%	69.6%

Country	24	16	12	9.6	8	6.90	6
Philippines	22.4%	4.7%	40.4%	14.5%	23.8%	3.3%	14.7%
Singapore	**84.7%**	77.8%	64.6%	52.0%	33.6%	41.5%	35.9%
South Korea	76.4%	28.1%	40.6%	66.0%	42.3%	45.5%	56.9%
Taiwan	**98.6%**	**97.5%**	**86.7%**	34.5%	7.9%	3.3%	22.5%
Thailand	50.9%	17.3%	31.9%	53.1%	45.6%	68.2%	79.0%

Australia and Oceania

Country	24	16	12	9.6	8	6.90	6
Australia	56.8%	42.5%	19.1%	10.0%	2.0%	8.1%	23.9%
N. Zealand	39.8%	45.1%	77.8%	**85.0%**	70.2%	40.1%	9.7%

Africa

Country	24	16	12	9.6	8	6.90	6
Morocco	45.1%	45.4%	43.2%	46.4%	56.3%	67.0%	36.9%
South Africa	**87.4%**	45.5%	19.9%	17.2%	10.5%	37.1%	61.3%

Source: based on World Bank data

Table 3 Coherence coefficients between business cycle in Poland and other countries (different cycle length); calculations for years 1995 – 2009, grouped by continents

Europe

Country	30	20	15	12	10	8.57	7.5	6.67	6
Austria	**84.8%**	76.1%	72.2%	46.7%	46.4%	60.5%	39.0%	14.4%	20.3%
Belgium	65.1%	51.3%	57.7%	35.4%	41.7%	63.4%	59.9%	49.9%	25.0%
Croatia	68.3%	60.7%	62.1%	64.8%	**80.9%**	77.2%	51.6%	70.2%	77.3%
Czech Rep.	63.9%	55.2%	58.8%	50.7%	42.4%	14.0%	1.2%	44.7%	**84.0%**
Denmark	**83.2%**	75.1%	71.4%	78.2%	77.7%	56.0%	11.9%	4.5%	38.9%
Estonia	63.4%	43.7%	36.9%	64.2%	**84.7%**	71.5%	14.0%	26.2%	65.4%
Finland	**87.4%**	**82.9%**	**82.0%**	**82.7%**	**83.9%**	68.2%	17.3%	6.0%	44.1%
France	**85.2%**	**80.8%**	**82.3%**	**85.4%**	**87.3%**	**80.1%**	45.6%	9.8%	28.2%
Georgia	32.6%	32.2%	58.4%	73.2%	46.9%	45.7%	54.9%	27.6%	**88.7%**
Germany	79.6%	69.2%	72.3%	**85.0%**	**89.0%**	74.4%	27.3%	21.2%	65.9%
G. Britain	**86.3%**	**84.4%**	**84.9%**	81.3%	79.9%	70.7%	30.2%	12.1%	63.7%
Hungary	**88.4%**	**83.8%**	73.4%	72.7%	**80.6%**	65.2%	22.5%	16.7%	67.8%
Iceland	75.1%	47.4%	53.9%	58.0%	24.9%	0.4%	32.1%	70.3%	**84.5%**
Ireland	**80.0%**	71.8%	73.6%	**85.8%**	**89.4%**	77.2%	33.8%	15.6%	2.0%
Italy	76.9%	67.5%	68.5%	**81.1%**	**88.5%**	77.7%	33.4%	8.6%	28.2%
Latvia	77.4%	60.0%	52.6%	62.0%	76.7%	71.8%	33.4%	8.4%	19.0%
Lithuania	49.9%	30.9%	33.7%	58.6%	73.3%	59.2%	17.8%	21.0%	61.5%
Netherlands	**91.7%**	**88.4%**	**84.6%**	**80.4%**	77.2%	71.0%	38.8%	8.8%	59.1%
Norway	60.7%	40.0%	61.3%	64.2%	78.9%	**85.0%**	66.6%	12.4%	19.1%
Portugal	**81.3%**	72.5%	67.8%	45.8%	43.6%	70.6%	71.2%	30.9%	29.1%
Russia	**83.8%**	**83.2%**	**92.0%**	**95.2%**	**91.2%**	**82.8%**	51.3%	18.4%	60.3%
Slovakia	37.0%	30.1%	37.9%	45.9%	35.1%	10.9%	6.2%	17.6%	25.1%
Slovenia	**85.2%**	76.7%	72.5%	64.9%	66.3%	63.9%	22.2%	7.5%	44.0%
Spain	**90.1%**	**84.9%**	**82.3%**	72.9%	71.6%	73.7%	50.2%	2.8%	28.6%
Sweden	**90.0%**	**90.4%**	**83.6%**	77.1%	**86.5%**	76.4%	25.2%	6.0%	35.3%
Switzerland	**87.4%**	72.5%	57.8%	69.9%	**87.6%**	77.9%	25.7%	8.9%	38.0%
Turkey	71.4%	63.3%	77.7%	**89.7%**	**83.7%**	42.5%	3.2%	1.9%	35.0%
EU 27	**86.5%**	**83.0%**	**82.1%**	**83.8%**	**86.8%**	76.3%	30.0%	13.8%	63.2%
Euro 17	**86.5%**	**81.5%**	80.0%	**83.7%**	**87.9%**	78.4%	33.0%	14.0%	63.9%

North and South America

Country	30	20	15	12	10	8.57	7.5	6.67	6
Argentina	64.0%	20.3%	25.2%	22.5%	17.1%	3.9%	3.1%	40.2%	**88.0%**
Bolivia	14.0%	25.1%	52.0%	28.9%	73.7%	62.3%	32.2%	34.4%	18.8%
Brazil	78.9%	79.6%	**89.9%**	69.9%	69.6%	54.4%	6.2%	21.2%	18.3%
Chile	37.6%	19.5%	56.6%	65.1%	**87.3%**	**86.7%**	59.7%	72.4%	**83.5%**
Canada	**88.6%**	**84.9%**	78.6%	**81.0%**	**87.5%**	66.8%	15.4%	4.6%	29.4%
Colombia	10.0%	19.5%	32.7%	48.4%	76.9%	77.7%	67.9%	64.7%	43.9%
Mexico	**81.3%**	78.1%	**80.1%**	**88.0%**	**90.1%**	58.2%	8.8%	18.0%	61.5%
Peru	44.1%	35.0%	34.3%	27.6%	67.3%	79.6%	31.5%	23.8%	35.8%
USA	**88.4%**	**89.7%**	**88.2%**	**88.0%**	81.2%	57.9%	11.4%	7.7%	24.1%

Asia

Country	30	20	15	12	10	8.57	7.5	6.67	6
China	**83.1%**	60.7%	31.3%	43.9%	57.8%	63.2%	38.9%	1.7%	61.1%
H. Kong	53.0%	53.5%	70.9%	70.0%	**86.1%**	78.0%	36.6%	13.3%	45.4%
India	51.7%	18.9%	62.6%	43.6%	9.4%	22.2%	5.4%	61.5%	**84.4%**
Indonesia	53.0%	36.2%	43.4%	2.4%	31.2%	66.8%	60.1%	76.8%	**81.0%**
Iran	1.6%	14.4%	54.7%	58.9%	29.0%	20.3%	15.6%	20.7%	44.5%
Israel	64.1%	52.7%	62.1%	76.7%	77.1%	44.3%	4.1%	11.7%	6.5%
Japan	50.2%	54.6%	79.8%	**85.6%**	72.7%	45.0%	16.0%	1.9%	14.2%
Malaysia	12.3%	41.6%	79.9%	75.8%	**83.1%**	80.0%	45.1%	29.5%	65.1%
Philippines	54.9%	4.9%	40.2%	31.5%	10.5%	29.9%	24.7%	24.8%	44.7%
Singapore	68.7%	68.1%	**81.4%**	86.6%	84.8%	71.6%	40.7%	42.2%	52.5%
S. Korea	36.0%	41.2%	62.8%	49.8%	72.6%	78.5%	42.3%	27.4%	61.9%
Taiwan	77.9%	**83.2%**	90.1%	87.7%	80.6%	48.1%	9.3%	2.4%	36.9%
Thailand	9.4%	38.2%	75.8%	62.6%	60.2%	68.1%	40.4%	29.9%	67.8%

Australia and Oceania

Country	30	20	15	12	10	8.57	7.5	6.67	6
Australia	16.8%	7.5%	36.9%	63.2%	49.1%	25.9%	3.5%	26.8%	27.6%
N.Zealand	66.7%	70.2%	**86.1%**	77.4%	**81.2%**	78.5%	53.9%	26.8%	2.7%

Africa

Country	30	20	15	12	10	8.57	7.5	6.67	6
Morocco	36.6%	17.4%	28.2%	49.5%	76.3%	57.2%	15.7%	33.1%	35.5%
S.Africa	68.0%	60.7%	65.5%	60.7%	63.3%	51.1%	6.4%	17.4%	67.4%

Source: based on World Bank data

4 Conclusions

Relations between economic variables can be superficial or accidental, but assuming that the domestic US consumer demand, encouraging for other investors role of the U.S. investment funds, rating agencies and the U.S. stock exchanges create information-and sentiment-based transmission channels, it is hard to ignore the evidence that a long-term Poland's cycle seems to be highly dependent on the changes in the US economy (Poland is preceded by the U.S. economy by 1 – 2 quarters, depending on the analyzed frequency). What is more, until recently, Poland preceded almost all EU economies lagging only behind very few world economies, including the U.S. one. Therefore, it is difficult to reject the hypothesis that whatever happens in the U.S. will find be followed by the changes Polish economy and, consequently, by all other countries all over the world, if one analyzes long-term frequencies that reflect strong economic trends lasting longer than 2 years.

Cutting the long story short, if one assumes that presented results do not originate in imperfections of chosen econometric methods, one should reject the decoupling hypothesis for at least long business cycles and support the notion of a strong synchronization of the path of GDP changes.

The synchronization became especially visible during the last global financial crisis. Some countries, like China, showed some resistance in the presence of the global shocks (at the same time influencing other countries), but generally the cyclical part of GDP in both advanced and emerging countries deflected down in relation to GDP long-term trend (Kim et al., 2009).

Hence, there seems to exist evidence of quite strong synchronization of GDP changes between advanced and emerging economies which raises the question whether the high rates of growth in emerging economies are sustainable without a recovery in advanced economies.

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of the 10[th] International
Scientific Conference