# Monetary Policy Efficiency in the Eurozone

Svatopluk Kapounek

**Abstract**

The author focuses on the current problems of the single monetary policy implementation in the Eurozone in context of output stabilization function. The first problem is money demand function stability and its estimation. The stable money demand function ensures that the money supply would have predictable impact on the macroeconomic variables such as inflation and real economic growth. Another problem lies in the Postkeynesians´ assumptions of money endogeneity. Although central banks may have certain control over the money supply, they cannot fix the stock of money in a country. According to the Postkeynesians´ assumptions, the enterprises do not need no ex ante stock of savings in order to carry out investment decisions. The causality is directed from economic activity to money demand. Interaction between the money demand and supply is arranged by multiplier effect of deposits. The third significant problem of the single monetary policy implementation is heterogeneity in terms of economic development, structure, exposure to exogenous shocks and adjustment mechanism.

## 1. Introduction

The primary target of most central banks in developed economies is to maintain price stability, the European central bank (ECB) included. When there is no threat to the fulfilment of the primary target, the ECB focuses on its secondary target which is defined as support of a sustainable economic growth and full employment.[1] These targets are based on the German model of central banking, where the guiding principle is political independence. (De Grauwe, 2007) Even though, a substantial part of the discussions regarding the targets of the central banks focus on price stability, the real target is to support a sustainable economic growth, especially to stabilize the fluctuation in the economic activity. Price level stability is an important tool to maintain economic growth. Price stability increases transparency of the price mechanism and thereby helps to improve the allocation of resources. Moreover, it reduces the risks of inflation and inflation premia in interest rates. Price stability reduces distortions

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[1] The Treaty establishing the European Community (Article 105) defines *"The primary objective of the ESCB shall be to maintain price stability. Without prejudice to the objective of price stability, the ESCB shall support the general economic policies in the Community with a view to contributing to the achievement of the objectives of the Community as laid down in Article 2."* Article 2 describes secondary objectives as *"harmonious, balanced and sustainable development of economic activities, a high level of employment and of social protection, equality between men and women, sustainable and non-inflationary growth, a high degree of competitiveness and convergence of economic performance, a high level of protection and improvement of the quality of the environment, the raising of the standard of living and quality of life, and economic and social cohesion and solidarity among Member States."*

caused by inflation or deflation and creates conditions essential for the formation of a stable rational expectation. (Angeloni, 2002)

The impact of monetary policy on price stability is generally agreed. However, there is no theoretical consensus on whether central banks´ monetary policy is able to influence economic growth. According to classical economics (and its supply oriented models) the real output, in the long run, is determined by the production capacity of the economy, which cannot be directly influenced by the central banks´ monetary policy. However, the monetary policy can be used to influence the accumulation of capital (i.e. value of investments) and consequently the level of technological progress. According to supply-side economics, monetary expansion exerts influence over the real output only in the short-run, in the long-run the rise in the real output is offset by price increase. On the other hand Keynesian economics accepts that the real output can be influenced by monetary policy to the extent to which it is able to influence the aggregate demand. Especially, interest rates directly affect the investment decision-making process of most enterprises. Based on this argument it could be assumed that in demand-side economics monetary policy is an effective tool to influence economic growth.

Concurrently, the sensitivity of the investments and aggregate demand is different in the case of monetary expansion and restriction. The monetary restriction, represented by increase in interest rates, has more significant impact on the investments and aggregate demand than monetary expansion. The problem is grounded in lack of credibility of households and small companies. Significance of this assumption is determined by funding possibilities of households and companies. Higher degree of financial dependence of economic agents to banking system increases the difference in transmission mechanism.

John Maynard Keynes (Keynes) as the first defines different motives in money demand. Consequently argues that money demand is not stable, since different causes of these motives and its sensitivity. In the case of liquidity trap, monetary expansion has no impact on the aggregate demand and output. It happens in the situation of high sensitivity speculation money demand on interest rates which cause high speculative money demand. The motives of money demand pours into them and changes in the money supply is absorbed only by the velocity of money.

In the empirical analysis the author focuses on the money demand function stability, money endogeneity and transmission mechanism heterogeneity in the Eurozone. The target of the paper is to answer the question, if the monetary policy is efficient to stabilize output in the Eurozone.

## 2. Money demand function stability

Money demand stability is a necessary condition to establish direct link between the relevant monetary aggregate and nominal income. Stable money demand function enhances the ability of monetary authorities to reach predetermined monetary growth targets. Stability of this relationship is basic condition of ECB´s single monetary policy implementation in the Eurozone.

Thomas (1993) defines stability as the constant relationship between the money demand and only a few variables. Stability will be tested for regression parameters in time and low variance of residuals. Common econometric tools are CUSUM test (cumulative sum

of the recursive residuals, (Brown, Durbin and Evans (1975)) and Hansen´s test (parameter instability in linear models, Hansen (1992)).

According to the theoretical background, the author applies the stability test with the keynesian´s money demand function assumptions:

$$\frac{M^d}{P} = f(\underset{+}{Y}, \underset{-}{IR})$$

(1)

where $M^d$ represents nominal stock of the money (M1, M2 and M3), $P$ is aggregate price level (HICP), $Y$ real income (log GDP) and $IR$ represents short-term interest rate (money market short term interest rate) in the period 1999/Q1 – 2010/Q1.

All models presented in Table 1 identify causality between interest rate, economic activity and money demand (money aggregates) at 10% of significance level. All models meet Keynesian assumptions about the money demand instability as well. Significant lags were not identified. Figure 1 presents CUSUM and recursive residuals tests. First indications of instability are significant in the year 2005. The years 2008 and 2009 are affected by financial crisis and sharp slowdown in economic growth.

Table 1: OLS estimation and Hansen instability test

| Variable | OLS estimation | | | | Hansen test | |
|---|---|---|---|---|---|---|
| | Parameter | Std. chyba | T-Stat | P-value | T-stat | P-value |
| **Monetary aggregate M1** | | | | | | |
| Constant | -176222704,90 | 9047743,40 | -19,477 | 0,0000 | 1,0934 | 0,0000 |
| Y | 12489023,10 | 628808,50 | 19,8614 | 0,0000 | 1,0980 | 0,0000 |
| IR | -165945,80 | 33537,1000 | -4,9481 | 0,0000 | 0,8104 | 0,0000 |
| Joint | | | | | 3,7208 | 0,0000 |
| Variance | | | | | 0,3415 | 0,1100 |
| **Monetary aggregate M2** | | | | | | |
| Constant | -293170548,40 | 19119841,6 | -15,3333 | 0,0000 | | 0,0000 |
| Y | 20817013,60 | 1328808,50 | 15,6659 | 0,0000 | 1,1305 | 0,0000 |
| IR | -198430,40 | 70871,10 | -2,7999 | 0,0078 | 0,8322 | 0,0000 |
| Joint | | | | | 3,1783 | 0,0000 |
| Variance | | | | | 0,9894 | 0,0000 |
| **Monetary aggregate M3** | | | | | | |
| Constant | -349559287,80 | 20937364,80 | -16,6955 | 0,0000 | 1,1019 | 0,0000 |
| Y | 24804510,00 | 1455124,40 | 17,0463 | 0,0000 | 1,1053 | 0,0000 |
| IR | -211857,20 | 77608,00 | -2,7298 | 0,0093 | 0,8143 | 0,0000 |
| Joint | | | | | 3,1018 | 0,0000 |
| Variance | | | | | 0,9839 | 0,0000 |

We can summarize that stability of money demand function (causality between economic activity, interest rates and monetary aggregates) could be rejected at 10% significance level. However, what´s happened in the Eurozone during the last years? Probable answer is Keynesians´ assumption about the money demand instability due to the uncertainty

and interest rates fluctuations. In spite of that, the author assumes that money demand instability is more significant in the monetary union than small economy. The reason is cashless money creation by financial, especially banking system.

According to the Walras and Say rules aggregate supply and demand are equal. The world economy is monetary system where money plays the main role. Consequently, the money supply increase induces the higher money demand without any impact on the real variables like an economic growth or employment. The transmission mechanism uses money balances (monetary) or interest rates (Keynes).

In the first case, decrease in money demand causes pursuit of economic agents on the money base reduction and consumption increase. Higher consumption costs increases money demand. The second transmission mechanism uses interest rate which is reduced if money demand is lower than supply. This changes boost investments, subsequently rice in aggregate prices and money demand.
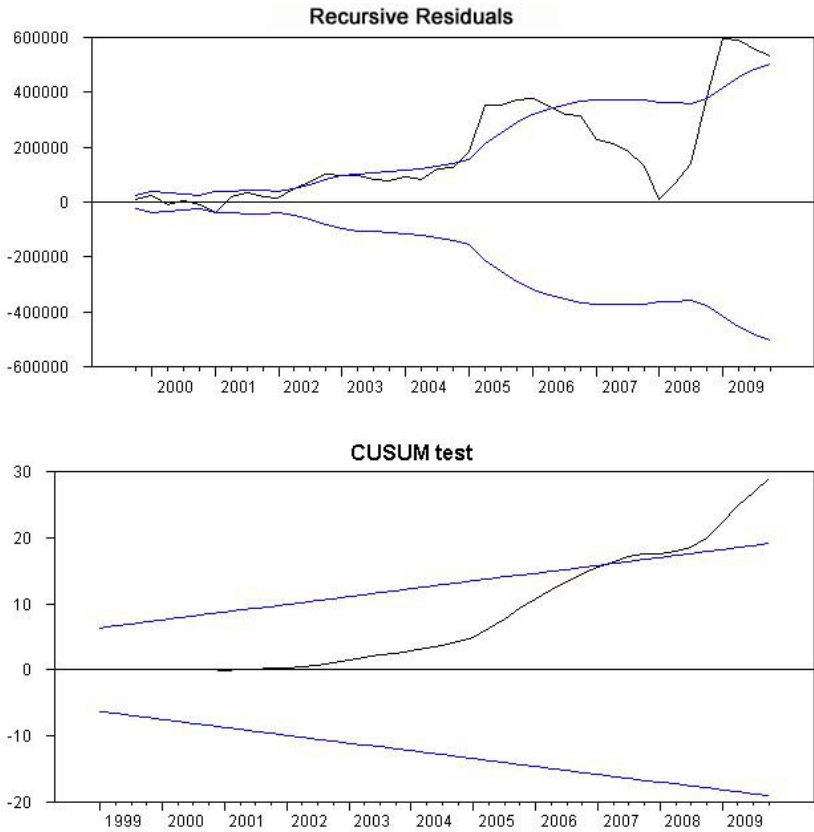


Figure 1: CUSUM test for monetary aggregate M1

Figure 1 represents monetary aggregates fluctuation during the last 12 years. In the year 2009 we can identify a significant difference between the monetary aggregate M1 and M2. Intermediate money (M2) comprises of narrow money (M1) and, in addition, deposits with an agreed maturity up to 2 years and deposits redeemable at a period of notice of up to 3 months. When the economic growth declined in the year 2009, increase of the monetary aggregate M1 (currency in circulation and overnight deposits) was not accompanied by increase of the deposits. In this case, the sources of equalization are changes in economic

activity, especially investment activity and cashless money creation by banking system. The changes in economic and investment activity appear in velocity of money.
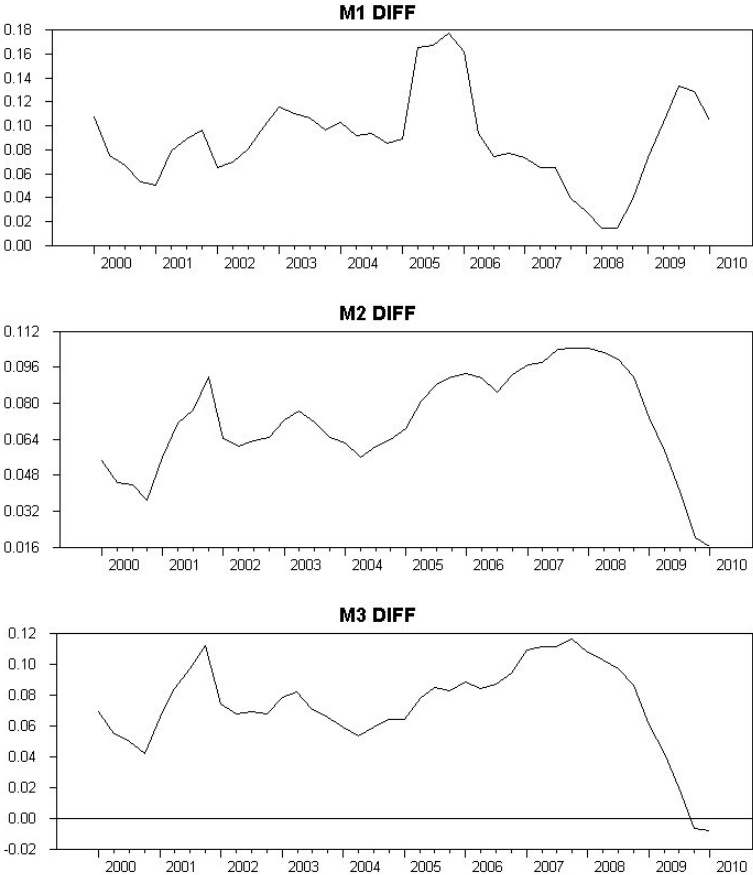


Figure 2: First order differences of monetary aggregates

The impact of banking system money creation on the stock of the money in the economy is determined by financial market size and share of small and medium enterprises, which are dependent on the credit financing of commercial banks. In the huge monetary union upper limit for the money creation vanishes since the financial market dimension. The money supply is continuously adjusted to money demand by force of the money velocity. From the reasons above we can reject the hypothesis about the money demand stability in the Eurozone.

### 3. Money endogeneity

The assumptions of money endogeneity are accepted by Post-Keynesian and New Keynesian economics. Although central banks may have certain control over the money supply, they cannot fix the stock of money in a country. The money supply is not an exogenously set policy variable but is the result of the portfolio decisions of the bank and non-bank private sector. "Thus, even if a central bank can directly set the value of its own liabilities, the money supply is endogenously determined as a residual of the economic process." (Fontana and Palacio-Vera, 2003) If money is a residual of economic processes, the rate of change in monetary aggregates is, in fact, a function of the aggregate demand and economy fluctuations. The implied direction of causality would then be from 'changes in nominal income' to

'changes in the stock of the money', which in turn has an impact on the short term interest rates of the interbank market.

Consequently, with the endogenous money assumption, the central banks´ monetary policy efficiency is limited. The control of money supply is indirect. The interest rate transmission mechanism channel is applicable. The interest rates influence the investment and economic activities which determine money demand. Subsequently, the stock of money (supply) is determined by its demand.

The money endogeneity is limited by sources of commercial banks. Small regional commercial banks are directly dependent on the interbank market and central bank. Their money supply is exogenously determined.

The problem is demonstrable during the years 2008 and 2009 (Figure 3). While money stock (money aggregate M1) rapidly grows, velocity of money falls with the economic activity.
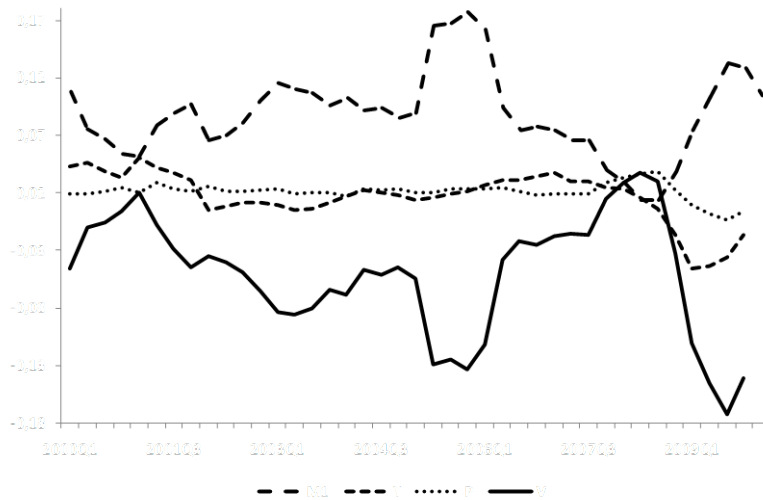


Figure 3:  Variables of Quantity Equation of Money

The empirical analysis of the money endogeneity is tested in Granger sense (Granger, 1969 and Sims, 1972). The author identifies direction of the causality between the variables in VAR model, where Akaik, Schwartz and Hannah-Quinn criterion for the lag identification are applied. The model is defined as follows:

$$Y_t = \alpha_{10} + \sum_{j=1}^{k} \alpha_{1j} X_{t-j} + \sum_{j=1}^{k} \beta_{1j} Y_{t-j} + \varepsilon_{1t},$$

$$X_t = \alpha_{20} + \sum_{j=1}^{k} \alpha_{2j} X_{t-j} + \sum_{j=1}^{k} \beta_{2j} Y_{t-j} + \varepsilon_{2t}. \tag{2}$$

where k represents lag order, $X_t$ and $Y_t$ are variables of the VAR model. Then, the types of causality direction are:

| Causality type | $\{\alpha_{11}, \alpha_{12}, ..., \alpha_{1k}\}$ | $\{\beta_{21}, \beta_{22}, ..., \beta_{2k}\}$ |
|---|---|---|
| Unilateral, $X \rightarrow Y$ | $\neq 0$ | $= 0$ |
| Unilateral, $Y \rightarrow X$ | $= 0$ | $\neq 0$ |
| Bilateral, $X \leftrightarrow Y$ | $\neq 0$ | $\neq 0$ |

To test the causality is applied statistic

$$FW = \frac{(RSS_r - RSS_u)/k}{RSS_u/(n-2k-1)} \sim F(k, n-2k-1), \tag{3}$$

where $RSS_u$ represents cumulative sum of residuals in unrestricted regression, $RSS_r$ cuulative sum of residuals in restricted regression. (Seddighi etc., 2000). The results of empirical analysis are presented in Tables 2, 3 and 4. Lag order 3 quarters is consistent with the lags of transmission mechanism in the Eurozone (Jílek, 2004 or Poměnková and Kapounek, 2009). The causality of variables itself is possible to interpret as the process memory. The aggregate price level, economic activity and interest rates are significantly affected by its past values.

Table 3: Granger causality for M1 and VAR(3)

| Independent variable (lag variables) | Causality type | Dependent variable |
|---|---|---|
| IR | $\rightarrow$ | |
| Y | no causality | |
| P | $\rightarrow$ | IR |
| M1 | $\rightarrow$ | |
| IR | no causality | |
| Y | $\rightarrow$ | |
| P | $\leftrightarrow$ | Y |
| M1 | $\leftrightarrow$ | |
| IR | no causality | |
| Y | $\leftrightarrow$ | |
| P | $\rightarrow$ | P |
| M1 | no causality | |
| IR | no causality | |
| Y | $\leftrightarrow$ | |
| P | $\rightarrow$ | M1 |
| M1 | no causality | |

Table 1 presents that monetary aggregate M1 is caused by economic activity and price level. Further, other analysed monetary aggregates (M2 and M3) are caused by interest rates again (Tables 2 and 3). However, changes in interest rates are not only one of the money demand motives but also these interest rates changes are caused by monetary aggregate too. The money supply and demand interaction has significant impact on the interest rates in the Eurozone. Possible interpretation is ECB reaction function and its targets´ definition.

Table 4: Granger causality for M2 and VAR(3)

| Independent variable (lag variables) | Causality type | Dependent variable |
|:---:|:---:|:---:|
| IR | → | |
| Y | → | |
| P | ↔ | IR |
| M2 | ↔ | |
| IR | no causality | |
| Y | → | |
| P | no causality | Y |
| M2 | no causality | |
| IR | ↔ | |
| Y | → | |
| P | ↔ | P |
| M2 | no causality | |
| IR | ↔ | |
| Y | → | |
| P | no causality | M2 |
| M2 | → | |

Table 5: Granger causality for M3 and VAR(3)

| Independent variable (lag variables) | Causality type | Dependent variable |
|:---:|:---:|:---:|
| IR | → | |
| Y | → | |
| P | no causality | IR |
| M3 | ↔ | |
| IR | no causality | |
| Y | → | |
| P | ↔ | Y |
| M3 | no causality | |
| IR | → | |
| Y | ↔ | |
| P | → | P |
| M3 | → | |
| IR | ↔ | |
| Y | → | |
| P | no causality | M3 |
| M3 | → | |

The money endogeneity was identified in the all analysed monetary aggregates (M1, M2 and M3). Absolute money endogeneity theory assumes infinitely elastic money supply. However, banking sector has some limitations in lending process. The economic agents (or enterprises) have different credibility at various levels of interest rates. From the specific point the money supply is not infinitely elastic but increasing. This approach is known as relative version of money endogeneity theory. The liquidity of commercial banks has also impact on the credits which are offered by banking sector (Wray, 1990). The tendency to offer more credits with lower interest rates increases with economic expansion too.

## 4. Currency union heterogeneity

Specific problem of monetary policy implementation in a currency union is heterogeneity between the individual countries. While economic growth in Ireland and Luxembourg fluctuates over 4%, economic growth in Italy falls below 1% (Table 6). Similar differences are possible to find in inflation rate. In spite of endogeneity in European integration process, the monetary policy efficiency is significantly restricted. The decisions about the single monetary policy character in the Eurozone are formed as the weighted mean of inflation rates (where the weights are determined by GNP of each member state).

Table 6: GDP growth

|  | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EA 12 | 2,8 | 2,9 | 3,9 | 1,9 | 0,9 | 0,8 | 2,1 | 1,7 | 2,9 | 2,7 | 0,5 | -4,1 | 1,6 |
| Belgium | 1,9 | 3,5 | 3,7 | 0,8 | 1,4 | 0,8 | 3,2 | 1,7 | 2,7 | 2,9 | 1,0 | -2,8 | 1,7 |
| Germany | 2,0 | 2,0 | 3,2 | 1,2 | 0,0 | -0,2 | 1,2 | 0,8 | 3,2 | 2,5 | 1,3 | -4,9 | 1,0 |
| Ireland | 8,4 | 10,7 | 9,4 | 5,7 | 6,5 | 4,4 | 4,6 | 6,2 | 5,4 | 6,0 | -3,0 | -7,1 | 4,8 |
| Greece | 3,4 | 3,4 | 4,5 | 4,2 | 3,4 | 5,9 | 4,6 | 2,2 | 4,5 | 4,5 | 2,0 | -2,0 | 3,4 |
| Spain | 4,5 | 4,7 | 5,0 | 3,6 | 2,7 | 3,1 | 3,3 | 3,6 | 4,0 | 3,6 | 0,9 | -3,6 | 3,0 |
| France | 3,5 | 3,3 | 3,9 | 1,9 | 1,0 | 1,1 | 2,5 | 1,9 | 2,2 | 2,4 | 0,2 | -2,6 | 1,8 |
| Italy | 1,4 | 1,5 | 3,7 | 1,8 | 0,5 | 0,0 | 1,5 | 0,7 | 2,0 | 1,5 | -1,3 | -5,0 | 0,7 |
| Luxembourg | 6,5 | 8,4 | 8,4 | 2,5 | 4,1 | 1,5 | 4,4 | 5,4 | 5,6 | 6,5 | 0,0 | -4,1 | 4,1 |
| Netherlands | 3,9 | 4,7 | 3,9 | 1,9 | 0,1 | 0,3 | 2,2 | 2,0 | 3,4 | 3,9 | 1,9 | -3,9 | 2,0 |
| Austria | 3,6 | 3,3 | 3,7 | 0,5 | 1,6 | 0,8 | 2,5 | 2,5 | 3,6 | 3,7 | 2,2 | -3,9 | 2,0 |
| Portugal | 5,0 | 4,1 | 3,9 | 2,0 | 0,7 | -0,9 | 1,6 | 0,8 | 1,4 | 2,4 | 0,0 | -2,6 | 1,5 |
| Finland | 5,0 | 3,9 | 5,3 | 2,3 | 1,8 | 2,0 | 4,1 | 2,9 | 4,4 | 5,3 | 0,9 | -8,0 | 2,5 |

Datasource: Eurostat

The problem with monetary policy implementation in a single country within a currency union is that it has different impacts on the aggregate price level and economic activities in different countries of this currency union. Nevertheless, there are different impacts of monetary policy expansion and restriction on investments and subsequently on economic activity. The Keynesians attribute this to the lack of credibility of many households and small companies. De Bondt et al. (2010) argue "that not only changes in the official interest rate and in loan demand matter for credit and output, but also bank loan supply factors, the balance sheet position of borrowers and the risk perception in the economy". Altunbas et al. (2010) argue that low interest rates increase banks´ risk. "The potential impact of risk-taking by banks may have implications on longer term macroeconomic outlook including output growth, investment and credit."(Altunbas et al., 2010) In heterogeneous

currency union the impact of the single monetary policy is not optimal for all member states. Excessively restrictive monetary policy in low-inflationary countries is balanced by lower interest rates in the member states where inflation is higher than the average. While the aggregate prices are balanced over the whole currency union, economic activity is systematically decreased due to the different impact of monetary restriction and expansion on economic growth. (Kapounek and Lacina, 2008)

Table 7: Percentage changes of HICP

|  | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EA 12 | 1,2 | 1,1 | 2,1 | 2,4 | 2,3 | 2,1 | 2,1 | 2,2 | 2,2 | 2,1 | 3,3 | 0,3 | 2,0 |
| Belgium | 0,9 | 1,1 | 2,7 | 2,4 | 1,6 | 1,5 | 1,9 | 2,5 | 2,3 | 1,8 | 4,5 | 0,0 | 1,9 |
| Germany | 0,6 | 0,6 | 1,4 | 1,9 | 1,4 | 1,0 | 1,8 | 1,9 | 1,8 | 2,3 | 2,8 | 0,2 | 1,5 |
| Ireland | 2,1 | 2,5 | 5,3 | 4,0 | 4,7 | 4,0 | 2,3 | 2,2 | 2,7 | 2,9 | 3,1 | -1,7 | 2,8 |
| Greece | 4,5 | 2,1 | 2,9 | 3,7 | 3,9 | 3,4 | 3,0 | 3,5 | 3,3 | 3,0 | 4,2 | 1,3 | 3,2 |
| Spain | 1,8 | 2,2 | 3,5 | 2,8 | 3,6 | 3,1 | 3,1 | 3,4 | 3,6 | 2,8 | 4,1 | -0,2 | 2,8 |
| France | 0,7 | 0,6 | 1,8 | 1,8 | 1,9 | 2,2 | 2,3 | 1,9 | 1,9 | 1,6 | 3,2 | 0,1 | 1,7 |
| Italy | 2,0 | 1,7 | 2,6 | 2,3 | 2,6 | 2,8 | 2,3 | 2,2 | 2,2 | 2,0 | 3,5 | 0,8 | 2,3 |
| Luxembourg | 1,0 | 1,0 | 3,8 | 2,4 | 2,1 | 2,5 | 3,2 | 3,8 | 3,0 | 2,7 | 4,1 | 0,0 | 2,5 |
| Netherlands | 1,8 | 2,0 | 2,3 | 5,1 | 3,9 | 2,2 | 1,4 | 1,5 | 1,7 | 1,6 | 2,2 | 1,0 | 2,2 |
| Austria | 0,8 | 0,5 | 2,0 | 2,3 | 1,7 | 1,3 | 2,0 | 2,1 | 1,7 | 2,2 | 3,2 | 0,4 | 1,7 |
| Portugal | 2,2 | 2,2 | 2,8 | 4,4 | 3,7 | 3,3 | 2,5 | 2,1 | 3,0 | 2,4 | 2,7 | -0,9 | 2,5 |
| Finland | 1,3 | 1,3 | 2,9 | 2,7 | 2,0 | 1,3 | 0,1 | 0,8 | 1,3 | 1,6 | 3,9 | 1,6 | 1,7 |

Datasource: Eurostat

Assume that the currency union fulfils the optimal currency area conditions especially there are no significant probability of asymmetric shocks appearing. Commercial banks play a central role in providing credits to small and medium-size enterprises. As the commercial banks are diversely sensitive about the central banks´ monetary policy character changes, different interest rates for credits are bid in different parts of the currency union. Detailed empirical analysis of the interest rates heterogeneity in the Eurozone was presented by Sorensen and Werner (2006). These authors have identified several factors which cause differences in the speed of commercial banks loan and deposit interest rates adjustment, e.g. concentration, market power (RoE), credit risk, interest rate risk, banks´ excess liquidity, diversification, banks´ excess capital, share of deposit funding and loan demand. The significant heterogeneity of the pass-through of market interest rates to bank interest rates in the Eurozone has a direct impact on the degree of retail banking sector integration and monetary policy efficiency.

## 5. Conclusions

The author identified three problems of monetary policy implementation in the Eurozone – money demand instability, money endogeneity and currency union heterogeneity.

The money stock is determined by the economic and investment activities in the Eurozone. The cashless money creation is source of economic system instability, where money supply is balanced by velocity of money and determined by money demand. The upper limit of money creation vanishes in the huge currency union and large financial system. The

instability increases rapidly if the economic and investment activities fall down. Consequently, the monetary policy implementation is significantly limited. The central bank is able to determine the money stock in the economy indirectly, through the interest rates and its impact on the investment and economic activity. The author prefers relative money endogeneity.

According to the Post-Keynesians assumptions administrative instruments are the most important. The target of central bank is not only maintaining price stability but also financial system stabilization and sufficient liquidity arrangement.

The most important problem of monetary policy implementation efficiency is transmission mechanism heterogeneity in the Eurozone. The heterogeneity consists in different economic growth and inflation rates in individual member states.

The author recommend passive role of central bank in the process of monetary policy implementation. The optimal ECB´s target is maintaining low and stable interest rates to support economic growth in the Eurozone. Price stability is recommended field of national governments excluding situation of symmetric and significant inflation shock in the all member states.

It is possible to conclude that current heterogeneous Eurozone, the money endogeneity and money demand stability restrict monetary policy efficiency, especially its stabilization function. The real convergence and OCA theory is not only the academic discussion.

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*Contact details:*
Ing. Svatopluk Kapounek, Ph.D.
Mendel University Brno
Faculty of Business Economics
Research Centre
Zemedelska 1, 613 00 BRNO, Czech Republic
Email: skapounek@mendelu.cz