

# MONETARY POLICY EFFICIENCY IN THE EURO ZONE: SOME EMPIRICAL EVIDENCE OF MONEY DEMAND STABILITY AND ENDOGENEITY

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**Abstract:** *The primary target of most central banks in developed economies is to maintain price stability. When there is no threat to the fulfilment of the primary target, the central bank focuses on its secondary target which is defined as support of a sustainable economic growth and full employment. 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.*

*This paper focuses on the current problems of monetary policy implementation in the Eurozone. Firstly, the author focus on the money demand function estimation and its stability. 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. Different trends in monetary aggregates fluctuation contribute to reject the money exogeneity hypothesis.*

**Key words:** *CUSUM test, Hansen stability test, money exogeneity and endogeneity, Granger Non-Causality test.*

## 1. Introduction

The primary target of most central banks in developed economies is to maintain price stability. When there is no threat to the fulfilment of the primary target, the central bank focuses on its secondary target which is defined as support of a sustainable economic growth and full employment. 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 caused by inflation or deflation and creates conditions essential for the formation of a stable rational expectation. (Angeloni, 2002)

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The impact of monetary policy on price stability is generally agreed on. However, there is no theoretical consensus on whether the 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.

## 2. Objectives

The first 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)

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.

The third 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. 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.

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. Deposits are main source of credits which commercial banks offer to enterprises, hence the impact of monetary

expansion on the investment activities and output is restricted.

If the money supply is influenced by money endogeneity assumptions, the monetary policy character is significantly determined by money demand. Beyer (2009) argues that important explanatory variable of long-run money demand is housing wealth. He also states that the current financial crises has no impact on the stability of this money demand model. Cointegrated variables in the model were GDP, prices and interest rates.

Another problem of the monetary policy output stabilization function is money demand stability. El-Shagi and Giesen (2009) identified the changes in growth rate of long run equilibrium velocity as one of the major problems of transmission mechanism, especially in analyzing the role of money for inflation. The authors "also find new evidence that monetary policy is not only driven by recent developments of macroeconomic indicators, but accounts for previous monetary policy that has not yet had its expected inflationary effect... A substantial part of the current velocity can most likely be explained by the increased risk aversion of banks in response to the current crisis and the corresponding deleveraging." (El-Shagi and Giesen, 2009)

The above mentioned current problems correspond to the theoretical and empirical evidence of monetary policy implementation in the currency area.

## 2.1. Material and Methods

To verify the efficiency of single monetary policy implementation in the Eurozone author tests the money demand stability function. 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:

$$\frac{M^d}{P} = f(Y, IR) \quad (1)$$

where  $M^d$  represents nominal stock of the money (M1, M2 and M3),  $P$  is aggregate price level (HICP),  $Y$  real income (wholesale and retail trade and repair of motor vehicles and motorcycles, index of turnover) and  $IR$  represents short-term interest rate (money market short term interest rate). All data are used as monthly percentage change compared to corresponding period of the previous year (excluding interest rates) in the period 2001/M1 – 2009/M8.

The money exogeneity is tested in Granger sense. Assume that the regression relationship is linear:

$$y_t = \beta_1 + \beta_2 x_t + \varepsilon_t \quad (2)$$

and transform the model (2) into the next equation:

$$y_t = E[y_t | x_t] + (y_t - E[y_t | x_t]), \quad (3)$$

where the condition  $E[y_t | \varepsilon_t] = 0$ . Analogically could be defined variable  $x_t$ . To identify the independency between the

variables must be defined exogenous variable in the model (3):

$$f(y_t, x_t) = f(y_t | \beta, x_t) \times f(\theta, x_t), \quad (4)$$

"where the parameters in the conditional distribution do not appear in and are functionally unrelated to those in the marginal distribution of  $x_t$ . By this arrangement, we can think of "autonomous variation" of the parameters of interest,  $\beta$ . The parameters in the conditional model for  $y_t | x_t$  can be analyzed as if they could vary independently of those in the marginal distribution of  $x_t$ . If this condition does not hold, then we cannot think of variation of those parameters without linking that variation to some effect in the marginal distribution of  $x_t$ . In this case, it makes little sense to think of  $x_t$  as somehow being determined "outside" the model." (Green, 2003, pp.591).

To reject or accept the hypothesis about the independency was used Granger non-causality approach, known also as strong exogeneity. Assume this equation:

$$E[y_t | y_{t-1}, x_{t-1}, x_{t-2}, \dots] = E[y_t | y_{t-1}], \quad (5)$$

which could be interpreted, if once we condition on past values of the dependent variable  $y_t$ , lags of the independent variable  $x_t$  do not explain any variation in the current value of the dependent variable  $y_t$ . In practise, the sequence of lags of variable  $x$  has to be truncated, and additional lags of  $y$  are included in the model. In Grange non-causality approach will be used model:

$$y_t = \alpha + \beta_1 y_{t-1} + \beta_2 y_{t-2} + \gamma_1 x_{t-1} + \gamma_2 x_{t-2} + \varepsilon_t \quad (6)$$

If the empirical analysis fails to reject the hypothesis  $\gamma_1 = \gamma_2 = 0$  and simultaneously reject the hypothesis  $\beta_1 = \beta_2 = 0$ , the variable  $y$  is exogenous. In this case will be rejected the hypothesis about the causality existence between the variables in Granger sense, consequently the money are exogenous.

### 3. Results and Discussion

The empirical analysis identifies significant relationship between the monetary aggregates (M1, M2, M3), interest rates and economic activity. Table 1 presents multiple regression analysis results where some lags were identified. However, many theoretical and empirical studies expect shorter lag than 9 months. Therefore the relationship between the monetary aggregate M3 and other independent variables is reflected.

The Hansen (Table 1) and CUSUM (Figure 2) stability tests reject the hypothesis about the money demand stability function at 1% significance level.

Money endogeneity hypothesis was tested in Granger Non-Causality sense. Results of multiple regression analysis (Table 2) fail to reject the hypothesis  $\gamma_1 = \gamma_2 = 0$  and simultaneously reject the hypothesis  $\beta_1 = \beta_2 = 0$  in the case of monetary base M1 and economic activity indicator. In the case of M1 monetary aggregate, we can conclude that money are exogenous. In the case of monetary base M2 and M3 we can reject the hypothesis about the money exogeneity at 5% significance level.

### 4. Conclusion

Money exogeneity, stable money demand and its interest rates elasticity is basic condition of central banks' monetary policy implementation and efficiency.

The empirical analysis identifies significant relationship between the monetary aggregates, interest rates and economic activity. Hansen test of stability and CUSUM test of recursive residuals rejected the hypothesis about the money demand stability for the all monetary aggregates used in the empirical analysis. According to the keynesians' assumptions,

the interest rate is not stable in economy and therefore the money demand is unpredictable. This assumption is very important for the monetary authorities. It is problematic to find direct link between the relevant monetary aggregate and nominal income. The causes of the instability could be found in changes in velocity of money or Eurozone heterogeneity.

This problem is emphasized by the money endogeneity character in the Eurozone. The empirical analysis rejects the money exogeneity of the monetary aggregate M2 and M3. The causality between economic activity and money stock is reversed.

According to the post-keynesians' assumption, the enterprises do not need no ex ante stock of saving 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.

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