



Empirical Evidence on Money Demand Modelling

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Abstract

The paper provides an empirical analysis of the demand for narrow money in Macedonia. Specifically, it deals with the following issues: the empirical modelling of the demand for money in the long-run, the short-run dynamics of money, and the stability of the demand for money. The empirical analysis of the demand for money covers the period Q1:1994-Q4:2008. The period following the Global economic crisis is excluded due to clear structural break in data. For the purpose of the research, the following variables are applied: narrow money as represented by the monetary aggregate M1, real Gross Domestic Product, and nominal interest rate on 3-month time deposits, denominated in domestic currency. The Vector Error Correction Model (VECM) is employed by running two alternative test statistics: the trace of the stochastic matrix and the maximum eigenvalue. Based on both tests it may be concluded that there is cointegration relationship between the variables of interest. Furthermore, the research results may reflect the fact that we model the demand for narrow money, which serves for transaction purposes and not as an asset, so that economic agents tend to economise with money holdings. This finding is further confirmed by the pretty high coefficient before the interest rate, which is in line with the interest semi-elasticity usually found in other countries with less developed financial systems. As for the short-run dynamics, the results suggest very slow adjustment of the demand for money towards its long-run equilibrium level. Finally, an estimation of the recursive coefficients before real income and nominal interest rates is conducted and found that they remain quite stable over time. Therefore, one may take this exercise as evidence in favour of the stability of the demand for money.

Keywords: Money demand; Vector error correction model; Cointegration.

Introduction

The growing interest in empirical modelling of money demand dates back decades ago, reflecting the need to investigate the relationship between monetary aggregates and macroeconomic variables. Intuitively, the analysis of money demand seems to be important for central bankers because, quite naturally, monetary policy deals with money. In these regards, the analysis of the stability of the relationship between money and prices is usually done within the context of the money demand function. This kind of empirical studies is especially relevant for monetary policy strategies where monetary aggregates play an important role, such as the two-pillar framework of the European Central Bank. In this case, the existence of a stable relationship between money, price level and other relevant variables is a precondition for the conduct of monetary policy.

Modelling money demand seems to be an important tool in the evaluation of the existing monetary policy strategy in Macedonia and the search for the possible alternatives. Since 1995, Macedonia has pursued the exchange rate targeting, which resulted in quick and sharp disinflation and sluggish economic growth. Hence, during the whole post-disinflation period, the peg has been criticised for its alleged negative effects on economic activity calling for replacing it with another monetary policy strategy. Therefore, if this substitution is to be done with a strategy in which monetary aggregates play more active role, the empirical analysis of money demand proves to be of crucial importance for checking the existence of a stable relationship between money and prices.

This paper provides an empirical analysis of the demand for narrow money in Macedonia. Specifically, the paper deals with the following issues: the empirical modelling of the demand for money in the long-run, the short-run dynamics of money, and the stability of the demand for money. The paper is organized as follows: the next section provides for a brief theoretical background for the demand for money; Section 3 reviews the empirical literature on the demand for money; Data and research methodology are outlined in Section 4; Section 5 focuses on the empirical modelling of the demand for money in Macedonia, both in the long and the short run. Finally, the paper ends with the most important conclusions and suggestions for possible future research.

Theoretical Background

As elaborated in any standard textbook on monetary theory, money may be demanded for two reasons: first, money is held for transaction purposes, and second, money may be viewed as an asset in the economic agents' portfolio. In the former case, holding some amount of money serves as a means of covering the gap between the periodic income and expenditure flows. In the latter case, economic agents may decide to keep a portion of their overall wealth in the form of money balances, given the useful functions they perform. Notwithstanding the reason for holding money, the demand for it is usually given in the following general form (Eq. 1):

$$M^d/P = f(I, R) \quad (1)$$

Where:

M^d denotes the nominal quantity of money demanded

P denotes a measure of the general price level

I denotes a scale variable representing the economic agents' income or wealth, and

R denotes a vector comprising the returns on various financial and physical assets, which appear as alternative investment opportunities.

Within this simple theoretical framework, the demand for money is an increasing function in the scale variable in the sense that an increase in economic activity raises the demand for money. As for the response of the demand for money with respect to the vector of returns, the standard monetary theory predicts that higher returns on the alternative assets in the portfolio result in decreasing demand for money. In this respect, the vector R is usually referred to as the opportunity cost of holding money. Recently,

reflecting the process of financial deregulation, where monetary aggregates provide some return, the vector R may be given a broader interpretation in the sense that it incorporates two types of returns: first, the return on the assets included in the definition of money (the "own" return on money), and second, the return on the assets outside the monetary aggregates (bonds, commodities, property etc.). If we take this broader interpretation of R , then the demand for money is an increasing function in the "own" rate of return and a decreasing function in the outside rates of return (which represent the opportunity cost of money).

An Overview of the Empirical Research of Money Demand

During the last two or three decades a huge empirical literature has accumulated dealing with demand for money. Though various studies differ with respect to the monetary aggregates analysed (narrow or broad money), the general approach (country-specific or panel data), the countries being covered (industrialised or emerging economies), the methodology (VECM, ARDL etc.), they usually follow some standard procedure. A non-exhaustive list of money demand studies comprises [1], [2], [3], [4], and [5] for industrialised countries; [6], [7], [8], [9], [10] and [11] for less developed, emerging economies; and [12], [13] and [14] for Central and Eastern European countries.

In addition, [15] provides an exhaustive review of the empirical literature on money demand, especially that employing the ECM approach. He finds that the estimated income elasticity for narrow money ranges from 0.4 to 2, although both the mean and the median of estimates are closer to 1 than to 0.5. Furthermore, [16] provide even a broader survey of almost 1000 money demand estimations extracted from three survey papers, including that of [15]. They find that the income elasticity is lower for the demand for narrow money, it is higher in less developed countries, and the estimates range within a wide interval (from 0.4 to 1.6), though, once again, the mean and median are often around 1.

Data and Methodology

The empirical analysis of the demand for money in Macedonia is based on data sources obtained from the Research Division within the central bank. The sample extends from the first quarter of 1994 up to the last

quarter of 2008, i.e. we exclude the period following the Global economic crisis, which has caused a structural break in the data. We work with quarterly values of the following variables: narrow money as represented by the monetary aggregate M1 (comprising cash plus sight deposits), Gross Domestic Product (GDP), and the interest rate on 3-month time deposits, denominated in domestic currency (DENDEP). In addition, nominal narrow money and GDP are deflated by the Consumer Price Index (CPI) and are expressed in natural logarithms.

We chose to model the demand for narrow money for several reasons: First, the definition of M1 in Macedonia is consistent with the definitions generally applied elsewhere, thus allowing comparisons of the results; Second, M1 is closely associated with transactions, because it comprises the most liquid financial instruments, i.e. those that serve as medium of exchange; Third, working with M1 allows for unambiguous selection of the opportunity cost of holding money, because it eliminates the need for differentiating between own and outside rate of return; Fourth, from central bank's point of view, it's much easier for monetary authorities to control narrow money than broader aggregates; Finally, one may argue that narrow money is closer related with prices and other economic variables, especially in countries where the financial system is not so developed and the financial instruments are not sophisticated. Therefore, we think that the model for narrow money will work better compared to the one with broader money (which was confirmed by our preliminary estimates of the money demand for M2).

In the empirical research on money demand, the general function (1) is usually represented in a log-linear form:

$$(m - p) = \beta_0 + \beta_1 y + \beta_2 r \quad (2)$$

In the above specification, the dependent variable is the real demand for money ($m - p$), where money is represented by the monetary aggregate M1. As can be seen, we model money demand as demand for real money, which implies that the model incorporates the assumption of price homogeneity. In turn, this assumption implies that money is neutral in the long run, i.e. the demand for nominal money balances rises proportionally with the increase in prices.

Further on, since we model the demand for narrow money, it means that the empirical model employed herein is consistent with the transactions demand for

money, so that real GDP is used as a measure of the volume of transactions. As for the last variable in equation (2), at least from theoretical point of view, the yield on long-term bonds seems to be an adequate proxy of the opportunity cost. However, there are no relevant long-term interest rates that would play this role in Macedonia. So far, only a few two-year government bonds have been issued for which there is no active secondary market. In these circumstances, short term interest rates are taken as representatives of the opportunity cost of money, because these financial instruments appear to be closer substitutes of money. Among the various short-term interest rates, the usual approach found in the empirical literature is to work with the yield on treasury bills. In Macedonia, treasury bills have been introduced only recently and, at the same time, they lack liquidity, so that the use of interest rates on central bank bills (CB-bills) seems to be more promising.

Yet, we think that the interest rate on three-month time deposits provides a better measure of the opportunity cost, compared to (CB-bills), for two reasons: First, the market for central bank bills is dominated by commercial bank, i.e. bank deposits are still the predominant form of financial assets in which population and companies invest their excess money holdings; Second, there's no active secondary market for CB-Bills, so due to their low liquidity, they can hardly be regarded as close substitutes of money. In addition, the preliminary investigation of the time series properties has shown that CB-Bills might not be integrated of the same order such as the other variables included in the model, which might be a source of estimation problems.

Given the log-linear form of the empirical model, the coefficients before the independent variables measure the elasticity of the demand for money. However, since the interest rate enters the model in levels rather than in logarithms, it implies that the coefficient before this variable represents the semi-elasticity. As for the signs and magnitudes of the coefficients, the main theoretical predictions are as follows: the quantity theory of money implies that $\beta_1 = 1$, while the Baumol-Tobin model asserts that $\beta_1 = 0.5$; and the coefficient before the opportunity cost of money should bear a negative sign. See [17] on these and other important issues on empirical modelling of money demand.

Estimation of the Empirical Model

In the last two decades, the Vector Error Correction Model (VECM) has emerged as the usual

methodology for analysing the demand for money, because it enables researchers to study both the long run and short run dynamics of economic variables. Here, we first look at the time series property of the variables in the empirical model.

Unit Root Tests

The variables included in the empirical model were checked for stationarity, using the Augmented Dickey-Fuller (ADF) test. Given the small sample, the Schwarz Information Criterion has been employed for determining the number of lags in the ADF test in order to save degrees of freedom. Based on this information criterion, the ADF-test for M1/P was performed with two lags in the test-equation, the test-equation for GDP included four lags, while the test for DENDEP didn't include any lags, implying that the basic DF-test has been employed. The results of the unit root tests performed in levels are reported in the Table 1.

As can be seen, the test of the null hypothesis for presence of a unit root reveals that GDP is clearly non-stationary, while two of the three test-variants show that money and interest rate are non-stationary, too.

TABLE 1. ADF UNIT ROOT TEST (IN LEVELS)

Variable	Variant of the test		
	constant	constant and trend	none
Log (M1/P)	-0.5212 (0.8773)	-3.2586* (0.0861)	3.7079 (0.9999)
Log (GDP)	0.1832 (0.9684)	-1.7157 (0.7270)	1.6652 (0.9749)
DENDEP	-1.9789 (0.2949)	-0.4943 (0.9804)	-2.9542*** (0.0040)

Note: *, ** and *** denote rejection of the null at 10%, 5% and 1%, respectively.

Due to the slight uncertainty of the results, and taking into account the low power of the ADF-test in small samples, we decided to check for the stationarity properties of the variables by means of the Philips-Perron (PP) test.

TABLE 2. PP UNIT ROOT TEST (IN LEVELS)

Variable	Variant of the test		
	constant	constant and trend	none
Log (M1/P)	-0.7309 (0.8288)	-2.5175 (0.3187)	4.7137 (1.0000)
Log (GDP)	-1.8672 (0.3445)	-4.8076*** (0.0017)	3.1138 (0.9993)
DENDEP	-1.9605 (0.3028)	-0.5503 (0.9774)	-2.9717*** (0.0038)

Note: *, ** and *** denote rejection of the null at 10%, 5% and 1%, respectively.

As shown in Table 2, the PP-test didn't change the previous results dramatically: Here, M1 appeared to be clearly non-stationary, while the tests for GDP and DENDEP provide mixed results, depending on the variant of the test-equation employed.

Overall, most of the tests suggest that all the variables, taken in levels, are non-stationary.

Therefore, the unit root tests performed on the levels of the variables lead to the conclusion that money, GDP and interest rates are non-stationary. In order to see if they're integrated of the same order, we checked for the stationarity properties of the same variables taken as first differences. Here, one again, we employed the ADF and PP tests, which clearly showed that the null of a unit root can be rejected at 1% significance level (The results of the unit root tests on the first differences are not presented in order to save space).

The Long-run Model of Money Demand

Hence, on the basis of the unit root tests, we can conclude that M1, GDP and DENDEP are I (1) processes. Since all the variables in the empirical model are integrated of the same order, we can proceed with the econometric analysis, by testing for the presence of cointegration between these three variables. As already mentioned, the concept of cointegration was introduced by [18] who showed that even if the variables are non-stationary, some linear combination of them may be stationary, in which case, they are said to be cointegrated. The economic interpretation of cointegration is that a long-run equilibrium relationship exists between a given set of variables.

We study the long-run relationship between money, income and interest rates by means of the maximum-likelihood approach to cointegration, introduced by [19] and [20], which appears to be commonly used method to analyse cointegrated systems. In contrast to the procedure of [18], which is based on the residuals obtained from a single equation, the [19] approach utilises the Vector Autoregression (VAR) framework. Here, the procedure begins with an unrestricted VAR and then the cointegration rank of the system is determined, showing the number of cointegrating vectors.

We begin our empirical modelling of money demand by specifying a VAR model containing the levels of three variables from the equation (2). Note that, a priori, all the variables in the money demand function

are endogenous, which implies that we employ a nonstructural VAR. When working with VARs, one needs to determine the lag length, which is usually done by means of some information criterion. We employed several information criteria and, expectedly, the results differed sharply, with Akaike and Hannan-Quinn Information Criteria suggesting much more lags, while Schwarz Information Criterion selecting a first-order VAR. Because of the limited size of the sample, we decided to make a compromise between the results from the three information criteria. Hence, we've included four lags in the VAR, which seems reasonable, given that we work with quarterly data. In order to determine the number of cointegrating vectors, we employed the two Johansen's alternative test statistics: the trace of the stochastic matrix (Table 3) and the maximum eigenvalue (Table 4).

TABLE 3. COINTEGRATION TEST BASED ON THE TRACE OF THE STOCHASTIC MATRIX

Null	Alternative	Statistic	5% critical value
r = 0	r >= 1	30.38127	24.27596
r <= 1	r = 2	11.69149	12.32090
r <= 2	r = 3	1.286008	4.129906

TABLE 4. COINTEGRATION TEST BASED ON THE MAXIMUM EIGENVALUE

Null	Alternative	Statistic	5% critical value
r = 0	r >= 1	18.68978	17.79730
r <= 1	r = 2	10.40548	11.22480
r <= 2	r = 3	1.286008	4.129906

As can be seen from Table 3 and Table 4, in both cases, the test statistic exceeds the critical values at 95% confidence level, suggesting that we can reject the null hypothesis of no cointegrating vectors in favour of the alternative. On the other side, the obtained test statistic is not sufficient to reject the null of at most one cointegrating vector in favour of the alternative of two cointegrating vectors. Hence, based on the trace statistic and the maximum eigenvalue statistic, we can conclude that there is cointegration relationship between the variables of interest, and this cointegrating vector can be regarded as money demand function. Yet, a note of caution is needed when interpreting these results: It is known that the results of the Johansen's cointegration tests depend on the lag-length of the VAR. As mentioned above, when determining the order of the VAR, two of the information criteria suggested that many lags should

be included, while one criterion pointed to only one lag. Since we work with a small sample and don't want to lose too many degrees of freedom, we've adopted a somewhat arbitrary approach to work with a VAR of fourth order. This decision had a substantial impact on the results of the cointegration test, which proved to be sensitive on the number of lags included in the VAR. Further on, it should be mentioned that the cointegrating rank depends on the variant of the cointegration test, i.e. on whether the VAR includes intercept and(or) trend. Finally, as noted in [17], this sensitivity of the cointegration tests may reflect the choice of particular measure of the variables in the empirical model.

When normalised with respect to M1, we obtain the following cointegration vector (with standard errors given in parentheses):

$$M1 - 0.607037GDP + 5.406044DENDEP \sim I(0).$$

(0.02471) (2.93254)

The coefficients before the variables are of the expected sign, although it should be noted that the coefficient before DENDEP is significant only at 10%, while that before GDP is highly significant. Hence, the cointegrating vector can be interpreted as a money demand function, where money holdings are positively related to real income and negatively associated with the short run interest rate. As for the economic importance of the obtained coefficients, it can be seen that income elasticity is much lower than unity, i.e. it is closer to 0.5. This result may reflect the fact that we model the demand for narrow money, which serves for transaction purposes and not as an asset, so that economic agents tend to economise with money holdings. In these regards, it is worth noting that the recent institutional and technological innovations in the payment system have increased the ability of economic agents to economise with money balances, thus, reducing the income elasticity of the demand for narrow money. In terms of money demand theories, it seems that our empirical model supports the Baumol-Tobin framework. This tendency of economic agents to economise with money holdings is further confirmed by the pretty high coefficient before the interest rate, which is in line with the interest semi-elasticity usually found in other countries with less developed financial systems.

Figure 1 plots the cointegrating vector estimated with the Johansen's approach. In these regards, the cointegrating vector might be taken as a measure for

the deviation of the money demand from its equilibrium level. As shown, during the whole period, the cointegrating vector lies below the zero line, which means that the demand for narrow money has been less than its equilibrium long-run level. This result reflects both the low income elasticity and the high interest rate elasticity of the demand for money, i.e. the tendency of economic agents to keep money holdings as low as possible. In addition, this finding might be related with the high degree of currency substitution, too. Finally, it seems that monetary policy had, also, been an important factor that kept demand for money under its equilibrium level. On the one hand, in order to defend the exchange rate peg, the central bank has maintained relatively high interest rates throughout the sample period, thus reducing the demand for money. On the other hand, during the second half of the 1990s, the central bank employed direct instruments for controlling the money supply (credit ceilings), resulting in very low rates of monetary growth. As a consequence of this tight monetary policy, it was difficult for the economic agents to adjust their money holdings to the desired level. However, recently, the overall macroeconomic environment has changed substantially (with quite high money growth rates and much lower interest rates), thus, enabling economic agents to drive their money holdings to the long-run equilibrium level.

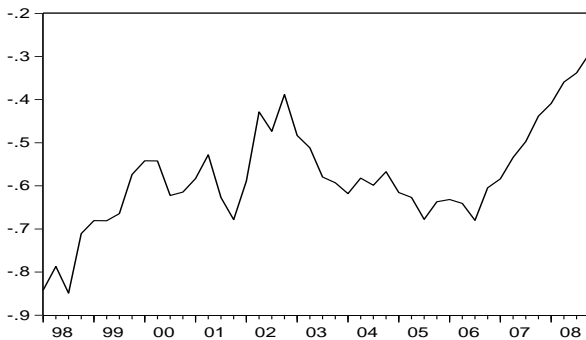


FIG. 1 COINTEGRATION VECTOR FOR THE MONEY DEMAND

The Short-run Model of Money Demand

We analyse the short-run dynamics of the money demand by means of the VEC model, containing the first differences of all endogenous variables entering the system (real money, real income and the short-run interest rate) along with the error correction vector, which represents the deviations of the endogenous variables from their long-run equilibrium levels. The short-run model shows how the demand for money

reverts to its long-run equilibrium level, after having been disturbed by exogenous shocks.

Therefore, on the basis of the cointegration equation, the following Error Correction Model (ECM) for the demand for narrow money was estimated:

$$\Delta M1_t = \beta_0 + \beta_1 \Delta M1_{t-1} + \beta_2 \Delta GDP_{t-1} + \beta_3 \Delta DENEDEP_{t-1} + \lambda ECM_{t-1} + u_t$$

Where:

$$ECM_{t-1} = M1_{t-1} - 0.607037GDP_{t-1} + 5.406044DENEDEP_{t-1}.$$

Table 5 presents the estimates obtained from the short-run empirical model of the demand for money.

TABLE 5. ECM OF THE DEMAND FOR MONEY

Dependent variable: $\Delta M1$ Sample: 1998Q1 - 2008Q4 Number of observations: 44			
Regressor	Coefficient	Standard error	t-statistics
$\Delta M1(-1)$	0.211292	0.16782	1.25905
$\Delta M1(-2)$	-0.268380	0.16440	-1.63246
$\Delta M1(-3)$	-0.004873	0.15940	-0.03057
$\Delta GDP(-1)$	-0.212917	0.20181	-1.05505
$\Delta GDP(-2)$	-0.447801	0.23282	-1.92338
$\Delta GDP(-3)$	-0.170700	0.18104	-0.94290
$\Delta DENEDEP(-1)$	3.065300	1.84455	1.66182
$\Delta DENEDEP(-2)$	1.266141	1.89475	0.66824
$\Delta DENEDEP(-3)$	0.049120	1.77842	0.02762
ECM(-1)	-0.070275	0.02009	-3.49872
$\bar{R}^2 = 0.1503$			
Standard error of the regression: 0.0467			
LM-test for serial correlation: 19.0588 (p-value 0.0247)*			
Jargue-Bera test for normality: 16.0864 (p-value 0.0133)			
Heteroskedasticity test: 118.6562 (p-value 0.5175)			

The error correction term in the equation of the demand for money represents the mechanism by which the demand for money adjusts towards its long-run equilibrium level. As such, the coefficient before the error term should have a negative sign, revealing how much of the deviation from equilibrium is adjusted in one period. As we can see, the error term bears the "correct" sign and is highly significant and this confirms the existence of the cointegrating relationship. In fact, the above table shows that only the error term is significant at 5%, with almost all the other coefficients being insignificant even at 10%. Moreover, it is obvious that the other coefficients in the short-run model bear "wrong" signs, as well. As for the magnitude of the coefficient before the error term, it is quite low, suggesting very slow adjustment of the demand for money towards its long-run equilibrium level. Indeed, the error correction term implies that less than 10% of the deviation from equilibrium is corrected in a single quarter, i.e. it takes three and a half years to restore the long-run equilibrium. This

result is in line with our explanation of Figure 1. Finally, the diagnostic tests presented in Table 5 show that our short-run model is less than satisfactory, because suffers from serial correlation and, also, the residuals are not normally distributed (although in the equation for the demand for money, we cannot reject the null of normality). Although, these weaknesses of the model should be taken seriously, still, they don't necessarily disqualify it in terms of the possibility to draw sound economic inferences. On the other hand, it is true that the above shortcomings imply opportunities for further development of the empirical model (Ericsson, 1998).

Stability of the Demand for Money

Following the estimation of both the long-run and the short-run model, in this section we address the issue of the stability of the money demand function. Specifically, we want to check whether the estimated coefficients are stable over time. In these regards, it is worth noting that parameter constancy is of critical importance in the empirical modelling of money demand, because it bears strong implications for the economic interpretation of the parameters as well as for policy evaluation across different regimes. As for the former, it is well known that in order to be relevant for the practical implementation of monetary policy, money demand needs to be stable. As for the latter, constancy of the parameters in the money demand function is a necessary condition in the evaluation of the effects of monetary policy actions across different policy regimes in the light of [21]. For precise and very useful discussion on the importance of parameter constancy in the analysis of the demand for money, see [17].

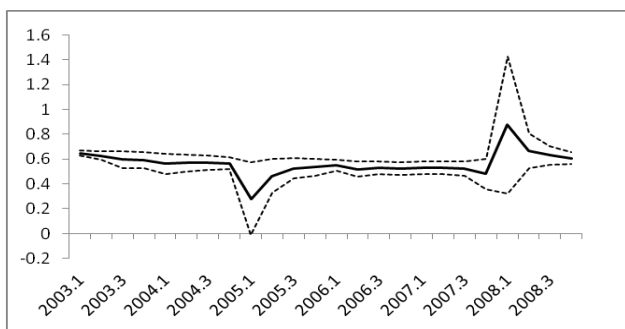


FIG. 2 RECURSIVE COEFFICIENTS OF INCOME ELASTICITY

Fig. 2 and 3 show the recursive estimates of the coefficients before real income and nominal interest rates, respectively, together with the confidence interval of ± 2 standard errors. It is striking that the

values of the coefficients remain quite stable over time, especially the coefficient before real income, which lies between 0.5 and 0.6.

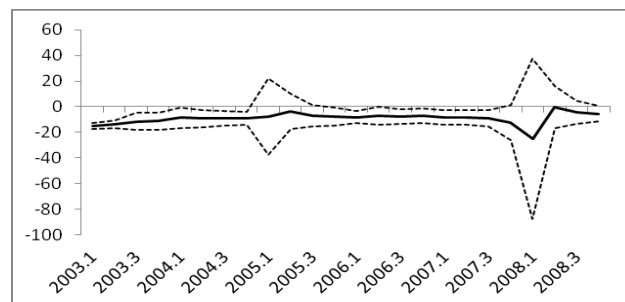


FIG. 3 RECURSIVE COEFFICIENTS OF INTEREST RATE SEMI-ELASTICITY

The stability of the coefficient before nominal interest rates is not so pronounced, since it shows much wider variations, although it usually varies between -7 and -10. In both cases, two outliers are present: one in the first quarter of 2005 and another one in the beginning of 2008. Since there's no obvious explanation for these large deviations, we treat them as random outcomes. Therefore, we take this exercise as evidence in favour of the stability of the demand for money. This finding is in contrast with the hypothesis of the alleged instability of the money demand in Macedonia, which has always been taken as a priori given, but has never been proven (or even investigated) empirically. In addition, the overall results of our study suggest that monetary aggregates might have an important role in the implementation of monetary policy within a different monetary policy framework (e.g. inflation targeting or the ECB framework).

Conclusion

In this paper, we provided an empirical analysis of the demand for narrow money in Macedonia during the post-stabilisation period, but excluding the aftermath of the Global economic crisis. Specifically, we have first estimated the long-run model and found a cointegrating relationship between real money, real income and nominal interest rates, which can be interpreted as money demand function. As for the magnitudes of the coefficients in the long-run model, we found income elasticity below unity and high interest rate semi-elasticity. Further on, we investigated the short-run dynamics of the demand for money employing the standard ECM. The error correction term appeared to be statistically significant, thus confirming the existence of the cointegration, though the estimated coefficient was very low, suggesting slow adjustment towards long-run

equilibrium. Finally, we checked for the parameter constancy and found that empirically stable money demand function could be established. Taken together, the results of our study imply that, in case the existing monetary policy strategy (exchange rate targeting) is substituted for an alternative framework (inflation targeting or ECB-style approach), narrow money might have some role in the practical implementation of monetary policy.

However, in order to be able to derive firm recommendations for policy makers, several open issues should be further investigated: First, this study deals only with the demand for narrow money, and hence, it would be interesting to analyse the demand for broader monetary aggregates, too; Second, since Macedonia is a small open economy with high degree of currency substitution, perhaps the inclusion of foreign returns in the money demand function (foreign interest rates and foreign exchange rates) might produce valuable insights; Third, though Macedonia has seen low inflation rates during the last 15 years, its previous long experience with high inflation might justify possible inclusion of inflation in the empirical model; Fourth, it could be interested to study the dynamics of the money demand within a regime-switching framework, which allows for a different behaviour in different environments (for instance, before and after the Global economic crisis); Finally, in future research, it would be useful to examine the robustness of the results across various econometric techniques and assumptions (VARs of different lag-length, alternative approaches to cointegration etc.).

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