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2011

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ABSTRACT

This paper examines whether the money multiplier processes in the Turkish economy is stable and can be forecasted. Research results using quarterly frequency data for the 1987Q1 – 2009Q4 investigation period show that the processes which convert the base money supply aggregates into the final monetary aggregates are unstable and tend to decrease the effectiveness of policies pursued by the monetary authorities. Such a result do not attribute credibility to the traditional Monetarist prescriptions for the conduct of the monetary economic policies in the Turkish economy.

Key Words: Money Multipliers ; Turkish Economy ;

JEL Classification: C32 ; E51 ;

ÖZET

Bu çalışma Türkiye ekonomisindeki para çarpanı süreçlerinin istikrarlı ve tahmin edilir olup olmadığını incelemektedir. 1987Q1 – 2009Q4 dönemi için üçer aylık veri sıklığını kullanan araştırma bulguları parasal taban arzı büyüklüklerini nihai parasal büyüklüklere çeviren süreçlerin istikrarlı olmadığını ve parasal yetkililer tarafından izlenen politikalarının etkinliğini azaltma eğiliminde olduğunu göstermektedir. Bu tür bir sonuç Türkiye ekonomisinde parasal ekonomi politikalarının yönetiminde geleneksel parasalcı reçetelere güvenilirlik atfetmemektedir.

Anahtar Kelimeler: Para Çarpanları ; Türkiye Ekonomisi ;

JEL Sınıflaması: C32 ; E51 ;

1. INTRODUCTION

According to the monetary theory pioneer Friedman (1968), proper implementation of monetary policy requires that the monetary authority target only the magnitudes of variables it can control as the best available guide chosen for monetary policy purposes. Decades of research in developed and developing countries concerning this prescription points out that the control of monetary aggregates is among the best available policy tools. Thus, in policy regimes that target the levels of monetary stocks, the policy authority must be able to control the quantity of money stock supplied and forecast the changes in the factors that affect the resulting money supply to ensure the stability of its monetary regime (Paya, 1998).

Under the above mentioned conditions, monetary targeting would be an appropriate policy regime in an inflationary environment if a long run relationship between the changes in the money stock and changes in the price level exists, provided that the direction of the causality extends from the money stock changes to the price changes. However, if a bi-directional causality occurs, the monetary authority cannot possibly control the money supply. In this case, monetary aggregates would be endogenous to the monetary regime and out of the control of the monetary authority. In addition, other economic variables may also impact the money stock and cause the final monetary aggregates be endogenous to the monetary regime.

Since controlling the changes in monetary aggregates is a basic requirement of the monetary policy implementation, effective policy making requires that stable relationships exist between these aggregates. As a partially or fully controllable target for monetary authority, the monetary base constitutes a fundamental relationship in policy making in order to estimate the appropriateness and the stability of policies applied by these authorities. The base money stock provided by the monetary authority is multiplied through the banking system creating additional deposits that become the major components of the final money supply (Begg et al. 1994). This money multiplier process describes how the final monetary aggregates are determined in an economy, and establishes the relationship between the changes in the final money supply for a given change in the monetary base. Since other economic variables may also impact the money supply, the stability of the money multiplier process must be established so that the impact of a controlled change in base money stock on the various other monetary aggregates can be separated from changes in endogenous economic variables (Keyder, 1998).

This study examines the stability of money multiplier processes in the Turkish economy during the 1987 – 2009 period in a similar way to Şahinbeyoğlu (1995). This approach empirically tests the models best describing the multiplier process for the stationary characteristics required, and uses co-integration estimation techniques to reveal the relationships between the base and final money supply aggregates. If it is found a stable multiplier relationship between the base money stock and final money supply aggregates, this means that the monetary theory prescriptions are likely to be successful in policy implementations. Upon the Turkish economy, Gökbudak (1995) interests in the same subject by distinguishing the base money and money supplies into sub-components and then examines the relationships between each other.

The next section describes a simple money multiplier process, highlights the preliminary data issues and gives methodological information for empirical purposes. Section three is devoted to various time series tests to examine the stationary characteristics of the money multipliers and then examines whether a co-integrating relationship between the base money supplies and broader money definitions can be obtained. The last section summarizes results and give concluding comments with some suggestions for future researches.

2. METHODOLOGY

2.1. A Money Multiplier Model: Identifying Basic Model Variables

In costructing a model for the multiplier process, let us first specify the money supply (M_s) in the economy as the total of cash held by non-bank private sector (C) and the deposits of the banking system (D):

$$M_s = C + D \qquad (1)$$

Next, the base money stock (B), high powered money, is defined as the net liabilities of the Central Bank of the Republic of Turkey (CBRT) held by either the non-bank private sector (RP) or banks (RB):

$$B = RP + RB \qquad (2)$$

Multiplying both sides of equation (1) by B / (RP + RB) would give:

$$Ms = [(C + D) / (RP + RB)] * B \qquad (3)$$

Further multiplying both the numerator and the denominator of the term in square brackets by 1/D, we will have the following identities:

$$M_s = [(1 + C / D) / (RP / D + RB / D)] * B$$

$$M_s = [(1 + c) / (p + b)] * B$$

$$M_s = k * B \tag{4}$$

$$k = M_s / B \tag{5}$$

In equations (4) and (5), c is the ratio of the non-bank private sector cash to bank deposits and p and b indicate the reserves to deposit assets ratio of the non-bank private sector and the commercial banks, respectively.

In equation (4), k equals to [(1 + c) / (p + b)] and represents the money multiplier, indicating that the changes in money supply (M_s) result from the changes in monetary base (B) and the changes in the value of the multiplier (k). Thus, for a stable and predictable relationship between the monetary base and the monetary aggregates originating from this base, (M_s / B) in equation (5) is expected to be stationary. To test this hypothesis, equation (5) can be re-arranged in a logarithmic scale to obtain:

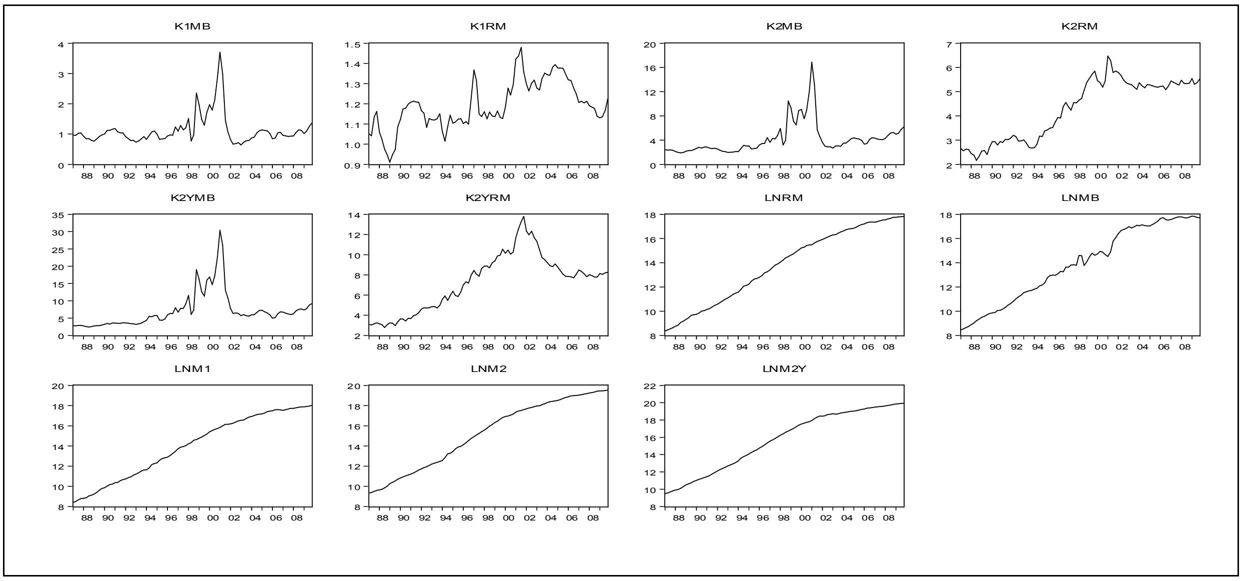
$$\ln k = \ln M_s - \ln B \tag{6}$$

A long run cointegration relationship between the money supply and monetary base exists when k is unstable but the co-integrating parameter is equal to one, the latter indicating that M_s and B have the same order of integration.

2.2. Variable Definitions

The time series of the money multipliers and the log-scaled variables used are shown in Figure 1. The prefix LN indicates the natural logarith operator. The variable RM is defined as the reserve money which is the sum of currency issued, deposits of the banking sector kept as required reserves and free deposits, and the funds and deposits of the non-bank sector. The variable MB is the central bank money, which is the sum of RM and the funds obtained through open market operations and the Turkish lira deposits of the public sector. M1 consists of the sum of the currency in circulation and demand deposits in the banking system, while M2 is M1 plus the time deposits in domestic currency. Also M2Y equals M2 plus the deposits denominated in foreign currencies. All data are obtained from the electronic data delivery system of the CBRT. K1RM, K1MB, K2RM, K2MB, K2YRM and K2YMB are the money multipliers that are calculated by dividing the M1, M2 and M2Y money supplies with RM and MB.

Figure 1 Time Series Used in the Paper



2.3 Models for Stability Tests

To develop models for stability tests, the basic unit root theory is used. Let us consider a simple AR(1) process:

$$y_t = \rho y_{t-1} + x_t'\delta + \varepsilon_t \tag{7}$$

where x_t are the optimal exogenous regressors which may consist of either a constant or a constant & trend, and ρ and δ are the parameters to be estimated. In addition, the ε_t terms are assumed to be white noise. If $|\rho| \geq 1$, y is a non-stationary time series and the variance of y increases with time and approached infinity. If $|\rho| < 1$, y is trend-stationary series. Thus, the hypothesis of trend stationarity can be evaluated by testing whether the absolute value of ρ is strictly less than 1.

The unit root models considered in this paper test the null hypothesis of H_0: ρ = 1 against the one-sided alternative of H_1: ρ < 1. Estimating equation (7) after subtracting y_{t-1} from both sides of the equation results in:

$$\Delta y_t = \alpha y_{t-1} + x_t'\delta + \varepsilon_t \tag{8}$$

where α = ρ - 1. The null and alternative hypothesis may be written as:

$$H0: \alpha = 0 \quad \text{and} \quad H1: \alpha < 0 \tag{9}$$

and evaluated using the conventional t-ratio for α:

$$t_{\alpha} = E(\alpha) / [se(E(\alpha))] \qquad (10)$$

where $E(\alpha)$ is the estimate of α, and $se(E(\alpha))$ is the coefficient standard error.

Dickey and Fuller (1979) show that when testing the null hypothesis under the unit root theory, the statistic does not follow the conventional Student's t-distribution. They derive asymptotic results and simulate critical values for various test and sample sizes. More recently, MacKinnon (1996) implements a much larger set of simulations than those tabulated by Dickey and Fuller.

The simple Dickey-Fuller unit root test described above is valid only if the series is an AR(1) process. If the series is correlated at higher order lags, the assumption of white noise disturbances ε_t is violated. The Augmented Dickey-Fuller (ADF) test constructs a parametric correction for higher-order correlation by assuming that the y series follows an AR(p) process and adding p lagged difference terms of the dependent variable y to the right-hand side of the test regression:

$$\Delta y_t = \alpha y_{t-1} + x_t'\delta + \beta_1 \Delta y_{t-1} + \beta_2 \Delta y_{t-2} + \ldots.. + \beta_p \Delta y_{t-p} + v_t \qquad (11)$$

This augmented specification is then used to test (9) using the t-ratio in equation (10). The critical issue in this analysis is the number of lagged differenced terms to be added to the test regression. In this study, a sufficient number of lags are added to remove the serial correlations that may exist in the residuals. In addition, the Phillips-Perron (PP) test is used for this purpose. Phillips and Perron (1988) propose an alternative (non-parametric) method of controlling for serial correlation when testing for a unit root. The PP method estimates the non-augmented DF test equation in (8) and modifies the t-ratio of the α coefficient so that serial correlation does not affect the asymptotic distribution of the test statistic. The asymptotic distribution of the PP modified t-ratio is the same as the ADF statistic.

Thus, the ADF and PP unit root tests are used in this study to check for the stationarity condition of the model variables by comparing the ADF and adjusted t-statistics obtained with the MacKinnon (1996) critical values. For the case of stationarity, these statistics are expected to be larger than the MacKinnon critical values in absolute value and to have a minus sign. Although differencing eliminates the trend, I also report the results of the unit root tests for the first differences of the variables, with a linear time trend in the test regression. For the MacKinnon critical values, 1% and 5% level values are considered for the null hypothesis of a unit root. The numbers in parentheses are the lags used for the ADF stationarity test and augmented up to a maximum of 10 lags, while the Newey-West bandwidths are used for the PP test. The choice of the optimum lag for the ADF test is selected to minimize the Schwarz information criterion. A statistically significant test statistic rejects the null hypothesis in favor of stationarity. The notations * and ** indicate the rejection of the nul hypothesis of a unit root at the 1% and 5% levels, respectively.

However, I know that conventional tests for identifying the unit roots in a time series are criticized strongly in the contemporaneous economics literature when they have been subject to structural breaks which yield biased estimations. Perron (1989) in his seminal paper on this issue argues that these unit root tests used by researchers not considering a possible known structural break in the trend function may tend too often not to reject the null hypothesis of a unit root in the time series when in fact the series is stationary around a one time structural break. In addition, selecting the date of the structural break may not be the most efficient methodology, because the actual dates of structural breaks may not be coincided with the dates chosen exogenously. For this purpose, in this paper I also apply to the methodology proposed by Zivot and Andrews (1992), allowing the data themselves to indicate breakpoints endogenously rather than imposing a breakpoint from outside the system. The ZA test chooses the breakpoint as the minimum t-value on the autoregressive y_t variable, which occurs at time $1 < TB < T$ leading to $\lambda = TB / T$, $\lambda \in |0.15, 0.85|$, by following the augmented regressions:

Model A:

$$y_t = \mu + \beta t + \theta DU_t(\lambda) + \alpha y_{t-1} + \sum_{j=1}^{k} c_j \Delta y_{t-j} + \varepsilon_t \tag{12}$$

Model B:

$$y_t = \mu + \beta t + \gamma DU_t(\lambda) + \alpha y_{t-1} + \sum_{j=1}^{k} c_j \Delta y_{t-j} + \varepsilon_t \tag{13}$$

Model C:

$$y_t = \mu + \beta t + \theta DU_t(\lambda) + \gamma DU_t(\lambda) + \alpha y_{t-1} + \sum_{j=1}^{k} c_j \Delta y_{t-j} + \varepsilon_t \tag{14}$$

where DU_t and DT_t are sustained dummy variables capturing a mean shift and a trend shift occuring at the break date respectively, i.e. $DU_t(\lambda) = 1$ if $t > T\lambda$, and 0 otherwise; $DT_t(\lambda) = t - T\lambda$ if $t > T\lambda$, and 0 otherwise. Δ is the difference operator, k is the number of lags determined for each possible breakpoint by one of the information criteria and ε_t is assumed to be identically and independently distributed (i.i.d.) error term. The ZA method runs a regression for every possible break date sequentially, and the time of structural changes is detected based on the most significant t-ratio for α. To test the unit root hypothesis, the smallest t-values are compared with a set of asymptotic critical values estimated by ZA. The critical values in the ZA methodology are larger in absolute sense than the conventional ADF critical values since the ZA methodology is not conditional on the prior selection of the breakpoint. Thus, it is more difficult to reject the null hypothesis of a unit root in the ZA test. For the appropriate lag length in this methodology, the Schwarz's Bayesian information criterion (SBIC)-minimizing value is used.

2.4 Models for Co-integration Tests

Engle and Granger (1987) indicate that even though economic time series may be non-stationary in their level forms, there may exist some linear combinations of these variables that converge to a stable relationship in the long-run. If the series are individually stationary only after differencing and a linear combination of their levels is stationary, then the series are said to be co-integrated. That is, they move in tandem and cannot move too far away from each other (Dickey et al., 1991). To test for a long-run relationship between the variables, the vector auto-regression (VAR) based co-integration methodology explained in Johansen (1995) is used.

A VAR of order p can be written as:

$$y_t = A_1 y_{t-1} + \ldots + A_p y_{t-p} + B x_t + \varepsilon_t \qquad (15)$$

where y_t is a k-vector of non-stationary I(1) variables; x_t is a d-vector of deterministic variables representing a constant term, a linear trend, and seasonal dummies; and ε_t is a vector of innovations. Next, this VAR can be re-arranged as:

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + Bx_t + \varepsilon_t \quad (16)$$

where:

$$\Pi = \sum_{i=1}^{p} A_i - I \text{ and } \Gamma_i = - \sum_{j=i+1}^{p} A_j \quad (17)$$

If the coefficient matrix Π has a reduced rank $r < k$, then there exist kxr matrices α and β, each with rank r, such that $\Pi = \alpha\beta'$ and $\beta' y_t$ is I(0). In this relationship, r is the number of co-integrating relations and each column of β is the co-integrating vector. The elements of α are known as the adjustment parameters in the vector error correction model and measure the speed of adjustment of the variables examined with respect to a disturbance in the equilibrium relationship. Gonzalo (1994) indicates that this estimation method performs better than other estimation methods even when the errors have non-normal distributions. In this study, the unrestricted VAR models are constructed with a maximum lag number of 5 tested, using quarterly data to develop bi-variate co-integrating equations. The lag number is chosen to minimize the Akaike's information criterion.

3. ESTIMATION RESULTS

3.1. Unit Root Tests for Stability

The results for the study period 1987Q1 – 2009Q4 are shown in Tables 1 and 2. The ADF unit root tests indicate that the null hypothesis cannot be rejected for any of the variables, using both constant and constant&trend terms in the test equation in the level form. In contrast, for the first differences all variables, except the variable LNRM, the null hypothesis of a unit root is rejected at 1% confidence level (for the variable LNM2Y the null hypothesis is rejected at the 5% and 1% levels by considering a constant and constant & trend effects, respectively).

The PP test statistics give similar results to those of the ADF test. All variables except K1MB are non-stationary in levels but stationary in first differences. Notice that the variable LNRM is now stationary in first differences. Thus, all money multipliers, maybe except for K1MB due to the PP test, are shown to be unstable and non-stationary. For the money multiplier K1MB, the ADF and PP test statistics give conflicting results concerning stationarity.

Table 3 presents the ZA unit root tests results carrying out estimations with 0.15 trimmed. The lag length for these tests are determined by the minimized Schwarz Bayesian information criterion. All the ZA test results verify the non-stationary characteristic of the variables for the cases assuming only constant or trend or both deterministic components in the test equation. Considering the ADF, PP and ZA unit root tests, we can assume that all variables contain a unit root, thus they are non-stationary in their level forms but stationary in their first differenced forms, enabling the model test for co-integration. Henceforth, various VAR models are constructed to test the potential co-integrating relationships between the variables.

Table 1 ADF Unit Root Test

	ADF test (in levels)		ADF test (in first differences)	
Variable	Constant	Constant & Trend	Constant	Constant & Trend
K1RM	-2.79 (1)	-3.35 (1)	-7.43 (1)*	-7.37 (1)*
K1MB	-2.69 (2)	-2.71 (2)	-8.94 (1)*	-8.88 (1)*
K2RM	-1.00 (0)	-1.49 (0)	-8.02 (1)*	-8.01 (1)*
K2MB	-2.07 (2)	-2.26 (2)	-9.81 (1)*	-9.76 (1)*
K2YRM	-1.53 (1)	-0.94 (1)	-7.21 (0)*	-7.32 (0)*
K2YMB	-2.00 (2)	-2.06 (2)	-9.13 (1)*	-9.08 (1)*
LNRM	-2.39 (4)	0.76 (4)	-1.17 (3)	-2.58 (3)
LNMB	-1.91 (2)	-0.28 (2)	-8.28 (1)*	-8.61 (1)*
LNM1	-2.00 (1)	2.13 (0)	-2.17 (3)	-7.36 (0)*
LNM2	-2.39 (3)	0.96 (1)	-2.43 (2)	-5.77 (0)*
LNM2Y	-2.86 (1)	0.90 (1)	-3.33 (0)**	-4.66 (0)*
	Constant	Constant & Trend		
1% CV	-3.50	-4.06		
5% CV	-2.89	-3.46		

Notes: * and ** indicate the rejection of the null hypothesis of a unit root at the 1% and 5% levels, respectively.

Table 2 PP Unit Root Test

	PP test (in levels)		PP test (in first differences)	
Variable	Constant	Constant & Trend	Constant	Constant & Trend
K1RM	-2.37 (3)	-2.79 (2)	-7.23 (10)*	-7.19 (10)*
K1MB	-3.14 (4)**	-3.17 (4)	-8.31 (17)*	-8.21 (17)*
K2RM	-0.98 (4)	-1.51 (2)	-8.54 (6)*	-8.52 (6)*
K2MB	-2.56 (8)	-2.85 (8)	-12.67 (18)*	-12.38 (18)*
K2YRM	-1.45 (3)	-0.79 (6)	-7.22 (1)*	-7.32 (0)*
K2YMB	-2.38 (6)	-2.54 (6)	-8.41 (20)*	-8.38 (20)*
LNRM	-3.47 (4)	2.58 (0)	-6.43 (3)*	-7.87 (0)
LNMB	-1.89 (7)	-0.72 (5)	-8.05 (7)*	-8.34 (9)*
LNM1	-2.43 (3)	1.98 (2)	-6.27 (0)*	-7.32 (4)*
LNM2	-2.65 (5)	1.26 (5)	-4.61 (2)*	-5.77 (0)*
LNM2Y	-2.09 (6)	1.53 (5)	-3.34 (8)**	-4.62 (7)*
	Constant	Constant & Trend		
1% CV	-3.50	-4.06		
5% CV	-2.89	-3.46		

Notes: * and ** indicate the rejection of the null hypothesis of a unit root at the 1% and 5% levels, respectively.

Table 3 Zivot-Andrews Unit Root Test

Variable	Intercept			Trend			Both		
	k	min t	TB	k	min t	TB	k	min t	TB
K1RM	1	-3.98	(05Q4)	1	-4.40	(05Q3)	1	-5.00	(00Q4)
K1MB	2	-4.53	(01Q3)	2	-3.25	(00Q4)	2	-4.32	(02Q1)
K2RM	0	-3.15	(96Q1)	0	-3.13	(01Q2)	0	-3.68	(98Q4)
K2MB	2	-4.53	(01Q3)	2	-2.87	(00Q1)	2	-4.18	(02Q1)
K2YRM	1	-3.72	(02Q4)	1	-3.83	(01Q3)	1	-4.08	(00Q4)
K2YMB	2	-4.52	(01Q3)	2	-3.04	(00Q2)	2	-4.29	(02Q1)
LNRM	0	-0.65	(94Q2)	0	-2.96	(00Q2)	0	-2.49	(01Q2)
LNMB	2	-2.15	(04Q3)	2	-3.55	(04Q1)	2	-4.22	(01Q3)
LNM1	2	0.25	(05Q4)	2	-3.06	(01Q3)	2	-2.44	(00Q1)
LNM2	1	-2.07	(94Q2)	1	-3.38	(00Q1)	1	-2.79	(98Q2)
LNM2Y	1	-1.14	(02Q4)	1	-4.39	(00Q1)	1	-3.84	(00Q1)

Notes: Critical values; intercept: -5.43 (1%), -4.80(5%); trend: -4.93 (1%), -4.42 (5%); both: -5.57 (1%), -5.08 (5%)

3.2. Co-integration Tests for Long-Run Relationships

The potential for long-run co-integrating relationship between the variables is examined by using two likelihood test statistics offered by Johansen and Juselius (1990), known as the maximum eigenvalue for the null hypothesis of r versus the alternative of r+1 co-integrating relations and trace for the null hypothesis of r cointegrating relations against the alternative of n co-integrating relations, for r = 0,1, ..., n-1 where n is the number of endogenous variables. The versions of these tests that are appropriate for this study are maximum eigenvalue and trace tests with a linear deterministic trend restricted in the co-integration analysis. The critical values and their probabilities at the 0.05 significance level, when choosing the rank, are taken from Osterwald-Lenum (1992) and MacKinnon et al. (1999). A star denotes the rejection of the null hypothesis.

The co-integration test results are presented at Table 4 below. The only significant long-run co-integrating vector found is between the variables LNM1 and LNRM when using the trace test values. The normalized vector yields a nearly one-to-one and statistically significant relationship between the coefficients of M1 money supply and reserve money aggregate. However, this relationship is rejected under the maximum eigenvalue test. Tests between all other variables show no significant relationships. Thus, there are no co-integrating vector between the base money stocks that are under the control of the CBRT and various money supply amounts that are created through the money multiplier process in the Turkish economy. The results are not sensitive to the use of trace or maximum eigenvalue statistic to determine the rank order. All these findings are in line with the money multiplier stationarity tests in the former sections.

The empirical results in Table 4 show that the money multipliers dominating the money markets during the investigation period are unstable and do not support a Monetarist explanation of how the money markets in Turkey operate. Thus, within the theme and limits of this study, it can be said as an inference that the conditions for implementing an effective monetary policy do not exist in the Turkish economy during the investigation period.

Table 4 Co-integration Analysis Between the Sub-Determinants Of Money Multipliers

SERIES: LNM1; LNRM [Lag interval (in first differences): 1 to 5]

Vectors	Eigenvalue	Trace	0.05 CV	Prob	Max-Eigen	0.05 CV	Prob
r = 0	0.18	26.40	25.87	0.04*	17.14	19.39	0.10
r ≤ 1	0.10	9.26	12.52	0.17	9.26	12.52	0.17

Trace test indicates 1 co-integrating relationship

Normalized Co-integrating Equation (Standard errors in parentheses)

LNM1	LNRM	TREND	CONSTANT
1.00	-1.169 (0.040)	0.019 (0.005)	1.269

Adjustment Coefficients ('D' indicates the difference operator. Standard errors in parentheses)

D(LNM1)	-0.390
	(0.123)
D(LNRM)	-0.085
	(0.114)

SERIES: LNM1; LNMB [Lag interval (in first differences): 1 to 4]

Hypothesized Vectors	Eigenvalue	Trace Stat.	0.05 CV	Prob	Max-Eigen Stat.	0.05 CV	Prob
r = 0	0.16	22.29	25.87	0.13	14.91	19.39	0.20
r ≤ 1	0.08	7.387	12.52	0.31	7.39	12.52	0.31

Both Trace and Max-eigen statistics indicate no co-integrating relationship

Table 4 continued

SERIES: LNM2; LNRM [Lag interval (in first differences): 1 to 5]

Hypothesized Vectors	Eigenvalue	Trace Stat.	0.05 CV	Prob	Max-Eigen Stat.	0.05 CV	Prob
r = 0	0.11	16.97	25.87	0.42	10.22	19.39	0.60
r ≤ 1	0.08	6.75	12.52	0.37	6.75	12.52	0.37

Both Trace and Max-eigen statistics indicate no co-integrating relationship

SERIES: LNM2; LNMB [Lag interval (in first differences): 1 to 4]

Hypothesized Vectors	Eigenvalue	Trace Stat.	0.05 CV	Prob	Max-Eigen Stat.	0.05 CV	Prob
r = 0	0.11	17.65	25.87	0.37	10.50	19.39	0.57
r ≤ 1	0.08	7.15	12.52	0.33	7.15	12.52	0.33

Both Trace and Max-eigen statistics indicate no co-integrating relationship

SERIES: LNM2Y; LNRM [Lag interval (in first differences): 1 to 5]

Hypothesized Vectors	Eigenvalue	Trace Stat.	0.05 CV	Prob	Max-Eigen Stat.	0.05 CV	Prob
r = 0	0.15	20.12	25.87	0.22	13.59	19.39	0.28
r ≤ 1	0.07	6.53	12.52	0.40	6.53	12.52	0.40

Both Trace and Max-eigen statistics indicate no co-integrating relationship

Table 4 continued

SERIES: LNM2Y; LNMB [Lag interval (in first differences): 1 to 5]							
Hypothesized Vectors	Eigenvalue	Trace Stat.	0.05 CV	Prob	Max-Eigen Stat.	0.05 CV	Prob
r = 0	0.14	17.96	25.87	0.34	13.29	19.39	0.31
r ≤ 1	0.05	4.67	12.52	0.64	4.67	12.52	0.64

Both Trace and Max-eigen statistics indicate no co-integrating relationship

4. CONCLUDING COMMENTS AND SUGGESTIONS FOR FUTURE RESEARCH

A basic tenet of the monetary economics theory is that the policy makers can control the monetary aggregates and forecast their growth paths. Under these conditions, monetary policy implementations would proceed in accordance with some *a priori* expectations, provided that the behavior of the money multipliers are stable and that there exist predictable relationships between the final money supplies and the sub-components of these multipliers.

This paper investigates whether this stability condition exists for the period of 1987Q1 – 2009Q4 with quarterly frequency data in the Turkish economy. In addition, the stability of various money multipliers and potential long-run co-integrating relationships between the sub-components of these multipliers and several money supply measures are examined. The results show that the processes that extend the basic money supply to the final monetary aggregates are unstable and tend to decrease the effectiveness of monetary policies implemented by the CBRT.

The co-integration analyses show that there exist no long-run relationship between the sub-components of money multipliers and money supply measures, except the case between the M1 money supply and reserve money aggregate, and reveal that, within the theme and limits of this study, the traditional monetary theory prescriptions cannot be used to implement monetary policy in Turkey.

However, I know that one of the identifying issues for Turkey is the unstable characteristics related to her main economic indicators that lead the policy makers to conducting different stabilization policies inside the whole period considered in this paper. The variation of policies in this sense also affects the consistency of forecasts resulted from the standard model evaluation processes. Thus, the results in this paper must be appreciated by the researchers and policy makers cautiously and need to be further examined by implementing sub-period robustness checks following also some systematic changes in the policy choices. In this line, the more recent advances in empirical estimation techniques, in addition to the standard methods, must be applied to control the validity of the estimation findings in this paper. Also, since the monetary theory constitutes an aggregated framework integrating its many different aspects within each other, future studies must analyze the impact of the changes in the base money stocks and broader monetary aggregates on the level of inflation rates. Finally, complementary papers may be conducted in countries other than Turkey to determine if the lack of stability and policy effectiveness in Turkey are common in other developed and developing countries .

ACKNOWLEDGEMENT

The author is grateful to Professor Ara G. Volkan of the Florida Gulf Coast University for his invaluable contributions to an earlier version of this paper. The usual disclaimer applies.

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