Long Term Validity of Monetary Exchange Rate Model: Evidence from Turkey

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In this study, it was analyzed if there is a long term relationship among the nominal exchange rate and monetary fundamentals within the periods of 1998:1-2011:2 in Turkey. This relationship has been analysed by using structural VAR (SVAR) model. Besides, Granger causality test and Dolado-Lütkepohl Granger causality test were used to determine if there were a causality relationship among the nominal exchange rate and monetary fundamentals. As a result of the SVAR model, the relationship among the series related to nominal exchange rate and money supply, GDP, interest rate in Turkey in long term were not determined and at the end of causality tests, causality relationship among the nominal exchange rate and monetary fundamentals were not determined.

Keywords: Monetary Exchange Rate Model, Structural VAR, Flexible Price Model.
JEL Classifications: E52, F31, O42

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1. Introduction

Prior to the 1970s, the dominant paradigm in macroeconomics was the Keynesian thought. Keynesian paradigm was used to model all aspects of the macroeconomy by many countries. By the late 1970s, however, the analysis of exchange rates was entered a new phase after the collapse of the Bretton Woods system. After the collapse of the Bretton Woods system, countries which included in the Bretton Woods system were free to choose any form of exchange. This situation was causing the volatilite on the exchange rates. This new view on the process of exchange rate determination spawned the monetary model of exchange rate.

The monetary exchange rate model implies that there is a strong link between the nominal exchange rate and a set of monetary fundamentals. The monetary model implies that price level of a country is determined by its supply and demand for money and that the price level in different countries should be the same when expressed in the same currency. Therefore, it can be crucial for policy makers, especially Central Banks that implement the monetary policy.

After financial crisis in 2000-2001, Central Bank of the Republic of Turkey (CBRT) became autonomuous and the exchange rate regime was moved to flexible in Turkey. Under the flexible exchange rate, growth of Turkish economy have gradually caused to fluctuation of exchange rate. In this situation, CBRT has changed interest rates from time to time. Moreover, CBRT has treated to market for decreasing the over fluctuation. It indicates that economies which implementing flexible exchange rate regime could utilize the instruments of monetary policy for affecting exchange rate. Thus, it is likely to implement to monetary exchange rate model in economies, which implement to flexible exchange rate, by CBRT.

The purpose of this paper is to determine whether the monetary exchange rate model is implemented by CBRT under flexible exchange rate regime. This paper is organised as follows. The second part comprises the literature. In this part, there are studies inspecting the relationship between nominal exchange rate and instruments of monetary policy. The third part introduces the methods used in the study. The fifth part comprises the empirical results obtained from the tests applied. Finally, the sixth part comprises analysis results and related evaluations.

2. Literature Review

The empirical literature on the factors underlying Turkey's exchange rate determination is very limited. But there are some articles that have attempted to determine the empirical variables explaining USD/TL exchange rate behavior and validity of monetary exchange rate model covering Turkey.

Civcir (2003), applied the Johansen cointegration technique to examine the validity of the monetary model of exchange rate determination in Turkey spanning the period 1987:1-2000:12. The results of test reveal the existence of a long-run cointegration relationship between monetary fundamentals and exchange rate. Pazarlioglu and Guloglu (2007), also researched the long run validity of monetary exchange rate model by using Johansen and Juselius cointegration tests in Turkey spanning the period 1987-2005. He precipitated that relative nominal exchange rates cointegrated with relative money supplies and relative price level. Uz and Ketenci (2010), studied the long-run performance of the monetary model approach of exchange rate determination in ten EU countries including Turkey, spanning the period 1993:1-2005:4. Their concluded that there was a strong evidence for a long-run equilibrium relationship between exchange rate and monetary variables in all countries.

Although the empirical literature about the determination of monetary exchange rate model in Turkey is very limited there are a lot of foreign empirical literatures about monetary exchange rate model. In these studies, mostly the cointegration tests were applied.

Josifidis et al. (2009) is described that "Transition Economies" as the Czech Republic, Poland, Slovakia and Serbia are investigated the transition to floating exchange rate regime for the exchange rate targeting. In this context, monetary, interest rate and inflation targeting, direct and indirect effects on the exchange rate with the VAR and VEC models examined. Showing that empirical results; Poland's monetary policy, the Slovak Republic and the Czech Republic, especially compared to the higher exchange rate flexibility, and includes money. In an example of Serbia, compared to these three countries, as well as low-interest rate policy is extremely strong and stable exchange rate policy. Indeed, the successful foreign policy, directly and indirectly affect the success of inflation targeting.

According to Neupauerova (2006), an effective strategy for the effectiveness of the Central Bank's monetary policy is noteworthy. Emphasizes the importance of the policy strategy to be applied, especially for transition economies. In addition, Taylor rule also reveals that the success of the Slovak Republic.

Groen (2000), in his study, for 14 industrialized countries covering the period 1973:1–1994:4 he precipitates that nominal exchange rates are cointegrated with money supplies and real output levels for his full panel, as a result of panel cointegration test which he applied. Wong (2002) applied the monetary model to examine the exchange rate between British sterling and US dollar from 1973 to 1989 econometrically.

The results showed that the monetary model could be used to predict the effects of changes in relative money supply, relative income level, and relative interest rate on the floating exchange rate. Agbola and

Kunanopparat (2005) investigated the determinants of the choice of exchange rate regime in Thailand by using time series data spanning the period 1990:1 to 2002:3 using Johansen's Maximum Likelihood Estimation (MLE) and multivariate co-integration tests. The outcome of the research was supportive of the generally held view. Frommel et al. (2004), extends the real interest differential (RID) model by introducing Markow regime, switches for three exchange rates covering the period 1973-2000. The result of test is provided by monetary exchange rate model. Basher and Westerlund (2009) re-examine the validity of the monetary exchange rate model, using the same data set as Mark and Sul (2001) covering the period 1973:1-1997:3 for 18 OECD countries. They precipitate that the monetary model emerges only when the presence of structural breaks and cross-country dependence has been taken into account and the breaks in the monetary model can be derived from the underlying purchasing power parity relation as a result of panel cointegration test.

Junttila and Korhonen (2011), analyzed the existence of nonlinear relationships between macroeconomic fundamentals and exchange rates for five industrialized countries (Canada, France, Germany, Italy, and the United Kingdom) using an error correction model covering the period 1974:1–2001:3. They found that inflation rate differentials with respect to the US inflation rate are the driving forces for the nonlinear relationships in the monetary model for exchange rates.

3. The Monetary Model of Exchange Rate

Monetarist model are based on Purchasing Power Parity (PPP) and Uncovered Interest Rate Parity (UIP). PPP expresses that exchange rates between currencies are in equilibrium when their purchasing power is the same in each of the two countries. This means that the exchange rate between two countries should equal the ratio of two currencies' price level of a fixed basket of goods and services (Taylor,

1995: 13-47). UIP forecasts that high yield currencies should be anticipated to depreciate. It also forecasts that an increase of real interest rate should appreciate the currency (Bekaert et al., 2005: 1-3).

Although there are various theoretical versions of the monetary model of exchange rate, we focus on flexible price of the monetary model to exchange rate determination since flexible price monetary model is one of the most commonly used methods in literature. The flexible of monetary approach to exchange rate determination, which is based on the current purchasing power parity (PPP), is as follows: (Dutt and Ghosh, 2000: 669-671).

$$e_t = (m_t - m_t^*) - \alpha(y_t - y_t^*) + \lambda(i_t - i_t^*) \qquad (1)$$

where e_t is the price of the domestic currency in terms of the foreign currency, m_t, y_t and i_t denote the levels of the money supply, the income level and the level of the interest rate respectively. α and and λ are parameters.

Under the assumption of flexible prices monetary model, the model has relative money supply, income level, and nominal interest rate as explanatory variables. This flexible price monetary model gives predictions about the effect of a change in relative money, income and nominal interest rate on the exchange rate.

According to model in equation (1), if the domestic money supply grows faster relative to foreign money supply the exchange rate is expected to rise.

This can be ascribed to the fact that the faster the growth in domestic money supply relative to foreign money supply the greater will be the domestic inflation, and thus the lower will be the real return on investment to assets denominated domestic currency. Moreover, if the domestic income grows faster relative to foreign income, the exchange rate is expected to fall. This situation can be attributed that the higher

the domestic growth in income relative to the foreign income, the higher the demand for real money balances will be. So the interest rate will increase leading to higher returns on investments to assets denominated domestic currency.

Eventually, if the domestic interest rates grow higher relative to foreign interest rates, the exchange rate is expected to rise. This situation will cause to expect to depreciate of domestic currency in the future. Higher domestic interest rate is required to atone for losses that will be originated in depreciate of domestic currency (MacDonald and Taylor 1993).

4. Data and Methodology

In this study, the relationship between the data of nominal exchange rate and monetary fundamentals like money supply, interest rate and real GDP (y) in Turkey, covering 1998Q1-2011Q2, was analysed by using unit root tests and structural VAR (SVAR) model. In this context, it was attempted to analyze the validity of monetary exchange rate model in the long term in Turkish domestic markets during the time period mentioned above.

We used to four variables belonging that system. Those are exchange rate, GDP, interest rate and money supply. The exchange rate is average of quarterly data, expressed in (Turkish Liras) TL per USD unit. The measure of money supply is average of quarterly M_1 consisting of drawing account and the money in circulation. Gross domestic product was used as a proxy for real output and the data of GDP is average of quarterly periods. Finally, interest rates are the rates that are implemented for deposit accounts of 12 months and the averages of quarterly periods are taken into consideration. We used to exchange rate as a dependent variable. The data procured from

electronic database of Central Bank of Turkish Republic (CBRT). The variables are as follows:

Table 1.

Data Set

Variables	Explanations	Source
e	Nominal Exchange Rate (USD/TL)	CBRT
m	Total M1 Money Supply (TL)	CBRT
y	Gross Domestic Product (TL)	CBRT
i	Interest Rate (%)	CBRT

We will use DF-GLS and KPSS unit root tests in order to find the stationary of series. Then we will use the structural break tests for determining whether the series has structural break.

4.1. Unit Root Tests

We used to unit root tests developed by Kwiatkowski et. al. (1992), Dickey Fuller (1979) and Lee-Strazicich (2003, 2004) for testing the stationary of series. KPSS unit root test generally tend to reject the alternative hypothesis and DF-GLS unit root test generally tend to reject the null hypothesis when there is a structural break. In this case, DF-GLS test tend to approve the null hypothesis which states that the series includes unit root and KPSS test tend to approve the alternative hypothesis which states that the series includes unit root. Lee-Strazicich test is the instance for double structural break and endogenously determined test that states the stationary of the trend. This unit root test helps to find two structural breaks. Only Model A and C take place in this unit root tests. Model A is used for breaking in

intercept. Model C is used for breaking in intercept snd trend (Temurlenk, Oltulular, 2007:4).

Model A;

$$\Delta y_t = K + \phi y_{t-1} + \beta t + \theta_1 DU1_t + \theta_1 DT2_t + \sum_{j=1}^{k} d_j \Delta y_{t-j} + \varepsilon_t \qquad (2)$$

Model C;

$$\Delta y_t = K + \phi y_{t-1} + \beta t + \theta_1 DU1_t + \theta_2 DT1_t + \theta_2 DU2_t$$

$$+\theta_1 DT2_t + \gamma_1 DT_t + \sum_{j=1}^{k} d_j \Delta y_{t-j} + \varepsilon_t \qquad (3)$$

in equation (2) and (3), Δ is the first difference operator, ε_t is a white noise disturbance term with variance σ^2; and t=1,….T is an index of time. The Δy_{t-j} terms on the right-hand side of equation (2) and (3) allow for serial correlation and ensure that the disturbance term is white noise. *DUt* is an indicator of dummy variable for a mean break occuring at time *TB* and DT_t is the corresponding trend break variable (Narayan and Smyth, 2005: 1109-1116).

$$DU_t = \begin{cases} 1 & t > TB \\ 0 & other \end{cases} \qquad \mathrm{DT_t} = \begin{cases} t - TB & t > TB \\ 0 & other \end{cases} \qquad (4)$$

after the structural break test we used to SVAR model.

4.2. Structural VAR Model

The SVAR model estimates the structural parameters by imposing contemporaneous structural restrictions based on economic theory. A Structural VAR model (SVAR) makes it possible to identify structural shocks. Each variable is engodenous in the SVAR. It is used to Choleski factorization of the reduced form covariance matrix.

The SVAR model can be written in a system of simultaneous equations represented in vector form like in equation as follows (Holtemöller, 2002: 8-12).

$$Ay_t = B(L)y_{t-1} + C\varepsilon_t \qquad (5)$$

A contains the structural parameters of the simultaneous endogenous variables. *B(L)* is a sth degree matrix polinomial in the lag operator *L*, where is the number of lagged periods used in the model. *C* contains the simultaneous response of the variables to the disturbances and innovations. y_t is a vector of endogenous variables, y_{t-1} is a vector of their lagged values and ε_t is white noise vector of the error terms for each variable. This error term includes any exogenous factors in the model.

There is a problem about "(5)" owing to the fact that coefficients in the matrices are unknown. But it is possible to write equation into reduced form model to obtain standart VAR representation.

$$y_t = D(L)y_{t-1} + \varepsilon_t \qquad (6)$$

in equation (6), *D(L)* represents $A^{-1}B(L)$ and e_t represents $A^{-1}C\varepsilon$ e_t are linear combinations of the uncorrelated shocks ε_t.

The restrictions are imposed on the simultaneous elements contained in A and C when the shocks are temporary effects on the variables. In contrast, in the case where the shocks are permanent effects the restrictions are imposed on the long-run multipliers in the impulse response functions, which in effect involves restrictions on *D(L)* (McCoy, 1997:8). A long-run restriction prevents a structural shock from affecting an endogenous variable in a cumulative way. The long-run restrictions require additional computations to be applied. The long-run multipliers can be derived from a moving average representation of equation (7) as below:

$$y_t = [I - D(L)L]^{-1}\varepsilon_t = [I - D(L)L]^{-1}A^{-1}C\varepsilon_t = \mu(L)\varepsilon_t \qquad (7)$$

The term $\mu(L) = \sum_{i=0}^{\infty}\mu_i L^i$ where each μ_i indicates the impact of changes in the shocks ε_t is reflected in the response of the variable y_{t+i}. These μ_i are the indicator of impact multipliers and the sum of these responses to infinity is the long run multiplier of each variable.

We use the long run restrictions in this study in order to test the validity of monetary exchange rate model in the long run. Therefore, short run restrictions will not be considered in the following parts.

4.3. Causality Tests

We use standart Granger causality test and modified Wald (MWALD) test developed by Dolado-Lütkepohl (1996) to test causal relationships among the variables. In order to do the Granger causality analysis, the series should be I(1). The most important advantage of this type causality test is that the unit root analysis is not important since the estimated model is robust to the type of integration and cointegration properties exhibited by data (Booth and Ciner, 2005). The Granger causality test requires carrying out zero restrictions on VAR coefficients using familiar $\chi 2$ or F-tests based on the Wald principle.

The presence of I(1) variables in the VAR model may cause nonstandard asymptotic distribution of these statistics. Especially, Wald tests for Granger causality may result in nonstandard limiting distributions based on the cointegration properties of the system and possibly on nuisance parameters. These nonstandard asymptotic properties of the test of the zero restriction on cointegrated VAR processes are due to the singularity of the asymptotic distributions of the estimators (Lütkepohl and Kratzig, 2004). The Dolado-Lütkepohl causality test overcomes this singularity problem by adding an additional lag to the true order of the VAR model. The testing

procedure involves two steps. Firstly, a VAR (p) is determined by a model selection criterion such as Schwarz Bayesian Criterion (SBC). Secondly, a VAR(p +1) is estimated and then the standard Wald test is applied on the first p lags.

The first step of the Dolado-Lütkepohl testing is to select the optimal lag length since results of causality test are sensitive to the lag imposed. We use Schwarz Information Criterion and find that the optimum lag is equal to 4. Therefore we estimate the following VAR (3) model by OLS,

$$\begin{bmatrix} e_t \\ m_t \\ y_t \\ i_t \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \\ \alpha_4 \end{bmatrix} + \begin{bmatrix} \beta_{11,1}\beta_{12,1}\beta_{13,1} \\ \beta_{21,1}\beta_{22,1}\beta_{23,1} \\ \beta_{31,1}\beta_{32,1}\beta_{33,1} \\ \beta_{41,1}\beta_{42,1}\beta_{43,1} \end{bmatrix} \begin{bmatrix} e_{t-1} \\ m_{t-1} \\ y_{t-1} \\ i_{t-1} \end{bmatrix} + \begin{bmatrix} \beta_{11,2}\beta_{12,2}\beta_{13,2} \\ \beta_{21,2}\beta_{22,2}\beta_{23,2} \\ \beta_{31,2}\beta_{32,2}\beta_{33,2} \\ \beta_{41,2}\beta_{42,2}\beta_{43,2} \end{bmatrix} \begin{bmatrix} e_{t-2} \\ m_{t-2} \\ y_{t-2} \\ i_{t-2} \end{bmatrix} + \begin{bmatrix} \beta_{11,3}\beta_{12,3}\beta_{13,3} \\ \beta_{21,3}\beta_{22,3}\beta_{23,3} \\ \beta_{31,3}\beta_{32,3}\beta_{33,3} \\ \beta_{41,3}\beta_{42,3}\beta_{43,3} \end{bmatrix} \begin{bmatrix} e_{t-3} \\ m_{t-3} \\ y_{t-3} \\ i_{t-3} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \end{bmatrix} \quad (8)$$

5. Empirical Results

In order to find the stationary of the series, or in other words whether they include roots or not, DF-GLS developed by Elliot et. al. (1996) and KPSS unit root tests developed by Kwaitkowski et. al. (1992) are used.

Table 2.

Results of KPSS Unit Root Test

Variables	Levels		First Differences	
	Intercept	Trend and	Intercept	Trend and

		Intercept		Intercept
e	0.6792	0.2077	0.2869	0.0857
m	0.9691	0.2292	0.3586	0.1390
y	0.8822	0.1031	0.2579	0.1072
i	0.8547	0.1701	0.1388	0.0326

The asymptotic critical values of LM statistic for intercept 0.739, 0.463 at the 1% and 5% levels, the asymptotic critical values of LM statistic for trend and intercept 0.216, 0.146 at the 1% and 5% level.

Table 3

Results of DF-GLS Unit Root Test

Variables	Levels		First Differences	
	Intercept	Trend and Intercept	Intercept	Trend and Intercept
e	-0.9358 [1]	-2.1349 [1]	3.0020 [1]	-3.2538 [1]
m	0.9825 [6]	-0.5976 [5]	-2.99840 [3]	-2.9495 [3]
y	0.6305 [7]	-1.3964 [5]	-3.6105 [4]	-1.3183 [7]
i	-0.3281[6]	-1.8560 [6]	-2.8437[5]	-3.4920 [5]

The asymtotic critical values for intercept -2.610, -1.947 at the 1% and 5% levels.The asymtotic critical values for trend and intercept -3.762, -3.183 at the 1% and 5% levels.

The figures in parenthesis denote the number of lags in the tests that ensure white noise residuals. They were estimated through the Schwarz criterion. The test results show that all variables are not stationary at level values. However, when the first differences of the variables are taken, they become stationary in both tests. So all variables are I(1). After unit root tests, the structural break test developed by Lee and Strazicich (2003, 2004) is applied to determine whether the series comprising unit root involve the structural break or

not. This unit root test, allege an endogenous two-break LM unit root test that allows to breaks under both null and alternative hypotheses. Moreover, the choice of lag length is crucial for this test.

Table 4.

Results of Lee-Strazicich Unit Root Test

Variables	Model A		
	Min. t stat	**Break 1**	**Break 2**
e	-0.8431	2001-Q1(0) [3.1756]	2001-Q3 (0) [2.4763]
m	-1.0936	2009-Q3(0) [1.4966]	2010-Q1(0) [2.4878]
y	-3.5432	2004-Q2(0) [2.2829]	2009-Q3(0) [0.5377]
i	-2.7997	1999-Q4(0) [-2.0407]	2003-Q2(0) [-1.1495]
Variables	**Model C**		
	Min. t stat	**Break 1**	**Break 2**
e	-2.3779	2001-Q1 (0) [1.1293]	2004-Q1(0) [-1.9149]
m	3.6654	2002-Q2(0) [1.1946]	2009*Q3(0) [2.7361]
y	-5.263	2000-Q2(0) [-0.8371]	2008-Q3(0) [0.2236]
i	-4.3274	2000-Q3(0) [1.1495]	2003-Q3(0) [-1.3121]

Figures in parenthesis below the lag lengths are selected using the Akaike Information criterion. The critical values for the Lee-Strazicich (2003) test is Model A : -4.545, -3.842 and -3.504; Model C: -5.823, -5.286 and -4.989 at the %1, 5% and 10% levels.

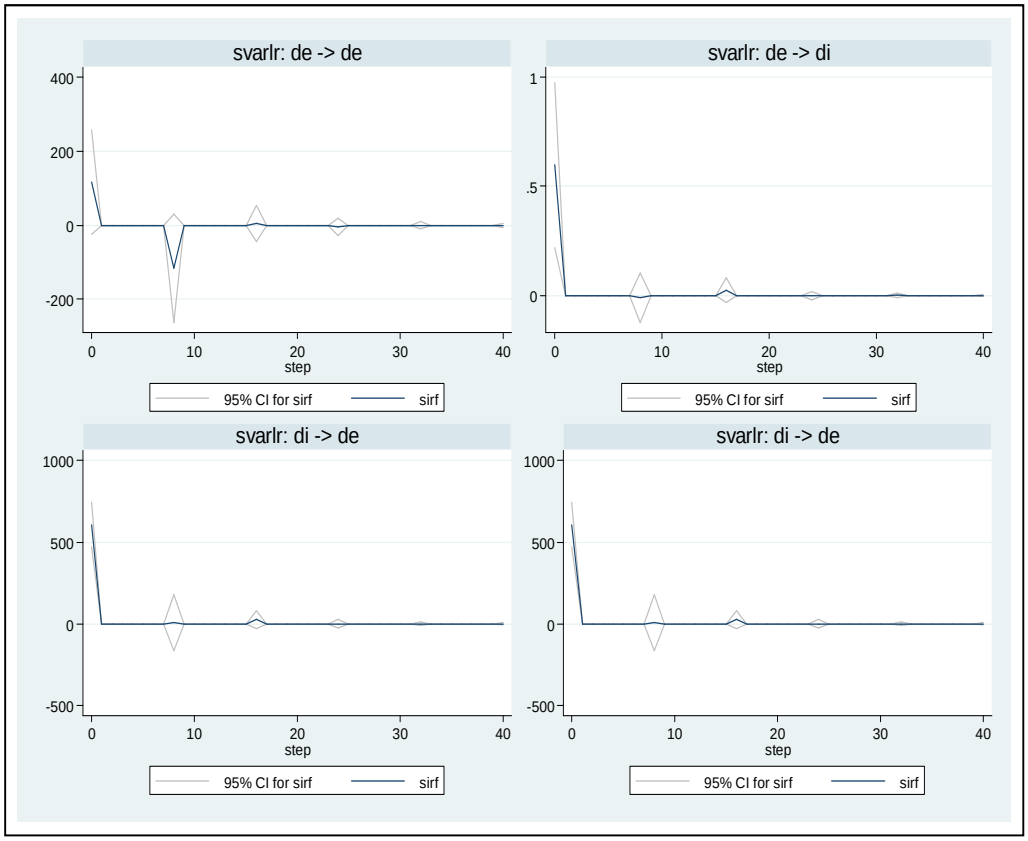
Model A allows for two shifts in level and model C allows for two breaks in level and trend. The test results that are done on quarterly series in table 3 were significant in 1% and 5 % significance levels and the break dates are determined in this way. From this point of view, the series are significant. As the assumption of the tests, zero

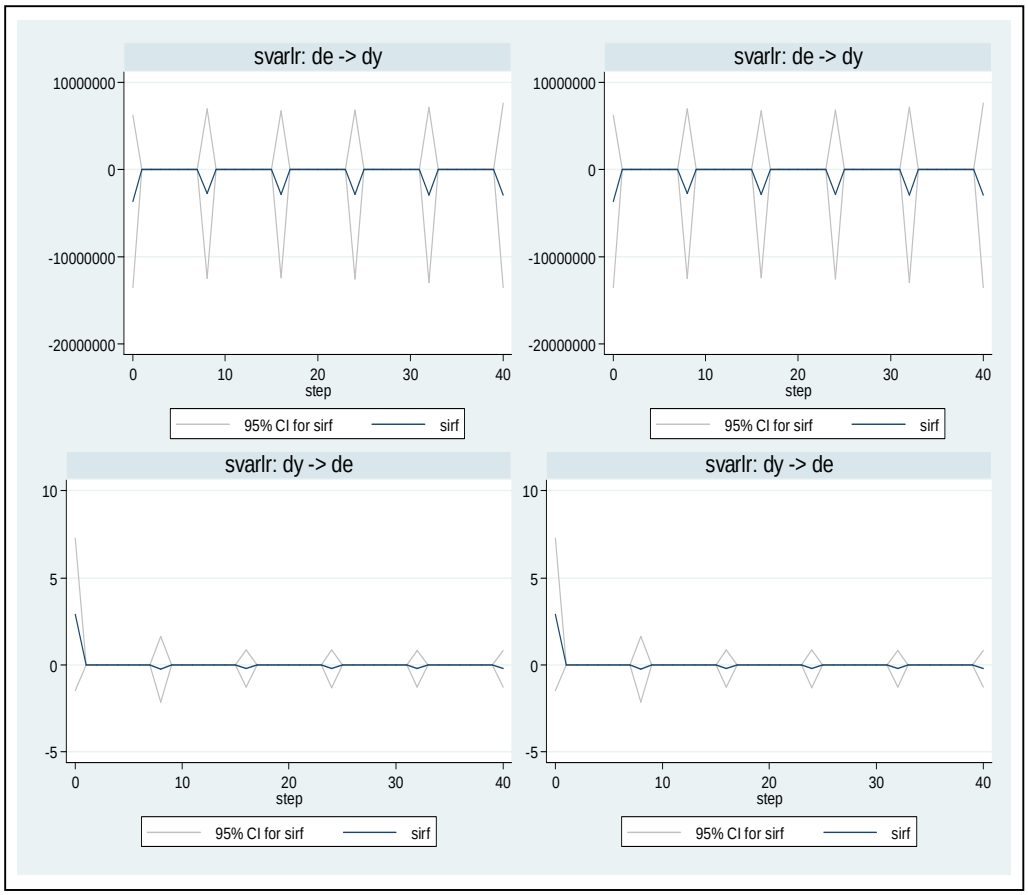
hypotheses are denied and alternative hypothesis is accepted. Thus, the break is observed in the years 2000 for interest rate and reel GDP, 2001 for nominal exchange rate, 2009 for money supply and real GDP. It can be concluded that the economic crisis in Turkey in 2000-2001 and the global economic crisis in USA in 2007 had an impact in the occurrence of these breaks. To eliminate the impact of the economic crises mentioned above, dummy variables will be added to the model.

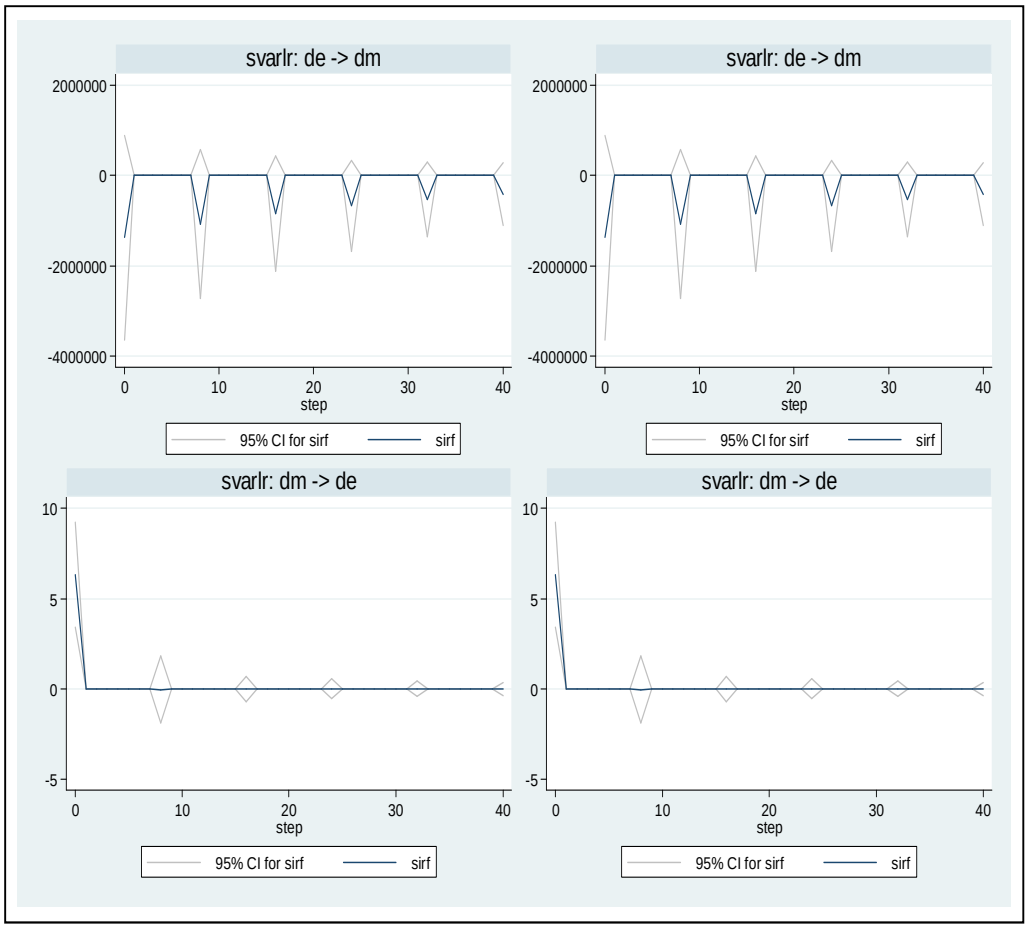
According to unit root test results all variables are I(1). To provide stationarity condition of the reduced VAR model, we use all variables in first differences in the analysis. Then, we select the optimal lag length for VAR model. The most common approach in selecting lag length is to re-estimate VAR model until the smallest Akaike Information criterion (AIC) value is found (Gujarati, 2004). According to Asteriou and Hall (2005) the judgement of the optimal length should still consider other factors like autocorrelation, heteroscedasticity, possible ARCH effects and normality of residuals. After we select the optimal lag length for VAR model, we will view impulse response analysis. The result of impulse-response analysis for monetary exchange rate model that determined in equation 1 as follows:

Graphic 1

Impulse Response Graphics of Equation 1.




svarlr: de -> dy
svarlr: de -> dy
svarlr: dy -> de
svarlr: dy -> de
step
95% CI for sirf
sirf



According to the graphics, which involve Monetary Exchange rate model and shows impulse-response analysis results for the first equation, all correlations between variables are not significant. Hence, it is not in question that money supply, national income, interest rate, which will be exposed to affect nominal exchage rate in the long term. In order to test the reliability of impulse-response analysis, it is envisaged to make causality tests. In accordance with this, the results of causality tests are shown in Table 5 and 6.

Table 5.

Results of Granger Causality Test

Hypothesis	MWALD	p-value	Causality
dm→de	0.79636	0.4570	**Reject**
de→dm	0.70064	0.5014	**Reject**
dy→de	0.57734	0.5653	**Reject**
de→dy	0.63868	0.5325	**Reject**
di→de	1.59731	0.2132	**Reject**
de→di	1.91941	0.1580	**Reject**

Table 6.

Results of Dolodo-Lütkepohl Causality Test

Hypothesis	Lag Length	MWALD	p-value	Causality
m→e	3(27.988)	0.5789	0.6795	**Reject**
e→m		0.4547	0.7684	**Reject**
y→e	4(31.654)	0.826	0.5385	**Reject**
e→y		0.152	0.9781	**Reject**
i→e	3(-0.902)	0.267	1.349	**Reject**
e→i		0.564	0.749	**Reject**

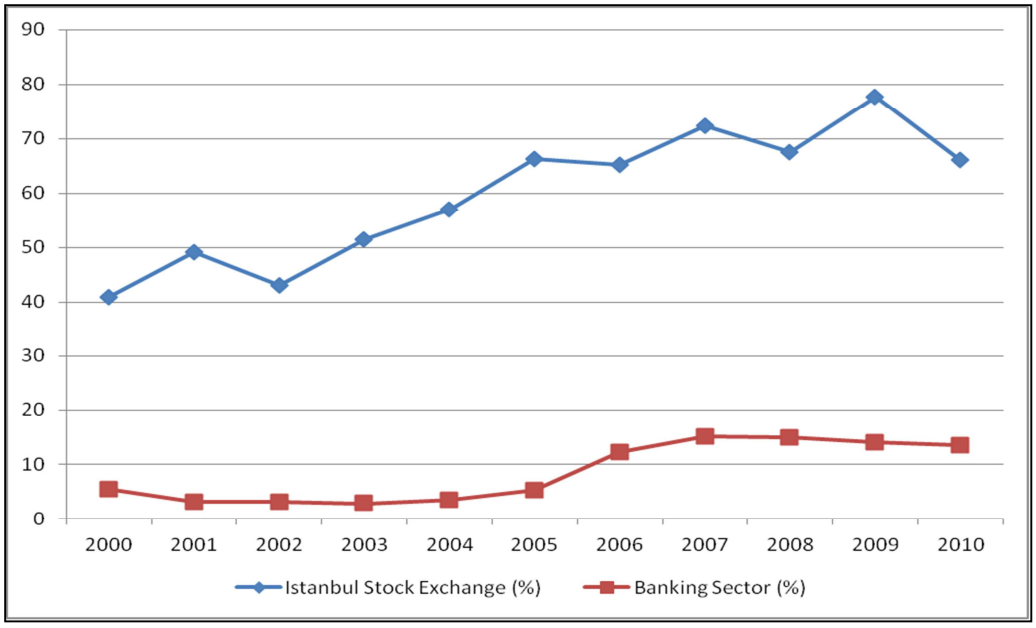
The values provided in the paranthesis show the delay lengths according to SIC criteria.

Dolado-Lütkepohl Granger causality test show consistency with Granger causality test. Accordingly, monetary exchange rate model is not valid in Turkey between 2000 and 2011. In the works of Civcir (2003), Uz and Ketenci (2010), It has been found a cointegration correlation between nominal exchange rate and monetary fundamentals.

Although they came to the conclusion that monetary exchage rate model would be valid in the long term, in our study, not determining the correlation between nominal exchange rate and monetary fundamentals can be explained due to the fact that our study involved the different periods. Both Civcir (2003) involves between the years 1987 and 2000 and Uz-Ketenci (2010) involves between 1993 and 2005 are crucial for exchange rate regime in Turkey and for CBRT which is in charge of monetary policy. The economic crisis in Turkey between 2001 and 2002 has given rise to big problems for markets. During this crisis in Turkey, in which period fixed exchange rate regime was enforced and CBRT was not an autonomous establishment to implement an independent monetary policy, increasing exchange demand could not be met. This case had a bad effect on the exchange rate. After the devaluation of Turkish Lira, flexible exchange regime was commenced and CBRT became an autonomous establishment which diminished the direct effect of CBRT on the exchange rates. In addition, the increases in share of foreign investors in financial markets may reduce the intervention of the CBRT. The share of foreign investors in financial markets in Turkey is shown in graphic 2.

Graphic 2.

The Share of Foreign Investers on Financial Markets in Turkey (%)



**Banking sector data gives the portion of the foreign banks in the sector according to their magnitude in assets.*
Resource: Data were gathered by the authors from the databank of Istanbul Stock Exchange (ISE) and The Bank Association of Turkey (BAT).

Accordingly, the share of foreign investors significantly increased in ISE and the Turkish banking sector. The high share of foreign investors in financial markets can lead to sudden input-outputs. This situation may bring about speculative transactions in the foreign exchange market. All these factors weaken the impact of CBRT on the exchange rate by monetary instruments.

6. Conclusion

In this work, the validity of monetary Exchange rate model in the long term in Turkey is examined. For this aim, SVAR model is used to

determine the correlation between the nominal exchange rate and monetary fundamentals. The reason why we used SVAR instead of VAR is that SVAR model takes into account structural changes thus having a dynamic structure. In this context, as a consequence of impulse-response analysis and causality analysis, any correlation between nominal exchange rate and monetary fundamentals is not found.

In the previous works conducted over the validity of monetary exchange rate model in the long term, the efficency of monetary Exchange rate model was determined, but we could not find such a result in our study which could be explained on the grounds that the previous studies involved the different periods as mentioned in the former part. The study of Civcir (2003) involved between 1987 and 2000, whereas Uz and Ketenci's works (2010) involved between 1993 and 2005. The fixed Exchange rate regime was being implemented until 2001 in Turkey. Thus, CBRT could directly interfere the exchange market.

Furthermore, in this case, it is inevitable that there is a correlation between Exchange rate and monetary fundamentals. After 2001, commencing flexible exchange rate regime which made CBRT an autonomous establishment, CBRT's direct intervening for exchange rate was abolished. Moreover, the economic and political stability in Turkey during 2000s brought about a reliable situation in markets. Furthermore, in 2005, Turkish Derivatives Exchange (TURKDEX) was established. These factors provided depth and extensiveness fort the markets.

In addition to these, CBRT's inclination to price stability as an ultimate aim has diminished the correlation between monetary fundamentals and nominal exchange rate. On examining the correlation between nominal exchange rate and monetary fundamentals, the main and the interim target preference is important

as well. Until the beginning of 2000s, CBRT prefered fixed exchange rate as an aim, but after commencing flexible exchange rate, CBRT started inclining to inflation target. Also, as previously noted in the study, the increase in the share of foreign investors in financial markets can lead to sudden input-outputs in markets and as a consequence resulting in speculative transactions. All these causes are important factor over invalidity of monetary exchange rate model. In this case, the ultimate objective of CBRT does not seem possible to reach the price stability on its own. Therefore, it must act together with executive organ. CBRT should perform a balancing policy on supply and demand for incentive, support, restrictions in export and imports by intervening while implementing monetary policies.

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