THE ASSESSMENT OF MACROECONOMIC VARIABILITY AND MONETARY TRANSMISSION MECHANISMS IN TURKEY WITH VAR ESTIMATIONS

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I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Science.

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This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Science.

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I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

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ABSTRACT

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This thesis investigates the nature of macroeconomic changes by focussing on the monetary policy changes in Turkey between 1990Q1-2011Q4 and assesses the variability of the economy via impulse response functions obtained from VAR analyses. The period of the analyses is characterized with changes of the definitions of monetary aggregates in 2002 and 2007. In order to have consistent monetary series, the new and old series are constructed according to new and old definitions and then analyses are carried out with each type of series and comparisons are given among the monetary series.

Keywords: Monetary Aggregates, Monetary and Financial Institutions, VAR Analysis, Changes in Monetary Definitions

ÖZ

TÜRKİYE'DEKİ PARASAL AKTARIM MEKANİZMASININ VE MAKROEKONOMİK DEĞİŞİMLERİN VAR ANALİZLERİ İLE ÖLÇÜLMESİ

Baştan, Emine Meltem

Yüksek Lisans, İktisat Bölümü

Tez Yöneticisi: Yrd. Doç. Dr. Esma Gaygısız

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Bu çalışma, Türkiye'deki makroekonomik değişimlerin gelişme biçimini 1990Ç1-2011Ç4 dönemleri arasında para politikasında meydana gelen değişiklikler ekseninde açıklamaya çalışmakta; değerlendirmeleri VAR analizleri sonucu ortaya çıkan etki-tepki işlevi fonsiyonları üzerinden yapmaktadır. Çalışmanın dönemi parasal büyüklüklerin tanım değişikliğine uğradığı 2002 ve 2007 dönemlerini de kapsamaktadır. Tanım değişiklikleri öncesi ve sonrasında tutarlı serilerin oluşturulması için eski ve yeni tanımlar ekseninde seriler oluşturulmuş; her bir seri için yapılan analizlerin yanı sıra seriler arası karşılaştırmalar verilmiştir.

Anahtar Kelimeler: Parasal Büyüklükler, Parasal ve Finansal Kuruluşlar, VAR Analizleri, Parasal Büyüklük Tanım Değişiklikleri

To my grandfather in heaven..

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I would like to thank sincerely Assoc. Prof. Elif Akbostancı for her very valuable supervision for my unfinished thesis, which started in 2009 and continued until 2011. With the initiation and suggestion of Prof. Akbostancı in 2009, I started to form consistent monetary series according to the old and new definitions applied by the Central Bank of Turkey. I am grateful to Prof. Akbostancı for her very kind participation in the examining committee and for her valuable comments.

I would also like to thank to Dr. Semih Tümen for sharing his practical and insightful solutions with me in each of the stressful times both in working life and through the thesis submission period.

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I would like to thank my family, who have been a constant source of support in my education and in other aspects of my life with their emotional and moral motivation.

For any errors or inadequacies that may remain in this work, of course, the responsibility is entirely my own.

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LIST OF ABBREVIATIONS

CBRT	Central Bank of Republic of Turkey
IMF	International Monetary Fund
MFI	Monetary and Financial Institutions
ECB	European Central Bank
TURKSTAT	Turkish Statistical Institute
Dlnyext	Growth Rate of Real GDP
Dlnroldm1	Growth Rate of Real Old M1
Dlnrnewm1	Growth Rate of Real New M1
Dlnroldm2	Growth Rate of Real Old M2
Dlnrnewm2	Growth Rate of Real New M2
gr_r_fx_us	Growth Rate of Real Foreign Exchange Rate (of Real USD)
r_deposit_rate_3_adj	Real Interest Rate on TL Deposits with Maturity of 3 Months

CHAPTER 1

INTRODUCTION

The role of money and monetary policy in an economy has always been a highly debated and dynamic subject which has formed the basic point of inspiration for many theories and policy suggestions. Various aspects of the subject have been discussed ranging from the comparative effectiveness of monetary policy with respect to other macro policies to the effectiveness of the tools utilized through the monetary framework.

In relation to the comparison of the effectiveness of monetary policy between long and short run, Friedman (1959) states that money is neutral in the long run in his influential article. Changes in money supply are wholly reflected on price level, which means that money matters in the economy. In the short run, however, changes in money supply can have impact on the levels of both price and output.

In terms of the impact on short-run, the sticky price and wage argument are presented as possible sources of the changes in real variables. Particularly promoted by New-Keynesians, it is stated that since prices react to changes in monetary variables slowly, the certain impact of the change is transferred on the real variables. One of the most prominent examples given in order to explain sticky prices is the menu cost argument. It is stated that due to the costs that will be incurred by firms in order to change prices, such as making new catalogs, or price list, there will be a lag in the reflection of the monetary changes on prices. In addition to that, the possibility that the increasing demand after the price decline will not be distributed fairly among the firms also stands as a discouraging factor for firms not to change prices (Mankiw, 1991). These arguments end up with the statement that money is not neutral in the short run.

On the other hand, there are also studies that claim that menu costs may not be a sufficient explanation for money neutrality. In their article Caplin and Spulber (1987) state that the effects on real variables can still disappear under menu costs. They state that in an economy, if only a small fraction of firms whose prices are out of line change their prices, on the aggregate there may be no price-stickiness. That is, if the price-changing firms are located at the tale of the distribution of all firms, then their effect on the total price level may be neglected, leading to the money neutrality.

In the literature, there are also studies conducting short run analyses in different contexts. Bernanke and Mihov (1998) check for the mutual existence of long run neutrality of money and liquidity effect in short run, which means that interest rates decrease when there is a monetary expansion. That the liquidity effect exists is equivalent to the ability of monetary policy to affect the economy. They find that they can co –exist using US data through a VAR model.

Berument and Dinçer(2008) conduct a VAR analysis for Turkey for the period 1986: 05-2000-10 and find out that in the short run changes in money growth affect output, but leaves permanent impact on inflation.

This thesis makes an analysis similar to Berument and Dinçer, but on a quarterly basis and through a different sample period. The analysis is conducted for short-run, but the sample period is 1987Q1-2011Q4. In this sample period, the effectivness of the monetary aggreagtes is investigated. However, there are some points that should be considered:

After the collapse of the monetary targeting policy with the crisis in 2001, Central Bank of the Republic of Turkey (CBRT) has adopted inflation targeting regime since 2006. Under this regime, there is no target on monetary aggragates, but still the changes in monetary aggregates are important as they may be closely linked to inflation. In addition to that, CBRT conducted two changes in monetary definitions in 2002 and 2007, respectively. While the changes in 2002 focussed on just an extension in the monetary sector with the inclusion of participation banks, the changes in 2007 included changes both in the coverage of the monetary sector and in the items that are considered in money supply calculation.

Following the changes in definitions, CBRT extended the series back to the last quarter of 2005 with new definitions.

The changes in the definitions lead to a breakpoint at 2005Q4 which is not only confined to changes in numerical values, but also the content of the series. In order to have a smooth series which is exempt from such a break, four new series for M1 and M2 are constructed following the changes in definitions. By applying definitions on the periods which they are not officially valid, a resemblance was tried to be acquired for the periods before and after 2005Q4.The VAR analyses are conducted not through the level values of the monetary terms, but through the growth rate of their real values. The other variables used in the analyses are chosen as the growth rate of real GDP, real interest rate on TL deposits with 3-month maturity, inflation and growth rate of real foreign exchange rate.

This thesis has two main research questions: First, is there any difference in the effectiveness of monetary policy in affecting the the short run dynamics of macroeconomic variables under old and new definitions? Second, which monetary aggregate is more functional in explaining the course of macroeconomic variables and does it change with the change in definitions?

In relation to the first question, the results show that the effectiveness of monetary variables in affecting the other macroeconomic variables may change with the change in definitions. The monetary aggregate M1 gets more powerful under new definitions, the power of “new M1” is higher than its old counterpart, “old M1”, in explaining the short-run movements of inflation, the growth rate of real GDP and real interest rate. However, the power of “old M1” is higher than its new counterpart, “new M1” in explaining the growth rate of the real foreign exchange rate.

The monetary aggregate M2 also gets more powerful in explaining certain macroeconomic variables with the introduction of new variables. Controlling macroeconomic variables such as inflation and growth rate of real GDP through M2 is easier and more robust with “new M2” than its old counterpart, “old M2”. However, the explanatory power of “old M2 “ is higher than its new counterpart “ new M2” in explaining real interest rate and the growth rate of real GDP.

These two results show that transition from old definitions to new definitions have increased the explanatory power of monetary aggregates in explaining the growth rate of real GDP and inflation. Such a conclusion is important since there are mainly two objectives of central banks. In general, central banks either focus on unemployment through targeting ouput, or they focus on price stability through inflation targeting. In other cases, they may aim at both of these objectives. The improvement in the explanatory power of the monetary variables both for interest rate and the growth rate of real GDP suggests that the monetary transmission mechanism is more powerful under new definitions. CBRT can gather better knowledge about the macroeconomic variables whether its main objective is price stability or higher output.

In relation to the results found for the second question, it is seen that under both old and new definitions, M1 is more powerful in explaining the short dynamics of the macroeconomic variables. This result suggests that CBRT should focus on M1 if it tries to attain the maximum control over the macroeconomic variables. Since, new definitions are the officially used definitions, CBRT should focus on new M1 if it tries to control the economy through monetary aggregates, which is not applicable under an inflation targeting, but monetary targeting regime.

The VAR model also presents results in relation to the impact of (the shocks to) the macroeconomic variables on monetary variables. The main focus of this thesis is on the impact of monetary aggregates on macroeconomic variables, but still those results have been discussed.

This thesis is organized as follows. Next chapter presents above mentioned analyses and results in a detailed way by introducing the data set and its statistical properties. The following chapter presents the VAR model and the results found. The last chapter presents conclusions and certain policy implications.

CHAPTER 2

DATA ANALYSIS

2.1 Monetary Aggregates

In an analysis which examines the relation between money and other macroeconomic variables, it is crucially important that the monetary variables through which the analysis will be conducted are correctly chosen. In literature, it is possible to find many studies that utilize different monetary aggregates through different time periods. It can be inferred that selection of the monetary variable basically depends on the purpose of the study. In this vein, a study that focusses on the effects of foreign currency on money demand may include a monetary aggregate including foreign exchange deposits Mutluer and Barlas (2002), while studies that focus on stability may prefer narrower aggregates such as M1, as in Halıcıoğlu and Ugur (2007).

In accordance with the fundamental purposes of this study, both M1 and M2 are taken into consideration, albeit through series that are newly constructed under specific assumptions.

As mentioned in the introduction, Central Bank of the Republic of Turkey conducted two changes in 2002 and 2007, the latter of which had greater implications on monetary aggregates. Following the changes in 2007, the monetary aggregates have been updated till 2005Q4.

Studies carried out under the supervision of Ass. Prof. Elif Akbostancı on monetary variables and their impact on economy in 2009 brought about the idea of constructing new series under new definitions. As Akbostancı suggested, constructing series by applying definitions for the periods which they are not prevalent would pave the way for making a comparison between the performance of M1 and M2 under both old and new definitions in terms of capturing the macroeconomic dynamics.

Following the above-mentioned discussions, new series are constructed such that new definitions are applied for the period before 2005Q4 till 1987Q1, while the old definitions are applied for the period after 2005Q4 till 2011Q4. The series can be extended back until 1987Q1 due to data availability.

The following section describes the changes that took place in the definitions. Before examining the content of the changes, it is useful to present the framework through which money creation process is carried out since part of the changes pertains that framework.

The term "money creation" basically refers to the release of money outside monetary financial institutions (MFIs). Central Bank is the main source of money- creation process since it is the only authorized institution for printing money. Theoretically, amount of money that is supplied to the economic agents either circulate in the economy, or they are kept in bank vaults through different types of deposits. Therefore, money supply aggregates are calculated with their counterparts at monetary financial institutions. The coverage of the monetary and financial institutions should be specifically determined in order to prevent leakages, which may lead to macroeconomic results, the origins of which can not be detected through given monetary variables. Since CBRT states that official definitions have been conducted in order to comply with International Standards, the type of institutions covered can be examined through the framework provided by European Central Bank. ECB[1] states that "Monetary Financial Institutions (MFIs) comprise resident credit institutions as defined in Community Law and other resident financial institutions the business of which is to receive deposits and/or close substitutes for deposits from entities other than MFIs and, for their own account (at least in economic terms), to grant credits and/or make investments in securities." In parallel with this definition, CBRT has also tried to include all the resident credit institutions in its definition. Since money creation refers to the "money" released outside monetary financial institutions, the transactions among these institutions are deducted in the calculation of total money supply.

[1] www.ecb.int

The first expansion in the coverage of the monetary financial institutions was conducted in 2002, with the acceptance of participation banks as a "bank" while being included into monetary financial institutions. Prior to change, only deposit banks and central bank used to be covered in the monetary financial institutions. However, the change did not end with inclusion of the deposits held by participation banks, only their transactions with the members of other monetary financial institutions (deposit banks and central bank) started to be deducted from the total money supply.

In 2007, a broader change in definitions was conducted on three pillars:

First, there have been changes in the coverage of monetary financial institutions. The coverage was extended so as to include money market funds and investment and development banks. Participation banks had already been regarded as a monetary financial institution since 2002, but as mentioned above, only their transactions with other monetary financial institutions used to be taken into consideration. In 2007, the deposits held at participation banks started to be added to the money supply calculation. B-Type Liquid Funds held by money market funds also started to be included into money supply calculation, being located in M3. Transactions of money market funds with other monetary financial institutions started to be deducted from the calculation of monetary aggregates. Since investment and development banks do not hold deposits, they do not make a direct contribution to money supply calculation. Yet, their transactions with other monetary financial institutions also started to be deducted from the calculation of monetary aggregates as those of money market funds did.

Second, there were changes in terms of the items that would be included into money supply calculation. With the change in 2007, foreign exchange deposits started to be included into monetary aggregates. Along with the extension in the coverage of the monetary financial institutions, foreign exchange deposits held by participation banks also started to be included into monetary aggregates depending on their maturity.

Third, there were changes in relation to the location of official deposits. Before the change took place, the official deposits used to be included into M3 through the titles "official deposits (both demand and time deposits) and "other CBRT deposits". The deposits belonging to "central government" were removed to "counterpart items" following the change. There used to be items in M3 that belonged to general government, but not central government[2]. Those residual items were allocated to M1 and M2 according to their maturities.

In construction of the series for M1 and M2, the changes that were mentioned above were not wholly reflected upon calculations either due to problems in data availability or due to their small shares in total monetary aggregates. The construction has been carried out under certain assumptions. They can be listed as follows:

- The deposits held by Central Bank have been ignored due to their small share in total money supply.
- Transactions among the monetary and financial institutions are ignored as they constitute a small share in total money supply.
- Related to the second assumption, money market funds are totally excluded from the analysis. Through new definitions, they are located in M3 and only their transactions with other monetary financial institutions can have impact upon M1 and M2. Since the transactions are ignored, there is no effect of money market funds on either M1 or M2.
- Due to changes in definitions, additional information on the maturity breakdown and the type of the currencies is required. As will be mentioned in the "data source" section; gathering data about participation banks was not so trivial. Moreover, the data found did not present the required detail. The data found through the library archives of Central Bank of Turkey involved currency breakdown, but not maturity breakdown. This problem was solved by applying the ratios of maturities found the period 2005Q4-2011Q4 on the period 1987-2005Q3.

[2] These items are the deposits of social security institutions and deposits that belonged to local government.

Using the above mentioned assumptions, four series are constructed. They can be summarized as in the following table:

Table 1: Monetary Definitions

New M2: Application of new definitions on series of M2 before 2005Q4	M2 before 2005Q4+ Time Deposits at Deposit Money Banks in Foreign Currency+ Funds Held at Participation Accounts of Participation Banks both in TL and in Foreign Currency. This series is continued with the presentation of new definitions for the period after 2005Q4.
Old M2: Application of old definitions on series of M2 after 2005Q4	M1 after 2005q4-Demand deposits at Deposit Money Banks in Foreign Exchange- Funds held at Private Current Accounts at Participation Banks both in TL and in Foreign Currency. This seris is preceded by the officially presented M1 series for the period prior 2005q4.
New M1: Application of new definitions on series of M1 before 2005Q4.	M2 after 2005q4- Time Deposits at Deposit Money Banks in Foreign Currency- Funds Held at Participation Accounts of Participation Banks both in TL and in Foreign Currency. This series is preceded by the officially presented M2 series for the period prior 2005q4
Old M1: Application of new definitions on series of M1 after 2005Q4.	M1 before 2005q4+Demand Deposits at Deposit Money Banks in Foreign Exchange + Funds Held at Private Accounts at Participation Banks both in TL and in Foregin Currency. This series is continued with the presentation of new definitions for the period after 2005q4.

2.2 Data Sources

The basic data source utilized in the study, basically in construction of new series is the “Electronic Data Dissemination System” (EDDS) (www.evds.tcmb.gov.tr) of Central Bank of the Republic of Turkey (CBRT). In addition to that, International Financial Statistics published by International Monetary Fund and the library archives of CBRT are used to collect data.

2.3 Variables Used to Explain Monetary Aggregates

In this thesis, the explanatory variables are chosen basedon the explanatory variables suggested by Mundell (1963). In this vein, the course of the monetary term is modelled through a scale variable, inflation, an exchange rate variable and an interest rate variable[3].

In this thesis, the scale variable chosen is (the logarithm of) real GDP. There are two GDP series for Turkey published by Turkish Statistics Institute (TURKSTAT) on a quarterly basis through two different base years; 1987 and 1998, respectively. The series with base year 1987 are extended till 2007 Q4 while the series with base year 1998 are extended till 2012

[3] For all the notations used for monetary and other variables, see list of abbreviations.

Q2 and currently used. Therefore, for Turkey, there is a requirement of an uninterrupted time series that goes back to 1987Q1 with the same base year. International Monetary Fund publishes a real GDP index for Turkey with base year 2005 from 1987Q1 through 2011Q4.

In this thesis, that index is used in order to obtain real GDP values with 2005 accepted as the base year. The GDP series is constructed by extrapolating the series with base year 1987 with the growth rates observed through the real GDP index with base year 2005.

The other explanatory variable used in the analyses is inflation. The problem of different base years is also encountered for the consumer price index in Turkey. There are three different series of price index (with base years 1987, 1998 and 2003) published by TURKSTAT, and the last series which is based on 2003 prices does not go back to 1987. Similar to the case in real GDP, IMF publishes a deflator for Turkey with base year 2005. The inflation variable used in the analysis is the quarterly inflation calculated using the related deflator.

The other variable used in the study is the growth rate of the real exchange rate. There are two basic exchange rate definitions which are deflated by the deflator mentioned above. These are USD/TL and WRATE/TL parities, the former of which is directly obtained from the EDDS of CBRT, while the latter one is calculated specifically. WRATE/TL is calculated by weighing the parities of USD/TL, DM/TL and EURO/TL with their respective shares in total foreign exchange deposits. For the period 1987Q1-1998Q4, DM/TL parity is used while EURO/TL parity is used for the period 1999Q1-2011 Q4.

The last variable is the real interest rate on TL deposits with 3 month maturity. As in the construction of exchange rates, the interest rate has also been deflated with the deflator published by IMF with base year 2005. The rationale behind the selection of the related interest rate is the fact that in the sample period, it is the 3- month maturity that has the highest share in total TL time deposits[4].

[4] Between 1987Q1 and 2011 Q4, the TL deposits with 3- month maturity held by deposit banks constitutes half of the total TL deposits.

2.4 Statistical Properties of Variables

In this section, the statistical properties of the variables introduced in the previous section are examined.

As mentioned in the first section, new M1 is constructed by applying new definitions on the existing M1 series for the period before 2005Q4 till 1987Q1.

Old M1, on the other hand is constructed by applying old definitions on the existing new M1 series for the period between 2005Q4 and 2011Q4. The monetary terms in the analyses are not the nominal values at levels, but the growth rates of real monetary terms. The nominal terms have been deflated to real values using the deflator published by IMF. With additional insight provided by inflation, the course of nominal terms and the growth rates of deflated values can be depicted in the following figures. Since there is a considerable increase in the level of monetary aggregates through the whole period of analysis, series have been divided into two through the first quarter of 1996 in order to present a more explicit picture.

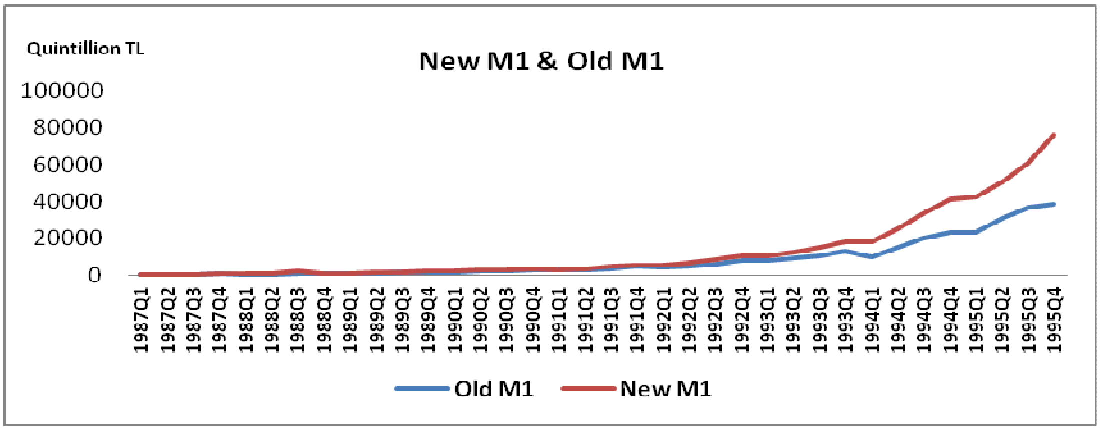


Figure 1. Paths of New M1, old M1 between 1987Q1 and 1995Q4

Source: Central Bank of Turkey

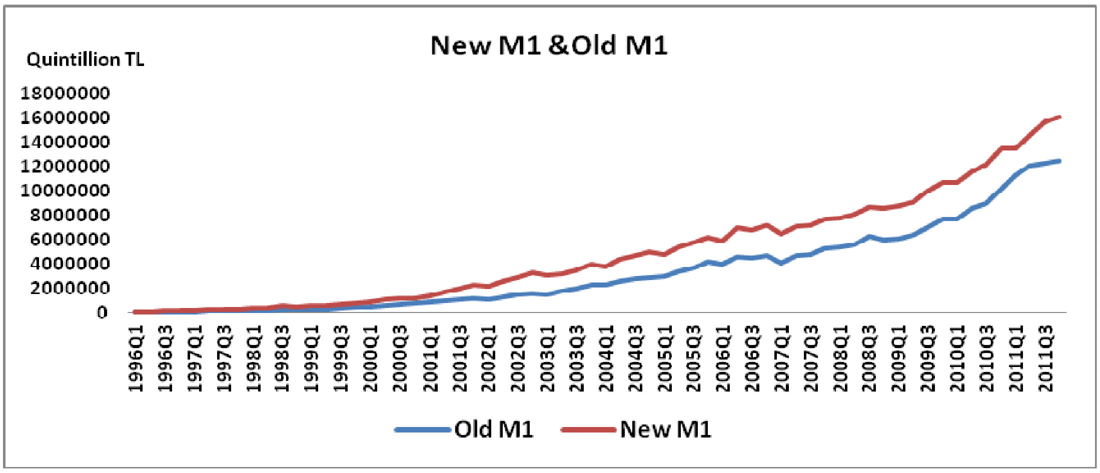


Figure 2. Paths of New M1, old M1 between 1996Q1 and 2011Q4

Source: Central Bank of Turkey

In both Figure 1 and Figure 2, it is observed that new M1 is higher than old M1 in all periods, which is the arithmetically expected result. In Figure 1, it is observed that new M1 increases more rapidly than old M1 in the aftermath of the crisis compared to its path before the crisis. This observation can be attributed to the procedure change of CBRT after the crisis along with currency substitution. Indeed, the increase in monetary terms before the 1994 crisis stemmed from the monetization of the Treasury's debt by CBRT through domestic credits (Celasun, 1998)[5]. In the aftermath of the crisis, however, the increase in monetary aggregates continues, albeit with the change in monetary policy procedures of Central Bank. In this period, CBRT increased money supply by buying foreign exchange or through open market operations. Such a change in procedure initially led to appreciation of foreign currency, but the increase in foreign reserves helped recover the confidence in TL, preventing it from further depreciation. (Ozdemir and Turner,2004). Excess supply of TL which is converted to foreign currency along with foreign currency appreciation reveals itself through the discrepancy betwen old and new M1.

For the period 1996Q1- 2011 Q4, there are two crisis periods: The Turkish financial crisis in 2001 and the global financial crisis of 2008. As in the period between 1987Q1-1995Q4, it is seen that the level of new M1 overwhelms that of old M1. However, it is also seen that the

[5] Celasun (1998) calculates the excess liquidity in the economy through M1, covering the period of the last two months of 1992 and the whole of 1993.

difference between old and new M1 moves in a steady manner. That is, there is not a jump of new M1 away from old M1 as in the previous period.

In Figure 3, movements of new and old M2 are depicted for the period 1987Q1-1995Q4. It is observed that similar to the movement of old and new M1, both old and new M2 increase rapidly during the period of 1994 crisis. The increasing discrepancy between old and new M2 can be attributed to the policy changes of CBRT mentioned above.

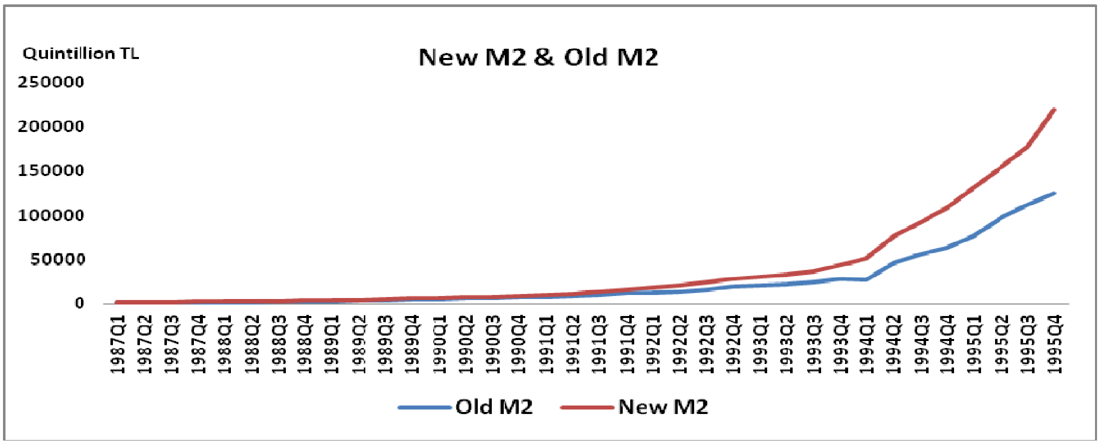


Figure 3. Paths of new M2, old M2 for the period between 1987Q1 and 1995Q4

Source: Central Bank of Turkey

In Figure 4, movements of new and old M2 are depicted for the period 1996Q1-2011Q4. It is seen that, the gap between old and new M2 starts to increase after the 2001 crisis. The difference between old and new M2 follows a steady pattern till the fourth quarter of 2010, during which old M2 exhibited a notable decline. Since new M2 went on increasing while old M2 declined, it can be extracted that there was a decrease in TL deposits which was highly compensated by the increase in foreign exchange deposits. Figure 5 shows the movement of foreign exchange deposits held by deposit money banks through time deposits. It is seen that starting with the third quarter, there is an increase in foreign exchange deposits.

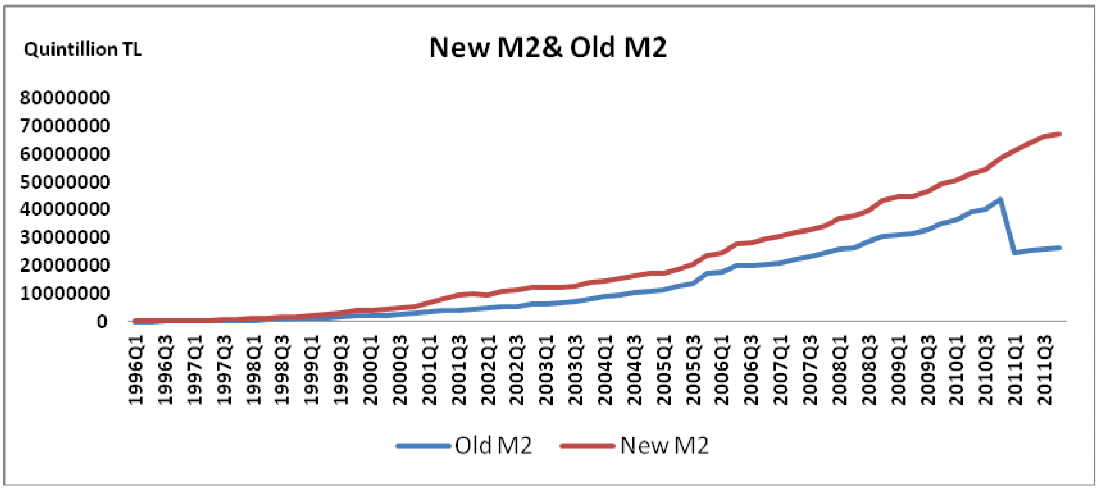


Figure 4. Paths of new M2, old M2 for the period between 1996Q1 and 2011Q4

Source: Central Bank of Turkey

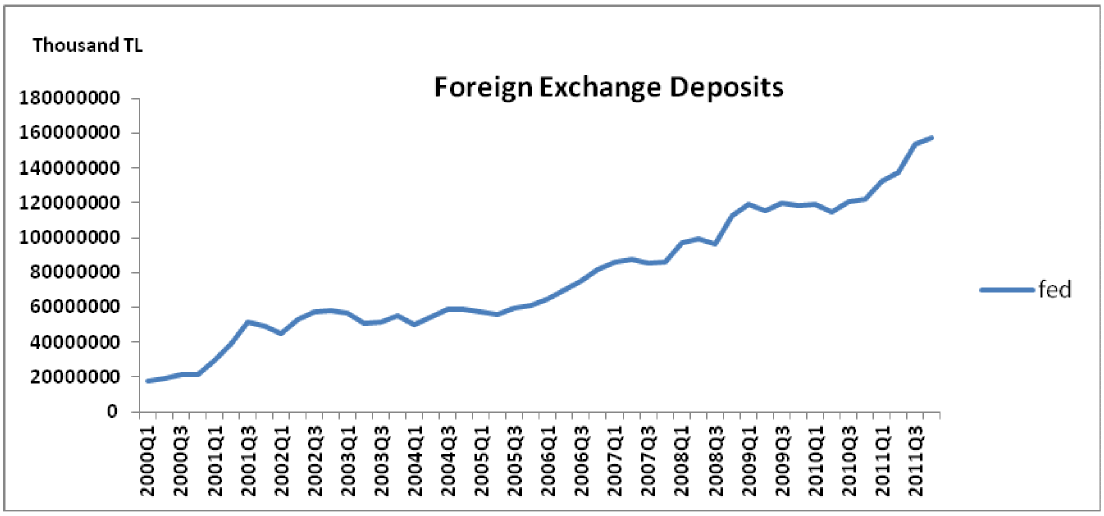


Figure 5. Path of foreign exchange deposits[6] between 2000Q1 and 2011Q4

Source: Central Bank of Turkey

In Figure 6, the relation between growth rates of real old and new M1 and inflation is depicted for the whole sample period. It can be stated that in general, inflation increase brings about increase in the growth rate of both real old and new M1. Such an observation can be attributed to the transactions demand for money. However, it is also seen that in the first quarter of 1998, inflation increase is associated with a decline in the growth rate of

[6]These foreign exchange deposits are held by deposit money banks as time deposits for the related period.

both real old and new M1. Currency substitution can be put forward as a possible suggestion for this observation, but the decrease observed for new M1 causes to think that there may be a shift toward alternative assets.

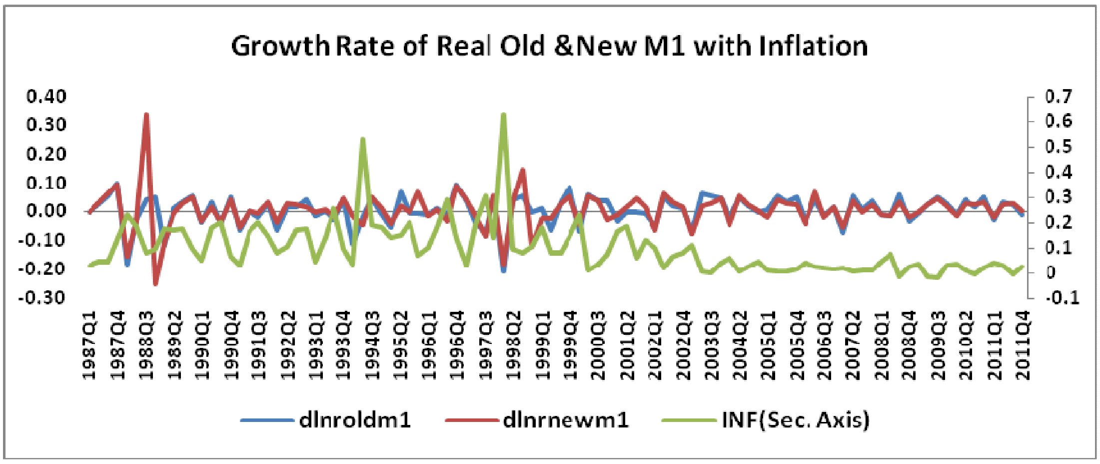


Figure 6. Growth rates of Real New M1, Real old M1 and inflation for the period 1987Q1 - 2011Q4

Source: Central Bank of Turkey and International Monetary Fund

In Figure 7, the relation between growth rates of real old and new M2 and inflation is depicted for the whole sample period. In general, it is seen that there is an opposite relation between the growth rate of real old and new M2 and inflation. During the first quarter of 1998 and 2000, the opposite relation becomes sharper. Considering the positive effect of inflation on interest rates, it would be considered that inflation would increase the growth rate of both real old and new M2 along with possible contribution of currency substitution which would be detected through the foreign exchange deposits. The sharp relation observed through these periods can be attributed to movement towards other alternative assets such as treasury bonds.

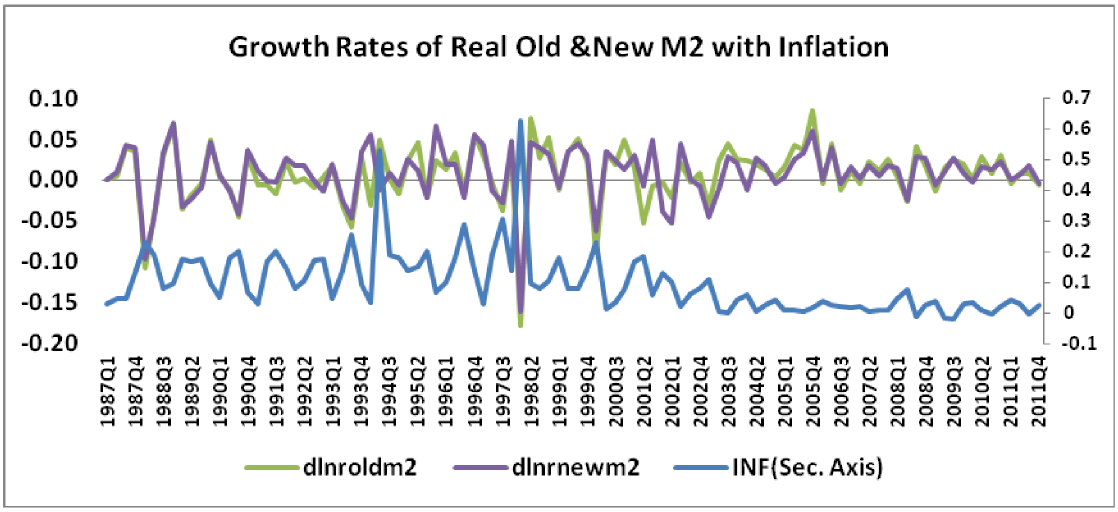


Figure 7. Growth rates of real new M2, real old M2 and inflation for the period between 1987Q1 and 2011Q4

Source: Central Bank of Turkey and International Monetary Fund

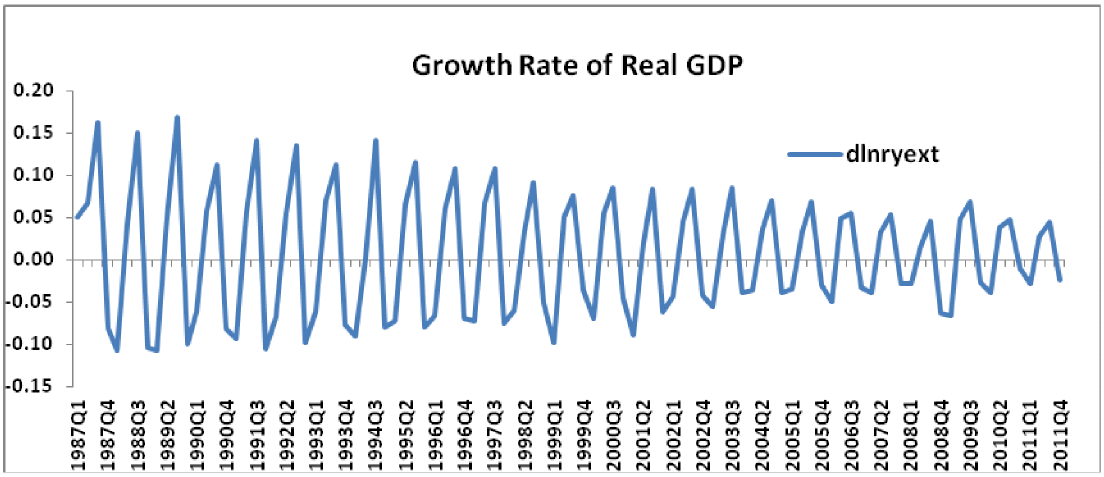


Figure 8. Growth Rate of Real GDP

Source: Central Bank of Turkey and International Monetary Fund

Figure 8 shows the growth rate of real GDP for the sample period. One of the notable points observed through the figure is that the impact of the last global crisis on the growth rate of real GDP has almost reached the impact of the 2001 crisis on the growth rate.

Figure 9 presents the growth rates of real exchange rates along with the path of inflation for the period between 1987Q1- 1995 Q4. The opposite relation between the growth rate of real exchange rate and inflation is clearly observed. Another point extracted from the figure is the lag between the responses of exchange rates to inflation observed through the 1994 crisis. It is seen that between 1993Q1 and 1994Q3, the growth rate of USD moves in the opposite direction of inflation before the growth rate of WRATE gives reaction. Moreover, the range through which USD fluctuates is wider than that of WRATE.

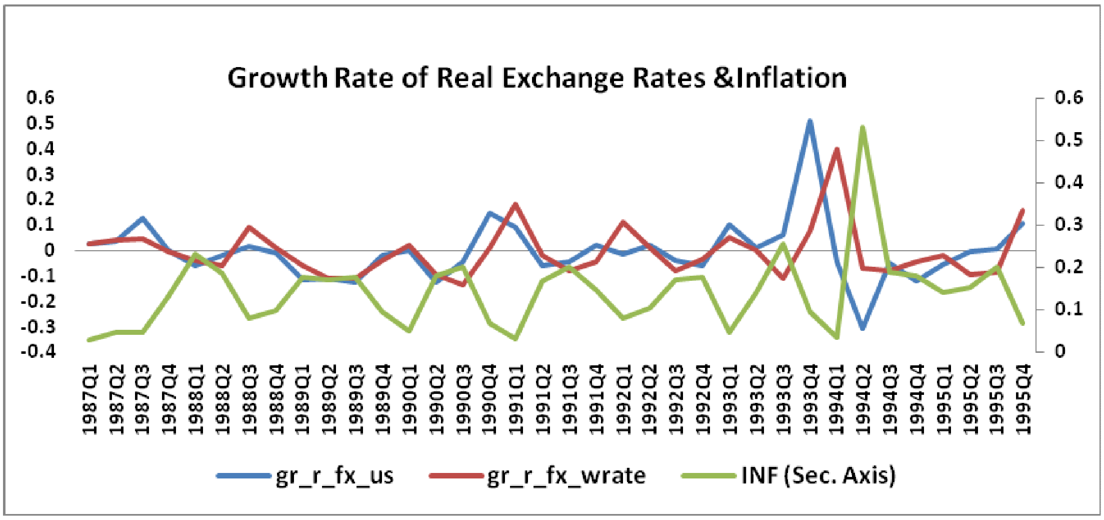


Figure 9. Growth Rates of Real Exchange Rates and Inflation for the period 1987Q1-1995Q4

Source: Central Bank of Turkey and International Monetary Fund

Through Figure 10, the relation between the growth rate of real exchange rates and inflation between 1996Q1 and 2011Q4 resembles that of observed between 1987Q1 and 1995Q4. That is, it is possible to observe a clear opposite relation between the growth rates of real exchange rate and inflation. However, in this period, the movement of the growth of real exchange rates may overwhelm the movement in inflation as observed through the 2001 crisis. Such an observation suggests that the change in real exchange rate does not stem only from the change in inflation, but also from the changes in the growth rate of nominal exchange rates. Similarly, during the global crisis through 2008, the upward trend in the growth rate of the real exchange rate is higher than the decline in inflation in absolute terms.

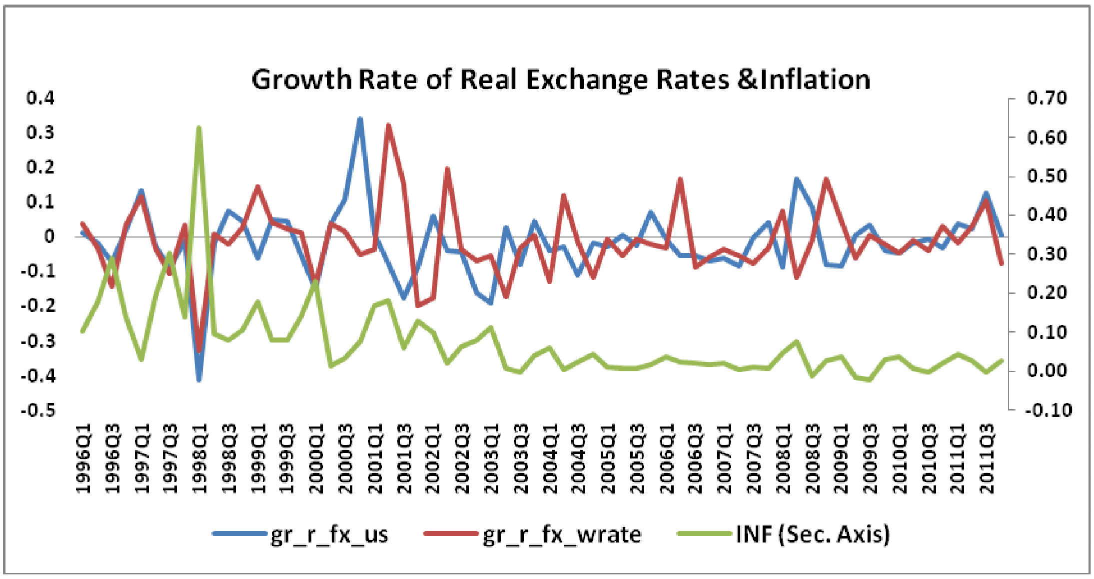


Figure 10. Growth Rates of Real Exchange Rates and Inflation for the period 1996Q1-2011Q4

Source: Central Bank of Turkey and International Monetary Fund

The course of interest rates has been depicted in Figure 11. "r_deposit_rate_3_adj"stands for the interest rate that has been constructed by deflating the nominal interest rate on 3-month TL deposits, "dep3" with the deflator published by IMF with base year 2005. It is observed that the course of real interest rate presents two peak points in 1994 and 2001, respectively and one trough in the first quarter of 1998. The peak points are observed through the 1994 and 2001 crises. The increase in real interest rate is observed along with the increase in nominal interest rate in 1994 and 2001. Yet, in 1998, despite the absence of an increase in nominal interest rates, real interest rates decline sharply which can be related to the increase in inflation.

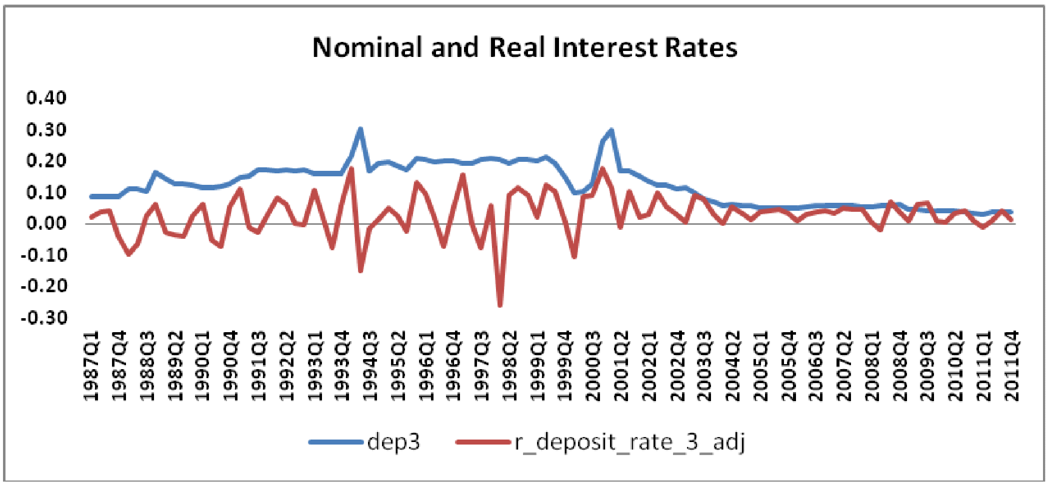


Figure 11. Nominal and Real Interest Rates for the period 1987Q1-2011Q4

Source: Central Bank of Turkey and International Monetary Fund

Table 2. Normality Tests of the Series

	Shapiro Francia W' Test				
Variable	Obs	W'	V'	z	Prob>z
dlnrm11	100	0.91246	7.9100	4.0040	0.00003
dlnrm1	100	0.82657	15.6710	5.2310	0.00001
dlnrm21	100	0.88592	10.3080	4.4850	0.00001
dlnrm2	100	0.89936	9.0930	4.2580	0.00001
dlnyrext	100	0.95680	3.9040	2.6880	0.00360
gr_r_fx_us	100	0.85771	12.8570	4.8800	0.00001
gr_r_fx_wrate	100	0.92532	6.7480	3.7120	0.00010
inf	100	0.7911	18.8760	5.5570	0.00001
r_deposit_rate_3_adj	100	0.9445	4.584	3.278	0.0004

In order to examine the normality properties of the series, Shapiro-Francia test is employed. According to p-values observed through Shapiro-Francia test, none of the variables used in the analyses are distributed normally.

Histograms of certain variables are presented in comparison to the results of the normality tests.

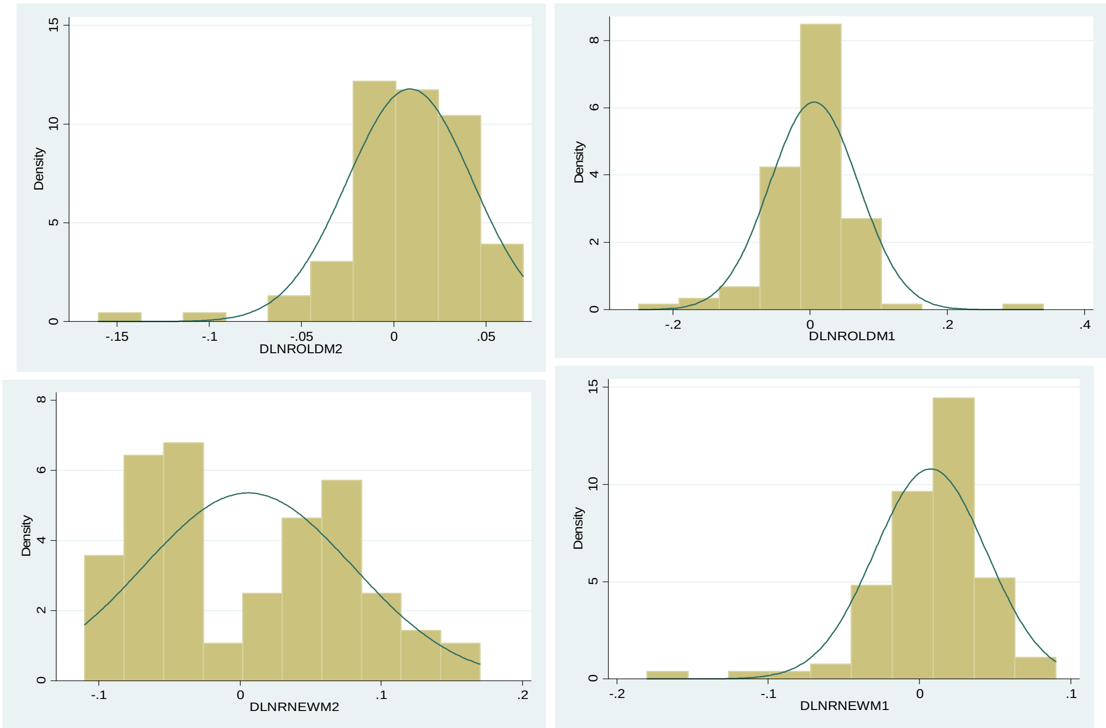


Figure 12. Histograms of the Growth Rates of Real Monetary Terms

Source: Central Bank of Turkey and International Monetary Fund

The histograms of the growth rates of monetary terms are depicted in Figure 12. It is seen that the normality test results for the growth rates of old M2 and new M1 are supported by histograms which present the negatively skewed distribution of the series while the histograms for the growth rates of old M1 and new M2 present a contradictory picture to the results of normality tests. The histograms present a distribution close to normal distribution while the tests reject the normality.

As shown in Figure 13, the growth rate of real GDP is not normally distributed and positively skewed, supporting the results of the normality tests.

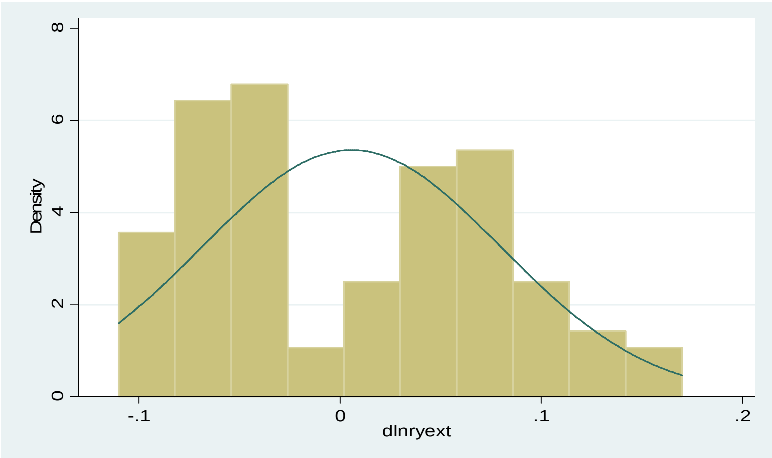


Figure 13. Histogram of the Growth Rate of Real GDP

Source: Central Bank of Republic of Turkey and International Monetary Fund

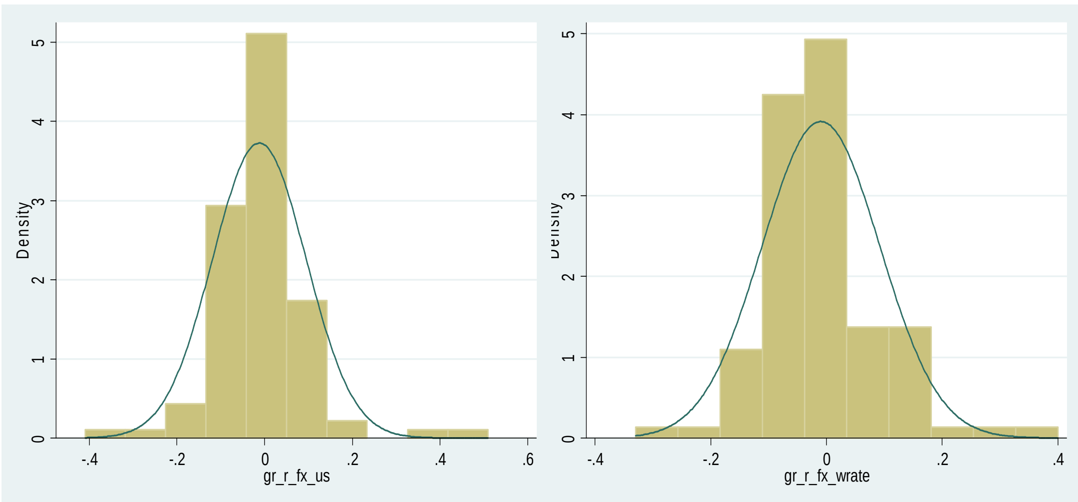
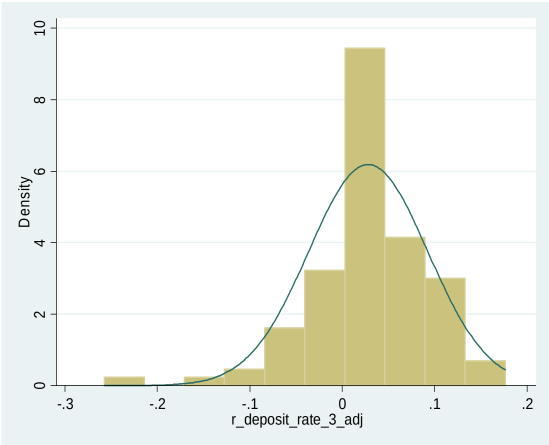


Figure 14. Histograms of the Growth Rates of Real Exchange Rates

Source: Central Bank of Republic of Turkey and International Monetary Fund

As shown in Figure 14, the distribution of the growth rates of the real exchange rates present a distribution close to normal distribution, in contradiction with the results found through the normality tests.



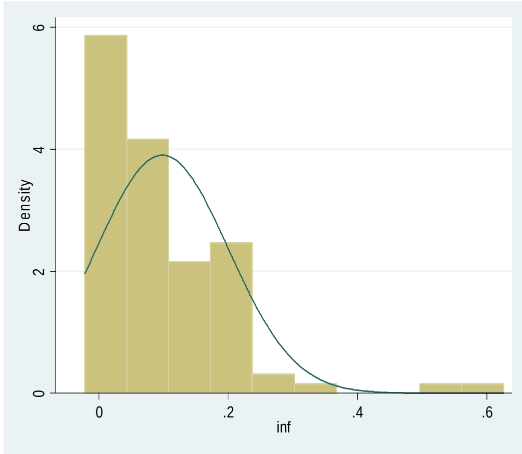


Figure 15. Histograms of Real Interest Rate and Inflation

Source: Central Bank of Republic of Turkey and International Monetary Fund

In Figure 16, the histogram of the real interest rate on TL deposits with 3- month maturity support the results of the normality test in that it presents a negatively skewed distribution. The histogram of inflation supports the results found through normality tests such that it exhibits a positive skewed distribution.

2.5 Unit Root Properties of the Series

Unit root tests have been conducted for both monetary and explanatory variables through Augmented Dickey- Fuller test. The lag length has been chosen according to Akaike Information Criterion (AIC). It has been determined that while the levels of real and nominal interest rate and inflation are I(0), the logarithms of other variables are I(1). The growth rates of the variables are found to be I(0).

Table 3. ADF Test Results of Non-Stationary Variables

Intercept			Trend and Intercept	
t-test statistic		lag-length	t-test statistic	lag-length
Lnrnewm1	0.591	2	-1.747	2
Lnrnewm2	0.049	2	-3.437	1
Lnroldm1	0.353	2	-1.243	2
Lnroldm2	0.517	1	-2.031	1
Lnyext	-0.298	8	-2.931	8
Lnrusd	-0.984	1	-3.302	1
Lnrwrate	-1.22	2	-3.455	1

Note: Rejection of null hypothesis is indicated with ** for 95% and *** for 99% confidence intervals.

Table 4. ADF Test Results of Stationary Variables

Intercept			Trend and Intercept	
	t-test statistic	lag-length	t-test statistic	lag-length
dlnyext	-4.698**	7	-4.666**	7
dlnroldm1	-12.844**	1	-13.085**	1
dlnrnewm1	-11.451**	1	-11.707**	1
dlnroldm2	-11.246**	1	-11.269**	1
dlnrnewm2	-4.765**	7	-4.741**	7
gr_r_fx_wrate	-9.851**	1	-9.799**	1
gr_r_fx_us	-8.241**	1	-8.241**	1
rdep3	-11.577**	2	-7.576**	6
dep3	-9.298**	2	-9.36**	2
İnf	-10.932**	2	-10.902**	2

Note: Rejection of null hypothesis is indicated with ** for 95% and *** for 99% confidence intervals

CHAPTER 3

EMPIRICAL ANALYSES

In this section detailed information on the VAR analyses for the monetary variables new M1 new M2 and their counterparts, old M1 and old M2 will be presented. In order to understand the change in the explanatory power of monetary variables between the old and new definitions, this section is organized to include detailed information on lag selection, residual diagnostics, model stability and impulse response functions for each of the variables under consideration.

3.1 VAR ANALYSIS WITH REAL NEW M1

The VAR model for the growth rate of **real new M1** is constructed with the growth rate of real GDP **(dlnryext)**, inflation **(inf)**, real interest rate on deposits with maturity of 3 months **(r_deposit_rate_3_adj)** and growth rate of real exchange rate **(gr_r_fx_us)** and a dummy variable standing for the first quarter of 1998. The analysis is carried out for the period between **1991q1- 2011q4.**

3.1.1 Lag Selection in VAR Model with Real New M1

Lag selection is important in order to be able to use the correct number of lags in the model. One should consider during this **process that selecting** too many lags might reduce the power of the tests since it requires the estimation of the additional parameters and causes loss of degrees of freedom. In our case, lag selection criteria LR, FPE, AIC, HQIC are used to determine the optimal number of lags and the results are shown in Table 5. These results indicate that four lags is optimal for the model.

Table 5. Lag Selection in VAR Model with Real New M1

Lag Selection Criteria for VAR Model with Real New M1						
Lag	LL	LR	FPE	AIC	HQIC	SBIC
0	578.38	-	$9.1x10^{-13}$	-13.53	-13.41	-13.24
1	674.76	192.75	$1.7x10^{-13}$	-15.23	-14.83	-14.22
2	811.27	273.04	$1.2x10^{-14}$	-17.89	-17.19	-16.15
3	869.43	116.30	$5.5x10^{-15}$	-18.68	-17.69	-16.22*
4	922.96	107.1*	$2.9x10^{-15}$*	-19.36*	-18.08*	-16.17

3.1.2 Stability of the Model with Real New M1

The VAR model should also be checked for stability to make sure that impulse-response analyses give robust results. Stability requires that all characteristic roots lie within the unit circle, since all the eigenvalues meet the above mentioned criteria, VAR model is stable.

Table 6. VAR Stability Test Results with Real New M1

Eigenvalue	Modulus	Eigenvalue	Modulus
.00670323 + .9946385i	0,994661	-.6454824 + .3425196i	0,730731
.00670323 - .9946385i	0,994661	-.6454824 - .3425196i	0,730731
0,9519886	0,951989	.5640256 + .4203666i	0,703444
-0,9198401	0,91984	.5640256 - .4203666i	0,703444
-.0162303 + .8606431i	0,860796	0,7022559	0,702256
-.0162303 - .8606431i	0,860796	-0,687514	0,687514
.4549075 + .6670069i	0,807366	-.08155419 + .4760996i	0,483034
.4549075 - .6670069i	0,807366	-.08155419 - .4760996i	0,483034
-.4282264 + .6219163i	0,755088	0,4151103	0,41511
-.4282264 - .6219163i	0,755088	-0,208357	0,208357

3.1.3 Residual Diagnostic Test Results

The LM test for serial correlation indicates that residuals are not serially correlated at %95 confidence level through 10 lags of the residuals.

Table 7. Serial Correlation Test for VAR model with Real New M1

Lag	LM-stat	Probability
1	28.4859	0.28598
2	35.0063	0.08809
3	22.8404	0.58688
4	29.5537	0.24144
5	24.5701	0.48666
6	18.9421	0.79989
7	34.0133	0.10762
8	21.3697	0.67182
9	27.5025	0.33126
10	23.9214	0.52392

As for the normality of residuals, it is satisfied only for the equation of “dlnrnewm1”. For the other equations in the VAR model, there is normality problem of the residuals. In terms of skewness and kurtosis of the residuals, only equations of “dlnrnewm1” and “dlnryext” are exempt from these problems.

Table 8. Normality Test for the Residuals of the Equations of VAR Models with Real New M1

Normality Test						
	Skewness		Kurtosis		Jarque-Bera	
	Chi-sq	Probability	Chi-sq	Probability	Chi-sq	Probability
dlnrnewm1	0.008	0.93064	0.045	0.83118	0.053	0.97384
dlnryext	2506	0.11338	3778	0.05192	6.285	0.04318
inf	4.786	0.02869	6.496	0.01081	11.282	0.00355
gr_r_fx_us	30.423	0.00000	122.185	0.00000	152.607	0.00000
|r_deposit_rate_3_adj|	13.227	0.00026	36.406	0.00000	49.733	0.0000
ALL	51.05	0.00000	168.910	0.00000	219.960	0.0000

3.1.4 Impulse Response Functions of the VAR Model with Real New M1

In this section, first the impacts of the shocks to the growth rates of real new M1 on itself and on other variables will be discussed. Therafter, the impacts of the shocks to other variables on the growth rate of real new M1 will be discussed. The illustrations in relation to the impulse response functions can be found in Figure 16.

- The initial response of the growth rate of real new M1 on itself is positive and declines to zero at the end of the first period. After the first period, it starts to increase again and after fluctuating between negative and positive values, the response dies off gradually through the tenth period. It can be stated that the shock to the growth rate of new M1 reinforces itself in the very short run.
- The initial response of the growth rate of real new M1 on the growth rate of real GDP is positive, but in the fourth period it reaches negative values, but becomes positive again through the fifth period. Indeed, till the tenth period the response follows mild fluctuations until it converges to zero. The response of the growth rate of real GDP is in the expected direction.
- The initial response of inflation to a shock to the growth rate of real new M1 is positive in the first four periods followed by a decline in the fifth period which recovers afterwards. The impact dies off through the tenth period. The result is in the expected direction.
- The impact of the shock to the growth rate of real new M1 on the growth rate of real foreign exchange rate is positive and increases through the fifth period. In the fifth period, it declines and after some periods of negative reponses, it converges to zero in the tenth period. The way that the growth rate of real exchange rate responses to the shock in the growth rate of real new M1 is unexpected. A positive shock for instance to the growth rate of real old M1 increases the growth rate of domestic money supply; aggravating the appreciation of foreign currency.
- The initial impact of the shock to the growth rate of real new M1 on the growth rate of real deposit rate is negative. After four periods, the response turns into positive and dies off gradually to zero through the tenth period. Since the response of inflation to a shock to the growth rate real new M1 is positive in the first four periods, it should be checked whether the negative response of the real interest rate stems from the negative response of nominal interest rate or a positive response of inflation.

In terms of the impact of the shock to one of the explanatory variables on the growth rate of the monetary aggregate; the following observations can be listed:

- The initial impact of the shock to the growth rate of real GDP on the growth rate of real new M1 is negative. After the second period, it starts to increase again and after fluctuating in a mild manner, converges to zero in the tenth period.
- The impact of the shock to the growth rate of real foreign exchange rate on the growth rate of real new M1 is almost zero through the whole period of analysis, which is an unexpected result considering that the new M1 include foreign exchange demand deposits.
- The initial impact of the shock to inflation on the growth rate of real new M1 is positive, but in the third period it starts to decline to negative values, which is recovered through the fifth period. After the recovery, the response dies off gradually through the tenth period. The response of the growth rate of real new M1 is in the expected direction which can be attributed to the transactions demand for money.
- The initial impact of the shock to real deposit rate on the growth rate of real new M1 is positive, being followed by a mild fluctuation. The negative peak point is seen in the seventh period and the response dies off gradually to zero in the tenth period. Through the whole horizon, it can be claimed that the response of the real new M1 to the shock to the real deposit rate is almost negligible.

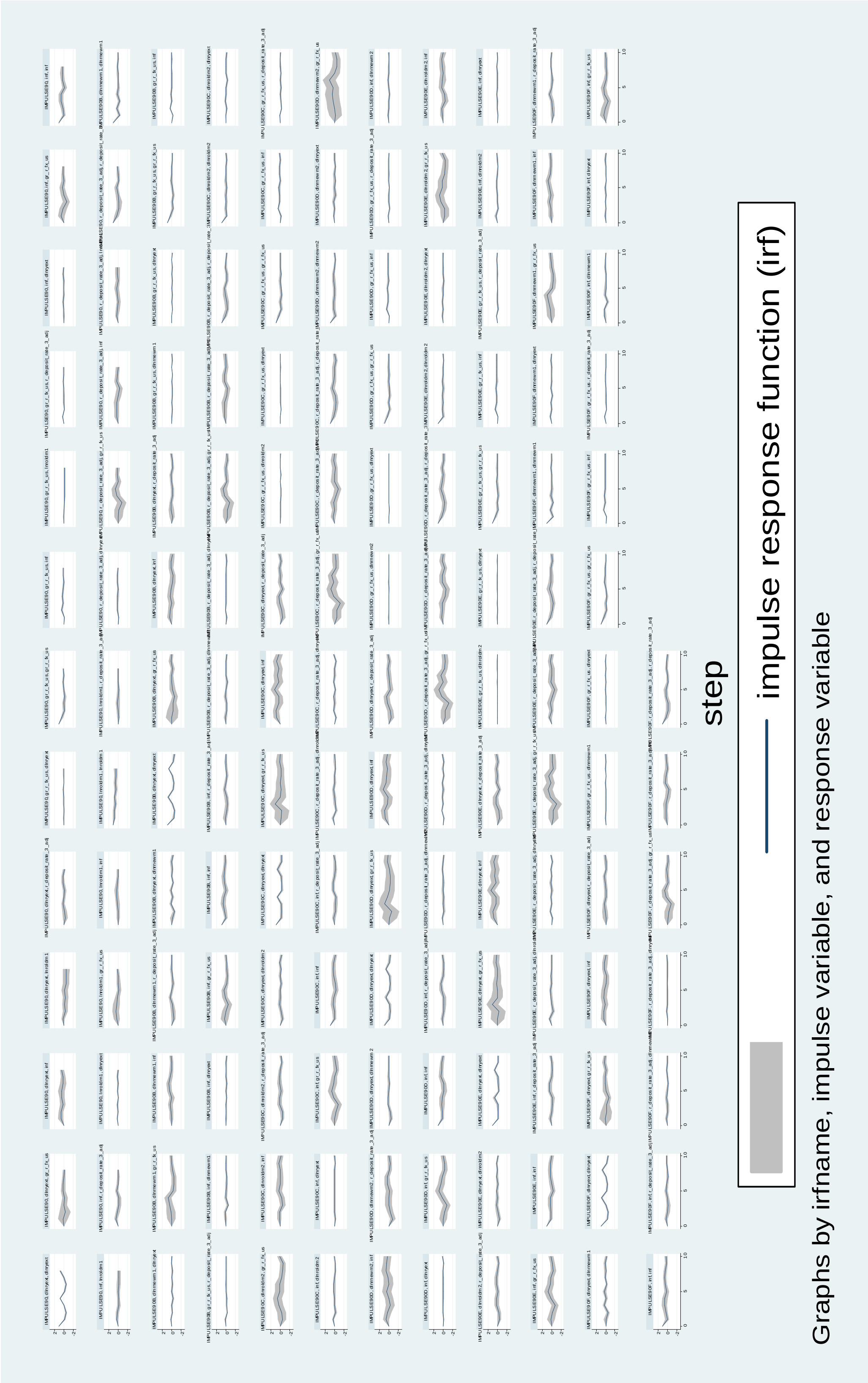


Figure 16. Impulse Response Functions from VAR Model with Real New M1

3.2 VAR ANALYSIS WITH REAL NEW M2

The VAR model for the growth rate of **real new M2** is constructed with the growth rate of real GDP **(dlnryext)**, inflation **(inf)**, real interest rate on deposits with maturity of 3 months **(r_deposit_rate_3_adj)** and growth rate of real exchange rate **(gr_r_fx_us)** and a dummy variable standing for the first quarter of 1998. The analysis is carried out for the period between **1991q3- 2011q4.**

3.2.1 Lag Selection in VAR Model with Real New M2

Lag selection criteria LR designate that six lags should be used in the model.

Table 9. Lag Selection in VAR Model with Real New M2

Lag Selection Criteria for VAR Model with Real New M2						
Lag	LL	LR	FPE	AIC	HQIC	SBIC
0	616.742		$2.6x10^{-13}$	-147.986	-146.808	-145.051
1	703.635	173,79	$5.7x10^{-14}$	-163.082	-158.957	-152.809
2	829.066	250,86	$5.0x10^{-15}$	-187.577	-180.507	-16.9967*
3	865.884	73.637	$3.8x10^{-15}$	-19.046	-180.444	-165.512
4	922.239	112,71	$1.8x10^{-15*}$	-198.107	-18.5145*	-165.822
5	948,59	52.701	$1.9x10^{-13}$	-19.8437*	-182.529	-158.814
6	970,32	43.461*	$2.2x10^{-15}$	-197.639	-178.785	-150.679

3.2.2 Stability of the Model with Real New M2

The VAR model should also be checked for stability to make sure that impulse-response analyses give robust results. As indicated in the table, since all the eigenvalues lie inside the unit circle, VAR model is stable.

Table 10. VAR Stability Test Results of the Model with Real New M2

Eigenvalue	Modulus	Eigenvalue	Modulus
.00318628 + .9908589i	0.990864	-.4032391 - .6743725i	0.785735
.00318628 - .9908589i	0.990864	.3350005 + .6996048i	0.775675
0.9707399	0.97074	.3350005 - .6996048i	0.775675
-0.9557542	0.955754	0.756997	0.756997
-.01575345 + .9079449i	0.908082	-.01703692 + .7183957i	0.718598
-.01575345 - .9079449i	0.908082	-.01703692 - .7183957i	0.718598
.5394239 + .6443301i	0.840321	-0.7022869	0.702287
.5394239 - .6443301i	0.840321	.5841048 + .247095i	0.63422
-.6993037 + .4394311i	0.825909	.5841048 - .247095i	0.63422
-.6993037 - .4394311i	0.825909	.3675797 + .5062107i	0.625591
-.6257902 + .498504i	0.800075	.3675797 - .5062107i	0.625591
-.6257902 - .498504i	0.800075	-.5368245 + .2722916i	0.601933
.7416768 + .2876664i	0.79551	-.5368245 - .2722916i	0.601933
.7416768 - .2876664i	0.79551	-.01843137 + .2410505i	0.241754
-.4032391 + .6743725i	0.785735	-.01843137 - .2410505i	0.241754

3.2.3 Residual Diagnostic Test Results

The LM test for serial correlation indicates that residuals are not serially correlated for %95 confidence level through 10 lags of the residuals.

Table 11. Serial Correlation Test for VAR model with Real New M2

Serial Correlation Test for VAR Model with Real New M2		
Lag	LM-stat	Probability
1	359.069	0.07302
2	259.202	0.41187
3	245.970	0.48513
4	322.172	0.15182
5	161.127	0.91143
6	226.819	0.59613
7	292.916	0.25191
8	199.458	0.74966
9	255.482	0.43201
10	253.714	0.44172

As for the normality of residuals, it is satisfied for the equations of “dlnrnewm2”, “dlnryext”, “inf”. For the other equations in the VAR model, there is normality problem of the residuals. In terms of skewness and kurtosis of the residuals, still the equations of “dlnrnewm2”,“dlnryext” “inf” are exempt from these problems.

Table 12. Normality Test for the Residuals of the Equations of VAR Models with Real New M2

Normality Test						
	Skewness		Kurtosis		Jarque-Bera	
	Chi-sq	Probability	Chi-sq	Probability	Chi-sq	Probability
dlnrnewm2	0.074	0.78607	3.138	0.07650	3.211	0.20075
dlnryext	0.262	0.60862	1523	0.21718	1.785	0.40961
inf	2.380	0.12287	2.413	0.12036	4.793	0.09103
gr_r_fx_us	22.793	0.00000	53.859	0.00000	76.652	0.00000
|r_deposit_rate_3_adj|	19.129	0.00001	69.520	0.00000	88.649	0.00000
ALL	44.638	0.00000	130.452	0.00000	175.091	0.00000

3.2.4 Impulse Response Functions of the VAR Model with Real New M2

In this section, first the impacts of the shocks to the growth rates of real new M2 on itself and on other variables will be discussed. Therafter, the impacts of the shocks to other variables on the growth rate of real new M1 will be discussed. The illustrations in relation to the impulse response functions can be found in Figure 17.

- The initial impact of the shock to the growth rate of real new M2 on itself is positive, but then declines to zero at the end of the second period. In the following periods, the response fluctuates mildly and through the tenth period, it converges to zero.
- The initial impact of the shock to the growth rate of real new M2 on the growth rate of real GDP is positive, but then declines to negative values through the fourth period. The response of the growth rate of real GDP dies off gradually through the tenth period. Through the whole horizon period, it can be claimed that the impact of a shock to the growth rate of real new M2 is negligible.
- The initial impact of the shock to the growth rate of real new M2 on inflation is positive, but declines to zero at the end of the third period. Until the end of the

tenth period, the response fluctuates between negative and positive values and ultimately converges to zero. The impact is expected since a shock to the growth rate of real new M2 would affect inflation in the same direction through aggregate demand.

- The initial impact of the shock to the growth rate of real new M2 on real deposit rate is negative, but then increases to positive values in the third period. After mild fluctuations, the response converges to zero in the tenth period. This result is expected in the sense that a shock to the growth rate of the monetary aggregate may affect the interest in opposite direction.
- The impact of the shock to the growth rate of real new M2 on the growth rate of real exchange rate is negligible till the seventh period. In the seventh period, there is a peak of the response which declines rapidly afterwards. Through the tenth period, the response converges to zero gradually. Compared to the results found for real old M2, it is observed that the response of the growth rate of real exchange rate to a shock in the growth rate of real new M2 is detected at a later period.

In terms of the impact of the shock to one of the explanatory variables on the growth rate of the monetary aggregate; the following observations can be listed:

- The initial impact of the shock to the growth rate of real GDP on the growth rate of real new M2 is negative. Through the fourth period, it increases and converges to zero. Despite the mild fluctuations through the seventh and eighth periods, the response dies off gradually through the tenth period.
- The initial impact of the shock to the growth rate of the real foreign exchange rate on the growth rate of real new M2 is almost zero. Moreover, the irresposiveness of the growth rate of the real new M2 continues through the whole horizon of analysis. It is expected that the shock to the growth rate of the real foreign exchange rate (i.e appreciation rate of the real exchange rate) would have an impact on the growth rate of the real new M2 since M2 includes foreign exchange deposits and holding foreign currency constitutes an alternative asset for holding deposits. Yet, it is significantly shown that there is almost no response.

- The initial impact of the shock to inflation on the growth rate of real new M2 is positive. Through the fifth period, it becomes negative, but then through the sixth period it becomes positive again, converging to zero through the tenth period.
- The initial impact of the shock to the growth rate of the real deposit rate on the growth rate of real new M2 is positive. Following the second period, the response turns into negative but recovers again through the fourth period after which it moves along a mildly fluctuating manner. Through the tenth period, the impact dies off gradually. It can be stated that the growth rate of real new M2 is responsive to the shock in the growth rate of real deposit rate in the very short run, but as the periods unfold, the response vanishes. This result is an expected result since M2 includes the deposits which are valued through the related deposit rate.

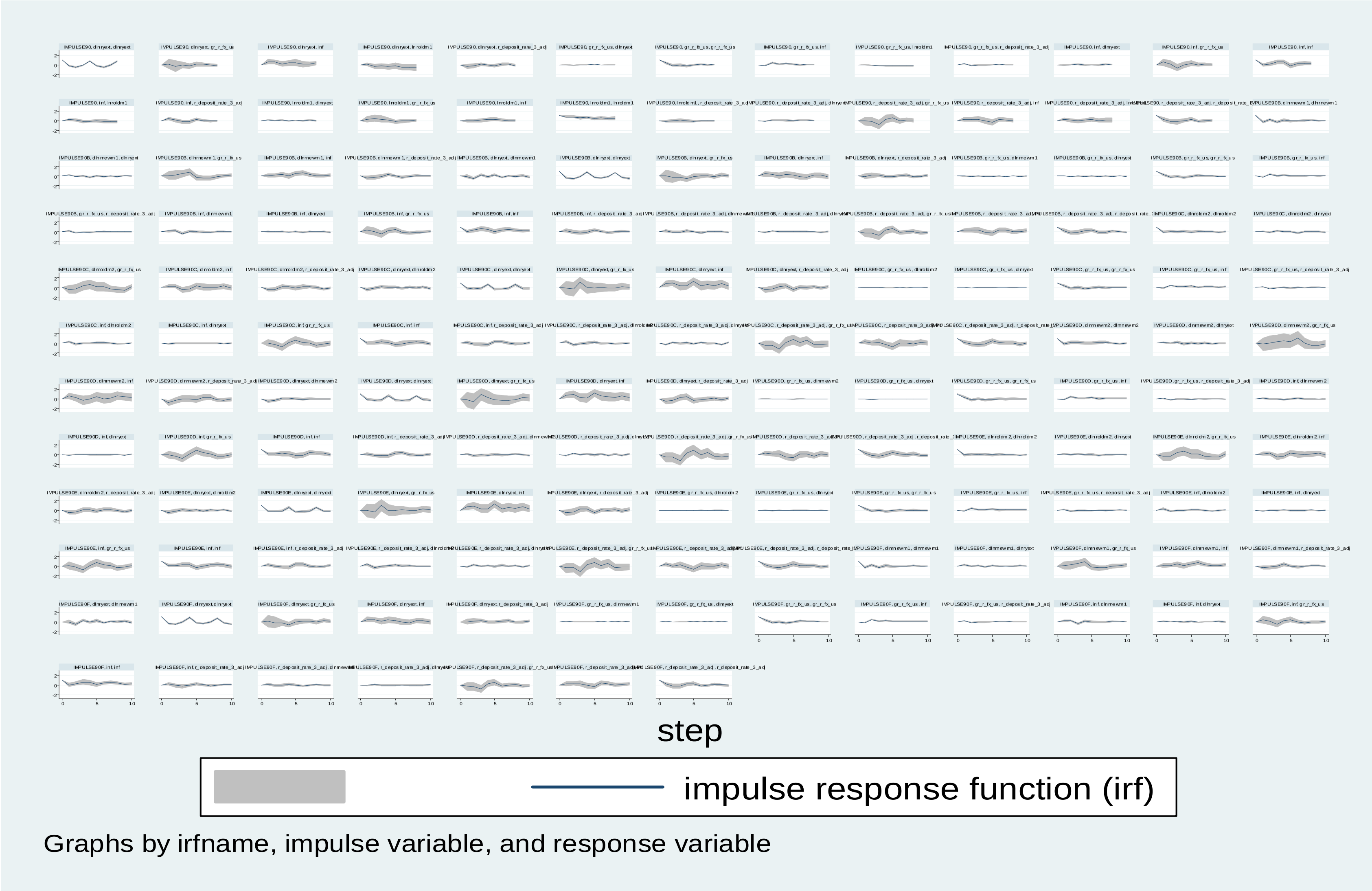


Figure 17. Impulse Response Functions from VAR Model with Real New M2

3.3 VAR ANALYSIS WITH REAL OLD M2

The VAR model for the growth rate of real old M2 is constructed with the growth rate of real GDP **(dlnryext)**, inflation **(inf)**, real interest rate on deposits with maturity of 3 months **(r_deposit_rate_3_adj)** and growth rate of real exchange rate **(gr_r_fx_us)** and a dummy variable standing for the first quarter of 1998. The analysis is carried out for the period between 1991q3- 2011q4.

3.3.1 Lag Selection in VAR Model with Real Old M2

Lag selection criteria (LR) designate that six lags should be used in the model.

Table 13. Lag Selection in VAR Model with Real Old M2

Lag Selection Criteria for VAR Model with Real Old M2						
Lag	LL	LR	FPE	AIC	HQIC	SBIC
0	592.505		$4.6\text{x}10^{-13}$	-142.075	-140.896	-139.139
1	681.885	178.76	$9.7\text{x}10^{-14}$	-157.777	-153.653	-147.504
2	801.738	239.71	$9.7\text{x}10^{-15}$	-180.912	-173.842	-16.3302*
3	835.967	68.458	$7.9\text{x}10^{-15}$	-183.163	-173.147	-158.215
4	889.329	106.72	$4.1\text{x}10^{-15*}$	-19.008	-17.7118*	-157.795
5	916.729	54.8	$4.1\text{x}10^{-15}$	-19.0666*	-174.758	-151.043
6	941.508	49.557*	$4.1\text{x}10^{-15}$	-190.612	-171.758	-143.651

3.3.2 Stability of the Model with Real Old M2

The VAR model should also be checked for stability to make sure that impulse-response analyses give robust results. As indicated in the table, since all the eigenvalues lie inside the unit circle, system of the VAR model is stable.

Table 14. VAR Stability Test Results of the Model with Real Old M2

Eigenvalue	Modulus	Eigenvalue	Modulus
.00384589 + .9913113i	0.991319	.5352332 - .6080272i	0.810044
.00384589 - .9913113i	0.991319	-.368604 + .7019214i	0.792819
0.9746227	0.974623	-.368604 - .7019214i	0.792819
-0.9525517	0.952552	.6241482 + .3766657i	0.728998
-.01599295 + .9215447i	0.921684	.6241482 - .3766657i	0.728998
-.01599295 - .9215447i	0.921684	-0.7241135	0.724114
-.6681594 + .5320736i	0.854131	.2568876 + .6356792i	0.685623
-.6681594 - .5320736i	0.854131	.2568876 - .6356792i	0.685623
.3328881 + .7737881i	0.842355	-.3275781 + .5661913i	0.654125
.3328881 - .7737881i	0.842355	-.3275781 - .5661913i	0.654125
-.7308418 + .3792045i	0.823362	.3888541 + .3744268i	0.539817
-.7308418 - .3792045i	0.823362	.3888541 - .3744268i	0.539817
.7903565 + .2072198i	0.81707	-.5298257 + .07334103i	0.534878
.7903565 - .2072198i	0.81707	-.5298257 - .07334103i	0.534878
.5352332 + .6080272i	0.810044	0.4929816	0.492982

3.3.3 Residual Diagnostic Test Results

The LM test for serial correlation indicates that residuals are not serially correlated for %95 confidence level through 10 lags of the residuals.

Table 15. Serial Correlation Test for VAR model with Real Old M2

Serial Correlation Test for VAR Model of Real Old M2		
Lag	LM-stat	Probability
1	313.627	0.17729
2	244.765	0.49199
3	284.090	0.28937
4	289.000	0.26812
5	204.328	0.72377
6	200.856	0.74232
7	187.312	0.80982
8	236.218	0.54130
9	307.002	0.19914
10	298.840	0.22866

As for the normality of residuals, it is satisfied for the equations of "dlnryext" and "inf". For the other equations in the VAR model, there is normality problem of the residuals. In terms of skewness of the residuals, the equations of "dlnroldm2", "dlnryext", "inf" are exempt from this problem, while only the residuals of equations "dlnryext", "inf" are exempt from the kurtosis problem.

Table 16. Normality Test for the Residuals of the Equations of VAR Models with Real Old M2

Normality Test						
	Skewness		Kurtosis		Jarque-Bera	
	Chi-sq	Probability	Chi-sq	Probability	Chi-sq	Probability
dlnroldm2	0.080	0.77777	13.757	0.00021	13.837	0.00099
dlnryext	0.003	0.95538	1582	0.20854	1.585	0.45279
inf	2.853	0.09118	1.594	0.20681	4.447	0.10822
gr_r_fx_us	20.227	0.00001	37.608	0.00000	57.835	0.00000
|r_deposit_rate_3_adj|	13.297	0.00027	33.754	0.00000	47.051	0.00000
ALL	36.461	0.00000	88.294	0.00000	124.755	0.00000

3.3.4 Impulse Response Functions of the VAR Model with Real Old M2

In this section, first the impacts of the shocks to the growth rates of real old M2 on itself and on other variables will be discussed. Therafter, the impacts of the shocks to other variables on the growth rate of real old M2 will be discussed. The illustrations in relation to the impulse response functions can be found in Figure 18.

- The initial impact of the growth rate of real old M2 on itself is positive, declining to zero in the first period. Following that, there are minor fluctuations and the response converges to zero in the tenth period. This result states that the shock to the growth rate of real old M2 reinforces itself in the very short run and then the impact vanishes.
- The initial impact of the growth rate of real old M2 on the growth rate of real GDP is positive and after exhibiting very mild fluctuations around positive and negative values, the response dies off converging to zero. Such a response is expected as the

increase in the growth rate of real old M2 would increase the demand for real output in the economy through aggregate demand.

- The initial impact of the growth rate of real old M2 on the growth rate of real exchange rate is negative. After the second period, the response turns into positive and after the sixth period, it starts to decline again. The response declines gradually until it increases again in the tenth period. The initial response is not expected since a (positive) shock to the growth rate of real old M2 would be expected to increase the rate of supply of domestic currency, leading to further appreciation of the foreign currency. That the shock to growth rate of real old M2 lead to increase in the growth rate of the real exchange rate might be attributed to a higher response given by domestic inflation to the same shock.
- The initial impact of the growth rate of real old M2 on inflation is positive. After becoming negative in the third period, it fluctuates around negative and positive values diverging to zero in the tenth period. The negative response is unexpected since the shock to the growth rate of real old M2 would be expected to affect inflation in the same direction.
- The initial impact of the growth rate of real old M2 on the real interest rate is negative. After four periods, the response becomes positive and following mild fluctuations, converges to zero in the tenth period. The negative response is an expected result, since theoretically, a shock to the growth rate of the monetary aggregate may affect the interest rate in opposite direction.

In terms of the impact of the shock to one of the explanatory variables on the growth rate of the monetary aggregate; the following observations can be listed:

- The initial impact of the shock to the growth rate of real GDP on the growth rate of real old M2 is negative and reaches a negative peak point in the first period. Thereafter, it starts to increase again and after vacillating around positive and negative values, it dies off gradually through the tenth period.
- The initial impact of the shock to the growth rate of real foreign exchange rate on the growth rate of real old M2 is zero. Through the whole sample period, it is seen that there is almost no response from the growth rate of real old M2 against a

shock to the growth rate of real foreign exchange rate. This result is unexpected since the shock to the growth rate of the real foreign exchange rate stands as a shock to an alternative asset to the items covered by old M2. Therefore, it is expected that it would have repercussions on the real old M2.

- The initial response of the growth rate of real old M2 against a shock to the growth rate of inflation is positive and reaches the peak point the first period. Thereafter, it starts to decline gradually until it converges to almost zero in the fourth period. Following mild fluctuations, the response dies off gradually through the tenth period. Such an observation is expected since the shock to inflation affects items included in old M2 in two ways: Inflation affects old M1 (which is already covered by old M2) through the transactions demand. Moreover, a shock to inflation may have impact on interest rates (real or nominal) which could ultimately affect the growth rate of real old M2 through deposit items.
- The initial response of the growth rate of real old M2 against a shock to real interest rate is positive. The response turns into negative in the second period while it converges to zero in the tenth period after fluctuating mildly between negative and positive values.

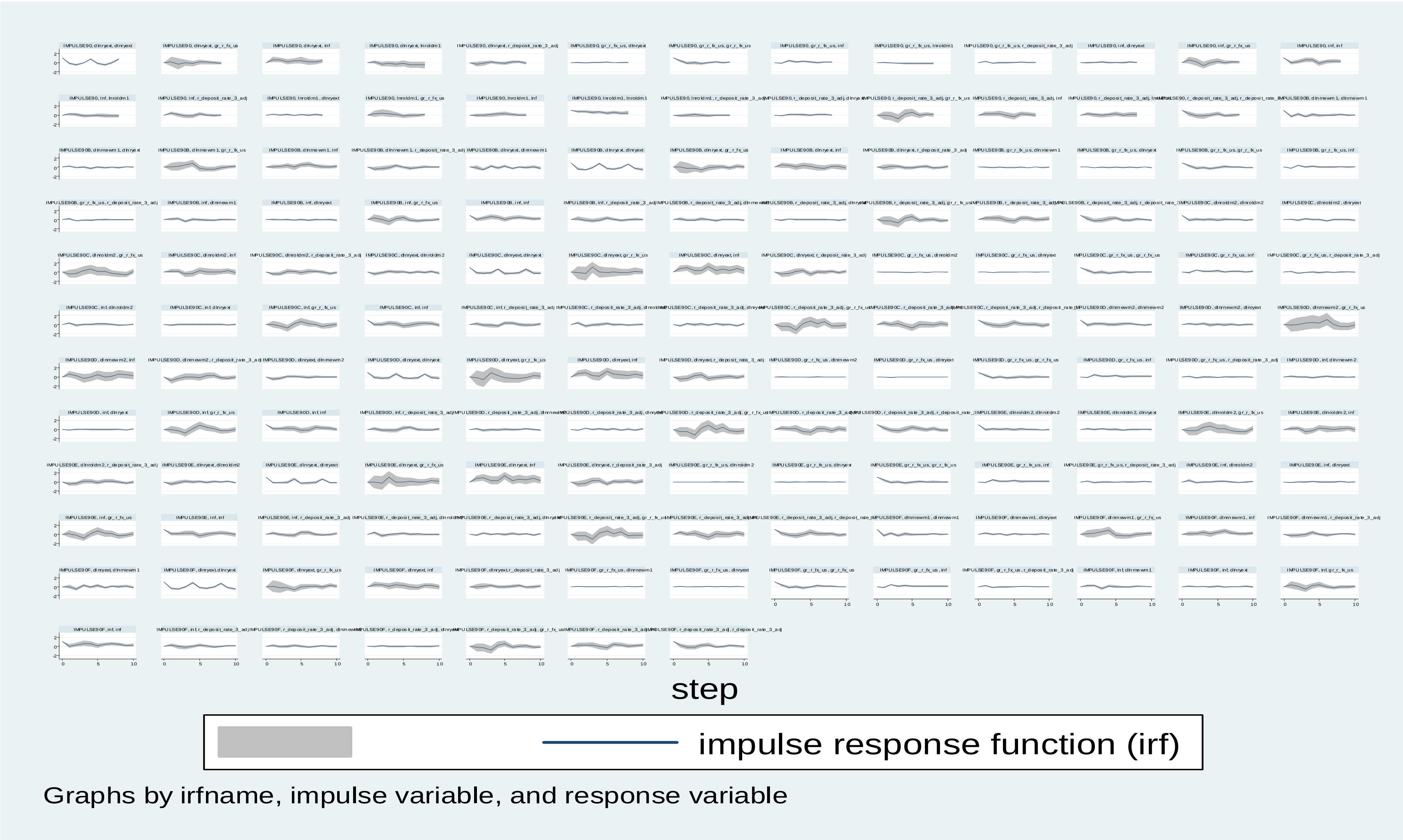


Figure 18. Impulse Response Functions from VAR Model with Real Old M2

3.4 VAR ANALYSIS WITH REAL OLD M1

The VAR model for the growth rate of real old M1 is constructed with the growth rate of real GDP **(dlnryext)**, inflation **(inf)**, real interest rate on deposits with maturity of 3 months **(r_deposit_rate_3_adj)** and growth rate of real exchange rate **(gr_r_fx_us).** The analysis is carried out for the period between 1992q1- 2011q4. The diagnostic tests of the model indicate that the model is exempt from autocorrelation problem for %95 confidence level through 10 lags of the residuals. While the normality tests; Jargue Bera, kurtosis and skewness tests show that the residuals of the model are not normally distributed, the eigenvalue stability condition states that the system of the VAR model satisfies the stability condition.

3.4.1 Lag Selection in VAR Model with Real Old M1

Lag selection criteria (LR, AIC) designate that eight lags should be used in the model.

Table 17. Lag Selection in VAR Model with Real Old M1

Lag	LL	LR	FPE	AIC	HQIC	SBIC
0	527.906		1.4e-12	-130.727	-13.013	-129.238
1	620.349	184.89	2.7e-13	-147.587	-144.006	-138.655
2	724.511	208.32	3.7e-14	-167.378	-160.812	-15.1001*
3	762.699	76.376	2.7e-14	-170.675	-161.125	-146.855
4	805.284	85.17	1.8e-14*	-175.071	-16.2536*	-143.807
5	823.07	35.571	2.3e-14	-173.267	-157.748	-134.559
6	850.321	54.503	2.4e-14	-17.383	-155.327	-127.679
7	879.252	57.861	2.5e-14	-174.813	-153.225	-121.217
8	907.56	56.616*	2.8e-14	-17.564*	-151.167	-11.46

3.4.2 Stability of the Model with Real Old M1

The VAR model should also be checked for stability to make sure that impulse-response analyses give robust results. As indicated in the table, since all the eigenvalues lie inside the unit circle, system of the VAR model is stable.

Table 18. VAR Stability Test Results with Real Old M1

Eigenvalue	Modulus	Eigenvalue	Modulus
.00035682 + .9855347i	0.985535	-.5056918 - .7174257i	0.877738
.00035682 - .9855347i	0.985535	.7992726 + .3072289i	0.856286
-0.9604562	0.960456	.7992726 - .3072289i	0.856286
-.09175173 + .9505732i	0.954991	.254699 + .8105034i	0.849581
-.09175173 - .9505732i	0.954991	.254699 - .8105034i	0.849581
0.946157	0.946157	.09977841 + .8363828i	0.842313
.6030566 + .6965201i	0.921313	.09977841 - .8363828i	0.842313
.6030566 - .6965201i	0.921313	-0.8343102	0.83431
-.370948 + .8354228i	0.914075	.5556561 + .6067861i	0.822766
-.370948 - .8354228i	0.914075	.5556561 - .6067861i	0.822766
.7987428 + .4405876i	0.912199	.4699959 + .6751485i	0.822631
.7987428 - .4405876i	0.912199	.4699959 - .6751485i	0.822631
-.8190458 + .377563i	0.901881	-.69909 + .1325737i	0.711549
-.8190458 - .377563i	0.901881	-.69909 - .1325737i	0.711549
-.6268026 + .646682i	0.900599	0.6001098	0.60011
-.6268026 - .646682i	0.900599	.4430065 + .3251055i	0.549498
0.8981106	0.898111	.4430065 - .3251055i	0.549498
-.7183097 + .5182991i	0.885778	-.4264534 + .3295252i	0.538934
-.7183097 - .5182991i	0.885778	-.4264534 - .3295252i	0.538934
-.5056918 + .7174257i	0.877738	-0.1732476	0.173248

3.4.3 Residual Diagnostic Test Results

The LM test for serial correlation indicates that residuals are not serially correlated for %95 confidence level through 10 lags of the residuals.

Table 19. Serial Correlation Test for VAR model with Real Old M1

Serial Correlation Test		
Lag	LM-stat	Probability
1	263.217	0.39059
2	213.778	0.67137
3	266.278	0.37473
4	213.521	0.67282
5	315.749	0.17068
6	292.047	0.25545
7	278.196	0.31622
8	344.483	0.09867
9	254.238	0.43883
10	222.970	0.61854
11	294.315	0.24628
12	197.249	0.76111

As for the normality of residuals, it is satisfied for the equations of "dlnroldm1" and "dlnryext". For the other equations in the VAR model, there is normality problem of the residuals. In terms of skewness and kurtosis of the residuals, still residuals out of the equations of "dlnroldm2", "dlnryext" are exempt from these problems.

Table 20. Normality Test for the Residuals of the Equations of VAR models with Real Old M1

Normality Test						
	Skewness		Kurtosis		Jarque-Bera	
	Chi-sq	Probability	Chi-sq	Probability	Chi-sq	Probability
dlnroldm1	0.227	0.63382	0.000	0.99088	0.227	0.89268
dlnryext	0.004	0.94758	0.277	0.59888	0.281	0.86892
inf	12.037	0.00052	45.403	0.00000	57.440	0.00000
gr_r_fx_us	14.337	0.00015	25.308	0.00000	39.644	0.00000
r_deposit_rate_3_adj	4.120	0.04238	9.214	0.00240	13.234	0.00127
ALL	30725	0.00001	80.202	0.00000	110.927	0.00000

3.4.4 Impulse Response Functions of the VAR Model with Real Old M1

In this section, first the impacts of the shocks to the growth rates of real old M1 on itself and on other variables will be discussed. Therafter, the impacts of the shocks to other variables on the growth rate of real old M1 will be discussed. The illustrations in relation to the impulse response functions can be found in Figure 19.

- The results show that the initial impact of the shock to growth rate of real old M1 on itself is positive. In the third period, the impact becomes negative and in the fifth period, it reaches the negative peak point. After the seventh period, it converges to zero and dies of gradually through the tenth period.
- The impact of a shock to growth rate of real old M1 on the growth rate of real GDP is positive and highly significant. The response of the growth rate of real GDP reaches the peak point in the seventh period. Thereafter, it dies off gradually. The response through the whole period is highly significant. The initial positive response is in the expected direction.
- The initial impact of a shock to growth rate of real old M1 on the growth rate of real foreign exchange rate is positive, but insignificant. Until the fifth period, the response of the growth rate of real foreign exchange rate is positive, but still insignificant. Thereafter, till the seventh period, the negative response continues after which the response becomes positive again and increases through the tenth period. The initial response of the growth rate of the foreign exchange rate is in the expected direction, since an increase in the growth rate of real money supply would be expected to lead to increase in the demand for foreign exchange which could end in real appreciation of the foreign exchange. Considering the whole horizon of ten periods, it can be claimed that the impact of a shock to the growth rate of real old M1 on the growth rate of real foreign exchange rate is not as significant as its impact on itself and on the growth rate of real GDP.
- The initial impact of a shock to the growth rate of real old M1 on inflation is negative, and significant till the third period. With the fourth period, it becomes positive, and fluctuates around negative and positive values by converging to zero in the tenth period. The negative initial impact on inflation is not an expected

result, but can be considered significant, particularly in comparison to the response of the growth rate of real foreign exchange rate to a shock to the growth rate of real old M1.

- The initial impact of a shock to the growth rate of real old M1 to the real deposit rate on TL deposits with 3- month maturity is positive and highly significant. The initial positive impact continues till the fourth period and it reaches at a negative peak value at the fifth period. Therefafter, it fluctuates around positive and negative values of responses and diverges away from zero at the tenth period. Considering the whole horizon, it can be stated that the impact of a shock to the growth rate of real old M1 on the real deposit rate is highly significant, but the initial impact is not in the expected direction. That response in the unexpected direction continues in a considerable manner for three periods.

In terms of the impact of the shock to one of the explanatory variables on the growth rate of the monetary aggregate; the following observations can be listed:

- The initial impact of the shock to the growth rate of real GDP on the growth rate of real old M1 is negative until the fourth period in which there is a positive peak of the response. After the fifth period, the impulse vacillates between negative and positive values until it reaches the negative peak in the tenth period. The negative response of the growth rate of real old M1 to the shock in the growth rate of real GDP is an unexpected result.
- The impact of the shock to the growth rate of the real foreign exchange rate on the growth rate of real old M1 is negative through second period, and after vacillating between positive and negative values for five periods, it converges to zero in the tenth period.
- The initial impact of the shock to inflation on the growth rate of real old M1 is positive. The peak point is observed in the first period followed by fluctuating negative and positive responses. Yet the response dies off gradually through the tenth period. The initial positive impact of the shock to inflation on the growth rate

- of real old M1 is an expected result in that higher inflation would increase the transactions demand for money.
- The initial impact of the shock to the real interest rate on the growth rate of real old M1 is positive. It is followed by a negative response with almost the same absolute value. The positive peak point is reached in the first period. After the second period, the response starts to decline gradually until it starts to increase again after the seventh period.

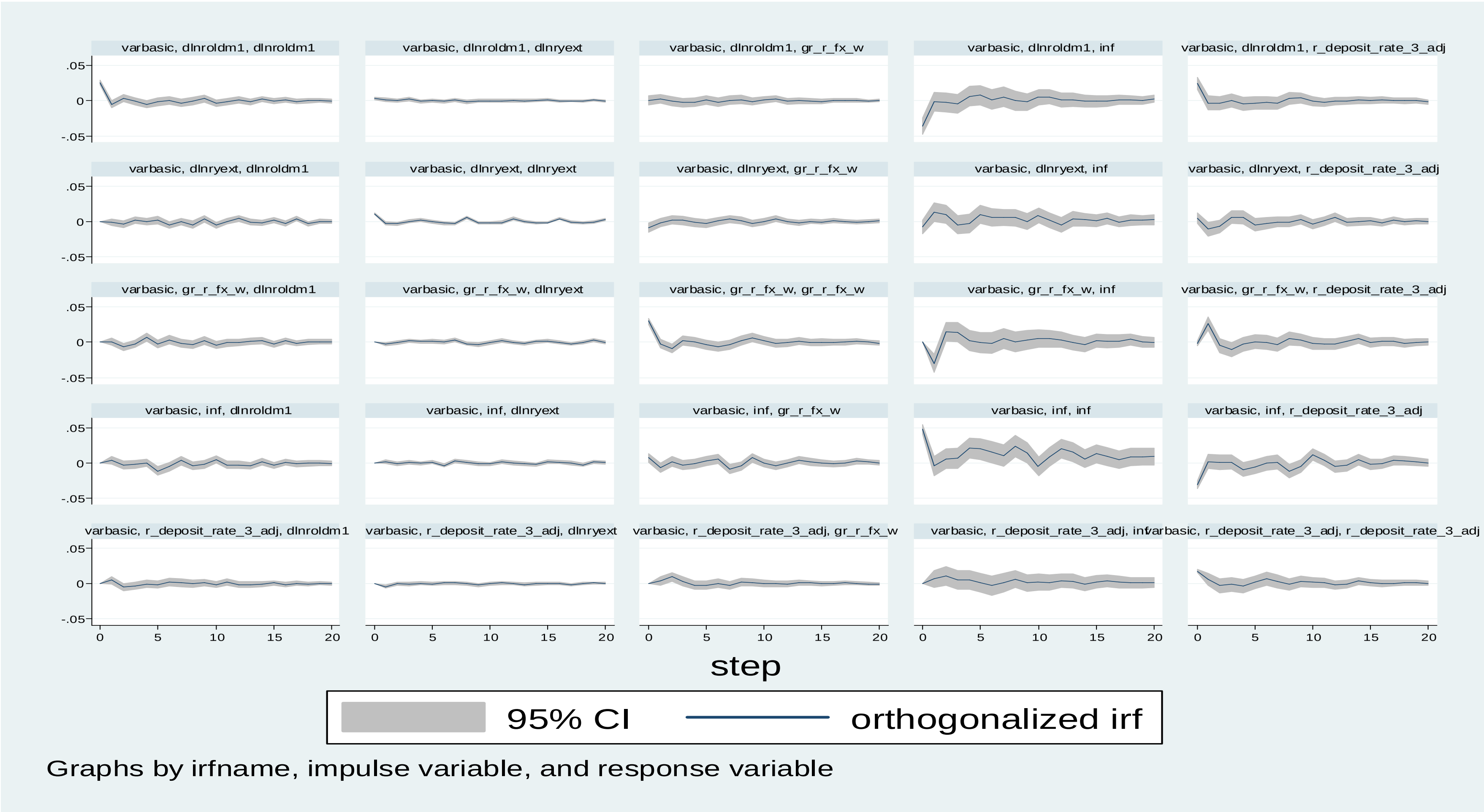


Figure 19. Impulse Response Functions from VAR Model with Real Old M1

3.5 DISCUSSION of the IMPULSE RESPONSE FUNCTIONS

3.5.1 Comparison of Short-Run Performance of New and Old Monetary Aggregates

In this section, the new and old monetary aggregates are compared with respect to their impact on other macroeconomic variables in the short run. The comparison is made through two pillars: The first comparison is made between the new and old definitions of the same series. The second comparison is made for the relation between M1 and M2 under both old and new definitions.

3.5.1.1 Comparison of Old and New Real M1

The comparison of old and new M1 in terms of their effects on other macroeconomic variables shows that impacts of a shock to the growth rate of real new M1, on inflation, real interest rate and the growth rate of real GDP are more significant than the impact of a shock to the growth rate of real old M1 on the same variables. Such a conclusion shows that in short run, new definitions have improved the impact of a shock to the growth rate of real monetary variables, measured in the narrowest sense, on inflation, real interest rate and the growth rate of real GDP. In terms of the impact of mentioned shocks on the growth rate of real foreign exchange rate, it is observed that the impact of a shock to the growth rate of real old M1 is more significant than the impact of a shock to the growth rate of real new M1. Therefore, it can be concluded that new definitions have not improved the impact of a shock to the growth rate of real monetary variables on the growth rate of the real foreign exchange rate, measured in the narrowest sense.

3.5.1.2 Comparison of Old and New Real M2

The comparison of old and new M2 in terms of their effects on other macroeconomic variables shows that the impact of a shock to the growth rate of real new M2 on inflation and on the growth rate of real GDP are more significant than the impact of a shock to the growth rate of real old M2 on the same variables. Such a conclusion shows that in short run, new definitions have improved the impact of a shock to the growth rate of real monetary variables, measured in the broader sense, on the growth rate of output and inflation.

In terms of the impact of mentioned shocks on real interest rate and on the growth rate of real foreign exchange rate, it is observed that the impact of a shock to the growth rate of real old M2 is more significant than the impact of a shock to the growth rate of real new M2. Therefore, it can be concluded that new definitions have not improved the impact of a shock to the growth rate of real monetary variables, measured in the broader sense, on real interest rate and the growth rate of the real exchange rate.

3.5.2 Comparison of the Relation Between M1 and M2 under New and Old Definitions

The comparison of the relation between M1 and M2 can also be made under both old and new definitions:

3.5.2.1 Impact on the Growth Rate of Real GDP

In terms of the impact of a shock to the growth rate of real old M1 and M2 on the growth rate of real GDP, it is observed that the impact of the growth rate of real old M1 is more significant than the impact of the growth rate of real old M2. That is, real old M1 overwhelms real old M2 in terms of the significance of the impact on the growth rate of real GDP. The comparison made between the impacts of the growth rate of real new M1 and M2 on the growth rate of real GDP, it is observed that the impact of the growth rate of real new M1 is more significant than the impact of the growth rate of real new M2. Therefore, it can be concluded that the changes in definitions have not affected the superiority of M1 over M2 in explaining the short-run dynamics of the growth rate of real GDP.

3.5.2.2 Impact on Inflation

In terms of the impact of a shock to the growth rate of real old M1 and M2 on inflation, it is observed that the impact of a shock of the growth rate of real old M1 is more significant than the impact of the shock to the growth rate of real old M2. That is, real old M1 overwhelms real old M2 in terms of the significance of its related shock’s impact on inflation. The comparison made between the impacts of shocks to the growth rate of real new M1 and M2 on inflation, it is observed that the impact of the shock to the growth rate of real new M1 is more significant than the impact of the shock to the growth rate of real new M2. Therefore, it can be concluded that the changes in definitions have not affected the superiority of M1 over M2 in explaining the short-run dynamics of inflation.

3.5.2.3 Impact on the Growth Rate of Real Foreign Exchange Rate

In terms of the impact of a shock to the growth rate of real old M1 and M2 on the growth rate of real foreign exchange rate, it is observed that the impact of a shock of the growth rate of real old M1 is more significant than the impact of a shock to the growth rate of real old M2. That is, real old M1 overwhelms real old M2 in terms of the significance of its related shock’s impact on the growth rate of real foreign exchange rate. The comparison made between the impacts of shocks to the growth rate of real new M1 and M2 on the growth rate of real foreign exchange rate, it is observed that the impact of the shock to the growth rate of real new M1 is more significant than the impact of the shock to the growth rate of real new M2. Therefore, it can be concluded that the changes in definitions have not affected the superiority of M1 over M2 in explaining the short-run dynamics of the growth rate of real foreign exchange rate.

3.5.2.4 Impact on the Real Interest Rate

In terms of the impact of a shock to the growth rate of real old M1 and M2 on real interest rate, it is observed that the impact of a shock of the growth rate of real old M1 is more significant than the impact of a shock to the growth rate of real old M2. That is, real old M1 overwhelms real old M2 in terms of the significance of its related shock’s impact on real interest rate. The comparison made between the impacts of shocks to the growth rate of real new M1 and M2 on real interest rate, it is observed that the impact of the shock to the growth rate of real new M1 is more significant than the impact of the shock to the growth rate of real new M2. Therefore, it can be concluded that the changes in definitions have not affected the superiority of M1 over M2 in explaining the short-run dynamics of the real exchange rate.

CHAPTER 4

CONCLUSION

Policies of Central Bank of the Republic of Turkey are transmitted to the economoy through monetary policy transmission mechansim. How and to what extent the mechanism operates is of interest for many studies. In this thesis, similar to that of Berument and Dinçer (2008), a short-run analysis is carried out through monetary policy aggregates in order to understand the effectiveness of the mechanism. Yet, the changes that took place in 2002 and 2007 in the definitions of monetary aggregates caused a breakdown of the related series both in terms of content and numerical value. Therefore, new series have been constructed by applying the new and old definitions for the periods which they are not officially valid. In this vein, four new series related to M1 and M2 are constructed. This thesis tries to answer two questions, focussing on the short-run dynamics, through four VAR models based on four series of monetary aggregates constructed.

The first research objective was to determine whether there is a significant difference in terms of the effectiveness of the monetary transmission on other macroeconomic variables such as real GDP, inflation, interest rate and real exchange rate mechanism through old and new definitions. In relation to this objective, impulse response functions of VAR analyses are examined. To get a better understanding of the realtionships further analyses are conducted in two directions: First the responses against the shocks to monetary variables are examined. Thereafter, the responses of the monetary aggregates against the shocks to other macroeconomic variables are examined. The results suggest that both M1 and M2 are more robust in explaining the course of inflation and real GDP growth under new definitions. The superiority of new definitions over old definitions in terms of explaining infaltion and output growth is significant since most of the central banks focus on either inflation targeting or output growth. The superiority of new definitions suggests that CBRT could utilize new definitions confidently whether the main objective is price stability or output growth.

The second research objective was to compare the relative performance of M1 and M2 under both old and new definitions. The results suggest that under both old and new definitions, M1 is more robust than M2 in explaining the course of other macroeconomic variables. Therefore, it can be suggested that in case of a search for a monetary variable that would capture mostly the course of other macroeconomic variables, the preference should be on M1.

The results of our study are important in the following aspects. In Turkish case, CBRT has been pursuing inflation targeting regime since 2006. Although one should expect that monetary aggregates would no longer be targeted; still it might be useful to keep in mind that effectiveness of monetary transmission mechanism should be controlled through the observance of many variables.

While the short run impacts of the changes have been detected as in the analyses, the impact on the long run relations still exist as a future extension for research. Examining the long run impacts of the changes in definitions would enable policy makers to more adequately and accurately assess the possible outcomes of a particular policy.

REFERENCES

Bernanke, Ben S., and İlian Mihov. "NBER Working Papers." *NBER Working Papers*. 6608. (1998).

Berument, Hakan, and Nergiz Dinçer. "Journal of Economic Cooperation among Islamic Countries." *Journal of Economic Cooperation among Islamic Countries*. 29.1 (2008): 88-107.

Caplin, Andrew S., and Daniel F. Spulber. "Quarterly Journal of Economics." *Quarterly Journal of Economics*. 102.November (1987): 703-25.

Celasun, Oya. "Macroeconomics and Growth Group Development Research Department." Macroeconomics and Growth Group Development Research Department. (1998).

Friedman, M. "Studies in the Quantity Theory of Money." Studies in the Quantity Theory of Money. Chicago: University of Chicago Press. Reprinted in Friedman, 1969. (1956).

Halıcıoğlu, Ferda, and Mehmet Uğur. "On Stability of the Demand for Money in a Developing OECD" *Macroeconomics*. 0508001. (2005)

Mankiw, Gregory N., and David Romer. "New Keynesian Economics." New Keynesian Economics. 1. (1991).

Mankiw, Gregory N. , and David Romer. "New Keynesian Economics." New Keynesian Economics. 2. (1991).

Mundell, Robert. "Journal of Political Economy, University of Chicago Press." Journal of Political Economy, University of Chicago Press. 71. 280

Mutluer, Defne, and Yasemin Barlas. "Central Bank Review." *Central Bank Review*. 2.2 (2002): 55-75.

Özdemir, K. Azim, and Paul Turner. "Working Papers Research and Monetary Policy Department, Central Bank of the Republic of Turkey." *Working Papers Research and Monetary Policy Department, Central Bank of the Republic of Turkey*. (2004).

www.ecb.int. European Central Bank. Web. 12 Sep 2012.

APPENDIX

TEZ FOTOKOPİSİ İZİN FORMU

ENSTİTÜ

Fen Bilimleri Enstitüsü ☐

Sosyal Bilimler Enstitüsü ☐

Uygulamalı Matematik Enstitüsü ☐

Enformatik Enstitüsü ☐

Deniz Bilimleri Enstitüsü ☐

YAZARIN

Soyadı :

Adı :

Bölümü :

TEZİN ADI (İngilizce) :

TEZİN TÜRÜ : Yüksek Lisans ☐ Doktora ☐

1. Tezimin tamamından kaynak gösterilmek şartıyla fotokopi alınabilir. ☐

2. Tezimin içindekiler sayfası, özet, indeks sayfalarından ve/veya bir bölümünden kaynak gösterilmek şartıyla fotokopi alınabilir. ☐

3. Tezimden bir bir (1) yıl süreyle fotokopi alınamaz. ☐

TEZİN KÜTÜPHANEYE TESLİM TARİHİ: