MONETARY TRANSMISSION MECHANISM IN TURKEY AND ARGENTINA

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Abstract

Monetary transmission mechanism, which is used by central banks to affect consumption, investment and saving decisions of both households and firms, has been subject of many theoretical and empirical studies. It seems that there is a consensus that monetary policy affects real economy in the short run. But on the other hand, the question "how it actually does" has been discussed by many economists for several years. The reason for this is that the countries which are at different stages of development also have financial systems at different levels. While in industrialized countries, the capital market system is more effective in the financial system; in developing countries, banking system is dominant in the financial system. From this viewpoint, this study tries to answer the question "which of the two channels of transmission mechanisms is effective in the two developing countries, Argentina and Turkey, "money channel or credit channel (which is not alternative but complementary for money channel)".

VAR model is used to identify relative strengths of different monetary transmission channels in each country by five macroeconomic variables which are stated in the following order: overnight rate, bank deposits, bank loans, consumer price index and industrial production index. The data period of these variables ranges from 2003:01 to 2010:08.

The paper proceeds as follows: Section I provides theoretical background of the money and credit channels of transmission mechanism. Section II summarizes recent empirical studies. Section III describes variables and discusses the empirical findings of the model. Section IV provides concluding remarks.

Keywords: Monetary Transmission Mechanism, Turkey, Argentina, VAR

JEL Classification Code: E51; E52

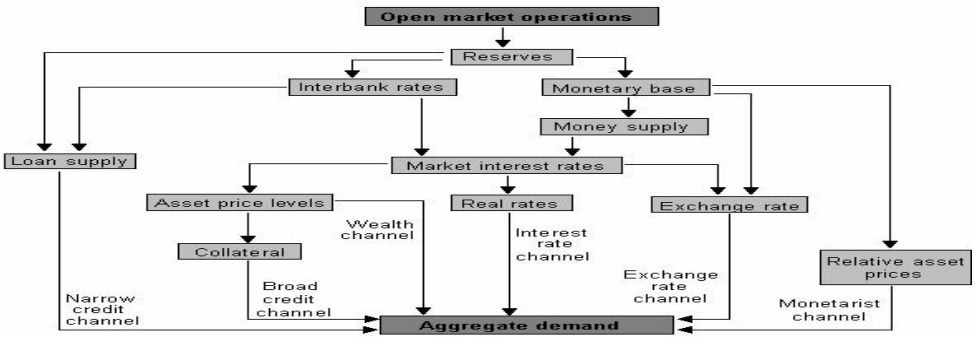
1. INTRODUCTION

1.1. Monetary Transmission Mechanism

The traditional monetary transmission mechanism (MTM) explains how nominal money supply and nominal interest rate changes affect reel macroeconomic variables such as output, price level and employment level. There are three basic MTM channels: Money channel, other asset price channels (exchange rate and equity price channels) and credit channels.

The functioning of monetary transmission mechanism channels is summarized as follow.

Figure 1: Monetary Transmission Mechanism



Source: http://ww2.publicbank.com.my/cnt_review37.html (9/12/2002)

The traditional interest rate channel based on the standard IS-LM model, also known as the money channel, is the origin of other channels. This channel is based on two assets, money and bonds. Banks do not play an active role in this channel and the mechanism operates directly through the effect of monetary policy on total output. Namely, under the assumption of sticky prices, monetary contraction raises the nominal interest rate. Rise in nominal rates increases the cost of real interests, in other words, the cost of capital. In this case, investment spending and ultimately output level declines (Mishkin, 1995: 4). Taylor (1995) has extended the theory by evaluating the decisions of consumers to purchase home and durable goods also as an investment. Central banks can change the monetary base by means of open market operations (OMO). There is no consensus based on the issue of which of the application instruments of money policy should be used. As money demand shocks are large and unpredictable,

many central bank's target the short-term interest rate instead of targeting the monetary base as a means of monetary policy (Özdoğan, 2009: 7).

The exchange rate channel which is one of the asset prices channels of monetary transmission mechanism is effective in open economy macroeconomic models. The increase in interest rates experienced as a result of monetary contraction leads to a capital inflow from the outside world to the country. When a capital inflow is experienced in open economies implementing a variable-rate regime, the currency of that country becomes valuable. In this case, the prices of export goods become relatively expensive. Export and thus output decreases. The effect of the exchange rate channel in developed countries remains weak. Because firms can tolerate the effect of exchange rates on prices by means of reductions in profit margins.

The asset price channel of monetary policy shows its effect on asset markets such as bonds and stocks etc. The market value of company shares and the overall wealth of households affect investment decisions. As Tobin (1969) states in his article, firms are affected by the q value of the firm while making investment decisions. If interest rates rise, the firm's q value falls and as a result of this, investments decrease. The life cycle income theory of Ando and Modigliani (1963) refers to the effect of the asset channel on households. When interest rate increases, the value of assets held by the households falls and therefore, their total wealth decreases. This case reduces consumption spending and total output. In addition to these factors, speculative attacks and expectations, changes in risk premium also affect the changes in asset prices.

The amount and price of credit gain importance as an instrument of monetary policy implementation in financially less developed or developing countries. This practice of monetary policy is called the credit channel. In his article Bernanke et. al.(1995) refers to two factors affecting external finance premium: The bank credit channel, which is also known as narrow credit channel, and the balance sheet channel that is known as broad credit channel. Small and medium-sized firms that cannot provide direct financing by issuing securities that is why they depend on banks for foreign financing. Credit channel markets operate over three markets: money, credit and bonds. The credit and bond market do not substitute each other. If the reserve decreases as a result of monetary contraction, it is compensated through credit contraction instead of selling bonds to the market . In contrast to the Modigliani Miller theorem, contraction in credit volume leads to a decline in investments. Because, possibility of liquidity problems have tendency to increase.

The balance sheet channel, on the other hand, explains in what direction the net worthiness (liquid assets and marketable bonds), cash flows and, therefore, the

credibility of firms and households are affected by monetary policy applications. The credibility of enterprises and households determines the external financing premium. The applications of the central bank towards monetary contraction reduce the spending of firms and households. The increase in interest rates as a result of monetary contraction causes distortion in borrowers' balance sheets. This happens in two ways: The first is that the rise in interest rates reduces the value of the company's liquid assets. The second is that the value of collaterals given against credit falls. Banks are motivated to find the company that has the capacity to pay its debts. Banks avoid making an adverse selection and act conservatively to give a credit due to the decline in the wealth of firms and households and due to the asymmetric information problem in markets. On the other hand, the rise in interest rates raises the opportunity cost of investments. In this case, the tendency of firms to invest in risky projects increases. Due to this situation, which is considered as a moral hazard and due to the banks' fears of making an adverse selection, the financing of credit markets and, therefore, the financing of investments projects constricts.

2. LITERATURE

2.1. Empirical Studies

Identifying strength of monetary transmission mechanism channels is important in the formulation of monetary policy decisions. That way, policy makers have the capability to react appropriately to any undesired outcome of a monetary policy. Therefore, monetary transmission mechanism remains as, Bernanke and Gertler (1995) mentioned, a black box to be explored (Fuinhas, 2008: 34). Most of empirical studies have led to a vast literature that tries to identify and quantify MTM.

As far as we examined, Bernanke (1993), Cechetti (1999), Hubbard (1994), Gertler and Gilchrist (1994), Fuinhas (2008) and many economists have analyzed the effectiveness of the monetary transmission mechanisms in different countries. According to the study of Gündüz (2001), who examined the functioning of the monetary transmission mechanism in Turkey, contractionary monetary policy rapidly constricts securities and credits, thus, limiting the role of the credit channel. According to the study of Çavuşoğlu (2002), the bank credit channel in Turkey is not functioning. In her study, Çiçek (2005) precipitated that the monetary policy is not effective on the bank credit supply due to the insensitivity of credits to overnight rates. Şengönül and Thorbecke (2005) have found that the credit channel is active and that banks with lower liquidity are more affected by contractionary monetary policies. According to Cengiz and Duman (2008), as

long as the necessary conditions for the bank credit channel of functioning is exist, the bank credit channel in Turkey will function. Regarding Argentina, the study of Gomez-Gonzales and Grosz (2007) who analyzed the functioning of the credit channel has been reached. This study had found no direct bank lending channel of monetary transmission mechanism. Results suggested that changes in interbank interest rates affects the growth rate of total loans less if banks well capitalized. The studies conducted in relation to the effectiveness of monetary transmission mechanism functioning have resulted in different conclusions. The study of Cambazoğlu (2010) can be reviewed for the detailed analysis of each study related to monetary transmission mechanism.

3. DATA AND EMPIRICAL MODEL

3.1. Data Selection

This study is based on the theoretical model of Bernanke and Blinder (1988). This model analyzes interaction among goods, money and loans markets. Thus, the set of variables representing these markets are: interest rate, output, price level, banks loans and deposits. Output and price level are conventionally measured by the log of industrial production (or log of *GDP)* and the log of *CPI*, respectively. The overnight interest rate, which is central bank's most preferred operational target, is chosen as a variable of short term interest rate (e.g. Suzuki, 2004). The overnight interest rate is measured in per cent. Banks loans and deposits are usually measured by deposits banks' total data.

The data period for Turkey and Argentina ranges from 2003:01 to 2010:08. The models include five endogenous variables: overnight interest rate (*ovr*), deposit bank deposits (*dbd*) and loans (*dbl*), consumer price index (*cpi*) and industrial production index (*ipi*). '*t*' and '*a*' symbols in front of these abbreviations represent Turkey and Argentina, respectively. The overnight interest rate and industrial production index of Argentina have been collected from Bloomberg; deposit bank deposits and loans variables of Turkey from Central Bank of the Republic of Turkey; and the rest of variables have been collected from International Monetary Fund's International Financial Statistics (IMF's IFS).

3.2. VAR Estimation

Before using any VAR estimation, it is necessary to control the statistical convenience of the variables. First of all, nominal variables are deflated by the consumer price index (2005=100) of each of these countries. Then, all variables except for the overnight interest rates are measured in logarithms. Finally,

whether the data includes seasonality or not, was investigated for all of the variables. Data doesn't include seasonality.

3.2.1. Preliminary Tests of VAR Model

According to the VAR method, all variables must be stationary. In this context, the Augmented Dickey- Fuller (ADF) unit root test was used in order to determine whether all variables covered by models were stationary or not (Table 1).

Table 1: Result of Augmented Dickey- Fuller Unit Root Test

Trend and Intercept, *i*=2

Turkey's Variables	*I(0)*	*I(I)*	**Argentina's Variables**	*I(0)*	*I(I)*	*I(II)*
tovr	-2.751	-3.615	*aovr*	-5.272		
tdbd	-3.500		*adbd*	-3.187	-4.909	
tdbl	-0.922	-3.639	*adbl*	-2.184	-3.083	-8.793
tcpi	-2.602	-7.066	*acpi*	-3.495		
tipi	-1.833	-5.731	*aipi*	-2.055	-7.856	

Note: According to MacKinnon (1996) asymptotic critical values for 1%, 5% and 10% level respectively are: - 4.064, -3.461 and -3.157.

According to Table 1, at the 5% significance level, *aovr, acpi* and *tdbd* are *I(0)*; *tovr, tdbl, tcpi*, *tipi, adbd* and *aipi are I(I),* and *adbl* is *I(II)*.

The direction of the relationship between variables is questioned by Granger Causality Test. In addition to variance decomposition results, direct and indirect relationships between variables were found.

The Model I and II, which include monthly aggregate data of Turkey, analyzed bank credit channel and money channel, respectively. Accordingly, the VAR models can be written as:

$$Model\ I: x_t = tcpt_t\ \ tipt_t\ tdbd_t\ \ tdbl_t\ tovr_t \quad (1.1)$$

$$Model\ II:\ x'_t = tovr_t\ tcpt_t\ tipt_t \quad (1.2)$$

The Model III and IV, which include monthly aggregate data of Argentina, respectively analyzed bank credit channel and money channel. Accordingly that, the VAR models can be written as:

$$Model\ III:\ y_t = acpt_t\ aipt_t\ aovr_t\ adbd_t\ adbl_t \quad (1.3)$$

$$Model\ IV: y'_t = acpi_t\ aipi_t\ aovr_t \quad (1.4)$$

Before the prediction of the VAR models, it is necessary to determine the optimal lag length. By using some test statistics, the optimal lag length of the models was chosen as two for Model I, Model III and Model IV, and also one for Model II. These models have been tested for structural break by CUSUM test. No structural break was found. And also, the reliability of the models was investigated by the diagnostic tests. According to Table 2, the null hypothesis Model I, II, III and IV cannot be rejected. In other words, results of diagnostic tests indicate that the models do not possess problems of serial correlation, and heteroscedasticity.

Table 2: Residual Diagnostic Various Tests

Diagnostic Tests	***P-Values****			
	Model I	**Model II**	**Model III**	**Model IV**
Jarque-Bera Normality Test	0.098	0.348	0.724	0.802
Breusch-Godfrey Serial Correlation LM Test	0.212	0.711	0.339	0.398
White Heteroskedasticity Test	0.759	0.971	0.642	0.871

* 5% significance level was considered.

3.2.2. Variance Decompositions

This study focuses on finding the relative strength of different channels that are important in transmitting the monetary effect on the real sector. The variance decomposition method is used to overcome the obstacles in the interpretation of VAR model parameters and to determine the source of changes that occur in a variable. The main source of all variable in Model I, II, III and IV is the own shock of variables. When the variance decomposition results are examined, it can be said that the money channel is more functional in Turkey. Because *ovr* variable explained approximately 21 % of price level in Turkey.

3.2.3. Impulse- Response Analysis

The ordering of the variables is important to analyse the effect of the shocks. But in this study, results indicate that the different ordering of the variable would not produce significantly different results.

Figure 2 shows impacts of an unexpected decrease of banks loans over price level and output. Price level responded in the direction of a small increase to loan contraction until the third period. On the other hand, the output increase was realized in significant amounts. The reason why the output in the first period increased in a manner not proportional to the transmission theory: Because banks in Turkey generally provide credits to large-scaled firms and not to small scaled

firms (OECD Report, 12. 12.2010). Therefore, large firms continue to increase production for a short period in monetary contraction. In other words, the stock investments of large-scaled firms increase as a response to short-term monetary contraction (see Bernanke and Gertler, 1995; Walsh, 1998). In the third period, when later bank credits hit rock bottom, a significant decline appeared also in the output level. Both variables moved in the same direction along the third and fifth periods and responded to the credit shock.

Figure 2: Model I-Response of Output and Price Level to Banks Loans Shock

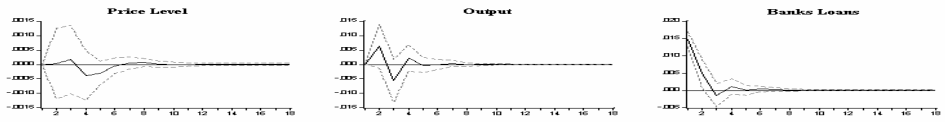
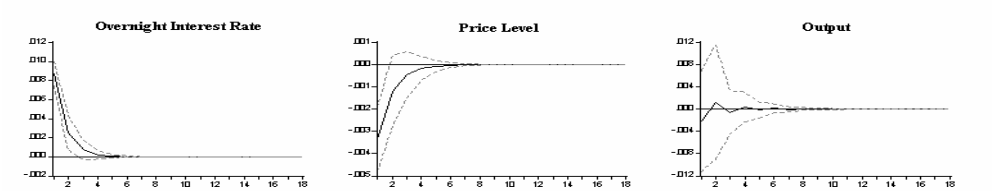


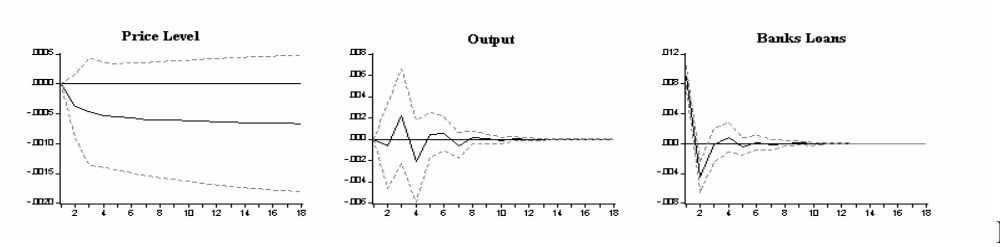
Figure 3 indicates impacts of an unexpected decrease of overnight interest rate on price level and output. Price level and output variables responding to monetary expansion in the increase direction is consistent with the traditional monetary transmission theory. The response of the price level is important and large-scale according to the output.

Figure 3: Model II-Response of Output and Price Level to Overnight Interest Rate Shocks



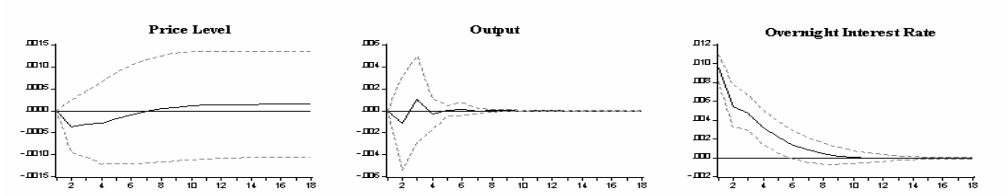
For Argentina, when Figure 4 is examined, it is seen that the price level falls and that it sustains this level also in later periods whereas the output variable responses in the direction of decrease from the initiation until the third period.

Figure 4: Model III- Response of Output and Price Level to Bank Loans Shock



For Argentina, according to Figure 5, the response of the overnight interest rate to its own shock continues until the eleventh period. It is expected that the initial response of the price level and output to expansionary monetary policy will be in the direction of increase and not in the direction of decrease according to the theory. If considered from this point of view, it can be said that the output and price level are insensitive to the overnight interest shock.

Figure 5: Model IV-Response of Output and Price Level to Overnight Interest Rate



4. CONCLUSION

It is known that banks have a predominant share in the financial system of Turkey (İnan, 2001; Cengiz and Duman, 2008; Cambazoğlu, 2010). According to researchers conducted, it is known that under this structure, large-scaled firms compared to small enterprises meet their funding requirements from banks. In this case, it becomes difficult to decision-makers to affect the real sector through bank credit channel. Because, in addition that large-scaled firms have to apply to other lending facilities, these firms direct their productions to stock investments in short terms as a response to contractionary shocks. Therefore, small-scaled firms are more affected by credit shocks rather than large-scaled firms. When the output and price level responses to unexpected credit shock and overnight interest shock are considered, it can be said that the money channel is operative in Turkey. Based on the empirical results for the period reviewed for Argentina, it is seen

that the bank credit channel is effective, whereas the money channel is not. Argentina's economy experiencing hyperinflation for many years may have caused the insensitivity of economic variables to overnight interest changes. As seen in this study, a conclusion was reached that it would be more appropriate not to make a generalization related to the effective channels of the monetary transmission mechanism in developing countries.

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