

## **PARASAL AKTARIM MEKANİZMASI KANALLARI: TÜRKİYE ÜZERİNE BİR ANALİZ**

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### **ÖZET**

Parasal aktarım mekanizması merkez bankasının uygulayacağı para politikası değişimlerinin ekonomi üzerinde yaratacağı etkileri göstermektedir. Para politikasında yapılan bir değişikliğin hasıla üzerindeki etkisi, parasal aktarım mekanizması kanalları üzerinden gerçekleşmektedir. Aktarım kanalları, faiz kanalı, varlık fiyatları kanalı, döviz kuru kanalı, kredi kanalı son olarak da beklenti kanalı olmak üzere 5 başlık ve bunun alt dalları altında şekillenmektedir. Aktarım kanallarının işleyiş sürecinin analizinden elde edilen bulgular, politika yapıcıların politika belirleme aşamalarında kullanılmaktadır. Bu nedenle çalışmanın amacı parasal aktarım mekanizmaları hakkında bilgi vererek, Türkiye'de para politikası-reel ekonomi etkileşimini ve parasal aktarım kanallarından hangilerinin etkin olarak çalıştığını araştırmaktır. Bu amaca ulaşmak için 1990Q1-2008Q2 dönemi veri seti ile VAR modeli oluşturulmuş ve etki tepki fonksiyonları ile varyans ayrıştırması yöntemine dayalı sonuçlar verilmiştir. Çalışma sonucunda, Türkiye'de geleneksel faiz oranı kanalının çalıştığına yönelik bulgulara rastlanmıştır. Bunun yanı sıra döviz kurunun reel faaliyetler üzerinde etkili olmadığı, ancak fiyatlar genel seviyesini etkilediği bulgularına ulaşılmıştır.

**Anahtar Kelimeler:** Parasal Aktarım Mekanizması, Parasal Aktarım Kanalları, Vektör Otoregresyon, VAR Modeli Türkiye.

**JEL Kodları:** E42, E52, C22

**THE MONETARY TRANSMISSION MECHANISM CHANNELS: AN ANALYSIS ON TURKEY<sup>1</sup>****ABSTRACT**

Transmission mechanism of monetary shocks shows how changes in the monetary policy are carried out by central bank into the real economy. Impact of a monetary policy shock in the real economy is realized through the channels of the monetary transmission mechanism. Transmission channels can be classified into five sections, namely interest rate channel, assets price channel, exchange rate channel, credit channel and expectation channel, and their subtitles. Results and analysis obtained from both process and function of the transmission channels are utilized by the policy makers to determine optimal policy mix. Therefore, the aim of this study is to provide information about the monetary transmission, to examine the interactions between real sector and financial system and to empirically determine most effective monetary transmission channels among the possible ones. In order to fulfill this aim, findings are obtained from the impulse-response analysis and variance decomposition based on a VAR model by utilizing the data for 1990Q1-2008Q2 period in the Turkish economy. The results represent that traditional interest rate channel is effective in Turkey. Moreover findings indicate that exchange rate does not have any influence on the real activity, but it influence price level.

**JEL Codes:** E42, E52, C22

**1. Introduction**

Money, with its functions of medium of exchange, measure of value, and value accumulation, is among the indispensable elements of our daily life. Money is a unit accepted by society as payment instrument. Societies used different sorts of money in the various stage of history. The nominal value of paper note was guaranteed by national state and together with establishing central banks and its having monopoly to print money, the applications of monetary policies have increasingly gained importance.

There are a number of different views on monetary transfer mechanism that is a channel for the decisions of monetary policy to affect real GDP and inflation (Taylor, 1995: 11 ).

Since monetary policies are neutral in long term, these views argued agree on that at least in the short term, monetary policy largely affected the economic activities. Most of recently empirical studies confirms the views of Friedman and Schwartz (1963), the first economists who put forward that monetary policy is effective on economic activity and this effect can realize after two years or more (Bernanke and Blinder, 1992: 904). However, these effects emerge as a result of monetary policy formed and what sort of operational mechanism became a subject of discussion and it is understood that the discussion will last for a long time (Nualtaranee, 2001: 1).

Many developed and developing countries, in order to restructure their financial systems, make reform in last twenty years. Among the countries making reform, Turkey also takes place with changes it carried out in different times. This reform process that begins in 1980s and lasts to our present days pushed economists to carry out much more research associated with the transmission mechanisms. Until 1980s, the studies were carried on the transmission mechanisms that operate by means of magnitudes by means of only monetary mechanisms, while, beginning from the second half of 1980, a mechanism especially concerning financial agents i.e. banking sector became to be the subject of discussion. This mechanism, termed as credit channel of monetary mechanism, as a result of change occurring in monetary policy, studies how the credit supply is affected and what kind of effects of the change in credit supply has on real variables.

Knowledge about the monetary transmission mechanism i.e. in what way and what magnitude the changes in monetary policy affected provides benefit from the aspect of supporting the effective management of monetary policy; selecting the suitable policy instruments; and using them in time and in place. Therefore, understanding monetary transmission mechanism is an obligatory in terms of implementing the monetary policy successfully.

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<sup>1</sup> This paper is based on master dissertation called "Channel of Monetary Transmission Mechanism: An Analysis on Turkey".

This study consists of three main sections. In the first section, the definition of transmission mechanism will be presented and then the information about direct and indirect transmission mechanism was given place. After examining the general views of Keynesian and Monetarist approaches, the determinations will be described about monetary transmission channels and how these channels functioned and made effects.

In the second section, the information was given about the theoretical background of econometric methods to be used during making the test of transmission channel and the necessary explanations were done about this issue.

In the last section, the model will be described. The information about selecting the variables concerning the properties of data was excluded. In order to test whether monetary transmission channels in Turkey effectively functions or not, an econometric application was carried out. In this section of thesis, in order to determine whether or not transmission channels are effective in monetary transmission mechanism and what their effects are, a method based on time series covering the period of 1990 - 2008 and the functions of cause-effect formed by means of Vector Auto Regressive (VAR) were assessed. At the same time, via the method of variance dissociation, the analysis of series was carried out.

## **2. Literature**

In academic studies carried out in this area, short termed interest rates were predominantly used as indicator of monetary policy and in a large part of the studies, the effects of externally changing monetary policies on macro –economy were examined on the basis of VAR. These examinations were initiated by Romer and Romer (1990) and Bernanke and Blinder (1992) and are based on macro data.

Bernanke and Blinder (1992), in their studies they carried out for US, used interbank interest rates as variable of monetary policy and also utilized, in the study, a dataset consisting of three variables - deposits, securities, and credits, selected from unemployment rate, consumer price index, and balance sheets of banks. In the study considering interbank interest rates as a variable measuring monetary policy, using the functions of cause-effect, the effects of five variables against shock applied to the variable policy were examined. The results were consistently interpreted with the channel of bank credits, but that the reduction in unemployment rate and the reduction in credits coincidence with the same time engendered the probability that the results may be interpreted consistently with the traditional channel. The banks in European financial system differ from those in US. Hence, using the data of European countries, what the results of application conducted will show is also important.

De Bond (1999), in the study he carried out for Euro region, examined the effect of macroeconomic variables in response to a shock of monetary policy and in his study including the data of Germany, Italy, France, Netherlands, United Kingdom, and Belgium, in the countries except for United Kingdom and Belgium, the results were reached about the presence of credit channel. In country based studies, while Hulsewig et.al. (2001) and Kakes et.al (1999) could not reach the results to support the channel of bank credits for Germany, the study of Holtemoller (2002) supports the channel of bank credits in Germany. Arcangelis and Giorgio (1999) presented the results supporting the presence of channel of bank credits for Italy, Garretsen and Swank (1998) for Netherland, Iturriaga (2000), and Iturriaga (2000) for 20 OECD countries.

O'Reilly (2004), for Ireland, analyzed the effect of production and shocks on exchange rate and concluded that short termed interest rates reduced the production and prices and immediately brought value in exchange rates, i.e. and caused national money to lose value.

The first study researching the channel of bank credits of Turkey belongs to Yülek (1998). In this study, via the monthly data covering the period 1986 -1994, and VAR Model and the functions of

cause-effect, the conclusion that is consistent with credit channel were reached. Gündüz (2001) following the same method in the study of Garretsen and Swank (1998) also reached the similar results to Yülek. Gündüz (2001), in his study, following the literature the mechanisms of monetary transmission by means of VAR model, used the interbank interest rates as variable representing monetary policy. In his study, following monetary policy, it was regarded that in the items of balance sheets of bank, there were changes in what measure and what direction. Following contractionary monetary policies, it was observed that both bank credits and securities decreased very fast.

Zengin (2000) studied the relationship between exchange rate and foreign trade in Turkey and as a result of co-integration, the findings obtained via VAR analysis predicted that there was a two directional causality relationship between real exchange rate and the prices of export and import. Decrease of effectiveness of exchange policy was seen as the cause of this.

The study of Öztürkler (2002) is based on macro data. The results he obtained suggested that there was a poor bank credit channel. Öztürkler (2002), in the range of time including the period of 1996 -2001, liberalization policies in financial markets reduced the importance of bank credits to finance the investments of private sector, but with the effects of economic instabilities experienced, he stated that the banks became more sensitive to macroeconomic changes and they acted in the behavior of profit maximization.

Us (2004), in his study, examined the mechanism of monetary transmission in Turkey, using small structural macroeconomic model. In his study, according to Taylor Rule and Monetary Condition Index, he analyzed the selection of monetary regime. In all sort of simulations established in the study, in case that MCI is used as monetary policy instrument, economy reached stability more rapidly. In addition, in case that MCI is used as an instrument, the fluctuation in economy decrease.

Kadioğlu (2006), in his study, in cause-effect analysis in his paper including the data in the range of 2001 – 1005 in Turkey, the effects imposed by the other variables to shock applied to nominal interest were examined The shock on interest effects the exchange rate in the same direction and increases the real exchange rate. As a result of this, the price of import goods relatively becomes cheaper.

Kasapoğlu (2007), in his study, in Turkey, considered the period of January 1990 – June 2006 and suggested that the channel of exchange rate did not have any effect on product, however, had a significant effect on inflation.

Aklan and Nargeleçeken (2008), in the period of 1998Q1-2001Q4, studied whether channel of bank credit was valid or not in Turkey. In the study, they determined that there was a weak relationship between the extension behaviors of banks and monetary policy. With moving from the views, the main conclusion reached is that in transmission process of monetary policies, the channel of bank credit did not function effectively.

Erdoğan and Beşballı (2009) realized a study in which, the channel of bank credits, application of monetary policy, the process of affecting the volume of bank credit thereby, total demand and product, and was studied. From the function of cause-effect, in Turkey, findings were met about that the channel of bank credit functions and they noted that there were some problems reducing the effectiveness of credit channel.

### **3. Monetary Transmission Mechanism**

Monetary transmission mechanism is a mechanism indicating the interaction between monetary policy and real economy, i.e. monetary change affected total demand and production in what ways and in what measure. In both theory and application, it is impossible to fully comprehend and solve this mechanism that is so complex.

Among economists, there was a consensus about the effectiveness of monetary policy, there was no togetherness about where the milestone of this is. Despite that there was a clash of ideas, in this short literature, this subject was considered in the frame of the views of monetary policy of Keynesian and Monetary school

#### **3.1. Transmission Mechanism in Theoretical Approach**

That monetary policy affected the economy in short period is a generally acceptable view among economists. However, there is a consensus here about the reconciliation, running of channel of monetary policy, and providing monetary transmission. Different transmission channels were introduced about monetary policy affected the economies by means of which variables. Before examining this transmission channels, it will be useful to roughly consider the views about the role of monetary policies in different theoretical on economy.

Mechanisms providing to transmit the effectiveness of monetary policy from theory to real economy are an issue to which academics showed interest in recent years. The effects of monetary policies on real economy were generally discussed from Keynesian and Monetarist point of view. Examinations also concentrated on this framework (Adanuraklan and Nargeleçekenler, 2008: 111-112).

#### **3.1.2. Keynesian Transmission Mechanism**

In Keynesian theory, as long as there was no liquidity trap, it is argued that the changes in monetary supply have effects on real interest rates and economic activity. The transmission mechanism in the frame of traditional monetary view is based on the channel of interest. In monetary view, there are two actives, one of which is obligation, representing the money and the other all financial actives. When a variation occurs in monetary supply, the balance is provided via interest rates having their effects on money and variables. In this model, the most important role of banking sector, in creating money, is interested in the passive part of balance sheets. In active part of bank balance sheets, since the substitution flexibility of active is full, a credit supply function was not additionally defined. The figure of IS LM model of transfer mechanism of monetary policy is an example for monetary view. In monetary view, the direct effects, the direct effects of interest variations on real economy are considered.

In transmission mechanism of traditional monetary policy, interest rates are one of the most important functions in reaction of economy to monetary policies. The variation in monetary policy begins in the conditions, in which the banks modified their reserves in order to affect short termed interest rates of authorities. In this process, first of all, an interest level of monetary policy is determined. The interest rate determined is kept in balance, modifying the reserve supply of banks. Monetary policies are carried out by juggling with interest rates (lowering or raising). In the condition under consideration, the transmission of monetary policy applications to economy depends on the reflection of interest variables of monetary policy on the long termed interest rates that are effective in the consumption and investment decisions of economic units (Sellon, 2002: 7).

Therefore, it is necessary to introduce the relationship between short termed nominal interest rates depending on the applications of monetary policy and long termed real interest rates. The connection between nominal interest variation and real interest variation is provided with the rigidities

of wage and price in Keynesian analysis.. The reflections of short termed interest rate on long termed interest rates are explained in the expectation hypothesis.

In describing the transmission mechanism of monetary policy, two kinds of rigidity are emphasized, that introduce the time delays in transmission process of monetary policy. These are the delays - nominal solidity - in adjusting the prices and wages to the variations in demand and the ones - anticipatory solidity - in adjusting the expectations to the changes of monetary policy regime. Under the presence of these solidities, monetary shocks affect the real variables in the short term and the prices in long term (Adanuraklan ve Nargeleçekenler, 2008: 111-112).

The importance of nominal and anticipatory solidities on the transmission of monetary policy can be summarized as follows: an unexpected increase in monetary supply causes decrease in nominal interest rates. In the conditions, in which the adjustment rate of inflation expectations to the increase in monetary supply is slow, the decrease of nominal interest rates also causes real interest rates to decrease. This variation occurring in interest rates results in the increase in the expenditures that are sensitive to interest. In this process, when the adjustment rate of prices and wages to the increase in demand is slow, supply increases in the short term (King, 2003: 74-75).

In Keynesian analysis, the effects of monetary supply on economic activity are examined in the structural models showing the run of monetary policy in the frame of structural models. In Keynesian structural models, the channels of monetary policy to affect the total product are presented by defining the behaviors of firms and consumers in most sectors of economy. In structural models, the transmission process of monetary policy is toward total expenditures from monetary supply. According to this, the variations of monetary supply affect the interest rates and the variations of interest rates makes an effect on the investment goods and consumer durables (Mishkin, 2003: 604).

With moving from this point, after a monetary contradiction, while total level of expenditure in economy declines, it increases after a monetary development. In the studies carried out toward the channel of interest, the main point is that the monetary authorities influence the cost of capital and expenditures of consumption by means of short termed interest rates. According to this, the variations in short termed interest rates, transmitting them via capital cost, affect the rate of capital/product and the expected return rate from investment projects. A similar effect occurs in the consumption expenditures. Economic units make a choice according to the variation in interest rate, between the consumption of current period and consumption of future period. If the interests are high, the consumption that should be made in the current period is substituted with the consumption in the future period. (Adanuraklan and Nargeleçekenler, 2008: 111-112).

The direct effects of variations in interest rate on the real economy by means of investment is described in Keynesian approach, in the frame of IS- LM analysis. In this analysis, that the banks do not have a special role is determined by the demand of economic units, depending on the variations occurring the credit supply, investment, and output in the analysis. In IS- LM analysis, the increase in monetary supply causes the fall in interest rate in the frame of theory of liquidity preference, while the fall in monetary supply increases the interest rates. Since the interest rate expresses the borrowing cost, monetary authorities, using the short termed interest rates, have a possibility to affect the cost of capital and thereby the expenditures made on fixed investment, housing, stock investment, and consumer durables. With moving from this point, in the mechanism of standard transmission, while the increases of monetary create economic development, a monetary contradiction causes a fall in economic activity (Telatar, 2002: 65).

In IS –LM analysis, in which the money is considered as an active not bringing any income, as financial interest rate, obligation interest were used. IS- LM analysis, based on the only interest

mechanism, reflects a model structure taking the economy to the balance level of full employment. When moving from the need to provide the balance of monetary market, the magnitude of interest variations in Keynesian analysis depends on the substitution flexibility between monetary variables and other financial liquid actives. When the substitution flexibility between monetary balances and the other liquid financial actives is low, the variations of interest rate for providing the balance of monetary market have important magnificence. In the conditions of interest, the effects of monetary policies on the level of expenditures in economy become so great. On the other hand, when the substitution flexibility between monetary balances and alternative liquid financial actives are high, the necessary interest rates for providing the balance of monetary market become lower. The effects of economic units on the decisions of expenditure also become lower in this scope (Keyder, 1991: 247).

When one moves from this point, in two the model with two actives, which the general Keynesian analysis is based on, that substitution flexibility between actives is full suggest the conclusion that the balance of monetary market will be provided with a small variation in interest rate. Since that the variations occurring in interest rates will be limited with its effects forming on total demand, the effects of monetary policies on real economy will not also be at the significant level. In Keynesian analysis, that the monetary policies the total demand with a single interest rate -obligation interest-made the effectiveness of monetary policy applications depended on the interest flexibility of monetary demand. However, in the later process, this narrowness of Keynesian transmission mechanism gained a new opening together with Portfolio Balance Approach by Tobin (1969).

Portfolio Balance Approach led to a remarkable Keynesian -Monetarist debate in related to the structure of transmission mechanism. In also both approaches, where the variations in nominal monetary stock are externally determined, the mechanism of transmission includes the adjustment process of monetary demand to monetary supply. In Keynesian approach, monetary supply surplus first of all addresses to short termed financial active. In this approach, since the direct effect of the variation of interest rate is seen on the prices and returns of active, the effect forming on the total demand is indirect. In spite of this, in Monetarist approach, the variations in monetary supply directs reflect on the product and service markets (Moore, 1988: 287).

In the traditional Keynesian approach, in which it is not interested in the source of variation occurring in monetary supply, the functions of banks to create money are emphasized and any connection cannot be made between bank reserves and variations in credit supply. In this approach, where banking sector did not play an active role, the credit supply of banks does not take place as a variable. This narrowness of transfer mechanism caused the credit view to dominate.

In market conditions, where asymmetric information is valid, in terms of both banks and borrowers, inter- actives substitution flexibility is not complete. In this process, banks undertake a specific role in the market with credit supplies. Credit channel was obtained by adding bank credits to Keynesian view as a third asset. In credit view, credit interest rate, as a variable affecting total demand, is added to obligation interest in traditional Keynesian Model .Together with extra credit channel, the transfer of monetary policy run out from depending on only the interest rate of monetary demand. This situation is an important point that are not emphasized in the monetary view (Neumann, 1995: 139).

If it is necessary to turn out a result from the main reasons we described, it is seen that Keynesian view has some missing points about transmission of monetary policies to the real economy. According to this, in Keynesian view, that the significant part of total demand variations are explained with the applications of monetary policy not including important variations in real interest rates excludes financial factor in the transfer of monetary policies. Therefore, the analyses toward the

transfer mechanism of monetary policy were enlarged in such a way that they will include financial factors.

### 3.1.3. Monetarist Transmission Mechanism

In monetarist approach, change of monetary policy has more effects than increasing the interest rates in the short term. Traditional quantity theory is based on a simple transmission mechanism, where the increases in monetary supply directly raised the level of demand. This simple mechanism is valid in the conditions, in which the level of demand directly depends on the variation in monetary supply. The effects of interest rates on the level of demand were described by classical economists in the frame of indirect mechanism. According to this,

1. The amount of money that increases raises the actual amount of money above the desired level.
2. Surplus money is supplied to the fund markets.
3. In fund markets, the prices of financial assets rise.
4. The falling interests increases the expenditures and prices. Together with the neoclassical economists, becoming mature the process of indirect mechanism, the effects of monetary variations were separately examined as short term and middle term (Paya, 2002: 204-205).

In the scope of indirect mechanism, developing the distinction of the real and market interest, the role of financial agents in economy was emphasized. According to this, in the conditions, where the tight monetary policies are applied, since the cash assets of banking systems increase (decrease), an effect constitutes in the direction of expansion (contraction) of credits (Paya, 2002: 209).

In neoclassic approach, the transmission of monetary policies is a process first beginning with credit channel and then running by means of the effects of long termed interest rates on the investments. Monetarist approach differs from the function imposed on interest rate in the transmission process from neoclassic approach. In monetarist approach, following Fisher, nominal interest rates forms from the addition of nominal interest rate and the expected inflation. Monetarists consider that on the reason that an important part of variation in the long termed interest rates reflects inflation rate, in the transmission of monetary policies to the real economy, they think of that the interest rates do not have an important effect (Goodfriend and King, 1997: 8).

In the transmission process of interest rates, by means of its effects on active prices and real wealth undertake function. In monetarist approach, the changes of monetary supply in this way affect financial and real actives as well as consumer durables. In the process under consideration, expenditure via active prices of interest variations have effects on product and inflation rate. Mechanism of monetarist transmission is based on examining the relationship between variation in monetary supply and the level of total output. The effect of changes in monetary policy on the level of total output is examined in the frame of model not covering the running mechanism of economy and based on the evidence of reduced form (Adanuraklan and Nargeleşkenler, 2008: 111-112)

In monetarist analysis, the structure and short termed dynamics of economy is less emphasized compared to the long termed dynamics including the relationships between money-production and money –inflation. When moving from this point, something like a situation , in which monetarist analysis do not entirely introduces the structural connections and dynamics, is met. That monetarists use the models based on the reduced form and are interested in long termed results instead of short termed dynamics support this view. In monetarist analysis, the variation occurring in monetary supply in the short term is accepted to affect the level of total output. However, despite these views of them, they are pessimistic about the use of monetary policies in long term. According to monetarists, in



order to reach a target of monetary growth in compatible with price stability, economy should be governed with the rules of passive monetary policy. This preference reflects the structure of economy, short termed dynamics, and uncertainties related to the long delaying times (Mayer, 2001: 2).

In monetarist approach, it is emphasized that the variations occurring in monetary stock will not only be able to explain in the frame of liquidity and that it will also make an effect on the current and expected prices of the domestic and foreign actives. In this approach, interest is only one of the relative prices in transmission process. In monetarist approach, substitution process was enlarged in such a way that it will include the real actives. In this process, since the prices of active are included in total demand function, transmission process is affected from the changes in prices of active.

In monetarist relative price approach, in which transmission mechanism is considered in a wide scope, inter – active substitution flexibility is assumed to be low. The meaning of this, the variations occurring in monetary base, influencing all relative prices, caused a wide range portfolio arrangement including the financial and real actives (Adanuraklan and Nargeleçekenler, 2008: 111–112).

According to monetarists, while the changes of monetary policy, on the one hand, modify the monetary stick compared to the other domestic and foreign active stocks, on the other hand, they modify the marginal utility of money compared to marginal utility of the other financial actives and consumption. The owners of portfolio, equating with all actives, the marginal utility of production and consumption in current period with the relative price rates, strive to establish the balance again. This is process containing the variation of a number of relative price, expenditure, and active portfolio (Meltzer, 1995: 52).

In monetarist approach, the relative price variations between money, financial actives, and real actives are explained in the frame of interest mechanism. In other words, the applications of monetary policy are transmitted to the economy by means of the effects of interest rates on the financial and real actives. The changes in interest rates modify the prices of current actives according to the return of new production and supply price (Brunner, 1989: 15).

In monetarist analysis, the transmission process begins in the markets of active. According to this, the changes in monetary supply, causing the portfolio to be rearranged, directly affects the nominal demand via the effects of wealth and substitution on the real actives, and indirectly via the financial returns that are determinative in the decisions to spend (King, 2003: 78 ).

The effects of relative price variations on the market of goods can be described with moving from the open market purchase. Depending on the open market purchase, when the amount of money that increases is used for purchasing financial real active by economic units, while the interest rate decreases, the prices of active rise. The fall in interest rate and rise in the prices of active last until all the additional money is kept in hand. New portfolio balance is provided at the level of low interest and high active price (Meltzer, 1995: 55).

In the conditions of new portfolio balance, where the market of active is in balance, but the product market, the prices of the existing actives is above the new production costs. This situation represents a process, in which the relative price of new production decreases. Under the conditions, where the marginal productivity of capital does not change, since the fall in the interest rates decreases the cost of new production that especially covers consumer durables and capital goods, the production increases and the relative prices of the new products decrease. When one moves from this point, following open market purchases, the adjustment of the market of active prices, causing total demand, general level of prices, and production to increase, disturbs the balance of product market

Since the demand for actives depends on the prices, product, and expectations, the reactions occurring in the product market vary the demand of money, obligation, and capital. The monetary

demand that is necessary for the transactions at the level of high price and production also increases. In this process, economic units having the expectations in the direction that the variations in price and production will be continuous, selling the obligations in their portfolios, actualize the purchases of securities and the other actives. As these reactions occurring in the market of actives caused a variation in the prices of actives, and interest rates, the new effects occur on aggregate demand.

In monetarist approach, in the transmission process of except for capital cost, it is suggested that interest rates have a functions such as affecting the substitution between capital cost. That there is possibility to substitute between money and real actives, in this approach, shows that the variations in the amount of money will be directly effective on total expenditures. The possibility to substitute under consideration provides an important link, which is not mentioned in standard Keynesian analyses, between the monetary and product markets.

The critics Monetarist economists addressed to the transmission mechanism with via Keynesian interest rate can be put in order as follows: firstly, in the model of IS- LM, the changes the new investments made on capital stocks caused in total stocks of actives are not taken into consideration. Secondly, the interest rate to that the transmission mechanism of monetary policy is attributed is not certain whether the short termed interest rate affecting the monetary demand or long termed interest rate that is the main determinative of investment and capital accumulation is. In the third model, financial agents have no function in the transmission of new policies. In this model, money is either the monetary model itself or directly a rate of monetary base. Fourthly, whether the entities substituting the money constitutes from obligations or active entity consisting of both obligatory and real capital is not clear. Finally, since the important part of short termed interest rates is a temporary attribute, it is not interested in the fact that these interest rate in the temporary attribute may affect the decisions to spend of economic units. The analysis of IS –LM does not distinct these temporary variations from the permanent changes in the real and nominal returns (Meltzer, 1995: 51-52).

With moving from all of these critics, in monetarist approach, it is emphasized that monetary shocks are transmitted through the relative price variations and variations in monetary balance to the real economy. In Monetarist approach, the variations in the values of active, especially in large defined credit channel, undertake an important function in terms of affecting the magnitudes shown as an assurance in getting credit from credit channel.

In the transmission process of monetary policy, the difference between the Keynesian and Monetarist approaches basically results from the substitution flexibility between money and financial actives and real actives. In Keynesian approach, substitution flexibility between money and the other actives is intact, its substitution flexibility with the real actives is zero. With moving from this point, in Keynesian approach, while monetary policy affect the total demand with interest rates, in Monetarist approach, that there is the possibility of substitution between money and the other actives enables the variations in the amounts of money to directly affect the total expenditure. Because of that, transmission mechanism is from the monetary stock to the expenditure.

### 3.2. The Views Associated with the Run of Monetary Transmission Mechanism

The explanations related to monetary transmission mechanism cause some debates between Keynesian and Monetarist economists on some points. Theoretical explanations of Monetary economists associated with monetary transmission mechanisms are based on direct transmission mechanism. From this point of view, monetary approach is the follower in our present day of direct transmission mechanism first expressed by Hume and Cantillon.

In classical economic thought, Thorston emphasizing that the insufficiency of direct transmission mechanism put forward the indirect transmission mechanism. Indirect transmission mechanism developed by Wicksell later affected the views of Keynes about monetary policy.

The explanations about the mechanism of monetary transmission caused the debates between Keynesian and Monetarist economists. The theoretical studies of Monetarists associated with the monetary transmission mechanism is based on *direct (indirect) transmission* mechanism. From this point of view, monetarist approach is the follower in our present day if direct transmission mechanism first expressed by Hume and Cantillon.

#### 3.2.1. Indirect Transmission Mechanism

Classical monetary theory is based on two main thoughts about the relationship from the variation in amount of money to the prices. First of them is direct mechanism described by Hume, and the other, indirect mechanism described by Thornton (Blaug, 2002: 153)

In classical approach, the money is an instrument facilitating exchange. In economy, the conditions of perfect combination. In accordance with Say Law, each supply creates of its demand. In Say Law, defining the money as a mediator is quite important, because all of money obtained from production and sale is used in buying the other goods. Money is only a medium of exchange and is neutral in this meaning, that is, money functions a numeraire. In this meaning, numeraire may be a number putting the determined quantity into words. This can be said in intangible form in full meaning. But, lack of such a calculation unit physically will be unimportant in full meaning for exchange of goods. Nobody will not keep in hand the money defined in this meaning. i.e. except for the money in circulation, economic units will not keep inactive money (Ercan, 2005: 138-139)).

In a case, where prices and money is in balance, let's assume that the amount of money is doubled. The surplus in monetary supply is the surplus of demand toward goods. The surplus of demand for goods will form a pressure upwardly on the prices. The establishment of equilibrium will realize with the increase of prices in the same rates with the amount of money. (Blaug, 2002: 154 )

Walras also, remaining loyal to the descriptions of Say, moves from the thought that money does not have any function except for facilitating the exchange. In Walrasian analysis, money is good that is not different from the other goods. Any of the other goods can make mediation for exchange of goods. Abstracting the money from its unique specifications, more importantly, priorities /functions associated with the system caused the money to be defined as a passive concept. The other important reason of perceiving the money as passive is that generally acceptable literature of economics builds its theory on the assumption of perfect competition market (Ercan, 2005: 146).

The most important representatives of tradition of direct transmission mechanism in the recent time are Monetarist economists. In analysis of Friedman, the balance between monetary supply and demand is established as a result of the change of general level of prices. The amount of money that increases stimulates expenditures. Expenditures increases the prices. Friedman, applying Relative Prices Theory, principles of Neoclassic Profit and Utility maximization to Portfolio Theory, developed the analysis he initiated in this way. The balancing element the monetary supply and demand is the compliance process of prices (Paya, 2002: 95 )

A monetarist model, in order to the mutual interaction of relative prices, has at least three entities: (a) money or monetary base (b) obligation or stock, (c) real capital stock. Between the entities in portfolio, substitution is not complete.

Transmission mechanisms begin in asset markets. The transaction and information cost of most assets is lower than the cost of modifying the production or investing on the consumer durables. Especially, if there is an uncertainty about whether the monetary effect is temporary or continuous, asset markets shows reaction more rapidly. In order to see the run of transmission mechanism, let's consider that central bank attempted for open market purchase. The owners of wealth use the extra money to buy the existing stocks and real capital. While such a behavior decreases the rates of interest, increases the prices of asset. Monetary prices and interest rates are negatively correlated, the prices of asset, positively. Because of that, the decrease in interest rates and increase in the prices of asset will continue until all extra money will be kept in hand. As a result of open market purchases, decrease of interest rates, and increase of asset prices, the balance of portfolio is reestablished. Asset markets are in the balance, but there is an unbalance in the product market. Price of the existing assets is higher than the cost of producing the new product and the relative prices of the new products decrease (Meltzer, 1995: 54).

Thus, adaptation process in asset market affects the product market. Total demand, output and prices increase. Since the demand of asset depends on the prices, output, and expectations, the reaction of product market affect the demand of money, stock, and real capital. This mutual interaction of the system, when the prices of asset and output are equalized, when fiscal and monetary effect ended, and finally, when the expected and actual values are equalized, will end up. Thus, system will converge again to the balance (Meltzer, 1995: 24).

### **3.2.2 Indirect Transmission Mechanism**

The indirect mechanism was first expressed in the literature by H. Thornton. In economy, in which there are assets other than money, the monetary balance is only provided in case that the interest rates in credit market and the return rate of the capital in the product price are equal to each other. In the state of balance, injecting money into economy reflects on credit market through banking system. Together with the increase of supply of lendable funds, market interest rate falls below the return of capital. While the price of investment goods increases, the volume of borrowing expands and the demand of credit is promoted. Finally, the increase of demand of credit leads to an increase in the supply of credit. However, as long as interest rate applied by banks remains below the return rate of capital, the demand for credit is rapacious. The surplus of demand for credit occurs and the interest rate applied by banks begin to increase. If the real return rate of capital, does not vary, monetary balance will be provided through bringing the interest rates to the previous level. Prices rose but real interest rate is the same (Blaug, 2002: 155).

Within neoclassic economics, the follower of indirect mechanism tradition is Wicksell. Wicksell developed the indirect mechanism posed by Thornton. According to Wicksell, in the economies, where credit system developed, not only the amount of money but also the variations at the domestic level will be able to cause the movements of price. Wicksell, going further, even in the regimes, in which monetary supply is bound to the metal stock, even though the amount of money does not vary, argued that interest movements can lead to the variations in the general level of prices. Wicksell, introducing the natural (real) interest rate and emphasizing that the role of monetary financial agents in economy, formed a difficult approach (Paya, 2002: 208 ).

Although Wicksell does not accept simple linear relationship between money and prices, he is a rhetorician of quantity. Despite the potential provided by theoretical frame of Wicksell, even if the emphasis that the increase in the amount of money will be able to affect the prices through the interest rates are described by means of rather different, the reached result is the same the reached one by Fisher (Ercan, 2005: 154).

While Keynes considers the relationship between money and total demand, through the ways Wicksell opened, he orientated to define the effect of money on the prices in the frame of interest. According to this, that the money affects the real world depend on its effect at effective demand and one of the elements directing this effect is also interest rates (Ercan, 2005: 182-183 ).

Liquidity preference of Keynes has a quality of optional approach in macro level. Decision units, according to the expectations of interest, keep their savings as either completely obligation or money. In real life, considering the fact that humans allocated their wealth in different types of investment instruments, it is Tobin, who changed the approach of Keynes in this way (Paya, 2002: 84).

Tobin, considering the risk and uncertainty, developed the macroeconomic portfolio. The movement point of this approach is the assumption that there is no full substitution between non – momentary wealth and obligation and stocks, thus that there is interest rate more than one in the market (Telatar, 2002: 73).

In the approach of Tobin, the relative (return) rates of the assets indicating different ways of keeping the wealth in hand depend on their relative supply. The demand toward the assets taking place in portfolio, also including money, varies with the interest rate of each asset in the same (opposite) direction and interest rate of substitute assets in opposite direction. Due to the fact that the substitution between assets are limited, it is assumed that there are a number of interest rate, thus, the demand for each asset is considered as a function of a number of interest rates. A variation emerging in the supply of any asset, including money, varies the interest rates of all other assets, not of a single asset. In similar way, the variations emerging of an asset affects the demand of all substitute assets, also including money, not the demand of relevant asset. Hence, the interest rate belonging to each of the assets in portfolio is determined the supply of all other assets, not only by the supply of that asset (Telatar, 2002: 74 ).

In macroeconomic portfolio, for describing the transmission mechanism considered, via falling the required reserve rate of central bank, let's consider that an expansionary monetary policy is applied. The banks will use the inactive reserve remaining in their hands in the area of security or to give credit. In case that they use them in the area of security, they will be able to cause their prices to fall, thus, the return rates to change. So, the non-banking sector will have turned the securities in their hands into money. The return rate revealed the need for investment instruments, whose return rate is high, This situation can increase the demand for money and capital goods. In case that the money is used in the area of capital good, the monetary price of capital goods will rise and the return rate will fall. This situation will cause the rate of capital goods of non –banking sector in total wealth to vary. However, the rising prices of capital goods will create the desire to produce much more in consumers. As a reaction to the supply of capitals goods that increase, the prices of capital goods will fall again and its return will rise again. As a result, it is seen that the increase in monetary supply varied the relative return rates and the composition of total wealth (Keyder, 2000: 376-377).

#### 4. Vector Autoregression (VAR) Models

Traditionally, in hypothesis tests carried out by using wide macroeconomic models and predictions, generally, each of structural equations is individually predicted. Then, bringing all equalities into together, macrocosmic tests are carried out. Sims criticized this kind of this type of model analyses due to the fact that they have considerable limitations about the main structure of economy. According to Sims, among the variables to be used in any macroeconomic model, if there is simultaneousness, between the internal and external variables, a specific distinction must be done (Enders, 1995: 86).

VAR models developed by these thinkers and Sims were commonly begun to be used especially in researching the run of the channels of monetary transmission mechanism, in analysis of monetary policies. The advantage of VAR models according to the other macroeconomic models is that all variables in model is internal; not to be experienced the difficulty to decide about which of models is internal or external. In addition, VAR Model Predictions carried out by using the method of least squares, a simple method, give better results than more complex simultaneous equation model.

However, VAR Model includes some difficulties in practice. In VAR models, all variables are necessary to be stable. Instable variable should be brought into stable with the suitable method. In addition, in VAR model, determining the suitable lagging length is important. If there is  $m$  variable in  $m$  equation VAR model and if each variable has a  $p$  lagged value, there will be  $(m + pm^2)$  piece of unknown coefficient in total. In case that the size of sample is not enough, a number of freedom degree will be lost and predicting the coefficient of model will become difficult (Gujarati, 2001: 749).

#### 5. Econometric Methodology

##### 5.1. Definition of Variables

The symbols of variables, in the way that they take place in analysis, to be used in econometric analysis; their descriptions, their data resource, and period are presented in table 5.1.

**Table 5.1. Description of Variables**

<i>Symbol</i>	<i>Description</i>	<i>Source and Period</i>
<i>LM2SA</i>	Seasonal free logarithm Monetary Supply (M2 TL)	TCMB EVDS 1990:1-2008:2
<i>LSUESA</i>	Seasonal free logarithm Industrial Production Index (1987=100)	TCMB EVDS 1990:1-2008:2
<i>LDK</i>	Logarithms Exchange Rate (Dollar Purchase Exchange Rate)	TCMB EVDS 1990:1-2008:2
<i>FA</i>	Interbank overnightAverage Interest Rate (%)	TCMB EVDS 1990:1-2008:2
<i>ENF</i>	Consumer Prices Index Variation Rate (%)	TCMB EVDS 1990:1-2008:2

Prefix of SA was added after freeing seasonally before data, prefix of L, after taking their logarithms. In determining time series properties of the data of related to the variables and predicting the model, E-Views 6.0 econometric program was utilized.

Our variables used in the model, since they the run of monetary transmission mechanism, were considered. To give an example, real exchange rate index was used to analyze the channel of exchange rate, while industrial production index was included in the model for its representing the real sector

## 5.2. Time Series Properties of Variables

That macroeconomic time series does not show the stability in time is one of the main questions met VAR models. This situation may cause to be obtained a relationship that is not existent in the reality between the variables used in model. For the results to be reliable, before predicting any model, it is necessary to examine the stability of the variables used in the examination (Günçavdı et al., 2002; Kasapoğlu, 2007).

Stationary of the series employed in the analysis is investigated by unit root test. For testing the presence of unit root, it is possible to use numerous techniques. In this study we employ Augmented Dickey-Fuller unit root test (Hereafter ADF).

Applying ADF unit root test was applied, in order to be able to determine the running rules of monetary transmission mechanism, optimum lagging number of VAR model formed must be identified.

In other words, in co-integration test, first of all, it is necessary to identify how much lagged value will take place in VAR analysis used

The Lengths of optimum lagging to be selected should be as small as not to confuse the calculation, also be as large as not to cause autocorrelation between error terms (Kasapoğlu, 2007: 84).

In order to be able to determine whether the variables are stable or not, becoming free the data from seasonal effects, test were realized. In Table 5.2, the results of PP unit root test are presented.

Results of unit root tests, applied to the first difference of variables, n shows that all variables became stationary. Johansen Co-integration Test, which will be used as analysis method requires all variables to be stationary from the same degree. Hence, the possible relationship between variables might be investigated by Johansen co-integration method.

**Tablo 5.2. PP Results of Unit Root Test**

<i>Variables</i>		<i>ADF t Statistic (Level)</i>		<i>ADF – t Statistic (First Difference)</i>	
		Without Trend	With Trend	Without Trend	With Trend
<i>LM2SA</i>		-1.047(6)	-3.145(4)	-9.888(13)*	-14.483(21)*
<i>LSUESA</i>		-1.165(8)	-2.908(2)	-8.872(9)*	-9.039(10)*
<i>LDK</i>		-1.475(4)	-1.450(4)	-8.417(9)*	-8.656(11)*
<i>FA</i>		-3,376 (4)	-4,493 (6)	-20,134(71)*	-26,158(71)*
<i>ENF</i>		-0.041(9)	-1.855(9)	-2.975(8)**	-3.166(8)**
<i>Significance Level</i>	<i>% 1</i>	-3.522	-4.088	-3.525	-4.092
	<i>% 5</i>	-2.901	-3.472	-2.902	-3.474
	<i>% 10</i>	-2.588	-3.163	-2588	-3.164

Note: In PP test, optimal lagging length, Barlett Kernel (Default) Spectral Estimation method, and Newey-West Bandwidth criteria were utilized. The numbers in parenthesis are lagging length. The signs of \*, \*\* and \*\*\* states the significance at the levels of 1%, 5%, and 10%.

The results of PP test carried out, together with lagging number, and integration degrees, are shown in the table above. In PP test, since the variables of LM2SA, LSUESA, LDK, ENF, FAİZSA are not stable at the level, and are stable when their first differences was taken, they become stable, integration degree is I(1).

### 5.3. Co-integration Test

In order to determine whether or not there is a balance relationship in long term, it is necessary to refer to co-integration analysis. For this purpose, co-integration test will be used in the study, developed by Johansen and Juselius (1990). Johansen- Juselius (JJ) method seems to be more advantageous than two staged procedure, developed by Engle-Granger.

Co-integration test suggest whether the series not being stable at the level act together or not in long term. If there is a co-integration relationship between series, that is they act together in long term, in the analysis to be carried out with the values of level, the problem of false regression will not be met. Both Engle-Granger co-integration test, developed by Engle and Granger (1987) and Johansen co-integration Test Johansen (1988) and Johansen and Juselius (1990) require all series considered not to be stable at the level and when their difference are taken at the same degree, they become stable.

That is, co-integration degrees of series are necessary to be the same. In our study, from the earlier unit –root tests, since all variables are I(1), Johansen co-integration test was used in the analysis.

In JJ test, the lagging number in VAR is important. If lagging number is less, model will be determined missing, if more, freedom degree will decrease. Before passing to VAR model to be estimated, it is necessary to determine the suitable lagging length for model.

As seen in Table 5, lagging length was determined as Likelihood Ratio, LR 4, Final Prediction Error, FPE 4, Akaike (AIC) 4, Schwarz (SC) 1 and Hannan-Quinn (HQ) 1. During stability test, since Akaike information criterion is considered, in determining lagging number of model, in VAR analysis, suitable lagging length have a great importance. Suitable lagging length was determined as 1, taking reference the criteria of SC and HQ.

**Table 5.3. Determining Optimum Lagging Number**

<i>VAR Lag Order Selection Criteria</i>						
<i>Endogenous variables: LM2SA LSUESA ENF LDK FA</i>						
<i>Exogenous variables: C</i>						
<i>Sample: 1990Q1 2008Q2</i>						
<i>Included observations: 70</i>						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-552.8746	NA	5.754014	15.93927	16.09988	16.00307
1	-153.7623	729.8053	0.000131	5.250351	<b>6.213992*</b>	<b>5.633121*</b>
2	-130.8572	38.61139	0.000141	5.310207	7.076881	6.011951
3	-99.18928	48.85912	0.000120	5.119694	7.689403	6.140413
4	-62.91874	50.77876*	9.17e-05*	4.797678*	8.170421	6.137373
* indicates lag order selected by the criterion						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error						
AIC: Akaike information criterion						
SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						

In VAR analysis, in lagging length 1, it is seen that there is no autocorrelation. As a result of analyses we carried out, in the following Table 5.4, for 1 lagging value, the results of Johansen-Juselius(JJ) co-integration test are shown.



**Table 5.4. Results of Johansen-Juselius Co-integration Test**

<i>VARIABLES: LM2SA LSUESA LDK FA ENF</i>					
<i>(Trace Statistic)</i>				<i>Maximum Eigenvalue Statistic</i>	
Null Hypothesis ( $H_0$ )	Alternative Hypothesis ( $H_1$ )	Test Statistic	Critical Value (%5)	Test Statistic	Critical Value (%5)
$r = 0$	$r \geq 1^*$	145.0448	76.97277*	67.73816	34.80587*
$r \leq 1$	$r \geq 2^*$	77.30661	54.07904*	47.46758	28.58808*
$r \leq 2$	$r \geq 3$	29.83902	35.19275	16.03721	22.29962
$r \leq 3$	$r \geq 4$	13.80182	20.26184	6.937003	15.89210
$r \leq 4$	$r \geq 5$	6.864812	9.164546	6.864812	9.164546

Johansen co-integration analysis, according to the results of both trace statistics and eigenvalue statistic results, shows that there are two long termed relationships.

#### **5.4. Results of Impulse Response Analysis**

Since it is rather difficult to make interpretation with the coefficients in VAR model, in interpretations on the results of VAR Model, the graphs of cause-effect function, known as graphical indication of the reactions given by variables to shocks, are generally used.

In VAR analysis, cause- effect functions used in determining the dynamic interaction and analyzing symmetric relationship examine that the effect of shock of 1 standard deviation in error terms on the present and future values of internal variables that may be.

In the figure showing the cause –effect function, the dashed lines represent the reliability ranges. Horizontal axis shows the number of month passing after shock and vertical axis shows in what way and at which level the relevant variable gives reaction. In VAR analysis examined, cause- effect functions give information how the shock in Overnight Interest Rate (FA) affects the other variables in the system.

While cause -effect functions are formed, the variables are put in order from internal to external and the results obtained are shown in the graphs as follows.

In all period, interest rate give a reaction to the shock applied, in contrast to the expectations of exchange rate and inflation, increasing by 0.3% and 3%. This reaction, lasting short, after quarterly period, entered the tendency to decrease, but did not lose its significance.

Gündüz (2000), Öztürkler (2002) and Peker (2004) determined that inflation reacted by increasing to the shocks in interest rates. Öztürkler (2002) interpreted the shocks in interest rates in the way that they caused cost inflation by affecting the debts of the producers quite rapidly (Kasapoğlu, 2007: 61 ).

Telatar and Telatar (2001) claim that the increase in interest rates in Turkey caused the increase in the incomes of the owners of bond and deposit and led to “demand -pulled” price increase. However, it is considered that interpreting this case will be more suitable in such a way that central bank intervene in the pressure forming on the exchange rate due to speculative reasons or the rise in inflation expectations and lead indicators by raising the interest rates, despite this, that inflation continues to rise up. Also for the reaction of exchange rates on monetary shocks, the same situation is under consideration. Kalkan et al., (1997) explained this situation in similar way (Kasapoğlu, 2007: 61).

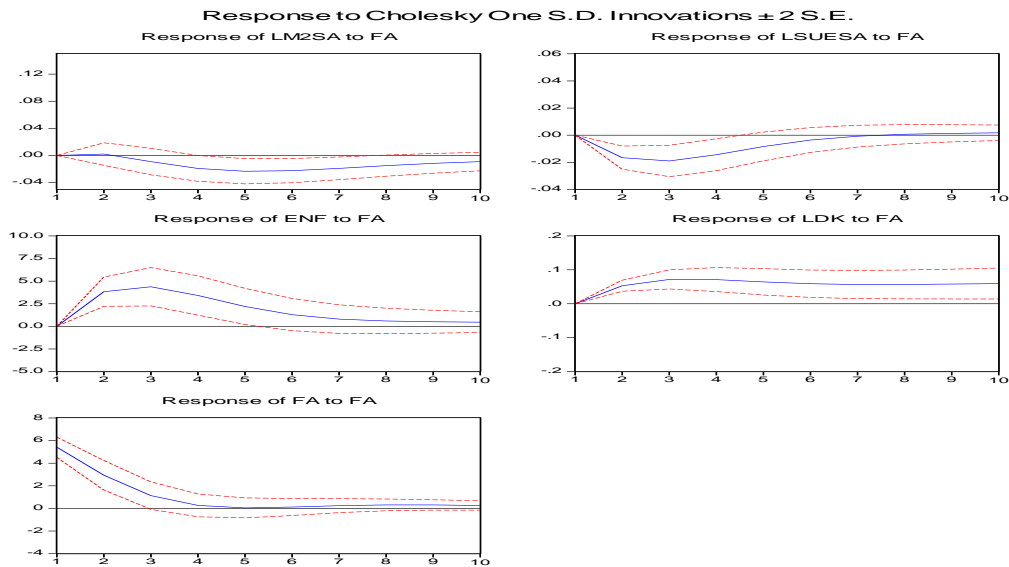


Figure 5.6. Impulse Response Function Results

Industrial production index reacted by falling to the increase in interest rate. In 2<sup>nd</sup> quarter, even though the effect of fall moderated, after 3<sup>rd</sup> Period, reached it's the lowest level. The fall of index lost its effect after this month and lost its significance after 7<sup>th</sup> period. The increase in interest rate increases the cost of both credit and alternative financing instruments. In this case, for firms, producing loses its attractiveness and production index falls.

In all period, the reaction of monetary supply rate to the shock applied to interest rate became by decreasing in the frame of expectations and in the quality supporting the results of the earlier study by Runkle (1987). Monetary supply is not significant until the end of 2<sup>nd</sup> Period. In 5<sup>th</sup> period, the fall lowered to the level of 0.3%, reaching the highest level.

### 5.5. Results of Variance Decomposition Analysis

Variance decomposition analysis indicates which variable is the variable being effective on a variable in the system, in other words, refers to the dissociation of the variable source and shows the fluctuations the occurring shock caused. Variance decomposition analysis also gives opinion about the degree of causality relationship between the variables.

In model, in the process of variance decomposition analysis, the variables were used regarding to the ordering of LM2SA, LSUESA, ENF, LDK, FA. Variance decomposition analysis is obtained in the time slice of 10 periods. According to this, the power to describe of all variables the variations in their own variances was found high. Variance decomposition is realized in the frame of analysis of model and expressed as follows.

**Table 5.7. Results of Variance Decomposition Analysis (%)**

<i>LM2SA VARIANCE DECOMPOSITION</i>					
<i>Period</i>	<i>LM2SA</i>	<i>LSUESA</i>	<i>ENF</i>	<i>LDK</i>	<i>FA</i>
<i>1</i>	100.0000	0.000000	0.000000	0.000000	0.000000
<i>2</i>	96.68480	0.386821	2.887087	0.003127	0.038165
<i>3</i>	90.44715	1.448988	7.419878	0.072196	0.611789
<i>4</i>	83.42037	2.578513	11.00918	0.286289	2.705641
<i>5</i>	77.87616	3.321263	13.03633	0.504093	5.262147
<i>6</i>	74.39177	3.686929	14.04061	0.628782	7.251913
<i>7</i>	72.46964	3.836382	14.56155	0.667207	8.465224
<i>8</i>	71.45368	3.892843	14.88303	0.661688	9.108766
<i>9</i>	70.88745	3.918838	15.11936	0.645272	9.429088
<i>10</i>	70.53091	3.939404	15.30706	0.634063	9.588567

In this period, all of variation in the variance of monetary supply are resulted from it itself. This rate becomes 77.87% when reached at the end of 5<sup>th</sup> month, while at the end of 10<sup>th</sup> month, it is 70.53%. At the end of 10<sup>th</sup> month, 3.9% of the variations in (M2) variance is accounted for by production index, 15.30% by inflation, 0,63% by exchange rate, and 9.58% by interest rates.

**Table 5.8. Results of Variance Decomposition Analysis(%)**

<i>LSUESA VARIANCE DECOMPOSITION</i>					
<i>Period</i>	<i>LM2SA</i>	<i>LSUESA</i>	<i>ENF</i>	<i>LDK</i>	<i>FA</i>
<i>1</i>	1.313086	98.68691	0.000000	0.000000	0.000000
<i>2</i>	1.610980	89.60564	0.005455	0.677880	8.100046
<i>3</i>	1.281054	83.74162	0.143979	0.959708	13.87364
<i>4</i>	1.155444	81.23915	0.576742	0.925914	16.10275
<i>5</i>	1.229883	80.35463	1.099572	0.878728	16.43718
<i>6</i>	1.308019	80.00818	1.520572	0.969070	16.19416
<i>7</i>	1.317970	79.76763	1.798505	1.195112	15.92079
<i>8</i>	1.300792	79.49864	1.977493	1.502786	15.72028
<i>9</i>	1.312124	79.15543	2.108972	1.850386	15.57309
<i>10</i>	1.379648	78.71617	2.227107	2.219358	15.45771

In the first period, 98.68% of the variation in variance of industrial production index is resulted from it itself. This rate becomes 80.35 % when reached the end of 5<sup>th</sup> month and 78.71 at the end of 10<sup>th</sup> month. At the end of 10<sup>th</sup> month, 1.37% of the variations occurring in industrial production index is accounted for by monetary supply (M2), 2.22%by inflation, 2.21 % by exchange rate, and 15.45% by interest rate. With moving from here, between industrial production index and interest rate, the conclusion that there was a relationship significant and opposite directional was posed.

**Table 5.9. Results of Variance Decomposition Analysis (%)**

<i>ENF VARIANCE DECOMPOSITION</i>					
<i>Period</i>	<i>LM2SA</i>	<i>LSUESA</i>	<i>ENF</i>	<i>LDK</i>	<i>FA</i>
<i>1</i>	2.408140	1.343751	96.24811	0.000000	0.000000
<i>2</i>	2.264744	2.848837	80.57020	1.418694	12.89753
<i>3</i>	3.805436	2.909355	69.30863	2.201440	21.77514
<i>4</i>	6.536152	2.640475	63.36181	2.344898	25.11666
<i>5</i>	9.450187	2.439771	60.24759	2.252719	25.60973
<i>6</i>	11.77281	2.325915	58.54112	2.149232	25.21092
<i>7</i>	13.31497	2.254757	57.60596	2.088897	24.73541
<i>8</i>	14.24005	2.209654	57.10525	2.062550	24.38250
<i>9</i>	14.77283	2.187470	56.82814	2.056677	24.15489
<i>10</i>	15.07910	2.183134	56.65689	2.065529	24.01534

In the first period, 96.24% of variation in inflation variance is resulted from it itself. This rate becomes 60.24% when reached at the end of 5<sup>th</sup> month and at the end of 10<sup>th</sup> month 56.65% and these rates are accounted for by them themselves. With moving from here, one –directional causality relationship is determined from the inflation rate to ENF.

**Table 5.10. Results of Variance Decomposition Analysis (%)**

<i>LDK VARIANCE Decomposition</i>					
<i>Period</i>	<i>LM2SA</i>	<i>LSUESA</i>	<i>ENF</i>	<i>LDK</i>	<i>FA</i>
<i>1</i>	1.309813	4.283518	17.05866	77.34801	0.000000
<i>2</i>	1.778784	3.468178	13.55792	63.90982	17.28530
<i>3</i>	4.375685	2.211316	10.89240	56.75667	25.76393
<i>4</i>	8.274729	1.481142	9.523233	52.52037	28.20053
<i>5</i>	12.44425	1.190088	9.011066	49.35446	28.00013
<i>6</i>	16.15423	1.115028	9.080694	46.69170	26.95835
<i>7</i>	19.13915	1.105473	9.530658	44.36928	25.85544
<i>8</i>	21.44295	1.099904	10.18261	42.32113	24.95341
<i>9</i>	23.22510	1.085263	10.89679	40.50631	24.28654
<i>10</i>	24.64506	1.064335	11.58841	38.89542	23.80678

In the first period, the part of 77.34 % of the variation in exchange rate variance is resulted from itself. This rate, decreasing by 49.35% when reached, and by 38.89 at the end of 10<sup>th</sup> month, is accounted for by itself. 23.80 % of it is explained for by the variable interest rate. Again at the end of 10<sup>th</sup> period, 1,06 of it is accounted for by industrial production, in the same period 11,58% by inflation rate. Again, 24,64% of exchange rate variance dissociation is accounted for by the variable of monetary supply (M2) in the same period.

**Table 5.11. Results of Variance Decomposition Analysis (%)**

<i>FA VARIANCE DECOMPOSITION</i>					
<i>Period</i>	<i>LM2SA</i>	<i>LSUESA</i>	<i>ENF</i>	<i>LDK</i>	<i>FA</i>
<i>1</i>	0.182080	11.96058	2.878575	10.14446	74.83430
<i>2</i>	4.281678	10.37561	2.189965	9.653450	73.49930
<i>3</i>	9.181557	9.625112	2.043213	9.087058	70.06306
<i>4</i>	12.51028	9.259848	1.977035	8.741444	67.51139
<i>5</i>	14.22038	9.069726	2.098020	8.561092	66.05078
<i>6</i>	15.00818	8.993000	2.392344	8.446598	65.15988
<i>7</i>	15.37715	8.979844	2.716595	8.357833	64.56858
<i>8</i>	15.57812	8.987169	2.971420	8.287168	64.17613
<i>9</i>	15.71576	8.994764	3.139576	8.234335	63.91556
<i>10</i>	15.82261	8.999266	3.242485	8.199292	63.73635

In the first period, 74.83 of variance in the variable interest is resulted from it itself. When regarded to the 5<sup>th</sup> period, while it is accounted for by 66.05 %, at the end of 10<sup>th</sup> period, a part of 63.73% is accounted for by itself. Again, at the end of 10<sup>th</sup> period, monetary supply account for the interest rate in the rate of 15.82%.

### CONCLUSION

In this study, the relationship between finance sector and real sector and the effectiveness of monetary transmission mechanism, one of the most important elements of the interaction between these sectors, are analyzed. For this purpose the data belonging to period between 1990 and 2008 is used. The effectiveness of monetary transmission mechanism by means of VAR model and the information and data in the studies already carried out were updated by using the different methods.

In the analysis, industrial production index is used as the indicator of real sector, consumer price index to represent the prices, and overnight interest rate as the indicator of policy and real exchange rate index are also included in the analysis. Overnight interest rate is used in the analysis of usefulness of interest channel, and real exchange rate index to test the exchange rate channel. We analyze the interaction via VAR method and we obtain impulse response and variance decomposition results.

It is impossible to completely determine the efficiency of monetary transmission mechanisms those are complex in both theory and practice. Also, there is no consensus among economists and policy makers about the existence of monetary transmission mechanisms. The views about the run of monetary transmission mechanism are embodied in the literature under the Keynesian and Monetary approaches. While Keynesian approaches argue that monetary transmission functions via interest rates channel, Monetarist economists claim that the variation in the prices of the other assets played role in transmitting monetary shocks.

It is not impossible to distinct with the exact lines through which channels are effective in transmission of the effects of monetary policies on the prices and real activities are realized. However, these channels are examined in the literature under three headings as the channel of traditional interest rate, channel of the other asset prices, and credit channel.

According to the empirical findings obtained in the study, there are two long termed relationships between the variables according to the result of both trace statistic and value statistic. That is, it is concluded that in long term, two variables acted together. In impulse-response analysis, exchange rate and inflation react by increasing to the shock applied to the interest rates; and that central bank intervene by raising the interest rates to the pressure formed on the exchange rates due to

speculative reasons were interpreted in such a way that in spite of this intervention, the increase in the exchange rate and inflation continue more a little time.

In variance decomposition related to industrial production index, the conclusions were reached in the supporting way the impulse response analysis. Therefore, it reveals the conclusion that monetary policy can be as a pre-indicator for its effects on real sector.

In the variance of monetary supply, at the end of 10<sup>th</sup> month, it becomes 70.53% of it. At the end of 10<sup>th</sup> month, 3.9% of variations in the monetary supply by industrial production index, 15.30% by inflation 0.63% by exchange rate, and 9.58% by interest rate. This rate in industrial production index, when reached at the end of 5<sup>th</sup> month, becomes 80.35%, and 78.71% at the end of 10<sup>th</sup> month. With moving from here, it was presented that the conclusion thee was an important and opposite directional relationship between industrial production index and interest rate.

In the first period, a part of 71.34 of the variation in the exchange rate variance is because of its own shock. This rate, decreasing by 49.35 % when reached at the end of 5<sup>th</sup> month, and 38.89 when reached at the end of 10<sup>th</sup> month, was accounted for by itself. Again at the end of 10<sup>th</sup> period, 1.06 of it is accounted for by industrial production index, and in the same period, 11.58% by inflation rate. Again 24.64 % of exchange rare variance dissociation is accounted for by the variable of monetary supply in the same period. In the first period, 74.83% of variance in interest variation is resulted from it itself. When regarding to the 5<sup>th</sup> period, while it is accounted for in the rate of 66.35%, at the end of 10<sup>th</sup> period, a part of 63.73 % is accounted for by itself. That is, monetary supply the interest at the end of 10<sup>th</sup> period in the rate of 15.82%.

Even though the results of application give the findings in the way that monetary transmission channels runs, it is rather difficult to make a general implication that some channels effectively run. For, not considering the difference in reaching alternative financial resources and the reactions of sectors can modify the interpretation of sectors. For the future studies it is suggested that the effects of monetary policy might be analyzed by employing sub sectors to better understand how it passes through into real sector.

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