The External Finance Premium and the Financial Accelerator: The Case of Turkey

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Abstract

The monetary transmission mechanisms have influence on saving and investment decisions of firms and households by affecting their balance sheets. This study examines the effects of monetary policy through the balance sheet channel (also known as 'financial accelerator'), which affects net worth, liquidity and spending of firms and households through external finance premium. The aim of this study is to analyze the effect of monetary contraction which raised the external finance premium and thus the effect of the increase in the external finance premium which diminishes output for Turkey over the period of 2003:01-2010:08 by using VAR (vector autoregressive models), impulse-response analysis and forecast error variance decomposition. The results indicate that contractionary monetary policy shock, which led to increased external finance premium, negatively affected the manufacturing sector and decreased total output. In other words, the monetary shock negatively affected firms' balance sheets in the short-run.

Keywords: Financial Accelerator, External Finance Premium, Turkey

JEL Classification: E52, C32, E44

1. Introduction

In recent years, many developed and developing countries have been implementing various instruments of fiscal and monetary policies to achieve macroeconomic goals such as development, redistribution of income, growth, employment creation, and financial stabilization (Georgantopoulos and Tsamis, 2012). Monetary policy is regulated as a set of decisions by the central bank. It affects the amount of money, the costs, and the expectations of households and firms to achieve ultimate goals. The central bank as an implementing agency of monetary policy, monitors operational and/or intermediate targets by using indirect monetary tools, such as required reserve, discount rate, open market operations. Moreover, it manages the expectations of aggregate demand, aggregate output,

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and inflation through the monetary channels towards these goals. In this framework, the monetary transmission mechanism can be viewed as a way of affecting the spending, saving, and investment decision making of firms and households through the central bank's transmission channels.

Despite concurrence among economists regarding the direct and indirect effects of monetary policy implementation on the real economy, changes in theoretical approaches over time have led to a lack of consensus about which transmission mechanism is more efficient when affecting real variables.

The classifications of the monetary transmission mechanism have generally been accepted as the traditional interest rate channel, the credit channel, and the other asset price channel. However, in recent years, the expectations channel has also gained usage within these classifications. Although the monetary transmission channel is comprised of these various channels, it is mainly based on two main channels: "the money channel" and "the credit channel".

Within this scope, the main aim of this study is to analyze the balance sheet channel, which is one of the three basic non-neoclassical credit channels: (i) effects on credit supply from government interventions in credit markets, (ii) the bank-based channels (bank lending channel and bank capital channel) and (iii) the "balance-sheet channel". In particular, this study will focus on the effect of a contractionary monetary policy in Turkey on the balance sheet channel, also known as 'financial accelerator' and external premium, which is caused by a change in total output and general price level. For this purpose, VAR (vector auto-regression models) method will be utilized to analyze the period of 2003:01-2010:08. To the best of our knowledge, there have been a limited number of studies that analyze the monetary transmission mechanism credit view in Turkey. Moreover, these studies have generally focused on the presence of the bank lending channel in the Turkish economy. In this context, apart from other studies, the main contribution of this study to the literature is to analyze the monetary transmission mechanism 'balance sheet channel' (financial accelerator) for Turkey.

We start our analysis by reviewing the credit channel (credit view) and its sub-titles; effects on credit supply from government interventions in credit markets, the bank-based channel and the balance sheet channel. Section three includes a summary of the empirical work on the balance-sheet channel, where few studies have conducted analyses for Turkey. Section four describes the empirical work, where the VAR method was utilized to analyze the effectiveness of the balance-sheet channel in Turkey. Section 5 presents the Conclusion of the study.

2. Non-neoclassical Channels: The Credit View

Monetary transmission can be categorized into two basic types: neoclassical channels, in which financial markets are perfect and non-neoclassical channels that involve financial market imperfections (Boivin et al., 2010). Non-neoclassical transmission mechanism channels may emerge from government interference in markets or through imperfections

in private markets. In this context, asymmetric information or market segmentation leads to barriers in effectiveness of the functioning of financial markets. Non-neoclassical transmission mechanisms involving market imperfections in credit markets are referred to as a "credit view". The credit channel (credit view) is considered to be a set of factors that produces and extends the effects of the traditional interest rate channel. It is considered quite difficult to explain the response, magnitude, and timing of macroeconomic variables in relation to monetary shocks only through the traditional interest rate channel. Therefore, to eliminate these difficulties in the use of the credit channel is considered.

According to the credit channel, as a result of the direct effects of monetary policy on interest rates, external finance premium also changes. Increases in external finance premium also increase credit market disruptions. This additional effect on the external finance premium increases the impact of monetary policy on the cost of borrowing (as a result of the effects on real expenditure and activities) (Bernanke and Gertler, 1995).

In this context, there are three basic non-neoclassical credit channels: effects on credit supply from government interventions in credit markets, the bank-based channels, and the balance-sheet channel (Mishkin, 1995; Boivin et al*.,* 2010).

2.1 Effects on Credit Supply from Government Interventions in Credit Markets

In order to achieve policy objectives (redistribution or stimulation of investment), free functioning of credit markets is often inhibited by governments. Especially in the USA, government intervention has been important in financing housing, such as through mortgage credits. Until the 1980's, thrift institutions (savings and loan associations) were the primary issuers of residential mortgages. These thrift institutions primarily made long-term, fixed-rate mortgage loans in their local areas, using funds provided by local time deposits. Under the scope of this process, the regulatory requirements that thrifts issue long-term mortgages and Regulation *Q* ceilings led to an important channel of monetary transmission involving credit supply. There were two effects that led to a decline in the supply of credit to the mortgage market when the Federal Reserve tightened policy (raised interest rates). This process operates as follows (Boivin et al*.,* 2010):

$$i \Rightarrow \textit{cost of funds for the thrifts} \Rightarrow \textit{income from fixed rate mortgages} \downarrow \Rightarrow \textit{net interest income} \downarrow \Rightarrow \textit{willingness to issue mortgages} \downarrow \Rightarrow \textit{credit supply} \downarrow \quad (1)$$

Secondly;

$$i \Rightarrow \textit{rates} > \textit{deposit rate ceilings} \Rightarrow \textit{depositors withdraw their funds from thrifts and commercial banks and put into higher yielding securities (this process is called disintermediation)} \Rightarrow \textit{mortgage credit} \downarrow \Rightarrow \textit{residential contraction activity} \downarrow \quad (2)$$

On the other hand, the central banks' effect on the external finance premium is described with two connections. One of them is the bank-based channel, which is also known as the narrow bank lending channel. The bank-based channel focuses on the

possible effects of monetary implementations on a deposit banks' loan supply. The second connection is the broad credit channel. The broad credit channel is also referred to as the balance sheet channel or financial accelerator. The balance sheet channel intimates the effects of changes in monetary policies on debtors' balance sheets and income statements (Cecchetti, 1995; Neyer, 2007; Bernanke and Gertler, 1995).

2.2 Bank - Based Channels

There are two bank-based transmission channels. Due to the imperfect substitution of bank loans, banks play a significant role in the transmission process of both channels.

2.2.1 Traditional Bank Lending Channel

Banks play a key role in transformation of savings into investments and through attracting savings they ensure the economic growth of the country (Bairamli and Kostoglou, 2010). According to the bank lending channel, banks play an effective role in the financial system because of their special tools to solve asymmetric information[1] problems in credit markets. Because of banks' special role in the financial markets, certain borrowers (generally bank-dependent small-sized firms) can access credit markets through banks. It is worth mentioning that an important implication of the bank lending channel is that monetary policy will have a greater effect on expenditure by smaller firms. In this context, due to large firms receiving funds not only through banks but also directly through stock and bond markets, small firms are more dependent on bank loans than large firms (Boivin et al., 2010).

Under the assumption of non-substitutability of retail bank deposits with other sources of funds, the process of the bank lending channel is as follows. Contractionary monetary policy affects markets negatively through credit channels -or- the credit channel. Implementation of contractionary monetary policy leads to a decrease in bank deposits, which subsequently precipitates a decrease in bank loans. Contraction in the quantity of loans supply also decrease total output. This process operates as follows (Mishkin, 1996):

$$M \downarrow \Rightarrow \textit{bank deposits} \downarrow \Rightarrow \textit{bank loans} \downarrow \Rightarrow I \downarrow \Rightarrow Y \downarrow \tag{3}$$

2.2.2 Bank Capital Channel

The bank capital channel is another bank channel, according to which, the state of the balance sheets for banks and other financial intermediaries has an important impact on

[1] Generally, there are two asymmetric information problems in the credit markets: adverse selection and moral hazard. Adverse selection occurs as a result of lack of information through inadequate investigation by lenders of the borrowers before signing a loan contract. Conversely, moral hazard occurs when lenders cannot determine whether borrowers use credit within the stated purpose in the loan contract after the credit assignment.

lending. A drop in asset prices can lead to losses in a bank's loan portfolio, or alternatively, a drop in credit quality may also decrease the value of bank assets. This may result from a reluctance of borrowers to pay back their loans. Losses of bank assets can generate diminution of bank capital. The shortage of bank capital can also lead to a cutback in the supply of bank credit. As a result of this process, bank-dependent borrowers are no longer able to access credit, forcing them to reduce consumption and ultimately aggregate demand will fall. On the other hand, in the bank capital channel, expansionary monetary policy boosts bank capital and then lending, therefore aggregate demand will increase through more spending of bank-dependent borrowers (Boivin et al., 2010).

2.3 Balance Sheet Channel

The balance sheet channel, also known as the 'financial accelerator' or broad credit channel, highlights the relationships of net worth, liquidity and spending of firms and households (Hubbard, 2008). In this context, the net worth and liquidity of firms and households determines their credibility. The effects of monetary policy in the balance sheet channel are assessed in terms of firms and households (Bernanke and Gertler, 1995; Gertler and Gilschrist, 1994; Gallegati, 2005; Boivin et al., 2010).

2.3.1 The Effects of Firms' Balance Sheet

Similar to the bank lending channel, the balance sheet channel also arises from the presence of asymmetric information problems in credit markets. As a result of implementation of contractionary monetary policy *(M),* stock prices fall *(Pe)* and when firms' net worth falls, they will be able to find less amount of loan in the credit market.

When a firm's net worth falls, adverse selection and moral hazard problems increase in credit markets. Lower net worth indicates that the lender can require less collateral. This suggests that the possible losses that arise from adverse selection can be higher. Thereby, the available volume of credit to finance investment spending will decrease. Moreover, a reduction in the value of a firm's shares increases the probability of the firm entering risky investment projects, thereby reducing the probability of debt payment while also increasing the moral hazard problem. As a result, a reduction in firms' net worth increases adverse selection and moral hazard, thus banks tend towards credit rationing, which leads to a contraction in the supply of loan contracts. A contraction of loan supply decreases investment spending and total output. This process operates as follows:

$$M \downarrow \Rightarrow Pe \downarrow \Rightarrow \textit{adverse selection} \uparrow \Rightarrow \textit{moral hazard} \uparrow \Rightarrow \textit{loans} \downarrow \Rightarrow I \downarrow \Rightarrow Y \downarrow \qquad (4)$$

In sum, contractionary monetary policy (increase in interest rates) which is also defined as the 'direct effect' of monetary policy to financial position of firms', leads to a decrease in firms' net worth, thereby rendering a decrease in the worth of collateral. The drop of a firm's net worth negatively affects debtor credibility (Bernanke and Gertler,

1995; Mishkin, 1995; Holtemöller, 2002; Hubbard, 2008). These internal fluctuations in the debtors' balance sheet gradually expand and broaden, causing conjectural fluctuations (Bernanke and Gertler, 1995). In other words, smaller shocks gradually increase and transform into major shocks, which adversely affect the economy. Because of this process, the balance sheet is called a 'financial accelerator' (Fender, 2000). Many empirical studies also indicate that these fluctuations affect firms' fixed investments, inventories, and other decisions regarding factor demands (balance sheets and cash flows).

Another way that monetary policy affects firms' balance sheets is through "cash flow". Cash flow is defined as the difference between a firm's cash receipts and cash expenditures. The most important feature of the cash flow channel is the short-term nominal interest rate which affects cash flow. Therefore, interest payments on short term debt affect cash flow (rather than long term debts). Apart from the traditional interest rate channel, which advocates investment spending affected by the real interest rate rather than nominal interest rates, the concept of interest in this process is the nominal interest rate (Mishkin, 1996). In the cash flow channel, a firm's net cash flow and collateral value are indirectly affected by monetary tightening. The schematic process operates as follows:

$$M\downarrow \Rightarrow i \uparrow \Rightarrow \textit{cash flow} \downarrow \Rightarrow \textit{adverse selection} \uparrow \textit{and moral hazard} \uparrow \Rightarrow \textit{loans} \downarrow \Rightarrow I \downarrow \Rightarrow Y \downarrow \quad (5)$$

Due to a firm's inability to adapt their short term fixed or semi-fixed (wages and interest payments) costs to contractionary monetary policy (increase in interest rates), which leads to a reduction in consumption spending, the firms' income level decreases. This leads to a gradual increase in financial deficit. In order to cope with the cash shortage, firms tend towards short-term borrowing, leading to increases in short-term interest payments. This eventually causes a decrease in a firm's net worth and credibility (Bernanke and Gertler, 1995). This drop generates an increase in external finance premium.

Under the assumption of non-substitutability of external finance and internal finance, the extent of the external finance premium is determined by a borrower's net worth (Oliner and Rudebusch, 1996). A borrower's net worth is comprised of liquid assets and marketable collateral. The interest debate between borrowers and banks will decline when debtors possess a strong financial structure (high net worth). High net worth for debtors means that these debtors have opportunities to invest by using their own possibilities (such as issuing securities and through banks), therefore, increasing the bargaining of loan interest between debtors and banks. If a borrower's net worth is not high, external finance premium increases.

As a result, tight (contractionary) monetary policy causes asymmetric information problems and alters the risk perception of banks. Banks may demand more marketable collateral from debtors because of a drop in cash flow of debtors and decreases in their wealth. Additionally, banks add uncontrollable and imponderable risks to external finance premium. Therefore, external finance becomes more costly compared to internal finance, with a gradually increasing gap (Fender, 2000). In this case, a bank's alteration of agreement

conditions causes debtors to seek alternative resources. Resource seeking also reveals the differences between small and large scale firms. This indicates a strong correlation between the scale of firms and external finance premium (Gertler and Gilchrist, 1994).

Contactionary monetary shocks affect small firms more than large firms (Gertler and Gilchrist, 1994; Fender, 2000; Oliner and Rudebusch, 1996)[2]. When banks increase premiums, large firms tend to seek financing through the bond market or other short-term fund resources. In this case, large firms can sustain their production and investment temporarily, despite income decreases (short term interest payments result in profit reduction). Consequently their stocks increase. However, small firms use their accumulated stocks in order to cope with cash shortages (Bernanke and Gertler, 1995) because they encounter high agency costs due to their worsening financial position, forcing them to access loans (Walsh, 1998). This situation obstructs the increase of small firms' short-term debts. As a result, small firms contract their production and decrease prices.

The balance sheet channel also affects firms through the unexpected price level channel. As debt payments are fixed in nominal terms by means of contracts, an unexpected increase in prices decreases a firm's liabilities in real terms and increases the real value of the firm's assets. Expansionary monetary policy creates an unexpected increase in the general price level, which leads to an increase in a firm's net worth, thus reducing adverse selection and moral hazard. This expands the supply of loans, and through the increase of investment spending, total output level and economic activity increase. This mechanism operates as follows:

$$M \Rightarrow \textit{unexpected } Pe \Rightarrow \textit{real net worth of assets} \Rightarrow \textit{adverse selection} \downarrow \textit{and moral hazard} \downarrow \Rightarrow \textit{loans} \Rightarrow I \Rightarrow Y \quad (6)$$

2.3.2 Effects of the Household Balance Sheet

The balance sheet channel pays particular attention to the effects of monetary implementations on a firm's balance sheet. However, the balance sheet channel also affects households. The balance sheet channel operates through consumer spending, especially durable consumer goods and housing expenditures. For example, due to contractionary monetary policy, a decrease in bank loans to those who do not have access to other credit channels, leads to a decrease in expenditures on durable consumer goods and housing.

Similarly, an increase in interest rates due to contractionary monetary policy negatively affects household liquidity, causing deterioration in the balance sheet structure. This situation is defined as the 'liquidity effect'. According to the liquidity effect, the effectiveness of the balance sheet on consumer spending is more than the lenders'

[2] According to Gertler and Gilchrist (1994), small firms are the enterprises which meet the funding needs through banks with low value collateral and high corporate risk and technology flexible structure. However large firms have adverse characteristics.

desire to provide credit. Durable consumer goods and houses are not liquid[3]because of an asymmetric information problem. A shock that reduces income leads to a decrease in consumers' liquidity and thus leads them to sell their durable consumer goods and houses due to their needs. In this case, consumers are concerned about not selling their assets at real worth and assuming a loss. In contrast, if consumers deposit their financial assets into more liquid assets (e.g. stocks and bonds), they can convert them easily to cash a market value. If consumers presume a financial bottleneck, they prefer to invest in more liquid assets than illiquid or low liquidity assets, such as durable consumer goods and houses.

The consumer balance sheet structure leads them to estimate the probability of a financial bottleneck (financial distress). If consumers hold more liquidity in terms of their debts, their financial bottleneck forecast will be lower. In this context, consumers tend to purchase greater amounts of durable consumer goods and houses (Mishkin, 1996; Gür, 1993). However, the contractionary monetary policy adversely affects the functioning of the mechanism. As a result of tight monetary policy, interest rates increase and the liquidity of assets (such as durable consumer goods and houses) and stock prices drop. Thereby, consumer cash flow contracts and the likelihood of encountering a financial bottleneck increases. Spending on durable consumer goods and houses decreases, and as a result, total demand decreases. The process of monetary contraction operates as follows:

$$M\downarrow \Rightarrow i \Rightarrow \textit{financial assets}\downarrow \Rightarrow \textit{probability of financial bottleneck} \Rightarrow \textit{durable consumer goods and housing expenditures}\downarrow \Rightarrow Y\downarrow \quad (7)$$

or,

$$M\downarrow \Rightarrow Pe\downarrow \Rightarrow \textit{financial assets}\downarrow \Rightarrow \textit{probability of financial bottleneck} \Rightarrow \textit{durable consumer goods and housing expenditures}\downarrow \Rightarrow Y\downarrow \quad (8)$$

Apart from these effects, the balance sheet channel also affects households through another way: An increase in housing prices leads to more potential collateral for the homeowner. This situation can also improve the amount and terms of credit available to these households. That is to say, higher housing prices can reduce the external finance premium or relax constraints on the quantity of credit available to a household. The importance of this process depends on how costly it is to withdraw housing equity and on the efficiency of mortgage markets that enable homeowners to overcome credit constraints. In this context, countries with better-developed mortgage markets can be more sensitive to increases in housing prices, as well as consumer spending (Boivin et al., 2010).

3. Recent Empirical Studies of Credit Channel

The monetary transmission mechanism credit channel, considering the modern outward-oriented financial system, has been a very complex process. It essentially operates

[3] Liquidity implies the conversion of assets into cash.

according to a country's financial structure and banking sector. For this reason, studies that have examined various countries can be differentiated in terms of interpretations and conclusions. Even in studies that have analyzed the same countries, interpretive differences arise from the use of different variables in explaining the mechanism. A few examples of international studies regarding credit channel and balance sheet channel are listed below.

The studies which analyzed the operation of the credit channel for various countries can be summarized as follows: Bernanke and Blinder (1992), Holtemöller (2003), Suzuki (2004), Hülsewig et al. (2006), Suzuki (2008), Lungu (2008). As regards to conclusion, Bernanke and Blinder (1992) revealed that the monetary transmission mechanism works with bank credits for the USA and the federal interest rate is also seen as an important indicator measuring monetary policy activity. Holtemöller (2003) and Hülsewig et al. (2006) found the effective operation of the credit channel in Germany. The results of Suzuki (2004) revealed that the importance of the bank lending channel in the monetary transmission mechanism and the effectiveness of the credit channel are decreasing for Australia. Another study of Suzuki (2008) analyzed the international credit view for Australia and New Zealand and the results revealed that the supply schedule of loans shifts left in New Zealand following a monetary tightening in Australia. By using seven variables, Lungu (2008) found mixed evidence for the bank lending channel in Botswana, Malawi, Namibia, and Zambia.

In regards to the balance sheet channel (broad credit channel) Oliner and Rudebusch (1996), Holtemöller (2002), de Bondt (2004), Angelopoulou and Gibson (2007), Hung and Pfau (2008) used the VAR model for different countries. Oliner and Rudebusch (1996) found that the effectiveness of balance sheet channel in small firms is higher than large firms in the USA. Holtemöller (2002) analyzed the bank-based channel and the balance sheet channel in Germany and found the effectiveness and relevance of a credit channel, and also found empirical support for the operation of the balance sheet channel. The results of de Bondt (2004) revealed that a small rate of change in loan interest rates can create a large-scale effect on the real economy through the external finance premium for the Euro region. Angelopoulou and Gibson (2007) found that the UK firms demonstrated greater investment sensitivity to cash flow during periods of tight monetary policy. Hung and Pfau (2008) found that the credit and exchange rate channels are more important than the interest rate channel, and rather than the balance sheet channel, the bank lending channel is operating in Vietnam.

Studies of monetary transmission mechanisms in Turkey are generally focused on the traditional interest rate channel and the exchange rate channel. However, a few studies have analyzed the credit channel and, instead of the balance sheet channel they placed particular emphasis on the bank lending channel such as Çavuşoğlu (2002), Gür (2003), Öztürkler and Çermikli (2007), Aktaş and Taş (2007), Ziaei (2009), Örnek (2009) and Erdoğan and Beşballı (2009). In this context, the studies focused on the bank lending channel by using the VAR model under the credit channel for Turkey, are discussed below.

The results of Çavuşoğlu (2002) indicate that bank lending behavior is influenced significantly by bank-specific factors, such as the balance sheet strength and the quality of

the asset portfolio, and by debt sales to the banking system. While Gür (2003) and Erdoğan and Beşballı (2009) found a favorable structure for this mechanism to operate, Gür (2003) pointed out the two important obstacles constraining the operation of the credit channel and Erdoğan and Beşballı (2009) mention the partial operation of this channel in Turkey. For the period of 1990-2006 Öztürkler and Çermikli (2007) found a unilateral relationship from monetary policy shocks to real credit, and a two-way relationship between real credit and industrial production. Aktaş and Taş (2007) found evidence that the bank lending channel of the monetary policy transmission mechanism is operating through the capital adequacy of Turkish banks. Utilizing Johanson cointegration and dynamic ordinary least square tests, Ziaei (2009) found that bank lending channel is likely to be an effective monetary transmission mechanism in Middle East and North Africa (MENA) countries which included Turkey. For the period of 1990-2006, Örnek (2009) found that the traditional interest rate and exchange rate channels seem to be effective in Turkey, yet no statistically significant results were found regarding the existence of equity price and bank credit channels.

4. Empirical Analysis

4.1 Method and Data Selection

In this study, the balance sheet channel of monetary transmission was tested for Turkey during the period of 2003:01-2010:08, by using the VAR method. Greene (1993) made the case that the VAR model is the more suitable and effective than other structural models to investigate the dynamic relationship between variables. According to Sims (1980), if there is a simultaneous relationship between the variables used in the economic model, all of the variables used in the model should be considered to be endogenous. This means that each equation's reduced form will consist of the same set of explanatory variables. Therefore, the researcher is not concerned with whether the variables included in the model are endogenous (internal) or exogenous (external) and this facilitates prediction (Asteriou and Hall, 2007).

In this study, the articles of Holtemöller (2003, 2002) were taken into consideration in the selection of variables. The primary aspect of the balance sheet channel is: Contractionary monetary policy that generates an increase in external finance premium leads to a decrease in the borrowing power of firms and households and thereby decreases total output. In this context, these effects are questioned with five variables by using an unrestricted VAR model.

In this framework, the hypothesis analyzed can be written as follows:

H_1: Monetary contraction raises the external finance premium.

H_2: Increased external finance premium diminishes output level.

In this model, money, goods, and credit markets are in interaction with each other. Hereunder, the variables used in the model are:

(i) to represent total output level of the good market (seasonally adjusted industrial production index (2005=100) was used, (ii) to represent the money market, broad money supply, (*M3* money supply) was used and (iii) to represent openness of the Turkish economy, the real effective exchange rate was used. The general price level was measured with the consumer price index (2005=100). In the analysis the broad money variable was used instead of short-term interest rate because as stated in monthly bulletin of ECB (2011:63-64), *"The volume of broad money in the economy is the result of the interaction of the banking sector (including the central bank) with the money holding sector, consisting of households, nonfinancial corporations, the general government other than central government, as well as non-monetary financial intermediaries. Broad money comprises currency in circulation and close substitutes, such as bank deposits, and is informative for aggregate spending and inflation"*. Moreover, Lebe and Bayat (2011) did not use overnight interest rate variable which is generally used to represent short-term interest rate. And they also added that money supply was an important variable to analyse the ultimate goal of the central bank of Turkey. In the study of Holtemöller (2003), the external finance premium (*efp*) was calculated by the method of Friedman and Kuttner (1992): the spread between the interest rate on loans and the yield on government bonds. De Bondt (1999) also used the same method in his study. Nonetheless, the external finance premium is calculated differently in many studies, yet it is generally calculated as the variation between corporate bonds and the yield on government bonds (Friedman and Kuttner, 1992; Boivin et al., 2010). However, it is known that corporate bonds are very few or almost non-existent in Turkey. According to the Istanbul Stock Exchange (ISE), only two firms issued corporate bonds in 2010, and there were no corporate bond issuances in 2011. For this reason, Holtemöller's calculation method of the external finance premium is more suitable for Turkey, in which the universal banking system is widespread. "*Following Holtemöller (2003), this spread is in general positive due to a risk premium and a liquidity premium. And also, these variables are not constant and presumably monetary policy can affect them"*.

Internal variables which were included in the VAR model are represented respectively: broad money *"rm3",* real effective exchange rate *"reer",* external finance premium *"efp",* consumer price index *"cpi"* and industrial production index *"ipi"*. The theoretical framework was taken into consideration in the ranking of the variables. *"rm3"* was deflated with *"cpi"* (2005 = 100). *"reer"* with a base year of 2003 was converted to a base year of 2005. The variables of *"reer"* and interest rates on loans were obtained from the Central Bank of the Republic of Turkey (CBRT), the yield on government bond (3 months) was supplied by ISE and the data set of other variables used in the model was provided by International Monetary Fund (IMF)-International Financial Statistics (IFS). The ordering of the variables was determined according to the monetary transmission mechanism theory.

In this framework, the VAR model, which was used to analyze the effects of financial accelerator on the real economy (total output) for Turkey, is as follows:

$$x_t = (rm3_t, reer_t, efp_t, ipi_t, cpi_t)$$

4.2 Preliminary Tests of VAR Model

Initially, all series should be processed for the VAR analysis. As a first step, in order to become variables independent from unit values (to arrive at the same level) logarithms of all variables were taken except *'efp'*. No seasonal effect was found for the variables after the analysis of seasonality.

As a second step, all variables were tested, whether stationary or not, because all variables are required to be stationary in VAR models. In this context, the Augmented Dickey-Fuller (ADF) test was implemented, which is a commonly used test found in the majority of analyses examined for our study. Initially, the stationarity of all variables were tested in their levels and variables were found to contain unit roots. After taking their first differences, it was found that all variables were stationary. This means that all variables in the model were stationary in their first difference *I(I),* as reported in Table 1.

Table 1: ADF unit root test results[4]

Variables	Level			1st differences			Result
	τ_μ	τ_τ	τ	τ_μ	τ_τ	τ	
Rm3	-1.368	-1.182	2.783	**-9.840(0)**	-9.911	-9.085	*I(I)*
reer	-2.111	-2.916	0.997	-7.726	-7.734	**-7.622(1)**	*I(I)*
efp	-0.944	-2.658	1.807	**-6.560(0)**	-6.578	-1.492	*I(I)*
cpi	-2.288	-1.068	3.101	**-6.897(2)**	-7.066	-3.689	*I(I)*
ipi	-1.802	-2.498	1.005	-4.034	-4.080	**-3.910(3)**	*I(I)*

Notes: Bold numbers indicate statistically significant series at 5%; parenthetical numbers indicate optimal lag length.

Before estimating a VAR model, it is essential to determine the optimal lag length of the model. To determine the optimal (appropriate) lag length, Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criteria (AIC) and Hannan-Quinn (HQ) were used. The results that were found according to these criteria are reported in Table 2. Table 2 provides the results of the optimal lag length for the model, respectively: LR, FPE, AIC and HQ "one"; SC "zero". Within the framework of these results, it was determined that the

[4] Statistics show that, $\Delta Y_t = \mu + \delta Y_{t-1} + \sum_{j=1}^{p} \delta_i \Delta Y_{t-j} + \varepsilon_\tau$ (τ_μ statistics with intercept), $\Delta Y_t = \mu + \beta t + \delta Y_{t-1} + \sum_{j=1}^{p} \delta_i \Delta Y_{t-j} + \varepsilon_\tau$ (τ_t statistics with trend and intercept) and $\Delta Y_t = \delta Y_{t-1} + \sum_{j=1}^{p} \delta_i \Delta Y_{t-j} + \varepsilon_\tau$ (τ statistics without trend and intercept (none)) respectively (Sevüktekin and Nargeleçekenler, 2007).

appropriate lag length of the model is one that is also supported by the LR, FPE, AIC and HQ tests.

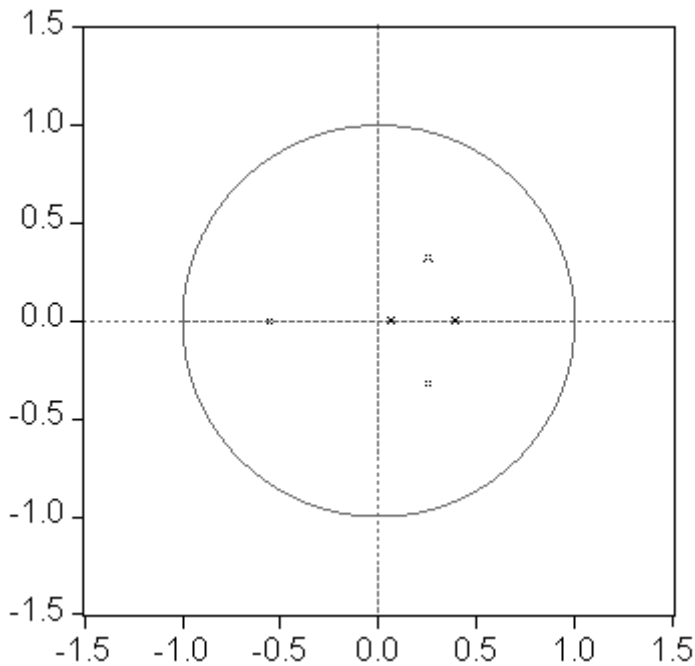
Table 2: VAR lag order selection criteria

Lag	LR	FPE	AIC	SC	HQ
0	NA	9.14E-13	-13.53126	**-13.38555***	-13.47272
1	**99.64227***	**4.58e-13***	**-14.22291***	-13.34863	**-13.87167***

Notes: Bold numbers and * symbols indicate the optimal lag lengths for the relevant tests.

Figure 1 reports that the inverse roots of AR characteristic polynomials lie within the unit circle. These findings indicate that there is no issue in terms of stability of the one-lag VAR model.

Figure 1: Inverse roots of the AR characteristic polynomial



The Lagrange Multiplier (LM) test was applied to the model's error term in order to determine whether there is an autocorrelation. Table 3 shows the results of autocorrelation. In this context, given that marginal significance level (probability) values are greater than 0.05 for the first lags, H_0 hypothesis that is based on the assumption of no autocorrelation

can not be rejected (i.e., H_0 accepted) for the LM test of the model (lag length is one). Finally, LM test results reveal that there is no autocorrelation in error terms.

Table 3: VAR residual serial correlation LM test

Lags	LM-Stat.	Prob.
1	28.672	0.278

The reliability of the model, with a determined lag length of one, was tested on the basis of 5% significance level with four diagnostic tests, respectively: Breusch-Godfrey Serial Correlation LM Test and Autoregressive Conditional Heteroskedasticity, ARCH LM, White Heteroskedasticity, and Ramsey Reset Tests. The results of these diagnostic tests were reported in Table 4. The findings reveal that the H_0 null hypothesis can not be rejected based on the following assumptions: no serial correlation in error terms, no ARCH structure, correct specification of the model, and variance of error terms are constant. In other words, the diagnostic test results confirmed the reliability of the model at the 0.05 significance level. The structural break in the model was tested by using the CUSUM Test and the results did not find any structural break in the time period.

Table 4: Model - diagnostic test results

Diagnostic Tests	*P-Values-*χ^2
Breusch-Godfrey Serial Correlation LM Test	0.877
ARCH Test	0.908
White Heteroskedasticity Test	0.864
Ramsey Reset Test	0.716

4.3 Variance Decomposition Results

The variance decomposition method was used to overcome the obstacles in the interpretation of the parameters in the VAR model and to determine the source of the changes that occurred in a variable.

From the optimal one-lag VAR model to the results of variance decomposition for twenty five periods, all variance in the fundamental source of variables was their own shock. The variance of the *'rm3'* and *'efp'* variables' secondary source averaged 2.83% and 20.37% with the *'reer'* variable, respectively. In the long and mid-term, the fundamental sources of change in the *'reer'* variable were its own shock. In addition, the secondary

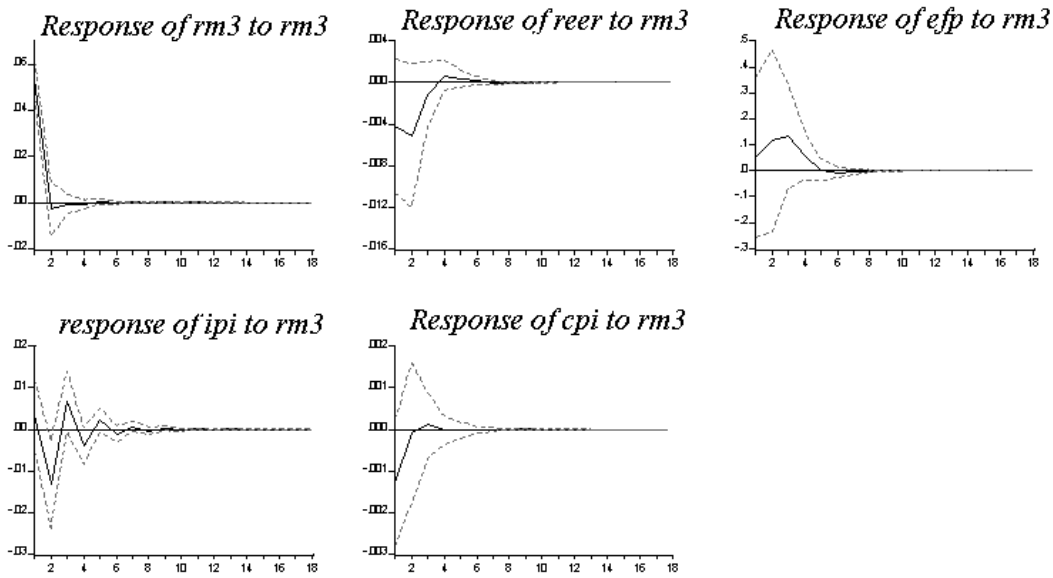
source was aggregated at 5.77% with *'efp'* and the third source was aggregated at 4.12% with '*rm3*'. In the relevant period, the sources of change in the *'ipi'* variable averaged 10.59% with the *'efp'* and *'rm3'* variables averaging 9.18%. As a result, it was determined that in the changes of the *'cpi'* variable, the effect of the *'efp'* variable was lower than the other variables. It can be argued that money supply is more efficient on the general price level than the total output, in the aforementioned time period. This is also supported by the results of the impulse-response function.

4.4 Impulse- Response Analysis

The response of other variables to one standard broad money shock, obtained for eighteen periods in one-lag VAR model, was reported in Figure 2. It is shown that the horizontal axis indicates the time period following the shocks as monthly and the vertical axis indicates a rational response of the variables of the model. In this analysis, the necessary confidence interval (± 2 SE) for the impulse-response functions was provided by using Monte Carlo simulations.

As shown in Figure 2, the response of the broad money to its own shock decreased from the beginning to the end of the second term. The response of the *'rm3'* variable indicates monetary contraction. A decrease in the broad money transforms domestic deposits into more productive investment instruments than foreign deposits. For this reason, foreign capital flow into the country increases. Therefore, increase in the amount of foreign currency in the country leads to a downward pressure on the exchange rate. In other words, the response of exchange to the increase of broad money diminished from starting period to the end of the third period. The *'reer'* variable response disappears after the third period. The response of the *'efp'* variable to a negative monetary shock is upward from the beginning to the end of third period. The effect of the shock on the *'efp'* variable disappears after the third period. The response of *'efp'* variable is also in line with the theory. After the monetary contraction, due to an increase caused by the *'efp'* variable, the *'ipi'* variable decreased 100 % from the beginning to the end of the second period and decreased to the level of -0.003. In other words, it can be said that the *'ipi'* variable is sensitive to changes in the *'efp'* variable. The response of the *'ipi'* variable is in line with the results of variance decomposition. However, it is found that the *'cpi'* variable is insensitive to the shocks originated from the *'rm3'* variable in the relevant period. It can be said that responses of the variables to the negative monetary shock disappear, on average, in the second period. In many studies, it is found that the effects of monetary shocks on variables last a short time in Turkey (Çiçek (2005); Öztürkler and Çermikli (2007); Demiralp (2007). In this context, it is necessary to examine the reasons of this situation in a further study.

Figure 2: Impulse-response results of VAR model



5. Conclusion

In this study, we tested the following hypotheses: (i) Monetary contraction raises the external finance premium; (ii) increased external finance premium diminishes output for the period of 2003:01 and 2010:08. The results suggest that restrictive monetary shock, which leads to an increase in external finance premium, affected the manufacturing sector negatively, thus decreasing total output. As the manufacturing industry is highly sensitive to bank loan rates in Turkey, they quickly respond to a rapid shock.

These results can be explained as follows: To achieve the ultimate goal, price stability, for the withdrawal of the money from market in a coordinated manner with the treasury, the central bank especially uses the open market operations as a tool. In this case, deposit into the bank account will decrease. During a negative shock, in Turkey, people prefer to invest in risk free Treasury bond. This process reduces the banks' willingness to lend and loan interest rates increase. Moreover, the rise of the rate of return on Treasury bill, which was used for calculating the external finance premium, also reveals the prevention from the decrease in the demand for this instrument. This stemmed from the budget deficit of the country. All these processes cause a decrease in the output level. To sum up, the empirical findings verified the examined hypotheses in this study. Contractionary monetary policy tends to increase refinancing costs. In other words, the external finance premium affected the output in the balance sheet channel negatively. However, these findings indicate that the balance sheet channel is not enough by itself to connect a link between the real economy

and money market and capital market. There is still a number of open-ended questions. For this reason, it will be useful the long-run relationships (cointegration vectors) between the considered variables to be identified in a further study.

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