

BANK LENDING CHANNEL IN TURKEY

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ABSTRACT

BANK LENDING CHANNEL in TURKEY

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This thesis analyses empirically the role of bank lending in monetary policy transmission on the basis of Turkish bank level data. First, the research addresses the theoretical framework of the bank lending channel, examines necessary conditions for its existence, and presents a simplified, but still explanatory theoretical model in the spirit of Kashyap and Stein's work empowered by Peek and Rosengren's assumptions. Second, attention is paid to the institutional features of Turkish financial system that make the bank lending channel (apart from traditional interest rate channel) a plausible candidate to explain the influence of the Turkish Central Bank's monetary policy on real sector. Third, the paper conducts an econometric analysis of whether bank lending channel in fact operates in Turkey. The main result suggests that there is a strong evidence supporting the operation of bank lending channel in Turkey, depending to the capital adequacy of the commercial banks, which is consistent with the bank lending channel hypothesis.

Keywords: Bank Lending Channel, Turkey.

ÖZET

TÜRKİYE'DE BANKA KREDİ KANALI

AKTAŞ, Cihan

Yüksek Lisans, Ekonomi Bölümü

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Bu tez, Türk bankacılık datasına dayanarak parasal aktarım mekanizmasında banka kredi kanalının rolünü analiz etmektedir. İlk olarak, banka kredi kanalının teorik çerçevesi ve varlığı için gerekli koşullar ele alınmış, Peek ve Rosengren'in varsayımları ile güçlendirilmiş, Kashyap ve Stein'in çalışmasının ruhuna uygun basit ama açıklayıcı bir teorik model sunulmuştur. İkinci olarak, banka kredi kanalının (geleneksel faiz kanalından ayrı olarak) Türkiye Cumhuriyet Merkez Bankası para politikasının reel sektör üzerindeki etkilerini açıklayan olası bir aday yapan Türk finansal sisteminin, kurumsal özelliklerine yoğunlaşmıştır. Üçüncü olarak, banka kredi kanalının çalışıp çalışmadığına dair ekonometrik bir analiz ortaya konmuştur. Ana sonuç, teorik hipotezlere uygun olarak, Türkiye'de, ticari bankaların sermaye yeterlilik rasyosuna bağlı, banka kredi kanalının çalıştığını gösteren güçlü kanıtların olduğudur.

Anahtar Kelimeler: Banka Kredi Kanalı, Türkiye.

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LIST of ACRONYMS

BAT	The Banks Association of Turkey
BRSA	Banking Regulation and Supervision Agency
CAR	Capital Adequacy Ratio
CBRT	Central Bank of the Republic of Turkey
EMU	European Monetary Union
FSR	Financial Stability Report
GDP	Gross Domestic Product
IMF	International Monetary Fund
SDIF	Savings Deposit Insurance Fund

CHAPTER 1

INTRODUCTION

The assessment of the monetary policy transmission is vital for understanding and foreseeing the effects of monetary conditions on the real economy. A comprehensive view about the monetary policy transmission necessitates extensive evidence on the reaction of each sector of the economy to policy changes.

As Bernanke and Gertler (1995) refer to it as a “black box”, there is considerable controversy over how exactly changes in the monetary policy are transmitted to and over the economy. The conventional view of monetary policy transmission, known as the “money view” or “interest rate view” is generally accepted. There is no doubt that this view, at least in the short run, can significantly influence the course of the real economy. However, since the recent empirical research has ascertained that monetary policy actions are followed by movements in real output that may last for two years or more (Bernanke and Gertler, 1995), we need to improve our understanding of the transmission mechanism in order to comprehend the links between the financial and real sectors of the economy.

Apart from the other asset price channels, an additional explanation for the transmission mechanism is provided by the credit channel theory. This channel points out that monetary policy may directly affect not only demand for loans as interest rate channel suggest, but also the supply of loans. More precisely, in addition to the impact on firms and households in the short-run, this channel states that monetary transmission is affected by the direct impact of monetary policy tightening (or easing) on financial intermediation (bank lending channel), and by the nature of the relationships between lenders and borrowers, especially in the presence of asymmetric information between them (broad credit channel). The relevance of a bank lending channel follows from the specific function of commercial banks as financial intermediaries, which is in contrast with their purely passive role in conventional interest rate view. Especially, for the developing countries where a significant portion of borrowers are bank-dependent, i.e. cannot switch to alternative sources of financing, the bank lending channel might have an important weight.

Within this framework, the empirical studies tried to answer whether there are important cross-sectional differences in the way that banks with varying characteristics respond to policy shocks. For this purpose, asset size, liquidity and capitalization of the banks were found to be important in assessing the impact of monetary policy on loan growth.

In this thesis, we provide empirical evidence on the effect of monetary policy changes on loan supply of Turkish banks (bank lending), using quarterly panel data based on 34 commercial banks' balance sheet, during the period of 2003:IV–2006:II.

Based on the results, we make inferences on the effectiveness of the interest rate channel and bank lending channel of monetary policy transmission.

Our results suggest that bank lending channel of monetary policy is operating through the capital adequacy of Turkish banks. Although banks' loan activity reacts to monetary policy i.e. interest rates, our results show that banks, that have capital adequacy rate above the average capital adequacy rate, respond more to monetary easing than the banks that have less than the average.

In our analysis, we adopt the model specification of generally applied approach suggested by Kashyap and Stein (1995) with the theoretical assumptions of Peek and Rosengren (1995), to capture the effectiveness of the lending channel for the recent period.

This research is organized as follows. Section 2 presents a short review of the literature on the theory of the monetary policy transmission mechanism, with an emphasis on the bank lending channel. Section 3 introduces the theoretical model and the next section introduces the empirical model. Section 5 describes the recent developments of the Turkish financial system, with an emphasis on the structure and specifics of the Turkish banking sector so as to convey those features which are likely to influence the transmission of monetary policy. Section 6 presents the data and the results of econometric estimations. Section 7 contains the concluding remarks.

CHAPTER 2

LITERATURE REVIEW

In economic literature, monetary transmission mechanism is identified as the mechanism that transforms monetary policy actions conducted by central bank into real economic activity. In other words, monetary transmission mechanism is a process through which monetary policy decisions are transmitted into changes in income and inflation (Taylor, 1995).

There is no doubt that monetary policy, at least in the short run, can significantly influence the course of the real economy. However, the recent empirical research has ascertained that monetary policy actions are followed by movements in real output that may last for two years or more (Bernanke and Gertler, 1995).

Therefore, understanding the transmission mechanism would definitely improve our understanding of the links between the financial and real sectors of the economy. Furthermore, having adequate information about the transmission mechanism might lead to a better choice of targets which would help policy makers infer movements in the financial sector.

The following part provides a brief overview of the major transmission channels in literature.

2.1 Traditional Interest Rate Channel

The traditional view (Keynesian Approach) on the transmission mechanism emphasize the changes in the monetary aggregate affecting the output via interest rate channel. According to this explanation, all agents in the economy hold only two assets: money (in the form of currency) and bonds (all the other financial assets). The mechanism can be characterized by using the following schematic diagram:

$$M \uparrow \Rightarrow r \downarrow \Rightarrow I \uparrow \Rightarrow Y \uparrow$$

The diagram states that the expansionary monetary policy leads to a rise in the amount of bank reserves and therefore to the expansion of deposits. Since money and bonds are the only assets in the economy, economic agents prefer to hold more money and fewer bonds. Short-term interest rates should fall so that the agents accept additional money holdings so as asset market to come to equilibrium. Fall in real interest rates decreases the cost of capital which also causes a rise in investment spending. Increased investment drives aggregate demand and then output up.

Although some economists believe that the interest rate channel is a strong transmission mechanism (Taylor (1995), lack of empirical support stimulated the

researchers to identify other transmission channels. Bernanke and Gertler (1995) identify two main mysteries concerning the conventional interest rate channel. First, empirical studies find expenditure components are insensitive to interest rates. Second, while the monetary policy have its strongest influence on short term interest rates, it is puzzling that monetary policy has large affects on long lived-assets which are responsive primarily to long term rates.

These shortfalls of conventional interest rate view stimulated a lot of research on the alternative transmission mechanisms. In order to classify the other mechanisms, we follow Mishkin (1996) who lists about nine such mechanisms that can be broadly divided into two categories: other asset price channels and credit channels.

2.2 Other Asset Price Channels

As mentioned above, traditional interest rate channel focuses on a single asset price (namely, bond price). However, recent literature identifies alternative channels of monetary transmission that incorporates into analysis the prices of other assets. Following Mishkin (1996), we will discuss two key assets besides bonds that receive substantial attention in the literature: foreign exchange and equities.

2.2.1 Exchange Rate Channel

Another channel through which monetary policy can affect GDP is through the impact on exchange rate which is also modeled in the IS-LM Model.

The basic idea as discussed by Mishkin (2001) is as follows: when the central bank increases the money supply, it lowers short-term nominal interest rates and thus lowers short-term real interest rates as well. Lower short-term real interest rates imply that dollar denominated assets are less attractive than foreign assets leading to a decrease in demand for dollars. The subsequent depreciation of the dollar makes domestic goods cheaper than foreign goods and leads to an increase in Net Exports, and therefore in GDP as well. The mechanism can be characterized by using the following schematic diagram:

$$M \uparrow \Rightarrow r \downarrow \Rightarrow E \uparrow \Rightarrow NX \uparrow \Rightarrow Y \uparrow$$

While the degree of the exchange rate channel depend on many circumstances (openness of the economy, elasticity of demand for exports and imports, etc), the change in the exchange rate affects the price competitiveness of the country thereby affecting net exports (Kuttner and Mosser, 2002).

It is also argued that this channel of monetary transmission can be particularly important for small open economies with flexible exchange rates. In the case of a fixed exchange rate the effectiveness of monetary policy is significantly reduced (Kamin et al., 1998).

2.2.2 Equity Price Channel (Tobin's q theory)

Mishkin(1996) emphasize two equity price channels: Tobin's q and wealth effects¹.

It is clear enough that there is a link between Tobin's q and investment spending. Expansionary monetary policy can lead to a higher Q. The reasons may be either because market interest rates are falling leaving people with less attractive alternatives or because they have more money to spend, therefore they buy more stocks. Higher stock prices leads to a higher Q and more investment. The mechanism can be characterized by using the following schematic diagram:

$$M \uparrow \Rightarrow \text{Equity Prices} \uparrow \Rightarrow \text{Q-ratio} \uparrow \Rightarrow \text{Investment} \uparrow \Rightarrow Y \uparrow$$

Mishkin (1996) also states an alternative channel for transmission through equity prices occurring through wealth effects on consumption. This argument built on the life-cycle model of consumption developed by Ando and Modigliani (1963), in which households' wealth is a key determinant of consumption spending (Kuttner and Mosser, 2002). Stock markets surge following the expansionary monetary policy raises household wealth and leads individuals to spend more money. Then, consumption spending would grow and stimulate aggregate output.

¹ Tobin's q is widely used theory of investment which is defined as firm's market value divided by replacement cost of firm's capital. When Q is high, firms will invest more either because adding capital is cheap or because the value of installed capital is high. Conversely when Q is low they will invest less

$M \uparrow \Rightarrow \text{Equity Prices} \uparrow \Rightarrow \text{Financial Wealth} \uparrow \Rightarrow \text{Consumption} \uparrow \Rightarrow Y \uparrow$

It is noteworthy that the definition of “equity” could be rather broad. The framework above could be applied to the housing and land market where they are assumed as equity. The mechanism will be same (Mishkin, 1996).

2.3 Credit Channel

The shortfalls of traditional theory stimulated a lot of research on the alternative transmission mechanisms that would be able to explain how changes in the short-term interest rates can induce changes in the level of investment. By the way, the credit channel is not an alternative view to the traditional interest channel. It is an enhancement mechanism, not a truly independent or parallel channel. This new view of transmission mechanism emphasizes how asymmetric information and costly enforcement of contracts creates agency problems in financial markets (Bernanke and Gertler, 1995).

There are two main channels of monetary transmission relying on credit market frictions: i) The broad credit (i.e. balance sheet) channel and ii) the narrow credit channel (i.e. bank lending) channel. These channels have the potential to explain the empirical mysteries emerged while discussing the interest rate channel (Bernanke and Gertler, 1995). The balance sheet channel emphasis on the impact of changes in monetary policy on the borrower’s balance sheet. The bank lending channel focuses on

the possible effect of monetary policy actions on the supply of loans by the banking system.

The credit view is important for several reasons. First, if there is a credit channel, it implies that monetary policy can affect the real economy without much variation in the open-market interest rate. Second, the channel can explain how monetary policy influences investment and inventory behavior. More than these, it offers insights on how innovation in financial institutions might affect the potency of monetary policy. In addition, the credit channel has the potential to explain the distributional effects of monetary policy on both lenders and borrowers while the interest rate channel cannot. Finally, it is sensitive to the state of firms' balance sheet and health of the banking sector which asserts that the impact of monetary policy on economic activity is not always the same (Horvath et al.,2006).

2.3.1 Balance Sheet Channel

The balance sheet channel is based on the prediction that the external finance premium² facing a borrower should depend on borrower's financial position. Therefore, any change in the quality of borrowers' balance sheets due to monetary policy should affect their investment and spending decisions (Bernanke and Gertler, 1995).

² *External Finance Premium* is defined by Bernanke and Gertler (1995) as the difference in cost between funds raised externally (by issuing equity or debt) and funds generated internally (by retaining earnings).

This channel arises from an asymmetry of information between borrowers and lenders: namely the problems of moral hazard³ and adverse selection⁴ in financial markets (Oliner and Rudebusch, 1996).

Mishkin (1996) states several ways in which monetary policy affects firms' balance sheets: first one can be stated as; lower interest rates which increase cash flow, higher equity prices, inflation that reduces value of liabilities, higher aggregate demand which raises business revenues and profits etc. The second mechanism might be: enhanced balance sheets reduce the moral hazard and adverse selection problems and lead to easier access to funds for borrowing firms and therefore stimulates more economic activity. The mechanism can be characterized by using the following schematic diagrams:

**M↑ => Equity Prices↑ => Adverse selection↓ & Moral Hazard ↓ =>
Lending ↑ => Investment↑ => Y ↑**

or,

**M↑ => Nominal Interest Rate↓ => Cash Flow↑ => Adverse selection↓ &
Moral Hazard ↓ => Loans ↑ => Investment↑ => Y ↑**

³ The lender has to wonder whether giving an increased loan to a low net-worth firm may make the borrower pursue risky investment projects, increasing the likelihood of Project failure since the owner of the firm has little to lose if the firm goes under.

⁴ The lender has to wonder if the reason that a low net-worth borrower is coming to him is because no one else is willing to lend to a borrower who may go under at any time.

2.3.2 Bank Lending Channel

2.3.2.1 Theoretical Literature

Mishkin (1996) states in his article, the basis of the bank lending channel depends on the view that banks play a special role in the financial system because the banks are especially well-suited to solve asymmetric information problems in credit markets. The basic intuition is as follows: borrowers and lenders have a hard time matching up because information about each other is very costly to verify. In particular, lenders have a very hard time evaluating the viability of an investment project run by a borrower about whom they know very little. Similarly, borrowers may have a hard time finding lenders who are looking for projects similar to their own to invest in. In Mishkin's view, the assumption behind the validity of the bank lending channel depends on these two headlines:

- (i) Banks has a special role in terms of intermediary between certain borrowers and credit markets. Especially in the developing countries, certain borrowers will not have access to the credit markets unless they borrow from banks.

- (ii) There should not be perfect substitutability between bank deposits and other sources of financing for banks.

Then the bank lending channel of monetary transmission operates as follows: Expansionary monetary policy increases bank reserves and bank deposits which increases the quantity of bank loans available. Growth of loans available will cause the

investment of bank-dependent firms and the spending of consumers to rise. Both of these will push up aggregate demand and output. This channel becomes especially vital for small firms, which are unable to offer shares on the stock market or issue their own bonds to raise money. Schematically:

$$\mathbf{M} \uparrow \Rightarrow \mathbf{Bank\ deposits} \uparrow \Rightarrow \mathbf{Bank\ Loans} \uparrow \Rightarrow \mathbf{Investment} \uparrow \Rightarrow \mathbf{Y} \uparrow$$

In order to formulate the bank lending channel of monetary transmission mechanism, Kashyap and Stein (1995), in addition to the two assets-economy (money and bonds) of the classical money view, they introduce three assets: money, publicly issued bonds and intermediated bonds. In this framework, banks have a special role in two respects: they can create money and also make loans to firms and households. They state that the decrease in bank reserves can considerably affect real activity if it makes banks reduce the supply of loans.

In order to analyze the microeconomic foundations effecting the existence and power of bank lending channel Kashyap and Stein (1993) rely on three conditions formulated earlier by Bernanke and Blinder (1988). The necessary conditions that must hold for bank lending channel to be operative:

- 1- Firms must not be able to completely compensate reduced supply of commercial bank loans from other sources. If firms are indifferent between the two types of financing, then the decrease in supply of loans does not affect the firm at all.

- 2- The Central Bank must be able to affect the supply of loans. Put another way, banks must not be able to offset the decrease in deposits caused by open market purchases by the Central Bank by raising funds from any other source. If it could raise funds from some other source, then the decrease in funds from deposits would not bother banks because they could simply raise funds from some other source.

- 3- There must be imperfection in the adjustment of the aggregate price level. Note that this is a requirement even for the money channel. There are several convincing theories put forward that explain why this condition is usually satisfied in an economy. This assumption is needed not only by lending channel view, but also by the conventional money view.

The third condition is usually met in economy according to the authors. They note that imperfect price adjustments is not unique to the bank lending view and is present in any theory where monetary policy is non-neutral.

With respect to the first condition, especially the smaller firms do not have access to the markets for commercial paper. Due to the asymmetric information, lenders' special role and information and lock-in problems, many firms are dependent on loans to finance their business activities. Thus, if contractionary monetary policy reduces the supply of loans, these firms will be affected adversely.

Second condition requires that the commercial banks are not indifferent between their holdings of T-Bills (assets) relative to their holdings of CDs (liabilities).

Thus, after a monetary contraction, a commercial bank will not be able to perfectly insulate against the decrease in demand deposits by liquidating T-Bills or selling more CDs. This implies that a monetary contraction will lead the commercial bank to reduce its supply of loans. Therefore, it is safe to conclude that a decrease in deposits does indeed lead to a decrease in the supply of loans which supports second condition.

2.3.2.2 Empirical Literature

There is extensive empirical literature on this subject especially for the developed countries. The pioneers of the literature support the importance of traditional interest rate channel as well as the bank lending channel in the monetary transmission mechanism. In this part, without giving their empirical framework, we will discuss the conclusion of the selected empirical literature.

In the USA, the literature focused on the relationship between aggregate income, commercial bank loans, money stock, interest rates, and money indicators. We can mention at this point Bernanke (1986), Bernanke and Blinder (1988), Bernanke and Blinder (1992); Kashyap, Stein, and Wilcox (1993), Walsh and Wilcox (1995); and Oliner and Rudebush (1995)); amongst others.

For the selected literature in the EU area, Altunbas et al (2002), using annual data for the period 1991 to 1999, states that the bank-lending channel appears more prevalent for banks with low capitalization operating in smaller EMU countries. Similarly Angeloni et al. (2002), in their summary paper of the ECB conference, displays

the general conclusions of many countries which are mixed and may not be consistent with all previous empirical findings. For the country level, Hernando and Martinez-Pages (2001) tests the existence of bank lending channel for Spanish economy and find no evidence for the period 1991-1998. However, Farinha and Marquez (2001) finds the existence of the bank lending channel in Portugese economy. Similarly, Westenlund (2003) finds that in Sweden small and undercapitalized banks are significantly affected by monetary policy, which supports the hypothesis of bank lending channel. Horvarth et al. (2006) investigated the working of bank lending channel using the approach of Kashyap and Stein and discovered asymmetric movements of loan quantities with respect to certain bank-characteristics in Hungary. Using the same model, Brissimis et al. (2001) finds compatible evidence of bank lending channel in Greece. Similarly, de Haan ((2001) finds that unsecured bank lending is responsive to monetary policy in the Netherlands.

Recently, bank lending channel is also scrutinized in the developing countries. For example, Alfaro et al.(2004) estimates the similar Kashyap and Stein model, using quarterly data, for Chilean economy. He founds a significant strength of bank lending channel in Chile during 1990s. One study worths to mention is those done for Korea (Park, 2003). Park founds that banks did not vary their lending in response to a change in monetary policy for the period before the currency crisis in 1997. But for the period after the currency crisis, bank lending reacted sensitively to monetary policy induced changes in call rates and reserves.

The majority of empirical studies on the bank lending channel have been trying to test the second condition stated above where the central bank can affect the supply

of commercial bank loans. The studies are carried out both in a time-series framework and a cross-sectional framework.

CHAPTER 3

TURKISH FINANCIAL SYSTEM

As discussed in the previous parts, there are three main assumptions whether the bank lending channel is relevant for a specific economy: the dominance of banks as the source of intermediated credit, the power of central bank to affect supply of bank loans through changes in available reserves and the imperfect substitutability between loans and bonds for certain borrowers.

In this part, the validity of these assumptions for Turkish financial system will be discussed. However, in order to understand the structure in the meantime, the recent history of the Turkish financial system will be reviewed.

3.1 Review of Recent History

Financial system in a country includes banks, securities exchanges, pension funds, insurers, central bank, national regulators and all the other institutions that provide a

framework for carrying out economic transactions and channel savings into investment. Therefore, a sound financial system is essential for supporting economic growth and development. The basis for the soundness of the financial system is the country's institutional environment which is defined as the terms of the quality of the legal framework and the evolutionary capabilities of the financial habitat. Moreover, macroeconomic indicators, surrounding the system, are also crucial for the stability of economy in total and financial system in specific. Problems in the financial system may reduce the effectiveness of monetary policy, create large fiscal costs related to rescuing troubled financial institutions, trigger capital flight, and deepen economic growth.

In these terms, Femise Report (2005) underlies that Turkish financial system seems to be in its adolescence. According to this report, Turkish financial system is not adequately deep; that is, the total flow of funds in relation to national income is not high. Moreover, these limited funds are concentrated on Treasury assets and exhibit low diversity. In addition to these, assets are not available for all maturities, high maturity assets are scarce, and/or investors have preferences for certain maturities. Finally, the institutional perspective of the Turkish financial system has been weak.

The vulnerability of the system has been experienced by two severe financial crises during the last two decades. The 1994 crisis was the result of the uncontrollable growth of domestic debt stock. The capital account liberalization from 1989 to 1994, the growing budget deficits and public sector borrowing requirement produced an overvalued domestic currency. These factors including extensive short-term borrowing of commercial banks, set the weak economic background prior to the crisis (Celasun, 1998). Moreover, there were some negative fundamentals such as; high public sector

deficits and debt relative to GNP ratios. The existence of vulnerable banking sector and the efforts of the banks to close open positions which is an outcome of high offshore borrowing in foreign currencies led to capital outflows and the central bank heavily intervened in the foreign exchange market. The loss of international reserves triggered a crisis, and the Turkish lira depreciated by almost 70% against the U.S. dollar in the first quarter of 1994 (Ozatay, 2000).

This crisis led the authorities to take drastic measures so as to save the economic system from collapse. The most controversial of them was the introduction of full guarantees of deposits⁵. However, this guarantee led the banks to offer higher interest rates to depositors. As a result, the full deposit insurance scheme tolerated the development of an unhealthy banking sector, and problems of asymmetry prevailed (Femise Report, 2005). During this time, CBRT tried to reduce price fluctuations in both the short-term Turkish lira and foreign currency markets and to establish an inflation expectation adaptive to foreign currency fluctuations. In summary, during the 1990s, Turkey lacked competent supervisory authorities, a transparent regulatory framework and legal and institutional structure.

At the beginning of 2000, Turkey adopted a comprehensive disinflation program, supported by the International Monetary Fund (IMF). The main pillars of the

⁵ In July 2000, as part of the disinflation program, the coalition government started to phase out the full guarantee of deposits, by lowering the ceilings to TL100 billion (more than US\$150,000 at the prevailing exchange rate). This guarantee was re-introduced six months later in December 2000 during the liquidity crisis. During the collapse of Imar Bank in July 2003, the BRSA said it would adhere to the full guarantee, but that it would reduce the coverage to deposits that are below TL 50,000 billion (around €30,000) by July 2004, which was executed as planned. This ceiling is broadly in line with the deposit guarantee in EU countries, whereby the level of deposit protection varies between €20,000 and €60,000, but is a bit high for Turkey, since its average income per capita is about one-fifth of that in the EU. The ceiling covers over 90% of the accounts by the number of accounts, but only about 60% by the size of the accounts (Steinherr, Tukel and Ucer, 2004).

program were tight fiscal and monetary policies, ambitious structural reforms and the use of a pre-determined exchange rate path as a nominal anchor. Monetary policy was conducted under a currency board type arrangement with liquidity expansion being strictly linked to foreign currency inflows.

In September 2000, the Banking Regulation and Supervision Agency (BRSA)⁶, an autonomous institution that is responsible for regulating and supervising the banking sector, began its operations following the enactment of new banking law in 1999. Soon after, the BRSA had to manage a major banking crisis brought on by the escalating political uncertainties, the loss of credibility by the exchange rate regime, and finally, the abolition of the pegged exchange rate system in February 2001 (Pazarbaşıoğlu, 2005). The main three shocks that hit the bank were: sharp increase in funding costs due to the increase in interest rates and maturity mismatch, capital losses due to a sharp mark-to-market decline in the value of government securities holdings and capital losses due to a sharp change in foreign exchange rate and open foreign currency position (BRSA, 2001). The government decided to abandon the crawling peg regime and floated the currency. After this most severe crisis, the government adopted a new program “Transition to a Strong Economy” in order to eliminate the confidence crisis and the financial instability. This strategy is strongly based on market-orientation and openness to the world economy. The main pillar of the program consists of a renewed effort to eliminate structural weaknesses that had not been fully tackled by the 2000 program, particularly by strengthening governance and good economic management. The key elements in the area of banking include: a deep financial restructuring of state and the

⁶ The mission of BRSA stated as “to ensure confidence and stability in financial markets, to create an environment that will improve competitiveness of the financial system, to enable effective operating of loan system, to protect the rights and benefits of the depositors, to take necessary measures for enabling institutions subject to supervision to operate in a sound, secure and well-organized manner in market discipline”.

Savings Deposit Insurance Fund (SDIF)⁷ banks; measures to facilitate the participation of private capital in the strengthening of the private banking system; and, a further improvement of banking regulation and supervision (BRSA, 2001).

The restructuring of Turkey's banking sector has been very costly. The initial fiscal costs of the resolution of the Turkish banking crisis were about €50 billion (about 34% of the gross domestic product, GDP), and annual cost about €5 billion (Pazarbaşıoğlu, 2005). The GNP during 2001 contracted by 9.4%, and the loss in employment was around 1.4 million (Femise Report, 2005).

After this severe crisis, Turkish economy has rapidly recovered and took sizeable steps towards restructuring its financial markets, keeping primary emphasis on the banking sector. Main developments of this recovery in 2002-2005 period were: adoption of an approach aiming for fiscal, price and financial stability, change in the behaviors of economic units including the public sector, efforts for well functioning of the market mechanism and for improving the capacity to compete internationally, continued process of harmonization with international standards and regulations, further improvements in expectations, and reducing the tax burden on economy. Along these national measures, continued growth in the world economy and increase in international trade volume, excess liquidity in international markets and improvement in external borrowing conditions, and the progress in relations with the European Union after the

⁷ Savings Deposit Insurance Fund (SDIF) was under the control of the Central Bank of Turkey since 1983 with the mandate to insure saving deposits. It was charged with resolving insolvent banks in 1994. It was transferred to the BRSA on August 31, 2000. During 1997-2002, 20 banks were transferred to the SDIF (Pazarbaşıoğlu, 2005). Among these banks, all but one have been liquidated, merged or sold, while İmarbank was liquidated due to bankruptcy in 2003, and in addition Kıbrıs Kredi Bank was voluntarily liquidated without any burden to the public (World Bank, 2006).

decision to start membership negotiations with Turkey in 2005 were also the main international headings helped Turkish economy during this period (BAT, 2006).

Since the banking sector is the largest and most important part of the Turkish financial sector, and other financial institutions are mostly owned or otherwise affiliated with the major commercial banks (World Bank, 2006) the next part will underline selected structural indicators of the banking system.

3.2 Structural Indicators of the Banking System

Turkish commercial banks are classified according to their capital structure into three categories: state-owned, privately owned and foreign. The banks transferred to SDIF form an additional fourth category.

3.2.1 Concentration and the Structure

The banking concentration ratio is defined as the ratio of assets of the five to ten largest banks to the assets of the total banking sector. As shown in the table below, as of December 2005, the shares of the largest five banks in total assets, total deposits and total loans were 63 percent, 66 percent and 56 percent respectively. The largest ten banks have 85 percent of assets, receive 89 percent of total deposits, and extend 80 percent of total loans.

Table-1: Concentration in Banking Sector (%)

	2001	2003	2004	2005
Largest Five				
Assets	58	60	60	63
Deposits	61	62	64	66
Loans	55	54	48	56
Largest Ten				
Assets	81	82	84	85
Deposits	86	86	88	89
Loans	74	75	77	80

Source: The Banks Association of Turkey

As BRSA Annual Report (2006) underlined, tendency of decrease in the number of banks and increase in concentration continued in 2005. With the merger of two deposit banks, the number of deposit banks decreased to 34 from 35, and with the merger of two participation banks, the number of participation banks decreased to 4 from 5. Thus, the total banks in the sector decreased to 51 from 53. By end-2005, of the banks in the sector, 3 was state banks, 17 are private banks, 13 was foreign commercial banks, 4 was participation banks, and 13 was development and investment banks. There is also 1 SDIF bank in the system.

Similarly, Herfindahl-Hirschman Index (HHI)⁸, which measures the concentration in the sector increase to 981 points in 2005 compared to 949 points in 2004. Therefore, it is observed that the weak oligopolistic structure in Turkish banking sector gradually converges to a stronger oligopolistic structure (BRSA, 2006).

Table-2: Turkish Banking System In Terms of Number of Institutions, Branches and Personnel

2005	Number of Institutions	Number of Branches			Number of Personnel		
		Domestic	Abroad	Total	Domestic	Abroad	Total
State-Owned Banks	3	2,095	15	2,110	37,860	177	38,037
Private Banks	17	3,712	25	3,737	78,475	329	78,804
Foreign Banks	13	388	5	393	10,570	41	10,611
Development and Investment Banks	13	34	1	35	5,124	2	5,126
SDIF	1	1	0	1	395	0	395
Participation Banks	4	291	1	292	5,741	4	5,745
TOTAL	51	6521	47	6568	138,165	553	138,718

Source: The Banks Association of Turkey

⁸ Herfindahl-Hirschman Index (HHI) is an indicator widely used in measurement of concentration ratio of goods and services market and obtained through summing the squares of sector shares of the banks.

The structure of the Turkish banking sector is changing as domestic banks are seeking partnership with foreign investors. With the successful implementation of economic program, increased confidence, political stability and start of accession talks with the EU, foreign investor interest in the Turkish banking sector has strengthened, and several deals have been made with foreign investors⁹. The share of banks in control of foreign capital in the sector increased to 5,2 percent from 3,4 percent, as well as the increase of the shares of foreign partnership in banks in control of domestic capital (BRSA, 2006).

3.2.2 Capital Adequacy

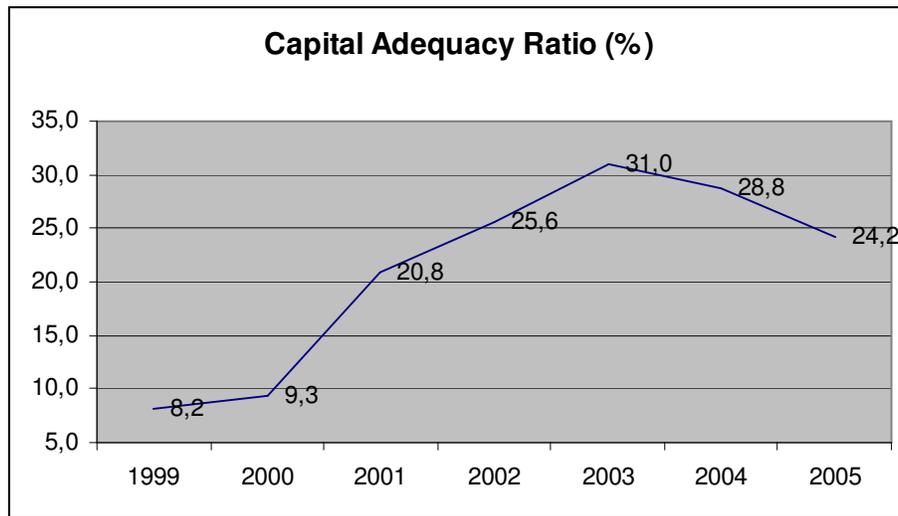
A minimum capital adequacy ratio (CAR) -the ratio that measures a bank's capital as a percentage of its risk-weighted assets- is a regulatory requirement intended to ensure that banks maintain adequate capital to support their risk exposures. The capital adequacy ratio of a bank is a good indication of its vulnerability to potential shocks and thus the health of that bank. The capital adequacy regulations in Turkey are in line with those of the EU.

Minimum capital adequacy ratio is set for each bank at 8 percent by the Regulation on measurement and Evaluation of Capital Adequacy Ratio. The CAR of the banking sector accounted for 9,3 percent in 2000, and increased to 20,8 percent by the

⁹ BNP Paribas bought 50 percent of Turk Ekonomi Bankasi (TEB) holding company for the bank. Unicredito bought 50 percent of Koc Bank. Koc/Unicredito partnership bought a 57.4 percent state of Yapi Kredi Bank. Disbank is acquired by Fortis, which took an 89.3 percent stake in the bank. Garanti Bank, strategic owner, Dogus Group, sold about half of its shares, 25.5 percent of the total stock to General Economic Consumer Finance.

end of 2001. At the end of 2004 and 2005, CAR was 28,8 percent and 24,2 percent, respectively.

Figure-1: Capital Adequacy Ratio



Source: FSR (2006)

The average capital adequacy ratio of the Turkish banking system is high compared with the EU average and of the candidate countries. As of 2003, the average capital adequacy ratios of the banking system for EU average and the candidate countries are; 12,5 percent and 16,67 percent, respectively.

3.2.3 Asset Quality

State-owned banks retain a very significant role in the Turkish banking system. The three large deposit taking state-owned banks are slated for privatization. State-owned banks are important in determining the asset quality of the banking sector. One third of the assets of the Turkish banking system are controlled by the state-owned banks. The number of these banks is three (namely Ziraat Bank, Halk Bank and Vakifbank); their total share in the financial system as of December 2005 is 30.6%. While they have collected 37.6% of the total deposits by December 2005, they have extended 20.2% of the total loans. The table below shows the market shares of the groups in terms of assets, loans and deposits.

Table-3: Market Shares by Groups

	Share in Total Assets (%)			Share in Total Loans (%)			Share in Total Deposits (%)		
	2003	2004	2005	2003	2004	2005	2003	2004	2005
State-owned Banks	32.6	34.1	30.6	17.4	20.1	20.2	37.6	41.1	37.6
Private Banks	53.9	53.9	58.3	63.2	62.8	65.4	53.6	51.6	55.1
SDIF	2.8	0.6	0.5	1.0	0.0	0.0	2.6	0.0	0.0
Foreign	4.7	5.5	5.1	6.7	7.3	6.5	3.6	4.1	4.0
Investment and Development Banks	3.9	3.6	3.1	7.2	5.1	3.8	-	-	-
Participation Banks	2.1	2.4	2.4	4.5	4.7	4.1	2.6	3.0	3.3
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: BRSA

Since 2002 total assets of Turkish Banking System is growing steadily. As of 2005 total assets reached USD 295.8 billion. During this period loan portfolio of Turkish Banking system also displayed an impressive growth. As of December 2005, the

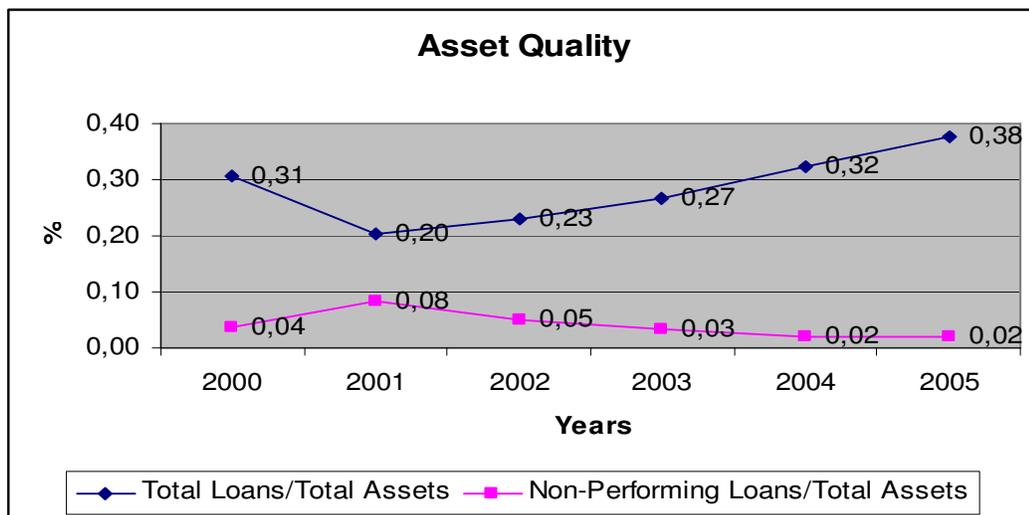
amount of in-cash loans extended by banks was USD 111.7 billion and the ratio of loans to deposits was 64.5%. The non-performing loans which amounted USD 9.6 billion in end-2001, decreased to USD 5.6 billion as of December 2005. The amount of provisions set aside for these loans was USD 5.0 billion.

Table-4: Main Indicators of the Banking Sector

USD Million	2000	2001	2002	2003	2004	2005
Total Assets	154,955	116,661	130,120	178,880	228,328	295,844
Loans	47,404	23,899	29,967	47,442	74,020	111,743
Non-performing Loans (gross)	5,895	9,595	6,381	6,182	4,736	5,587
Securities Portfolio	27,485	41,059	52,680	76,545	123,680	106,585
Deposits	87,680	75,938	84,413	111,268	142,363	181,190

Source: BRSA

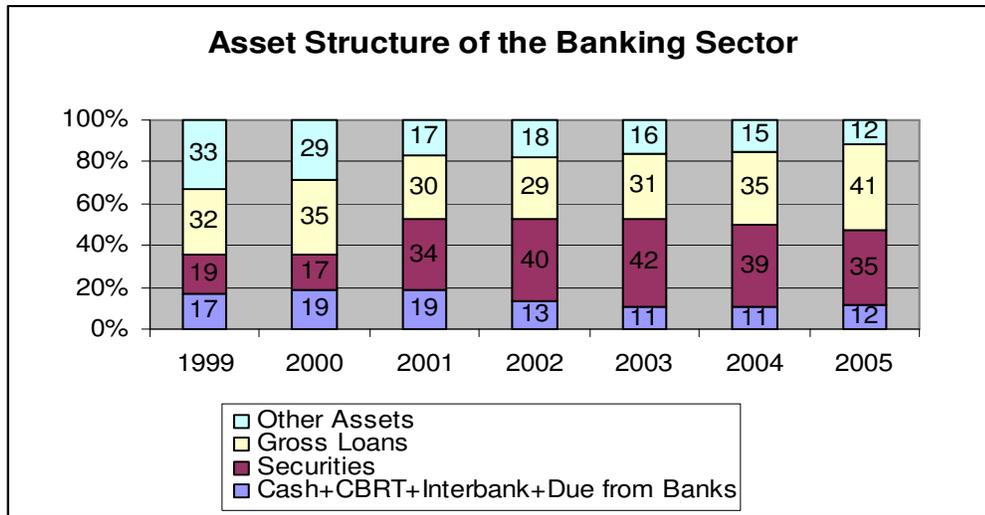
Figure-2: Share of Credits in Total Assets, 2000-2005



3.2.4 Asset Structure

As a part of restructuring program, government debt securities were given to the banks. Therefore, securities had become the largest item in the asset structure of the Turkish banking system. However, in 2005, compared to the previous year, its share declined by 4 percentage points, to 35 percent, due to more rapid increase in the loan portfolio. The share of loans in total assets rose by 6 percentage points to 41 percent due to strong growth in economic activity and the rise in demand for corporate loans and consumer loans.

Figure-3: Asset Structure of the Banking Sector

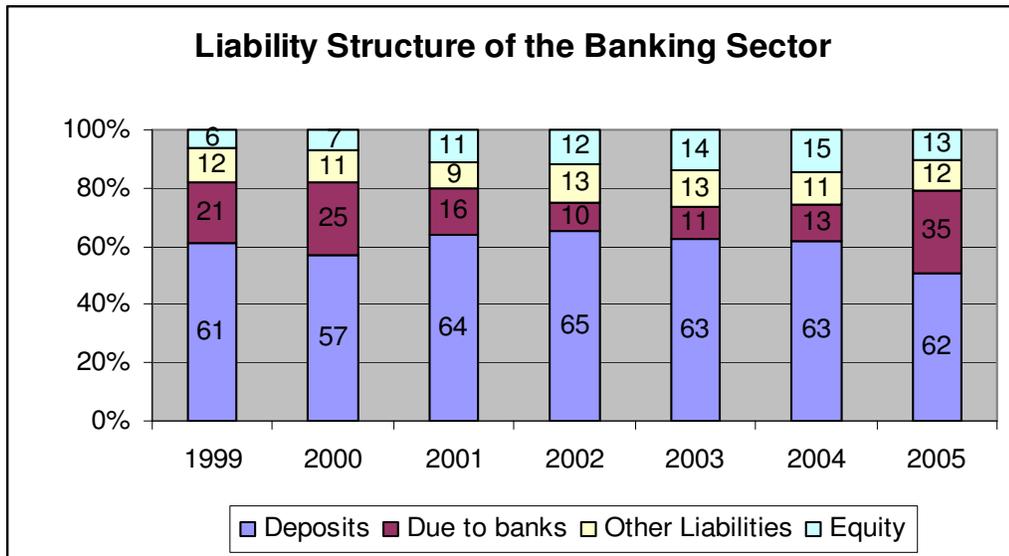


Source: FSR(2006)

3.2.5 Structure of Liabilities

In 2005, total deposits increased by 28 percent, but its share in total liabilities decrease by 1 percentage point to 62 percent when compared to the previous year. The share of own funds in total liabilities is 13 percent. The share of due banks in total liabilities increased by 2 points and stood at 13 percent.

Figure-4: Liability Structure of the Banking Sector



Source: FSR(2006)

3.2.6 Comparison with EU Countries

Turkey has fulfilled most of the conditions required for the banking sector to comply with the integration process for the EU. Despite the adverse macroeconomic economic conditions, the Turkish banking sector continues to demonstrate progress and even the core Turkish banking sector proved to be resilient in terms of selected indicators, such as high quality of human resources, technological infrastructure, a nationwide branch network, and high-quality service provided in a variety of financial products (Pazarbasioglu, 2005).

The table below shows the comparison of selected balance sheet items with EU countries. Total loans and total deposits to GDP ratios, which are good indicators of financial depth and the level of intermediation in the system, are below the averages of EU countries in 2004 and 2005.

Table-5: Comparison of Selected Balance Sheet Items with EU Countries

Countries	Deposits/GDP (%)	Loans/GDP (%)	Loans/Deposits (%)	Loans/Total Assets (%)
Belgium	143	107	75	33
Denmark	63	166	264	53
Germany	113	136	120	46
Greece	96	76	80	55
Spain	104	121	116	59
France	77	93	121	35
Ireland	123	176	144	36
Italy	58	88	152	52
Luxembourg	859	467	54	17
Netherlands	122	174	142	51
Austria	98	125	128	45
Portugal	103	138	134	56
Finland	53	69	130	49

Sweden	51	115	224	55
UK	118	142	121	35
EU15 Ave.	99	122	124	42
EU25 Ave.	96	118	123	42
TURKEY				
2004	46	24	53	33
2005	52	32	63	39

Source: FSR (2006)

3.3 Bank Lending Channel as a Powerful Transmission Mechanism in Turkish Economy

Before starting this part, let's remind Kashyap and Stein (1997) setting, on the basis of four indicators of the relative importance of the bank lending channel in the EU countries (EU-12). The first indicator refers to the concentration of the banking system: the more concentrated the system, the less sensitive is expected to be its responsiveness to monetary policy shocks, given that large banks can more easily substitute other liabilities that are not subject to reserve requirements and/or are uninsured, for deposits. The second indicator is the rate of return on bank assets: other things being equal, the more well-capitalised a bank, the higher its expected profitability, since the cost its funds is relatively lower. On the other hand, well capitalised banks should have an easier access to capital markets to raise funds in the event of a deposit shock, implying that monetary policy would have less of an impact on those banks. The third indicator relates to the size of firms: smaller firms are more dependent on bank financing than larger firms, as monitoring costs for small firms are so high that they would have difficulties in securing non-bank financing. Thus, for a given contraction of bank credit, these firms will be affected more. Finally, the fourth indicator refers to the importance of non-bank financing, in particular equity and bond financing. Where the availability of non-bank financing is greater, the efficacy of the bank lending channel is likely to be less.

Apart from the indicators above, as discussed in the previous parts, there are three main assumptions whether the bank lending channel is relevant for a specific economy: the dominance of banks as the source of intermediated credit, the power of central bank to affect supply of bank loans through changes in available reserves and the imperfect substitutability between loans and bonds for certain borrowers.

3.3.1 Dominance of Turkish Banks as the source of intermediated loans

If banks rely on mostly reservable demand deposits as an important source of funds, contractionary monetary policy, by reducing the aggregate volume of bank reserves, will reduce the availability of bank loans to the real economy. Since a significant number of firms and households rely heavily on bank financing, they cannot easily switch to alternative forms of external financing and a reduction in loan supply will decrease aggregate spending.

Similar to most of the developing countries, domestic loan in Turkey is exclusively dependent on the lending capacity of Turkish banking system. Other sources of financing such as stock exchange and alternative non-financial credit institutes are unimportant.

The banking sector is the largest and most important part of the Turkish financial system. Especially when CBRT and ISE market capitalization (market value of the publicly held companies) is omitted, it is observed that the banking sector reached about 86 % of total financial sector.

Table-6: Size and Composition of the Turkish Financial Sector

	Total Assets		% Distribution			Assets /GDP %
	TRY (million)	USD (billion)	Including CBRT	Excluding CBRT	Excluding ISE Mar.	
Banks	396,967	295.6	51.4	58.2	85.5	81.3
Participation Banks	9,945	7.4	1.3	1.5	2.1	2.0
Insurance Companies	5,574	4.2	0.7	0.8	1.2	1.1
Leasing Companies	6,708	5.0	0.9	1.0	1.4	1.4
Factoring Companies	4,691	3.5	0.6	0.7	1.0	1.0
Securities Inter. Inst.	3,341	1.7	0.3	0.3	0.5	0.5
Pension Companies	4,234	3.2	0.5	0.6	0.9	0.9
Securities Inv. Funds	29,374	21.9	3.8	4.3	6.3	6.0
Consumer Finance Com.	1,769	1.3	0.2	0.3	0.4	0.4
Real Estate Inv.Trust	2,209	1.6	0.3	0.3	0.5	0.5
Securities Investment Trust	488	0.4	0.1	0.1	0.1	0.1
ISE market Capitalization	218,318	162.6	28.3	32.0	-	44.7
Central Bank TR	90,070	67.1	11.7	-	-	18.5
TOTAL	772,688	575.4	100.0	100.0	100.0	158.3

Source: BRSA (2006)

The composition of the loan market confirms that access to credit for SMEs is poor, since the bank loan has been concentrated with few firms, and leasing and factoring volumes remain small (World Bank, 2006).

3.3.2 The power of Central Bank to affect of bank loans

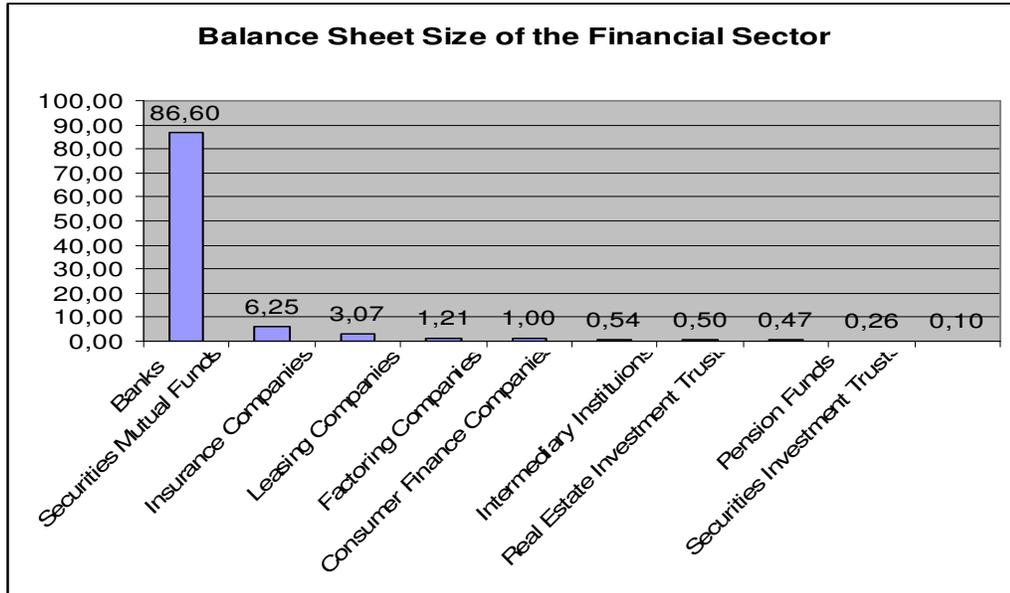
In general view, the credit channel of monetary transmission mechanism works if banks reduce their supply of loans in response to a squeezing of bank reserves by contractionary monetary policy.

Kashyap and Stein (1993) underlines two factors that influence central bank's capacity to control lending. These are the participation of non-banking financial institutions in the economy and existence of capital requirements.

Non-bank financial institutions can collect deposits and issue loans, but in many countries they do not face reserve requirements on their deposits. So, the larger the participation of non-banking financial institutions in loan supply, the weaker is the ability of a central bank to manage loan supply.

According to Financial Stability Report (FSA, 2006), in 2005, total asset size of the Turkish financial sector amounted to 469,9 billion New Turkish Liras and about 87 percent of financial sector assets are composed of bank assets (including development and investment banks and participation banks). As seen in the figure below, banks dominate the Turkish financial system. Therefore, non-bank financial institutions hardly play a serious role in loan supply.

Figure-5: Balance Sheet Size of the Financial Sector



Source: FSR (2006)

In terms of capital adequacy, On 31 January 2002, the BRSA issued a regulation on the measurement and assessment of the capital adequacy of banks¹⁰. This regulation established the methodology for the calculation of capital adequacy ratios of banks on both a consolidated and unconsolidated basis to ensure that they maintain an adequate amount of capital against existing and potential losses. The ratio of own funds to risk-weighted assets, non-cash loans and obligations will be a minimum 8%. Similarly to generally accepted EU principles, the category of own funds consist of two elements: core capital and supplementary capital.

¹⁰ The regulation is available at http://www.bddk.org.tr/turkce/mevzuat/sermaye_yet_y2.doc

Remembering that the average capital adequacy of Turkish banks in 2005 is 24,5 percent, it is not binding for the commercial banks which does not undermine the importance of bank lending channel in Turkey.

3.3.3 Imperfect substitutability between loans and bonds for certain borrowers

Final assumption of the bank lending channel is the imperfect substitutability between credits and other financial assets in the banks' balance sheet on the one hand, and that between bank credits and other forms of financing on firms' balance sheet on the other hand.

Imperfect substitution in banks' assets ensures that a tightening (loosening) of monetary policy brings about a contraction (expansion) in banks' credit supply. As a response to a monetary and hence liquidity tightening, banks have two ways to offset reserve drains and accordingly to prevent their loan supply from declining. First one is to reduce their credit supply instead of selling bonds they own because they have the desired level of liquidity to face. Alternatively, banks could also issue bonds or collect deposits from households or from the corporate sector rather than decrease credit. However, the ability of some banks to borrow from financial markets may be limited by financial market imperfections, such as adverse selection and moral hazard (imperfect substitutability between credits and bonds on the asset side and bonds and deposits on the liability side).

On the other side, for monetary policy to be transmitted to the real economy, it is necessary for some firms not to be capable of substituting bank credit for other forms of external funding on the capital markets (imperfect substitutability on the liability side of firms). In such a case, once credit supply has decreased (increased), investment spending will be cut back because of the lack of external financial resources.

In Turkey, despite the decline of their share, deposits are the main source of funding. As of June 2005, the share of deposits declined to 60.7 percent from 64.9 percent in 2002. The figure below underlines that the significant increase indication and securitization credits play an important role in this development.

Table-7 : Source of Funds of the Firms

	Source of Funds			
	2002	2003	2004	June 2005
Deposits (Billions of US Dollars)	84	111	142	153
Deposits/Liabilities (%)	64.9	62.2	62.3	60.7
Gross Loans/Total Deposits Ratio (%)	43.1	48.2	55.3	62.9
Securitization Credits (billions of US Dollars)	2	3	4	7
Syndication Credits (billions of US Dollars)	2	3	6	6

Source: Basci (2006)

As a result, assumptions for bank lending channel seem to be satisfied for Turkish economy, especially in the last decade. This provides a strong support for our study.

CHAPTER 4

THEORETICAL MODEL

Following Peek and Rosengren (1995), in order to understand an independent lending channel, let's consider a simple bank balance sheet. This simple bank has only reserves and securities as assets, and transactions deposits and capital as liabilities. In this simple model, open market operations which decrease reserves will cause interest rates to rise. This will induce the individuals and firms to hold fewer transactions deposits until transaction deposits have declined enough to bring required reserves back into line with available reserves. Consequently, bank will hold fewer bonds and individuals hold more. This mechanism describes the traditional "money view" which operates solely through the user of capital, as interest rates rise to equate money demand and money supply.

Now, so as to expose an additional channel, let's add more complicated financial intermediaries to both sides of the bank balance sheet namely, loans and (nonreservable) nontransactions deposits. In this model, the balance sheet has three assets (namely reserves, securities, and loans) and three liabilities (namely (reservable) transactions deposits, (nonreservable) nontransactions deposits, and capital). In this case, an open market operation that decreases reserves might have additional effects that operate through the asset side of the bank balance sheet. The decrease in reserves decreases

transactions deposits. This will result in a decrease in loans if not offset by an increase in nontransactions deposits or a decrease in securities holdings.

The lending channel exists if the above mechanism operates. Therefore, the necessary condition for the lending channel is that the loans not be totally insulated from monetary policy changes by banks altering their nontransactions deposits and securities sufficiently to offset completely any change in their transactions deposits.

One step further, the lending channel above could be significantly reduced by banks being capital-constrained as Kashyap and Stein (1995) acknowledges. Their story is that when the FED drains deposits from the system, banks cannot frictionlessly make up the funding shortfall by raising nondeposit external finance. Consequently, their lending behavior is affected, and so in turn is the investment spending of those nonfinancial firms that rely on banks for funding. Actually, they find no evidence of this effect in their data because of the level of disaggregation and the relatively short time series that they worked on.

In order to test the size of the effect of monetary policy is likely to be effected by capital constraint banks, we consider a highly simplified one-period model whose behavior described by Peek and Rosengren (1995).

In this model, the bank has three types of assets described above: loans (L), securities (S), and required reserves (R) and three liabilities: capital (K), transactions deposits (DD) and, nontransactions deposits (CD).

Balance sheet constraint requires the equality of total assets and total liabilities:

$$\mathbf{R + S + L = K + DD + CD} \quad (1)$$

On the liabilities side, Capital is assumed to be fixed in the short-run and transaction deposits are assumed to be inversely related to the market interest rate (namely, federal funds rate, r_f). An increase in market interest rates increase the opportunity cost of holding such deposits, causing bank customers to reduce their holdings of transactions deposits and shift into interest paying assets.

Transactions deposits are tied to check-clearing services and convenience, therefore this market tends to be imperfectly competitive. In order to maximize their monopoly rent in transactions deposits, banks set imperfectly competitive retail deposit interest rates. Therefore, transactions deposits can be treated as determined by profit-maximizing interest rate setting regardless to the bank's overall need for funding.

$$\mathbf{DD = a_0 - a_1 r_f} \quad (2)$$

We also assume that, banks can expand total deposits by offering an interest rate on nontransactions deposits (r_D) greater than the mean rate in its market (r_D^m). Offering a deposit rate greater than the mean market rate will draw funds not only from competitor banks but also from other substitute financial instruments, such as money market mutual funds and Treasury securities.

$$\mathbf{CD = f_0 + f_1(r_D - r_D^m)} \quad (3)$$

On the asset side, banks must hold a fraction (α) for their reserve requirement ratio times their transactions deposits (DD). We assume that banks hold no excess reserves. Securities are assumed to compose a fixed proportion of transactions deposits (h) net of reserves. This will be a buffer stock motive for holding securities.

$$\mathbf{R} = \alpha\mathbf{DD} \quad (4)$$

$$\mathbf{S} = h_0 + h_1\mathbf{DD} - \mathbf{R} \quad (5)$$

Similar to the transactions accounts, market for loans is also imperfectly competitive. A bank can increase (decrease) its credit volume by offering a credit rate (r_l) lower (higher) than the average credit rate in its market (r_l^m). Taking into account that the bank loans are unique source of finance to many firms (especially the small ones), the value of g_1 (the sensitivity of credit demand to a change in the bank's credit interest rate) is likely to be large.

$$\mathbf{L} = g_0 - g_1 (r_l - r_l^m) \quad (6)$$

The market rates are assumed to be directly related to the federal funds rate with fixed spreads. To simplify the algebra, the same amount (φ) is assumed for each market.

$$r_D^m = b_0 + \varphi r_F \quad (7)$$

$$r_L^m = c_0 + \varphi r_F \quad (8)$$

$$r_S^m = e_0 + \varphi r_F \quad (9)$$

Bank profits are simply the sum of interest income on loans ($r_L L$) net of loan losses (θL) and interest received on securities ($r_S S$), minus interest paid on transactions deposits ($r_{DD} DD$) and interest paid on nontransactions deposits ($r_D CD$).

$$\Pi = (r_L - \theta)L + r_S S - r_{DD} DD - r_D CD \quad (10)$$

Following Kishan and Opiela (2000), we do not specify a capital constraint as Peek and Rosengren did. Their capital constraint assumes that regulators force undercapitalized (capital constrained) banks to meet the risk-weighted capital requirement. Given that regulators may have changed the intensity of their examinations over time, over regions, and over banks, this constraint may not apply. Rather, it is assumed that market discipline by TD purchasers place a funding constraint on banks.

Using equations (1) to (9) to eliminate R , DD , L , S , r_D , r_L , and the three market interest rates, the maximization problem can be stated as a Lagrangian equation, maximizing the profit function. The Lagrangian equation is maximized with respect to CD to obtain the first-order condition. Next, first-order conditions are used to solve for CD in the equation. In a similar way, the equations are solved for L and S .

The results for the derivatives of the L , CD , and S equations with respect to r_F :

$$\partial L / \partial r_F = -g_1 a_1 (1-h_1) / (f_1 + g_1) < 0, \text{ assuming } h_1 < 1 \quad (11)$$

$$\partial CD / \partial r_F = f_1 a_1 (1-h_1) / (f_1 + g_1) > 0, \text{ assuming } h_1 < 1 \quad (12)$$

$$\partial S / \partial r_F = -a_1 (h_1 - \alpha) < 0 \quad (13)$$

Nontransaction deposits increase with an increase in federal funds rate. However, with an increase in the federal funds rate, loans decline as long as h_1 is less than 1. This is a reasonable assumption, given that only a proportion of deposits would be held in liquid form to cover possible withdrawals of transactions deposits. Finally, the response of securities is indeterminate. If the federal funds rate increase, well-capitalized banks can sell securities to continue providing loans. Therefore, for well-capitalized banks (13) is likely to be negative.

Additional implications of this model could be derived with referring to Kashyap and Stein (1995) argument which argues that large and small banks face different market conditions in raising marginal sources of funding (nontransactions deposits). If so, Peek and Rosengren (1995) states that f_1 will be positively related to the size of the bank. Therefore, in this model, nontransactions deposits at larger banks will be more responsive to changes in the federal funds rate compared to those at smaller banks, and loans at larger banks will be less responsive.

Following the same line, another possibility would be loans at large banks, whose borrowers have greater access to national credit markets, have greater sensitivity to changes in loan rates than loans at smaller banks. This implies that g_1 will be larger for larger banks. In this case, nontransactions deposits at larger banks will be less responsive to changes in the federal funds rate than those at smaller banks, and loans will be more responsive.

The assumptions above, larger values of f_1 and g_1 for larger banks, have opposite effects on the magnitude of the response to changes in the federal funds rate of both

transactions deposits and loans. Therefore, the net effect is ambiguous. Focusing on differing responses by large and small banks, as emphasized in Kashyap and Stein (1994), may not provide clear evidence unless one has priors on the magnitudes of the effects of bank size on the values of f_1 and g_1 .

At the end, Peek and Rosengren (1995) states that since we have little evidence on their relative responses (f_1 and g_1) to changes in bank size, the clearest distinctions are likely to be between capital-constrained (weak) and unconstrained (strong) banks, rather than between large and small banks.

CHAPTER 5

EMPIRICAL MODEL

Following from Peek and Rosengren (1995) theoretical model, we want to empirically test the hypothesis that strong and weak bank react differently to a change in monetary policy. The effect of bank capital and bank asset on the response of loans to change in the monetary policy will also be tested. As discussed above, the theory predicts that better capitalized banks should be less sensitive to changes in policy and the impact of asset size is ambiguous.

Therefore, our empirical model will try to explain the growth rate of bank loans, ΔLN , for each banks $i = 1, 2, \dots, N$ in time period $t = 1, 2, \dots, T$.

In our empirical model, the main exogenous indicator variable describing monetary shocks is interest rate, i_t . As in Turkey, monetary authority controls the short-term nominal interest rate. Bernanke and Blinder (1992) use the change in the short-term interest rate under the control of the central bank as a good measure of monetary policy shocks. Most of the empirical literature uses the same variable as the policy indicator as well. Along the same line, we will use the Turkish Central Bank short-term (overnight) interest rate as the policy indicator.

The effect of monetary policy on bank loan depends on the balance sheet strength of a bank. Therefore, we include second set of explanatory variables that interacts with the change in i_t and a measure of balance sheet strength of a bank. Empirical papers typically use assets size (A_{it}), liquidity (LQ_{it}), or capitalization (CA_{it}) as separating variables. Liquidity is defined as the ratio of liquid assets to total assets. Asset size is measured by total assets. Capitalization is defined as the shareholders' equity to total assets.

Since we are testing whether the CBRT can affect the supply of loans, we have to isolate the change in total loans caused by movements in loan demand. In general, control variables like GDP or CPI have traditionally used in the model so as to account for loan demand movements for the consecutive years. However, macroeconomic aggregates are common for all banks and fail to capture demand changes for an individual bank. So, as Kashyap and Stein (1995) and Kishan and Opiela (2000) discussed, measures like real certificates of deposits and bank securities were suggested so as to better control for cross-sectional differences in loan demand. Therefore, we use total deposits (TD) to proxy movements in demand for loans of a particular bank.

We also have to include lagged values of both dependent and explanatory variables to allow for dynamic effects for two reasons. First, there is a close banker-customer relationship that develops and may create lock-in effects thus making it costly for the borrower to change a bank. Thus lagged loans affect current loans. Second, monetary policy only impacts lending behavior with a lag due to contractual commitments (e.g. floating and fixed charges on movable and immovable assets,

respectively). Hence, lagged values of the explanatory variables also affect current loans with a lag.

The main assumption stated above in the theoretical model, indicates that constrained and unconstrained banks should respond quite differently to changes in monetary policy. Therefore, our focus will be on the determinants of the change in bank loans.

The key implication is that the response of loans to a tightening (an easing) of monetary policy at unconstrained banks should be to decline (increase) more than at capital-constrained banks (Peek and Rosengren, 1995).

At this point, we introduce a **dummy variable** so as to identify the distinction between capital-constrained and unconstrained banks. Since, capital adequacy ratio is a measure of the amount of a bank's capital expressed as a percentage of its risk weighted credit exposures, we can use Capital Adequacy Ratio (CAR) as an indicator to see whether a bank is capital-constrained or unconstrained.

However, in order to differentiate between those banks, first, we calculated the average capital adequacy for all banks in years 2003, 2004, 2005 and 2006, and then assign 1 if the specific bank's CAR is above the average CAR, and 0 if the bank's CAR is below the average CAR.

Following that, we create an **interaction variable** defined as the interaction between our dummy (1 if unconstrained, 0 if unconstrained) and the change in our exogenous indicator -short-term nominal interest rate-.

Therefore, the model is as follows:

$$\Delta LN_{it} = \alpha_i + \sum_j \beta \Delta LN_{it} (-1) + \sum_j \gamma \Delta i_{t-j} + \sum_j \delta \Delta i_{t-j} \text{Dummy} + \theta_j BS_{it-1} + \sum_j TDE_{it-1} + \varepsilon_{it}$$

where ΔLN_{it} is the growth of bank loan of bank i in year t . Δi_{t-j} is the annualized, average weighted, CBRT overnight rate.

BS_{it} includes assets size (A_{it}), liquidity (LQ_{it}), and capitalization (CA_{it}) as the balance sheet strength of the a bank.

TDE is the growth rate of total deposits.

Coefficients on Δi_{t-j} determine a response to a monetary shock by an average bank. Coefficients on interaction variable describe how a response differs for constrained and unconstrained banks. For an operational lending channel to exist it is sufficient that all coefficients on Δi_{t-j} are negative and the coefficients on BS_{it} are positive. The most important coefficient for our purpose will be the interaction variable which will state whether bank lending channel works or does not work for Turkey.

CHAPTER 6

DATA and ESTIMATION RESULTS

6.1 Data

The use of bank level data has supplemented the empirical analysis of the role of bank lending in monetary transmission. We follow the same methodology so as to address the issue that monetary policy actions may affect banks' loan supply.

We use quarterly balance sheet data from 2001:4 to 2006:3 for 34 Turkish commercial banks. We limit our sample to commercial banks, because development and investment banks do not collect a deposit that is important for our analysis.

The balance sheet data on those banks are taken from statistical reports of the Banks Association of Turkey¹¹. Therefore, we have $34 \times 15 = 510$ ($N=34$ and $t=15$) observations in our dataset.

The exogenous indicator variable is the Turkish Central Bank short-term (overnight) interest rate which is parallel to Bernanke and Blinder (1992) methodology. Also, the reason for taking the overnight interest rate stems from the fact that the

¹¹ Available at <http://www.tbb.org.tr/net/donemsel/>

CBRT started to implement inflation targeting regime, where short-term interest rates are used as the main policy instruments. However, in order to get a quarterly data to be consistent with banks' balance sheet data, we calculated an average overnight interest rate for every three-month period. This data is taken from the EVDS dataset of the CBRT.

Total assets and total liabilities are defined as the sum of all bank assets and liabilities, respectively.

Liquidity is defined as the ratio of liquid assets to total assets, and is taken as the sum of cash and balances in CBRT, due from banks, other financial institutions and, money market securities.

Capital is proxied by bank equity and capital adequacy ratio (CAR) is calculated as the capital over total assets.

6.2 Estimation Results

The role of the bank lending is at the core of the “bank lending view”, we focus on the empirical analysis on the change in bank loans. In the model, we included all the variables which the empirical literature finds important to explain the loan movements.

Since some bank-specific factors may affect the loan movements such as corporate culture, quality of the managers, governance of the bank, etc., we use the fixed effects estimator so as to include the fixed effects.

As discussed above, lagged values of both dependent and explanatory variables are included in order to allow for dynamic effects for two reasons. First, there is a close banker-customer relationship that develops and may create lock-in effects thus making it costly for the borrower to change a bank. Thus lagged loans affect current loans. Second, monetary policy only impacts lending behavior with a lag due to contractual commitments (e.g. floating and fixed charges on movable and immovable assets, respectively). Hence, lagged values of the explanatory variables may also affect current loans with a lag.

Structured before, our model is:

$$\Delta LN_{it} = \alpha_i + \sum_j \beta \Delta LN_{it} (-1) + \sum_j \gamma \Delta i_{t-j} + \sum_j \delta \Delta i_{t-j} \text{ Dummy} + \theta_j BS_{it-1} + \sum_j TDE_{it-1} + \varepsilon_{it}$$

where ΔLN_{it} is the growth of bank loan of bank i in year t . Δi_{t-j} is the annualized, average weighted, CBRT overnight rate.

BS_{it} includes assets size (A_{it}), liquidity (LQ_{it}), and capitalization (CA_{it}) as the balance sheet strength of the a bank.

TDE is the growth rate of total deposits.

TABLE-8 : REGRESSION RESULTS

Effect of Monetary Policy Shocks on Loan Growth

	Dependent Variable: Growth rate of Total Loans (ΔLN) ^a									
	1	2	3	4	5	6	7	8	9	10
$\Delta LN(-1)$			0.02 (0.34)	-0.01 (-0.23)	0.02 (0.45)	-0.01 (-0.14)	0.02 (0.48)	0.00 (-0.10)	0.02 (0.49)	-0.00 (-0.10)
Δi	-1.13* (-2.49)	-0.87 (-0.17)	-1.10* (-2.29)	-0.05 (-0.10)	-1.10* (-2.25)	-0.04 (-0.07)	-1.11* (-2.28)	-0.05 (-0.10)	-1.08 (-1.88)	-0.11 (-0.17)
$\Delta i(-1)$									-0.02 (-0.03)	0.03 (0.05)
Δi*Dummy		-3.31** (-3.85)		-3.35** (-3.69)		-3.59** (-3.82)		-3.57** (-3.80)		-3.46** (-3.73)
LIQ					-0.01 (-0.60)	-0.00 (-0.27)	-0.00 (-0.63)	-0.00 (-0.30)	-0.02** (-2.93)	-0.02* (-2.55)
LIQ(-1)									0.02** (3.58)	0.02** (3.35)
CAR					-0.01 (0.79)	0.00 (0.10)	0.00 (0.83)	0.00 (0.15)	0.00 (0.13)	-0.00 (-0.35)
CAR(-1)									0.00 (0.59)	0.01 (0.74)
ΔTA					0.26 (1.73)	0.31* (2.03)	0.28* (1.82)	0.32* (2.11)	0.38 (1.78)	0.40 (1.94)
$\Delta TA(-1)$									0.02 (0.10)	0.06 (0.38)
ΔTDE							0.01 (1.48)	0.01 (1.44)	0.01 (1.82)	0.01 (1.75)
$\Delta TDE(-1)$									0.01* (2.41)	0.01* (2.58)
R ² = ***	0.0123	0.0416	0.0160	0.0386	0.0334	0.0569	0.0418	0.0624	0.0684	0.0753
Prob>F****	0.0101	0.0078	0.0207	0.0095	0.0789	0.0290	0.0882	0.0319	0.1165	0.0328

^a Values of t-statistics in parantheses

* Significant at the 5 percent confidence level.

** Significant at the 1 percent confidence level.

*** R² overall value.

**** F test that all u_i=0

Table 8 presents the regression results with different sets of regressors. The main explanatory variables are interest rate and the interaction variable. As mentioned before, our **interaction variable** is defined as the interaction between our dummy (1 if unconstrained, 0 if constrained) and the change in our exogenous indicator -short-term nominal interest rate-. The dependent variable is growth rate of total loans. The first column displays the names of the explanatory variables used in the regressions.

The first regression examines the response of growth rate of total loans to change in the change interest rate (Δi) by simply using Δi as a regressor. As expected, the variable is significant and has a negative sign. This result implies that in very general terms, conventional interest rate channel works for the Turkish economy.

The main question in this analysis is trying to answer is whether capital-unconstrained banks are affected more by the monetary policy actions. To be able to answer this question, as discussed in the previous section, we include the interaction variable which is multiplication of the dummy variable with the Δi . Thus, the coefficient of the interaction variable shows the difference of the response of capital-unconstrained banks (banks with above average capital adequacy ratio) from the response of capital-constrained banks.

The results of the second regression are presented at the third column. The coefficient of the interaction variable is significant at one percent level and the coefficient is negative. With the addition of the interaction variable the coefficient of the

interest rate became insignificant. As expected these results show that capital-unconstrained banks respond significantly more than capital-constrained banks.

The fourth column displays the results of the third regression. The third regression includes the lag of ΔLN as a control variable. Δi is still significant at five percent level with a coefficient of -1.1. In the next regression, the interaction variable is included. The coefficient of the interaction variable is significant at one percent level and the coefficient is negative. When we add the interaction variable the coefficient of the interest rate became insignificant.

The fifth regression includes the lag of ΔLN , liquidity, capital adequacy ratio and change in total assets as control variables. Δi is still significant at five percent level with a coefficient of -1.1. The next column presents the regression with the addition of the interaction variable. The coefficient of the interaction variable is significant at one percent level and the coefficient is negative. Similarly, with the addition of the interaction variable the coefficient of the interest rate became insignificant.

The seventh regression includes the lag of ΔLN , liquidity, capital adequacy ratio, change in total assets and change in total deposits as control variables. Δi is still significant at five percent level with a coefficient of -1.11. Interaction variable is included for the following regression. The coefficient of the interaction variable is significant at one percent level and the coefficient is negative. Similar to the previous results, the coefficient of the interest rate became insignificant when the interaction variable is included..

The ninth regression includes the lag of ΔLN , liquidity, capital adequacy ratio, change in total assets, change in total deposits, and lags of all explanatory variables as control variables. Δi is still significant with a coefficient of -1.08. The last column presents the regression with the addition of the interaction variable. The coefficient of the interaction variable is significant at one percent level and the coefficient is negative and the coefficient of the interest rate became insignificant as before.

The main result that we get out of the regressions is that the response of loans to a monetary tightening at unconstrained banks is a decline more than the capital-constrained banks. Furthermore, when the interaction variable is included in the regression set, the significance of the interest rate decreases. Such a result implies that, the policy instrument of the CBRT (short-term interest rate) is effective only for the banks which have capital adequacy ratio above the sector average. In this context, we may say that the monetary transmission mechanism through bank lending channel have asymmetric effects and this asymmetry stems from the capital adequacy ratio (CAR). Thus, our results provide empirical support for Peek and Rosengren (1995). We used several control variables and tried different interest rates as monetary policy indicators. The regression results are not sensitive to the selection of interest rates. So, we believe that our results are robust and reliable.

CHAPTER 7

CONCLUSION

Improving our understanding of the transmission mechanism has important implications for the conduct of monetary policy by central bank. Apart from traditional interest rate channel and other asset price channels, bank lending channel has an important weight where a significant portion of borrowers are bank-dependent and cannot switch to alternative sources of financing.

The literature predicts that if bank lending channel exists than the response of loans to a tightening (an easing) of monetary policy at unconstrained banks should be to decline (increase) more than at capital-constrained banks.

In this thesis, we provide empirical evidence on the effect of monetary policy changes on loan supply of Turkish banks, using quarterly panel data based on all Turkish commercial banks' balance sheet, during the period of 2003:IV–2006:II. In our analysis, we adopt the model specification of generally applied approach suggested by Kashyap and Stein (1995) with the theoretical assumptions of Peek and Rosengren (1995), to capture the effectiveness of the lending channel for the relevant period.

We found the evidence of bank lending channel of monetary policy, operating through the capital adequacy of the banks. Although banks' loan activity reacts to monetary policy i.e. interest rates, our results show that banks, that have capital adequacy rate above the average capital adequacy rate, respond more to monetary easing than the banks that have less than the average. This result is consistent with theoretical predictions and implies that bank lending channel has meaningful economic power in the Turkish economy.

During the taken period, 2003:IV-2006-II, interest rates had a decreasing trend. Hence, it should be noted as a shortfall of this study while it is not possible to identify a lending channel as motivated by the theory. This shortfall should be taken into account for future research.

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