THE SENSITIVITY OF LOAN GROWTH AND THE EXISTENCE OF BANK LENDING CHANNEL DURING THE NEW REGULATORY ENVIRONMENT IN TURKEY

A Master's Thesis

by
ZEYNEP GÖZDE KUŞAKCIOĞLU

Department of
Management
Bilkent University
Ankara
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The Institute of Economics and Social Sciences
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ZEYNEP GÖZDE KUŞAKCIOĞLU

In Partial Fulfilment of the Requirements for the Degree of
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I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Science in Management.

Assoc. Prof. Dr. Süheyla Özyıldırım

Supervisor

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Science in Management.

Assoc. Prof. Dr. Zeynep Önder

Examining Committee Member

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Science in Management.

Assist. Prof. Dr. Şirin Saracoğlu

Examining Committee Member

Approval of the Institute of Economics and Social Sciences

Prof. Dr. Erdal Erel

Director

ABSTRACT

THE SENSITIVITY OF LOAN GROWTH AND THE EXISTENCE OF BANK LENDING CHANNEL DURING THE NEW REGULATORY ENVIRONMENT IN TURKEY

Kuşakcıoğlu, Zeynep Gözde

M.A., Department of Management

Supervisors: Assoc. Prof. Süheyla Özyıldırım

January 2010

Theoretical framework for monetary transmission mechanism and hence for bank lending channel provides straightforward impacts of monetary policy on aggregate output, however there is a problem of identification for these impacts with aggregate data. Using a two-staged approach, the thesis studies the loan growth sensitivities of banks in the new regulatory system in Turkey and tries to identify a relationship between loan growth sensitivity and monetary tightening. There are six alternative sensitivities tested in the thesis: (1) Liquidity sensitivity of bank loan growth, (2) Income sensitivity of bank loan growth, (3) Liquidity sensitivity of bank loan growth with ownership type of banks controlled, (4) Liquidity sensitivity of large banks loan growth, (5) Liquidity sensitivity of small banks loan growth. (6) Liquidity sensitivity of bank loan growth with foreign affiliation of banks controlled. Results confirm that there exists a positive relationship between liquidity sensitivity of loan

growth of Turkish banks and monetary policy shocks. Results also show that small banks are more liquidity dependent during contradictionary monetary policy periods than large banks. Besides the results parallel to empirical findings in the literature, characteristics of Turkish banking sector are included in the discussion such as the influence of BRSA on banks and the impacts of its regulations. Robustness of the tests are checked with additional econometric models. Hence, the findings suggest that there are evidences on bank lending channel in Turkey for the period 1998-2009.

Keywords: Bank Lending Channel, Liquidity Sensitivity, Loan Growth.

ÖZET

TÜRKİYE'DEKİ YENİ DENETLEME ORTAMINDA KREDİ BÜYÜME HASSASİYETİ VE BANKA KREDİ KANALININ VARLIĞI

Kuşakcıoğlu, Zeynep Gözde

Yüksek Lisans, İşletme Bölümü

Tez Yöneticisi: Doç. Dr. Süheyla Özyıldırım

Ocak 2010

Para aktarım mekanizmasını ve dolayısıyla banka kredileri kanalını oluşturan teorik yapı, para politikalarının ülke üretimine yapacağı etkiler konusunda anlaşılır bir açıklama getirmektedir. Ancak bu etkileri verilerle belirlemek araştırmacılar için bir sorun olmaktadır. Bu tez, iki aşamalı bir ekonometrik yaklaşımla banka kredilerindeki büyüme hassasiyetlerini Türkiyedeki yeni düzenleme ortamında araştırmakta ve para arzındaki daralmalarla banka kredilerinin büyüme hassasiyetleri arasında bir ilişki bulmayı amaçlamaktadır. Tezde incelenen altı alternatif hassasiyet türü vardır: (1) Banka kredi büyümelerinin likiditeye olan hassasiyeti. (2) Banka kredi büyümelerinin nakit akışına olan hassasiyeti. (3) Bankaların mülkiyet türleri kontrol edilerek banka kredi büyümelerinin likiditeye olan hassasiyeti. (4) Büyük bankaların kredi büyümelerinin likiditeye olan hassasiyeti. (5) Küçük bankaların kredi büyümelerinin likiditeye olan hassasiyeti. (6) Bankaların yabancı bankalar ile ortaklıkları kontrol edilerek banka kredi büyümelerinin

likiditeye olan hassasiyeti. Elde edilen sonuçlar, Türkiyede banka kredi büyümelerinin likidite hassasiyetlerinin para arzındaki şoklarla pozitif bir ilişkisi olduğunu onaylamaktadır. Sonuçlar ayrıca, para arzında daralma olduğu dönemlerde küçük bankaların likiditeye büyük bankalara nazaran daha bağımlı olduğunu göstermektedir. Literatürdeki ampirik bulgulara paralel bulguların yanı sıra, BDDK'nın ve BDDK tarafından getirilen düzenlemelerin etkileri gibi Türkiye bankacılık sistemine özgü özellikler de tezde yer almaktadır. Yapılan testlerin güvenilirlikleri başka ekonometrik modellerle test edilmiştir. Bütün bu sonuçlar ışığında, 1998-2009 dönemi için Türkiye'de banka kredileri kanalının var olduğu bulgusuna rastlanmaktadır. *Anahtar Kelimeler:* Banka Kredi Kanalı, Likidite Hassaslığı

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CHAPTER 1

INTRODUCTION

The soundness of the financial institutions is key part of the infrastructure for strong macroeconomic performance and effective monetary policy at the national level. Central banks and governments pay increasing attention to monitoring the health of the financial institutions and markets, and to macroeconomic and institutional developments that pose potential risks to financial stability.

Among the core principles for banking supervision by Basle Committee, the first principle emphasizes that an effective system of banking monitoring and supervision must have clear responsibilities and objectives for each agency involved in the supervision of banks. In most of the developed and developing countries, the governance of the financial system had traditionally been performed by the Central Banks. In addition to several advantage of bank supervision in the Central Bank (Peek et al., 1999; Di Noia and Di Giorgio, 2002), the major disadvantage of assigning to Central banks the joint responsibility for the functions of conducting monetary policy and bank supervision is the conflict of interest argument (Oosterloo and de Haan, 2004; Vilmunen, 2008; De Graeve, Kick, Koetter, 2008). It is mainly argued that a trade-off may exist among monetary stability and stability of banks. For example, monetary authority might wish for higher interest rates (e.g. to maintain an exchange rate peg, to bear down on inflation, or to reduce the pace of monetary growth) while the regulatory authorities are frightened about the

adverse effect such higher rates may have upon the bad debts, profitability, capital adequacy and solvency of the banking system (Goodhart and Shoenmaker, 1992). Since late 1990s, a definitive separation of the monetary and supervisory authorities has become more popular.

Turkey's financial system and its banking sector are virtually synonymous. Since early 2000s, increasing intermediation role of banks and separation of monetary and supervisory authorities in Turkey may create an interest for understanding of the existence of monetary transmission on the real economy not *directly* through the impact of interest rate on the aggregate demand but *indirectly* through shifts in the supply of bank loans. Peek and Rosengren (1995) show that both regulatory and monetary policy could alter the amount of bank lending that affects investments of private firms. Moreover, the findings of this thesis may create more interest considering the fact that as the banking sector opens to foreign entry, policymakers, central bankers and regulatory authorities should be aware of the possibility that business spending may become more volatile and sensitive to their interventions.

Monetary policy and its effects on real economy have long been examined. As a whole, these analyses make up the literature on the monetary transmission mechanism. The patterns of this mechanism by which the changes in monetary policy affect real output are also referred as channels of monetary transmission mechanism and various channels have been identified. One of these channels is the bank lending channel - also called the narrow credit channel. As its name indicates, in this channel, the monetary policy changes affect real output through the channel of bank loans. This channel places emphasis on banks in the economic structure and focuses on loan demand and supply changes when monetary policy changes. Although the name of the channel is narrow, there is a broad literature for this channel and the focus of the thesis is on a specific segment of this literature.

As briefly mentioned above, the main interest of this thesis is to investigate

the bank lending channel of the monetary transmission mechanism in Turkey. This interest is motivated by the developments in Turkish banking system in the past decade: The financial crisis of 2000-2001, rehabilitation programs and regulations operationalized by Banking Regulation and Supervision Agency (BRSA) since 2000, restructuring of state-owned banks and increase in the loan demand/supply in Turkish banking sector. These changes in the sector have led Turkish banks to act in a new regulatory environment with changing dynamics. Therefore, their loan supply and lending strategies have changed to adapt to the new regulatory environment. For example, the share of loans in total assets increased from 27% at the end of 2001 to 48% by December 2009. Government securities, which used to dominate the asset side of the banking sector, were overtaken by loans as an asset class in banks' books during 2005. Hence, the bank lending channel for Turkish banks is an interesting investigation for the decade 1998 to 2009.

Due to new regulation regarding the measurement and assessment of liquidity, liquid assets over total assets is around 30% as of December 2009. However, given the short-run maturity of the banks' funding base and the fact that all banks still have considerable amount of government securities on their balance sheets, liquidity could become a problem in times of systematic stress. Hence, in this study, we aim to understand to what extent is the Turkish banking sector is ready to withstand a monetary shock through credit channel. More precisely, we examine the banking sector's sensitivity to interest rate shocks.

Among different strategies developed to examine the existence of bank lending channel, one group of studies focuses on the loan growth sensitivity of banks (Kashyap and Stein, 2000; Campello, 2002; Cetorelli and Goldberg, 2008). In these studies, the impact of monetary policy shocks on loan growth sensitivities of banks is tested. Bank characteristics are also added to the empirical models. Especially size, liquidity and capitalization are considered to

study the influence of cross-sectional differences among banks on loan growth when there exists a contradictionary monetary policy. Following these studies, the motivation of the thesis is to test loan growth sensitivity of Turkish banks and to study the importance of different bank characteristics for loan growth sensitivity. While conducting these tests, the main objective is to identify the relationship between monetary policy changes and loan growth sensitivities. Another objective is to test significance of different portfolio choices of banks in terms of their loan growth sensitivity. Liquidity and cash-flow proxies will be used in the econometric tests to fulfill this objective. A third objective will be to capture specific conditions of Turkish economy and banking system. In this way, the main objective of this thesis to provide a better understanding of the effects of the new regulatory environment and monetary policy changes on the Turkish banking system will be remained. Control variables and dummy variables will be included in the models with the intention of controlling or emphasizing country specific conditions.

Final objective of the thesis is to test differences between large and small banks in terms of their loan growth sensitivities. Since their portfolios and funding opportunities may differ, there is evidence on small banks' higher sensitivity to monetary policy shocks. Kashyap and Stein (2000) showed that small banks are more sensitive (or dependent) to their liquid funds when there is monetary tightening. Small banks have limited access to external funds in contradictionary monetary policy periods. Hence their possibility to make loan provisions is lower than that of large banks. Large banks, on the other hand, are argued to absorb the impact of monetary shocks since there are alternative funding options for large banks. These options decrease their sensitivity (or dependence) on liquidity, hence the impact of monetary tightening on their loan growth is low or absent.

Alternative models of the thesis utilize the two-staged least squares regression (2SLS) method to achieve the aforementioned objectives. This method

introduced by Kashyap and Stein (2000). The first stage is a cross-sectional regression conducted on bank level data. The aim of this stage is to obtain an *estimate* for sensitivity of banks to a specific bank characteristic.[1] And the second stage links sensitivities of banks with monetary policy changes. This step is a time-series regression hence macroeconomic indicators and monetary policy indicators are regressed on sensitivities obtained in the first step. This two-step identification strategy links monetary policy shocks with loan growths indirectly. Therefore it is not possible to interpret the results obtained from this strategy in terms of the *magnitude* of the impact of shocks. The focus of the strategy is to identify a relationship which is addressed as a "problem" and stated as the premise of Kashyap and Stein's study (2000:408).

Two-stage identification strategy is found to be significant and robust and yields positive relationship between liquidity sensitivity of loan growth and monetary policy changes according to the tests conducted in the thesis. Both the econometric models and robustness checks identify an impact of monetary shocks on liquidity of banks. This relationship cannot be identified for the cash flow sensitivities of Turkish banks. Hence cash flow is found to be less (or not) influential on banks' lending strategies when monetary policy changes. Besides the impact of monetary policy changes on 20 deposit banks, there are differences between large and small banks in terms of their sensitivities. Small banks are found to be more dependent to their liquid funds in contradictionary monetary policy periods than large banks. Hence the results confirm the evidence found in literature. It is also observed that the influence of BRSA in the new regulatory period is significant in most of the econometric models. Overall, the existence of bank lending channel in Turkey is identified within several limitations due to mainly scarcity of data for the period 1998-2009.

[1] Kashyap and Stein (2000) obtain liquidity sensitivities in the first step and Cetorelli and Goldberg (2008) follow them. On the other hand, Campello (2002) uses cash-flow proxy to obtain income sensitivity of banks.

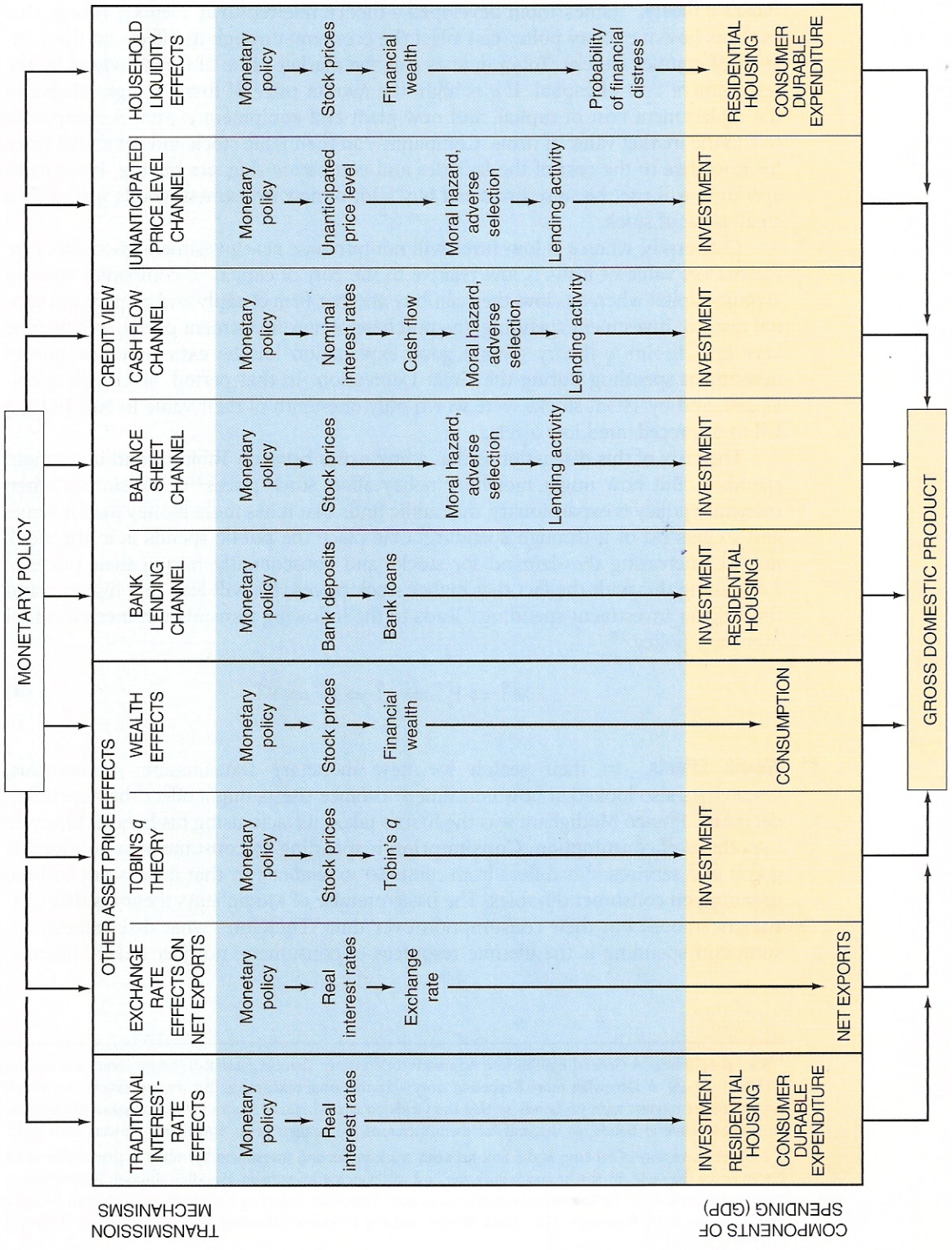
The following chapter reviews literature for monetary transmission channels. Section 2.2, briefly overviews the theoretical framework for bank lending channel and the role of bank characteristics in cross-sectional differences of banks and their loan supply. Chapter 3 overviews the Turkish banking sector and the regulatory environment for period of 1998-2009. Chapter 4 explains the data and methodology and suggests hypotheses and expected results. Chapter 5 summarizes the empirical results and robustness checks. Chapter 6 concludes the thesis with policy implications.

CHAPTER 2

MONETARY TRANSMISSION MECHANISM

Most researchers agree on the significant influence of monetary policy on the real economy. There are evidences on the impact of the changes in monetary policy on real output. (Friedman and Schwarz, 1971) However, there are varying views on which route this impact follows to reach the real output. And these views together define monetary transmission mechanism. The mechanism through which changes in the monetary policy influence the real economy is called *monetary transmission mechanism*. Meltzer's (1995:49-50) explanation for this transmission process is "businesses and households fall into a misperception of past and current actions of monetary policy makers. And they respond to changes with relative price, interest rate, exchange rate and/or output level changes." These relative changes are the *channels* of monetary transmission mechanism. In this section, we first distinguish the channels of monetary policy transmission, then concentrate on narrow lending channel (see Figure 2.1 for summary of these channels).

Figure 2.1: Summary of Monetary Transmission Mechanism Channel



2.1 Monetary Transmission Channels

2.1.1 Interest Rate Channel - Textbook View

The classical view on monetary transmission mechanism advocates that monetary policy changes affect aggregate demand through interest rates. In this view, changes in money supply leads to changes in interest rates. More precisely, when a contractionary monetary policy is pursued, interest rates rise. Hence, the cost of borrowing increases which leads investors to reduce or postpone their investment spending or households to defer consumption. Thereby, the aggregate demand declines and eventually output declines.

$$M \downarrow \Longrightarrow i \uparrow \Longrightarrow I \downarrow \Longrightarrow Y \downarrow \tag{2.1}$$

This channel is implied by the traditional IS/LM model introduced by Hicks in 1937 and takes part in most intermediate macroeconomics textbooks. Besides the supporters, there are strong criticisms on this view:

1. It is found to be very restrictive and mechanical. It is argued that there should be some other changes in the real economy besides the interest rates. (Meltzer, 1995:51)

2. Traditional IS/LM model assumes a two-asset world. Either money is a substitute for financial assets or there is money on one side and real and financial assets on the other. For the latter case, it is still assumed to be a two asset world because real assets and financial assets are assumed to be perfect substitutes. In consequence, textbook view fails to explain major events. Brunner and Meltzer's (1995:446) suggestion is "a joint determination of bank credit, money stock, interest rate and the price level of real assets".

3. It is claimed to be a puzzling reasoning on the impact of short term interest rates and long term interest rates. The impact of short term

rates versus long term rates is unclear. Short-term rates are relevant for the demand of money, and long-term rates are relevant for investment and capital accumulation. In the model, it is not clear whether the single rate is short-term or long-term interest rate.

4. There is no role for financial intermediaries.

5. Many of the changes in short term interest rates are transitory disturbances that do not affect spending decisions. However, IS/LM model does not capture these transitory movements.

6. Interest rate view assumes no externalities or market imperfections. In this view, the least productive investments are postponed or left unfunded. However, this is not the real case, there is some degree of market imperfections that cause wrong investments to be made or productive investments to left unfunded (Cecchetti, 1994:5).

2.1.2 Exchange Rate Channel

Globalization and emergence of flexible exchange rates give rise to significant impact of exchange rates on the economy, since net exports and economic output are influenced by exchange rates. Thus, higher attention has been paid on the exchange rate channel in monetary transmission mechanism literature. Exchange rate channel is related with interest channel because the rise in interest rates triggers currency appreciation:

$$M \downarrow \Longrightarrow i \uparrow \Longrightarrow E \uparrow \Longrightarrow NX \downarrow \Longrightarrow Y \downarrow \tag{2.2}$$

where $E \uparrow$ is the appreciation of the domestic currency. Net exports decline as E increases, because domestic currency is now more valuable and this increases the value of domestic goods. Domestic goods become more expensive relative to foreign goods, thereby net exports decrease and causes aggregate

demand and output to decrease. Taylor's study (1995) concentrates on the large impact of short term interest rates on exchange rates.

2.1.3 Tobin's-q Theory

Tobin (1969) discusses the impact of equity prices on transmission process:

$$M \downarrow \Longrightarrow P_e \downarrow \Longrightarrow q \downarrow \Longrightarrow I \downarrow \Longrightarrow Y \downarrow \tag{2.3}$$

where P_e is the equity price and q is the ratio of market value of firms to replacement cost of capital. Tobin argued that equity prices fall when money supply declines. Since investors have less money than they desire to have, they compensate by postponing or reducing investment spending. Thus, equity demand falls which lowers equity prices. From the Keynesian viewpoint, contractionary monetary policy causes interest rates to increase as in interest rate channel. Therefore bonds become more attractive than alternative equities. Hence, equity prices decline due to a decrease in equity demand. Hence both views expect a fall in equity prices.

Impact of q is the core interest of Tobin's study. When q is high, new plants and equipments are cheaper relative to the market value of business firms. Businesses choose to invest and thereby $I \uparrow$. On the other hand, when q is low, market values of firms are cheaper relative to new plants and equipments. Businesses find it more profitable to buy existing firms than investing in new plants and equipment. Hence, $I \downarrow$. When there is monetary tightening, P_e falls and since the nominator of q is market value of firms, decline of equity prices reduces q. As a result, aggregate output declines.

2.1.4 Wealth Channel

Wealth channel is parallel to the Tobin's q theory because it also focuses on the impact of equity prices on real economy. Modigliani (1971) raised the

question of wealth effect on monetary transmission mechanism as follows:

$$M \downarrow \Longrightarrow P_e \downarrow \Longrightarrow \text{wealth} \downarrow \Longrightarrow C \downarrow \Longrightarrow Y \downarrow \tag{2.4}$$

Wealth channel argues that consumption level of people is determined by the "lifetime resources", which is made up of human capital, real capital and financial wealth. As it is discussed in the Tobin's q theory, contradictionary monetary policy yields equity prices to fall. Such a decline shrinks the current wealth level since a major component of financial wealth is common stocks. To compensate, consumers lower their consumption expenditures and hence, aggregate output decreases. (Mishkin, 1995: 6-7)

Meltzer (1995) extends the impact of monetary policy on wealth level with land and property values which is supported by Japanese experience in the 1980s and 1990s. Meltzer suggests that contractionary monetary policy can lead a decrease in land and property values, which causes wealth of consumer to decrease. Thereby consumption and aggregate output decline. Accordingly, P_e in schematic view in wealth channel and Tobin's q theory equally applies to residential housings.

2.2 Credit View

Previous channels discussed are referred to as "money view" since monetary policy impact is mainly based on the interest rate and asset price effects. Limiting monetary transmission mechanism with the interest rate effects led researchers to make alternative explanations based on the asymmetric information in financial markets. Credit view proposes two channels for monetary transmission mechanism that are influenced by the information problems. One of the channels operates through the effects of balance sheets and income statements of businesses and households, including net worth, cash flow and liquid assets - in some sources it is referred to as *"broad credit channel"*.

Section 2.2.1 discusses different channels of balance sheet effects. Other credit channel operates through bank lending and it is refereed as *"narrow credit channel"* and it is the main interest of the thesis. Section 2.2.2 reviews bank lending channel literature.

2.2.1 Broad Credit Channel

Balance Sheet Channel

Balance sheet channel works through the net worth of firms. Contractionary monetary policy causes equity prices to decrease (as explained in Section 2.1.3). Hence net worth and creditworthiness of the firms fall. With lower net worth, lenders have less collateral for their loans; therefore firms face difficulties in borrowing due to increased adverse selection problems. Parallel to adverse selection, moral hazard problems also increase since firms have higher incentive to choose risky projects since their equity stakes shrink. When adverse selection and moral hazard problems arise, likelihood of banks to have higher amounts of nonperforming loans also increases. Therefore, lending decreases which leads investment to decrease. Hence aggregate output declines.

$$\begin{aligned} M \downarrow \Longrightarrow P_e \downarrow \Longrightarrow \text{adverse selection} \uparrow \Longrightarrow \\ \text{moral hazard} \uparrow \Longrightarrow \text{lending} \downarrow \Longrightarrow I \downarrow \Longrightarrow Y \downarrow \end{aligned} \tag{2.5}$$

Kuttner and Mosser (2002:17) discuss balance sheet channel as "financial accelerator" effect (referred to Bernanke et. al., 1999 study) :

> *In "frictionless" credit markets, a fall in the value of borrowers' collateral will not affect investment decisions; but in the presence of information or agency costs, declining collateral values will increase the premium borrowers must pay for external finance, which in turn will reduce consumption and investment. Thus, the impact of policy-induced changes in interest rates may be magnified through this "financial accelerator" effect.*

Financial accelerator model of Bernanke et al. (1999) also provides basis for cash flow channel which is discussed in the next section.

Cash Flow Channel

Since a rise in the interest rates causes interest expenses of the borrower to increase, which causes productivity, and in turn output to decrease and firm's cash flow to decline. Lower cash flow increases the dependence of firms to external funds because of a decrease in internal finance strength. This increases the expected agency costs (adverse selection problems) and moral hazard problems. Therefore the premium[1] that must be paid by the firms for external funds increases. Thereby lending decreases as explained in "financial accelerator model" and in turn investment and aggregate output decrease.

$$M \downarrow \Longrightarrow i \uparrow \Longrightarrow \text{cash flow} \downarrow \Longrightarrow \text{adverse selection} \uparrow \Longrightarrow$$
$$\text{moral hazard} \uparrow \Longrightarrow \text{lending} \downarrow \Longrightarrow I \downarrow \Longrightarrow Y \downarrow \tag{2.6}$$

Although most of the studies investigate this *direct* effect of monetary policy changes on cash flow, Bernanke and Gertler (1995: 36) underlines a plausible *indirect* effect of contractionary monetary policy on cash flow of firms. Since a tight monetary policy influences consumer spending (due to cost-of-capital or balance sheet reasons) in a negative way, revenues and profits of firms decrease. But since there are fixed costs including wage and interest payments, there appears a financial gap. Thereby the net worth and creditworthiness of firms decrease and cause to investment spending to decrease.

[1] *External Finance Premium* defined by Agénor (2004) as: The wedge between the cost of funds raised externally (the bank lending rate for most firms in developing countries) and the opportunity cost of internal funds (or retained earnings) which could be an interest rate on government bonds, the bank deposit rate, or the foreign rate of interest." (page 138)

Household Liquidity Effects

In liquidity-effects view, unwillingness of consumer to spend is influential on the aggregate output:

$$\begin{aligned} M \downarrow \implies & P_e \downarrow \implies \text{financial assets} \downarrow \implies \text{likelihood of financial distress} \uparrow \\ \implies & \text{consumer durable and housing expenditure} \downarrow \implies Y \downarrow \end{aligned} \tag{2.7}$$

In this model, decreased value of equity prices due to a contractionary monetary policy yields the value of financial assets to fall. This situation causes consumers to expect financial distress since they feel insecure. The expectation of financial distress leads consumers to hold liquid assets because in financial distress periods, their illiquid assets will be sold with large losses and it is irrational to invest on illiquid assets. Hence consumption on durables and housing expenditures fall. Aggregate output declines since consumption declines. This effect has been found to be the important factor during the Great Depression period (Mishkin, 1978). The main difference between liquid and cash-flow views is that it is not the lenders who are unwilling to lend to consumers but the consumers who are unwilling to spend.

Unanticipated Price Level Channel

Mishkin (2006) underlines the third balance sheet channel that can be observed in industrialized economies which operates through general price level. An unanticipated decline in the price level due to monetary tightening may be influential on the net worth of the firm. Since debt payments are contractually fixed in nominal terms in industrialized countries, unanticipated decline in price leads real value of debt to rise, but the real value of assets

remain unchanged.

$$\begin{aligned} M\downarrow \implies & \text{ unanticipated P}\downarrow \implies \text{adverse selection}\uparrow \implies \text{moral hazard}\uparrow \\ \implies & \text{ lending}\downarrow \implies I\downarrow \implies Y\downarrow \end{aligned} \tag{2.8}$$

Hence, net worth of the company decreases which causes moral hazard and adverse selection problems to arise.

2.2.2 Narrow Credit Channel - Bank Lending Channel

The idea of bank lending channel originates from the significant role of banks in the financial system. Since banks specialize in overcoming informational problems and other frictions in credit markets, they are the principal source of external finance in many countries. This dominance is more obvious especially for small and medium-sized borrowers, because their access to stock market is generally limited. Following a monetary tightening, banks' ability to offer lending may decline due to a decline in bank reserves:

$$M\downarrow \implies \text{bank reserves}\downarrow \implies \text{bank loans}\downarrow \implies I\downarrow \implies Y\downarrow \tag{2.9}$$

Decline in bank reserves may result from the restrictions on banks' external funding as explained in broad credit channel section 2.2.1. A contractionary monetary policy may reduce the net value and/or cash flow of the banks, hence external financing may become as challenging for banks as for any firm. This may restrict banks' ability to offer loans, and cause a shift in loan supply - this phenomenon is also referred to as *"credit crunch"*. As bank loans decrease, investment of bank-loan-dependent firms will also decline (as the external funding premium increases) and in turn aggregate output will decline.

For highly credit-worthy borrowers, including large firms, it may be possi-

ble to substitute bank loans with other means of external financing since their access to credit markets is easier. But for small borrowers and individuals this shift may not be an alternative.

In bank lending channel view, *a* three-asset world is assumed, which aims to explain circumstances that cannot be captured by the classical money view's two-asset world. Three assets of the view are *money, bonds* and *bank loans*. Kashyap and Stein's (1994: 2) observation on these assets are that they are different from each other and they need to be accounted for separately when analyzing the impact of monetary policy shocks. Hence, perfect substitution assumption is abandoned in bank lending view.

Criticisms on Bank Lending View

There are two necessary conditions that must hold for bank lending channel to be present distinctively and they are exposed to critiques. The first condition is as follows:

> *Spending or investment of some households or firms depends on bank loans.*

Meltzer's (1995: 65) criticism mainly on the word "depends". Since it is agreed on the importance of banks on external financing for small firms, this proposition is doubtful if "depends" means "the only source of financing". In that case, it should be remembered that there may be alternative lenders including credit cards, finance companies, trade credit, venture capitalists, families and others. Therefore Meltzer (1995:65) suggests using the word "depends" in the meaning of "the principal source of external funds". A detailed discussion on "bank-dependence" and "intermediary-dependence" in Kashyap and Stein (1994) is also criticize the first necessary condition and reach a similar result to Meltzer (1995).

The second condition is as follows:

> *Monetary policy shifts the banks' supply of loans relative to the other types of credit.*

Critics of this condition raise the question "*Why do banks prefer to reduce loans more than proportionally to their loss of reserves but not to borrow or sell securities to compensate?*". Bank lending view explains this shift with the reduced net worth of banks and disproportionate effects on small borrowers (Broad credit channel effects). But this explanation is found to be shallow since the effect of monetary policy changes on banks' net worth is generally small. Critics argue that banks compensate losses with the gains from private agents. For example, Romer and Romer (1990) points out that to the extent that there exist substitutes in bank portfolios for reservable deposits such as certificate of deposits (CDs), this specific channel could be weak to non-existent.Therefore this proposition is doubtful for some researchers.

The Role of Bank Characteristics

Critiques on Proposition 2 lead bank lending literature to focus on cross-sectional differences between banks with the intention of discriminating among loan supply and loan demand movements. Gambacorta (2004: 1740) explains this strategy with:

> *... the hypothesis that certain bank-specific characteristics (for example size, liquidity, capitalization) influence only loan supply movements while bank's loan demand is independent of these characteristics. Broadly speaking, this approach assumes that after a monetary tightening the drop in the availability of total deposits (which affects banks' availability to make new loans) or the ability to shield loan portfolio is different among banks.*

This relatively new approach claims that small and less capitalized banks face higher costs in raising "non-secured" deposits since they suffer from higher degree of informational frictions in financial markets. Therefore they are obliged to reduce lending more. Likewise, illiquid banks are argued to

be exposed to stronger impacts of contractionary monetary policy on lending because of drawing down cash and securities. Hence it is expected that these banks are more sensitive to monetary policy changes. Agénor (2004: 121) interprets this aspect in general: "... weaknesses in the banking system distort the transmission process of monetary policy because banks that are less able to control their balance sheets will be less responsive to changes in interest rates..." The characteristics of banks which increase their sensitivities to the monetary policy changes are one of the main interests of current bank lending literature.

This literature is different from the studies investigating the macroeconomic impact of bank lending channel on loans. Instead, it "claims the existence of such channel upon the fact that a different response of lending supply among banks is detected" (Gambacorta, 2004: 1740).

Next section summarizes empirical studies of the literature and focuses on bank characteristics that are included as independent variables in the models.

2.3 Empirical Evidence On Bank Lending Channel

The model proposed by Bernanke and Blinder in 1988 was the pioneer study that proposes an alternative model to classical IS/LM model. In Bernanke and Blinder's model, IS curve replaced with CC curve (stands for commodities and credits. The CC/LM model led many researchers to inquire evidence on bank lending channel. To this end, alternative models proposed (including Bernanke and Blinder (1992), Kashyap et. al. (1993)) and the existence of this channel, initially, has been searched for US economy. Time-series relationships were estimated in most of the studies to distinguish shifts either by loan demand or loan supply. However, there are problems in distinguishing these shifts and explaining long-term responses of loan supply to monetary

tightening. Consequently, researchers have begun to focus on bank characteristics for individual effects of bank lending (Kashyap and Stein, 2000; Kishan and Opiela, 2000).

There are vast about of empirical studies in this literature for several countries (see some of these in Table 1).[2] These evidence are chosen to emphasize several bank characteristics used in the literature. The common dependent variable of the chosen studies is annual loan growth.[3] As seen in Table 1, there is negative impact of monetary policy indicator on lending growth. Monetary policy (MP) indicators are generally short-term interest rates in most of the studies. However, there are also some studies especially in US, that use different measures such as Romer dates as in (Romer and Romer, 1989), Boschen-Mills index as in Boschen-Mills (1995), measures developed by Bernanke and Mihov (1998) by Strongin (1995).

Besides monetary policy, other economic indicators such as GDP growth, inflation rate were included in the models to control the macroeconomic impacts on bank lending. Three most common bank specific variables are *size, liquidity and capitalization.* Although there are alternative balance-sheet items as shown in Table 1, these three bank characteristics are common in almost all studies. Securitization and multibank holding company affiliations were tested in recent studies of Altunbas (2009) and Ashcraft (2006), respectively.

There is a segment of literature that adopted the two-stage empirical strategy which is first introduced by Kashyap and Stein in 2000 and followed by Campello (2002) and Cetorelli and Goldberg (2008). This two-stage strategy is different from most of the studies in the literature that combine bank level data and aggregate data to estimate at one stage. It links annual loan growth with monetary policy shocks indirectly. The first step of the strat-

[2]See Kashyap and Stein (1997) and Bean, Larsen, Nikolov (2002) for a brief surveys.

[3] Only in Brissimis and Delis (2008), the dependent variable is spread between lending rate and bond rate.

Table 2.1: Empirical Evidence on Bank Lending Channel. Dependent variable is Annual Loan Growth

	Gambacorta (2004)	Ehrmann (2001)	Cavusoglu (2003)	Ashcraft (2006)	Brissimis, Delis† (2008)
Country	Italy	France, Spain Germany, Italy	Turkey	U.S.	Greece‡
Method	GMM	GMM	GMM-SYS	OLS	2SLS
Sample	All Banks	National Banks	Deposit Banks	Commercial Banks	All Banks
Independent Variables:					
Lag of Annual Bank Growth			- *		+ **
Change in Reserve Requirement Ratio			n. sig.		
Government Security Stocks/Total Assets			n. sig.		
Shareholder's Equity + Income + Borrowed Funds			+ **		
Security Portfolio/Total Assets			+ **		
Government Security Stocks			+ **		
Monetary Policy Indicator	- ***	- ***			
GDP growth		+ ***			
Inflation Rate		+ *			
Size	n. sig.	+ ***		sig.	+ **
Liquidity	+ ***	n. sig.			+ **
Capitalization	n. sig.	n. sig.		sig.	+ **
Real EX Devaluation					
Term Spread					
Deposits					- **
Lending minus bond rate (lagged)					+ ***
Securities				sig.	
Expected Default Frequency					
Loan Loss Provision/Total Assets					
Affiliation w/ Multibank Holding Co				sig.	
Binding Leverage				sig.	

*: significant at 10% level, **: significant at 5% level, ***: significant at 1% level, n. sig.: tested but insignificant. sig: Significant but level has not reported. †: Dependent variable is the spread between lending and bond rate. ‡ This is a cross-country analysis which includes France, Germany, Greece, Japan, UK and USA, however, for compactness of the table, only results for Greece displayed.

Table 2.1 (cont'd): Empirical Evidence on Bank Lending Channel. Dependent variable is Annual Loan Growth

	Alfaro et. al. (2003)	Wrobel, Pawlowska (2002)	Altunbas et. al. (2009)	De Haan (2001)	Aktas, Tas (2007)
Country	Chile	Poland	20 Euro Area Countries	Netherlands	Turkey
Method	GMM	GLS and Fixed Effects	GMM	Two Step GMM	Fixed Effects
Sample	Native Banks	Commercial Banks	Commercial Banks	All Banks	Commercial Banks
Independent Variables:					
Lag of Annual Bank Growth		⋆	- ***		n. sig.
Change in Reserve Requirement Ratio					
Government Security Stocks/Total Assets					
Shareholder's Equity + Income + Borrowed Fund					
Security Portfolio/Total Assets			+ ***		
Government Security Stocks					
Monetary Policy Indicator		⋆	- ***	- ***	- *
GDP growth	n. sig.	⋆	+ ***	+ ***	
Inflation Rate		⋆		+ **	
Size	n. sig.	+ ***	- ***	- ***	+ *
Liquidity	n. sig.	+ ***	+***		- **
Capitalization	n. sig.	+ ***	+ ***		n. sig.
Real EX Devaluation	n. sig.				
Term Spread	n. sig.				
Deposits					n. sig.
Lending minus bond rate (lagged)					
Securities					
Expected Default Frequency			- ***		
Loan Loss Provision/Total Assets			- ***		
Affiliation w/ Multibank Holding Co.					
Binding Leverage					

*: significant at 10% level, **: significant at 5% level, ***: significant at 1% level, n. sig.: tested but insignificant. sig: Significant but level has not reported.

⋆: Tested but not reported in the paper.

egy is to cross-sectionally test data and to obtain estimates for sensitivities on particular bank characteristic. This characteristic is considered to be influential on bank's reaction to monetary tightening. In other words, it is expected that monetary tightening will affect the sensitivity (or dependence) of banks to that characteristic (for example liquidity) and in turn their internal funds will be affected. This will also cause loan growth of banks to change. Due to the fact that the regression coefficients (sensitivities) obtained from the first step generate time-series data, they are included in a second stage (time-series) regression. The second stage regression searches for a relationship between banks' sensitivities and monetary policy shocks and other macroeconomic indicators.

Kashyap and Stein (2000) used two-step strategy to identify a bank lending channel in US economy during the period of 1976-1993. They found evidence on bank lending channel and emphasized that "...Within the class of small banks, changes in monetary policy matter more for the lending of those banks with the least liquid balance sheets." Following them, Campello (2002) focused on income-sensitivity of loan growth especially for small banks. More precisely, he categorized small banks which act alone and which affiliate with a global bank and showed that the impact of monetary policy shocks is stronger on stand-alone small banks than on affiliated small banks. Therefore the dependence (sensitivity) of stand-alone banks to their own cash-flow is higher when there is a monetary tightening.

Cetorelli and Goldberg (2008) also adopted Kashyap and Stein's identification strategy to test the influence of globalization on the transmission of monetary policy. Their main variable for the first stage is liquidity. Their results suggest that banks with higher global access to external funds are less dependent to liquidity when there is monetary tightening since they have a unique ability to activate their internal sources using their foreign offices. Whereas, banks with less global connections are more dependent on liquidity

when there is a monetary policy shock.

In this thesis, the studies by Kashyap and Stein (2000), Campello (2002) and Cetorelli and Goldberg (2008) are taken as a roadmap and their methodologies are adopted to Turkish data to understand the sensitivity of Turkish commercial banks on monetary shock during the period 1998:Q1-2009:Q1.

CHAPTER 3

RECENT DEVELOPMENTS IN TURKISH BANKING SECTOR AND REGULATORY ENVIRONMENT

Following the crises in 2001 and the restructuring process, Turkish banking sector showed a rapid growth performance in 1998- 2009 period. The total assets raised from USD 45 million USD to 464 billion billion USD, their ratio to GDP from 57 percent to 81 percent. The share of loans in total asset increased from 38.0 percent in 1998[1] to 54.0 percent in 2008, and loans to GDP ratio increased from 9.4 percent to 40.1 percent (see Figure 3.1). The financial sector is still at the stage of growth. It is small and shallow when compared with the financial sectors of developed countries.

In the banking sector, there are 45 banks at September 30, 2009. The system underwent substantial consolidation in the past ten years, shrinking down from 80 banks at September 30, 2000. This drop was mainly due to the failure and the transfer of about 20 banks to the Savings Deposit Insurance Fund (SDIF), but also some mergers in recent years. As seen in Table 3.1, the number of banks declined to 61 as of December 31, 2001. The

[1] In 2001, due to financial crisis, total loans to total asset decreased to 26.5 percent.

Figure 3.1: Financial Depth (1998-2009 period)

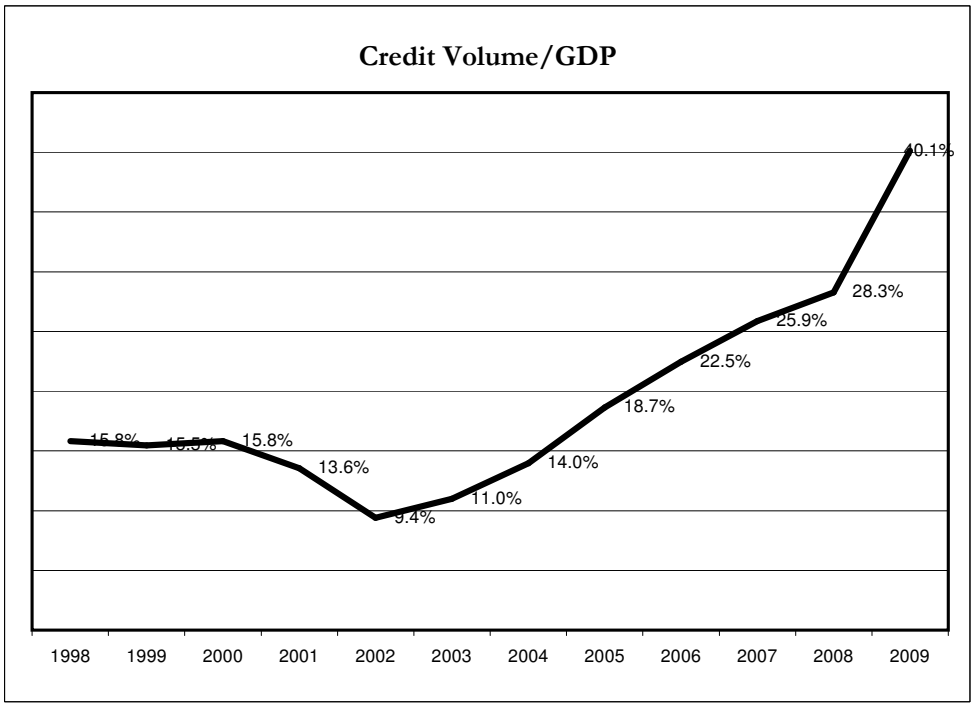


Table 3.1: Number of Banks in 1998, 2001 and 2009

	1998		2001		2009	
	Number		Number		Number	
	Banks	Branches	Banks	Branches	Banks	Branches
Deposit Bank	60	7340	46	6889	45	8991
State-owned	4	2832	3	2725	2	2530
Private	38	4393	22	3523	11	4390
SDIF	-	-	6	408	1	1
Foreign	18	115	15	233	17	2070
Non-depository Banks	15	30	15	19	13	45
State-owned	3	12	3	4	3	19
Private	9	14	9	12	6	12
Foreign	3	4	3	3	4	14
Total	75	7370	61	6908	45	8790

Source: TBA. SDIF stands for banks in the Savings Deposit Insurance Fund.

bank failures and the transfer of these failed banks to SDIF were mostly between the periods of December 1999 to November 2001.[2] Nevertheless, the system was considered to be overbanked even in 2001 and the total number of banks declined to 45 as of 2009 (32 out of the current 45 banks are deposit banks). There has been no regional bank in Turkey since 1980s and hence, all banks conduct their banking activities through nation-wide branches. As also seen in Table 3.1, over the period of 1998-2009, the total number of branches increased significantly especially for private banks (domestic and foreign private banks). Recent acquisitions of small-scaled domestic private banks by foreign banks increased the number of branches of the foreign banks.

In terms of funding and liquidity structure of the Turkish banks, the numbers are more stable. Total deposits rose from 77 million USD in 1998 to 298 billion USD in 2008. Total deposits to total assets ratio declined from 66.0 percent in 1998 to 64.0 percent in 2008. The liquidity of the Turkish banking sector is considered to be satisfactory. As compared to developed countries, this ratio is quite high since customer deposits have historically been the most important funding source of Turkish banks. Yet, the introduction of several other new financial instruments such as mutual funds, pension funds,

[2]See Saving Deposit Insurance Fund Annual Report, 2000 from www.tmsf.org.tr.

stabilized this ratio to be around 60 percent over time. During the period 1998-2009, the liquid asset to total asset ratio was also steadily: 32.0 percent in 1998 to 30.2 percent in 2008. To test the existence of monetary transmission in Turkey, the level of liquidity and deposit funding of banks are two main balance sheet items that would be used.

Financial sector reform began with the establishment of the Banking Regulation and Supervision Agency (BRSA) in August 2000. Members of staff from the banking supervision departments at the treasury and the Central Bank were transferred to the BRSA, including staff of the SDIF, which became a legal entity administered by the BRSA. The BRSA is in charge of the regulation and supervision of the banking sector. It is an independent body established by the Banks Act and came into force in June 1999.

The mission of the agency is "...to provide confidence and stability in the financial markets, ... to ensure active operating of the credit system..."[3] Steinherr et. al. (2004) discuss the role of BRSA in rehabilitating banking system after crisis extensively . In May 2001, BRSA formulated and executed a rehabilitation program in consultation with IMF and World Bank and took a four-prong approach:

- restructuring state-owned banks,
- resolving banks taken over by the Savings and Deposits Insurance Fund,
- strengthening the financial structure of private banks,
- improving the regulatory and supervisory framework.

Steinherr et al. (2004) argue that state banks were restructured in the early phases of the program, however rest of the rehabilitation were relatively slow. In addition to the financial and operational restructuring of these banks, all adopted legislative amendments promoted efficiency and competition in

[3]Source: http://www.bddk.org.tr/WebSitesi/english/About_Us/About_BRSA/5804BRSA_Info_Booklet_31_07_2009.pdf

the whole banking sector. Following sound banking practices established confidence in the sector. Thus, lending activities of the Turkish banks in this new closely regulated environment grew steadily.

Government intervention takes important role in monetary transmission mechanism (Agénor, 2004; Kamin et al., 1998). It has been argued that besides the direct intervention of monetary authorities (government or central bank), regulations and supervisions exert influence on financial system. There are evidence of prudential regulations in emerging market economies including India, Hong Kong, and Argentina that is discussed in detail by Kamin et. al. (1998). These regulations have incentive or disincentive role in the conduct of monetary policy and there are objections and appreciations for regulations in the context of the economic situation.

Especially after financial crisis in 2000-2001, the measures taken by the Central Bank and BRSA against the increase in domestic and global financial risks have helped the banking sector to maintain healthy functioning in Turkey. More precisely, the main structure and the duties of the Central Bank have been altered considerably through a series of legal arrangements effected as of April 2001. By virtue of an amendment introduced to the Law, the Central Bank is rendered independent with regard to the use of monetary tools such as overnight rates. In this thesis, it is aimed to understand whether Turkish banks are sensitive or less sensitive to monetary policy changes during the period of stable monetary policy and stable banking operations

CHAPTER 4
DATA AND METHODOLOGY

4.1 Data

In the econometric analysis of this thesis, quarterly data are used for the period 1998:Q1-2009:Q1. The beginning period is selected according to the availability of quarterly banking data by Turkish Banking Association. Moreover, this period covers the whole new era with new regulatory agency in Turkey.

As explained in Section 3, several bank characteristics play a significant role on the transmission of monetary policy on bank lending. These bank level data are obtained from *Statistical Reports* provided by *The Banks Association of Turkey* (www.tbb.org.tr). As of December 2009, 32 deposit banks are reported to be active in the financial system. Total number of bank branches is 8,991 with total of 167,064 employees. Among these 32 deposit banks, 20 of these banks are selected for analysis.[1] These banks constitute 95.52% of the total banking assets, 95.18% of the loans provided and 99.10% of the total deposits collected. There are also non-deposit banks in Turkey known as investment and development banks and participation banks. In addition to their small share in banking, these banks are excluded in the analysis since their funding structure is different than deposit banks.

[1] Although it is not currently active, balance sheet items of Koc Bank for period 1998Q1-2006Q2 are included in the data set. Koc Bank has merged with Yapi Kredi Bankasi in the third quarter of 2006.

Table 4.1: Descriptive Statistics for Selected Balance Sheet Items of 20 Banks

	Mean	Std. Dev.	Min	Max	Obs.
Total Loans (US million)	4,215.82	6,595.53	13.47	37,751.08	890
Liquid Assets (US million)	4,527.57	7,817.85	13.20	50,567.94	890
Total Assets (US million)	10,312.34	14,626.52	38.83	74,974.12	890
Liquid Assets/Total Assets	0.41	0.15	0.05	1.00	890
Capital Ratio (%)	0.12	0.06	-0.03	0.95	890
Net Income/Total Loans	0.05	0.13	-1.54	1.44	890

Summary statistics for balance sheet items of banks chosen are presented in Table 4.1. Bank size, liquidity and capitalization are the three most common bank characteristics in bank lending channel.[2] On average, banks in the sample hold 41 percent of their portfolio as liquid assets. Their capital-to-assets is 12 percent and cash flow proxied by net income-to-total loans is 5 percent.

As mentioned in Section 2, size is another important characteristic of banks that may influence the impact of monetary shocks on bank lending. More precisely, the impact of monetary policy shock is different among small and large banks. In the empirical analysis, seven banks are selected as large banks according to their total assets where three of them are state-owned banks. These seven banks are determined arbitrarily, since there is an obvious difference between top seven banks and the rest of the banks in terms of their total assets.[3] Remaining thirteen banks are categorized as small banks. As seen in Table 4.2, capitalization, liquidity and cash flows for small and large banks are, on average, similar characteristics as in the full sample.

Not only the bank level data but macroeconomic data are also used in the empirical study. To this end, nominal GDP growth rates are collected from Turkish Statistical Institute. The monetary policy indicator is quarterly nominal overnight rates that are announced by Central Bank of Republic of Turkey. Alternative measures of monetary policy indicator do not exist in

[2]The description of the the bank characteristics is included in Data Appendix.

[3]For example, the "smallest" bank among large banks group is Halkbank and its total asset size is 51,096 million TL whereas the "biggest" bank of the small banks group (Finansbank) has a size of 26,573 million TL. (As of December 2008 - source: www.tbb.org.tr)

Table 4.2: Descriptive Statistics for Large and Small Banks

Large Banks:	Mean	Std. Dev.	Min	Max	Obs.
Total Loans (US million)	8,982.32	8,833.73	671	37,751	314
Liquid Assets (US million)	10,775.77	10,343.65	578	50,568	314
Total Assets (US million)	23,615.46	17,571.87	4,041	74,974	314
Liquid Assets/Total Assets	0.42	0.16	0.05	0.79	314
Capital Ratio (%)	0.11	0.04	0.02	0.25	314
Net Income/Total Loans	0.05	0.12	-0.77	0.88	314
Small Banks:	Mean	Std. Dev.	Min	Max	Obs.
Total Loans (US million)	1,604.60	2,321.05	13.47	14,078	576
Liquid Assets (US million)	1,006.67	978.29	13.20	6,562	576
Total Assets (US million)	3,024.54	3,479.25	38.83	19,958	576
Liquid Assets/Total Assets	0.41	0.15	0.09	1.00	576
Capital Ratio (%)	0.13	0.06	-0.03	0.95	576
Net Income/Total Loans	0.05	0.13	-1.54	1.44	576

Turkey for the time period studied in this thesis. Overnight rate is the most common variable used since it is controlled by monetary authority (Central Bank) in most of the countries. There are also supportive comments on overnight rate as a monetary policy indicator. For example, Agénor (2004: 131) constructs a base to his arguments with the following sentence: "*The discussion throughout focuses on the case of a country ..... where the operational target for monetary policy is an* ***overnight interest rate****, which the central bank controls by affecting commercial banks' liquid reserves through repurchase and reserve repurchase agreements...*"

Hence, overnight rate is used in the time-series regression of this thesis. Figure 4.1 presents the quarterly graph of overnight rate. There is a sharp peak in the financial crisis period (2000:Q3-200:Q1), but except for that period, figures are steadily declining over the 10% - 30% interval. A relatively small fluctuation can be observed in 2006:Q3 which is an outcome of the Monetary Policy Meeting in June 2006 (see Figure 4.2 for closer look at this peak). Researchers on Turkish inflation place emphasis on this meeting, including Basci et. al. (2008) and Brooks (2007). Therefore an additional test will be conducted to analyze the influence of this meeting, as explained in the

next section.

4.2 Methodology

The empirical model is based on Kashyap and Stein (2000)'s two-step strategy. This model was then utilized and refined by Campello (2002). The strategy includes estimation of cross-sectional sensitivities of loan growth to bank specific variables at each quarter in the first step. Therefore, cross-sectional regressions for each quarter are conducted separately for banks indexed by i. In this step, there is a variable of interest among independent variables. In this way, research focuses on the sensitivity of loan growth to one specific bank characteristic. For Campello's study, income from operations (or cash flow) is the characteristic of interest. Another study that follows Kashyap and Stein and Campello is the paper by Cetorelli and Goldberg (2008). Different from Campello, in this research the characteristic of interest is the liquidity of banks. More precisely, global banks that may have fewer problems in terms of liquidity, argued to be less sensitivity to monetary shocks.

The purpose of the first regression is to collect the coefficient estimates of the chosen variable for each quarter and then regress them in the second step. Second step is dealing with monetary shocks; therefore it is a time-series regression. Similar to Campello (2002) and Cetorelli and Goldberg (2008), the lagged values of monetary policy indicator and lagged value of GDP growth will be the two main variables in the second-stage. Following subsection includes alternative models for the first step.

4.2.1 Step 1

Alternative Model 1

The first alternative model is similar to Cetorelli and Goldberg (2008) in

Figure 4.1: Overnight Rate in Turkey (1998-2009 period)

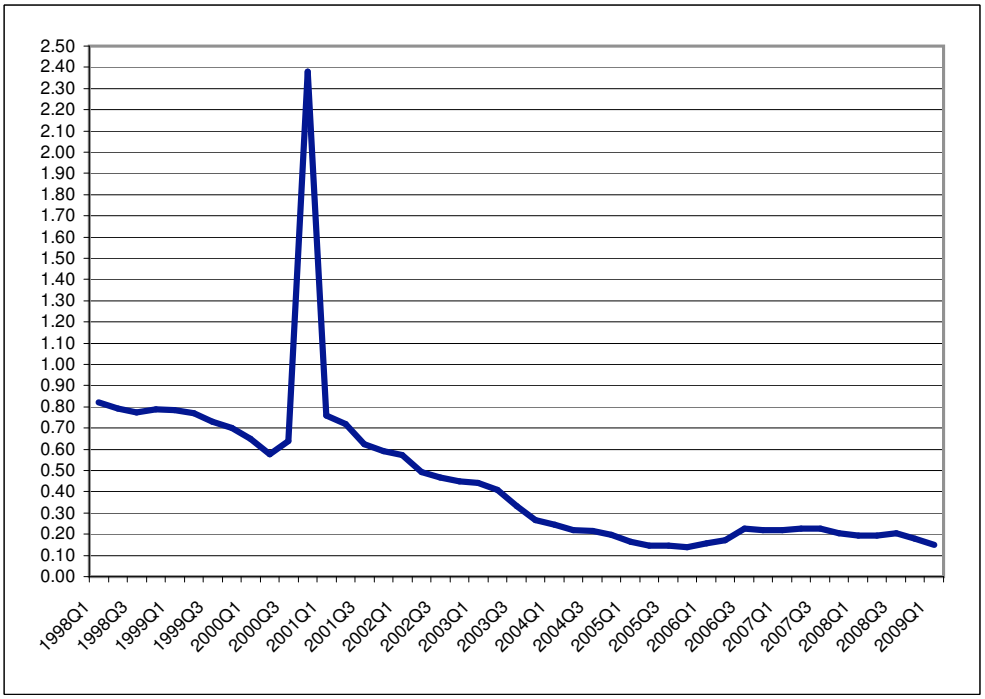
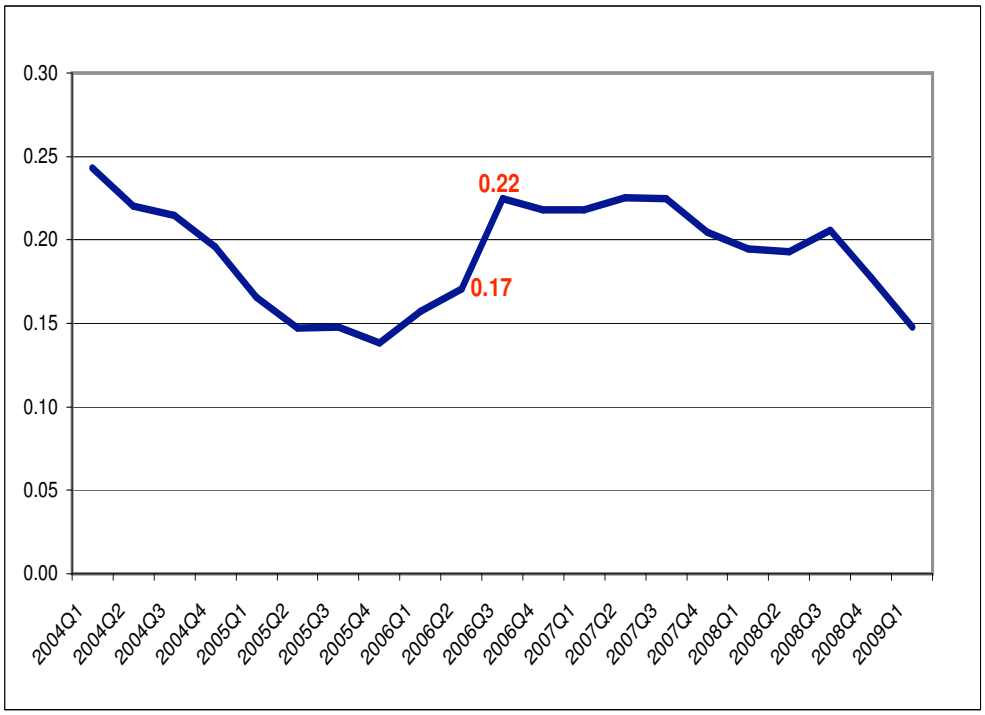


Figure 4.2: Closer look: Impact of 2006:Q3 Monetary Policy Meeting on Overnight Rates



which the cross-sectional model is regressed at each quarter in following form:

$$\begin{aligned}\Delta \log(Loans)_{i,t} &= \alpha_t + \gamma_t \Delta \log(Loans)_{i,t-1} + \beta_{1,t} L/A_{i,t-1} + \lambda_t Log(A)_{i,t-1} \\ &\quad + \mu_t K/A_{i,t-1} + \varepsilon_{i,t}. \end{aligned} \tag{4.1}$$

Change of annual loan growth, $\Delta \log(Loans)_{i,t}$, is regressed on the first lag of change of annual loan growth in order to capture bank-specific growth opportunities.

$L/A_{i,t-1}$ denotes the ratio of liquid assets to total assets and it is first-degree lagged variable. This variable is the main variable of interest following Cetorelli and Goldberg (2008). More precisely, it is assumed that bank lending sensitivity to monetary shock depends on the availability of liquidity of a bank. Thus, the estimated beta coefficient of liquidity variable (β_1)[4] will be included in the second step estimation to understand the sensitivity of monetary shock on annual loan growth of a bank.

$K/A_{i,t-1}$ is the capitalization ratio and measures the degree of capitalization of the bank. $Log(A)_{i,t-1}$ is logarithms of total assets (A) of bank i. Both capitalization ratio and size characteristics are used in first lag. In the papers by Cetorelli and Goldberg (2008) and Campello, four lags of loan growth were studied. However, due to the scarcity of time series data, the lags are limited with only the first lag and thus, excessive loss of observations are aimed to be prevented in this study.

Alternative Model 2

Following model is a modified version of Campello (2002):

$$\begin{aligned}\Delta \log(Loans)_{i,t} &= \alpha_t + \gamma_t \Delta \log(Loans)_{i,t-1} + \beta_{2,t} I_{i,t-1} + \lambda_t Log(A)_{i,t-1} \\ &\quad + \mu_t K/A_{i,t-1} + \varepsilon_{i,t}. \end{aligned} \tag{4.2}$$

[4]Subscript is used to differentiate among alternative models and their beta estimates.

Main difference between first and the second alternative is the variable of interest that is changed from liquidity of banks, $L/A_{i,t-1}$, to net income-to-total loan ratio, $I_{i,t-1}$, of a bank. This ratio is used as a proxy for cash flow of banks. Campello (2002) argued that the income coefficient will capture the extent to which frictions in the market for uninsured deposits create a wedge between a small banks cost of internal and external funds. Hence, this coefficient measures the sensitivity of loan growth to income from banking operations. For similar reasons discussed in the first alternative, lags of loan growth are reduced, only the first lag considered.

Alternative Model 3

Third alternative is aiming to give an insight about the relationship between loan growth and the type of ownership of the bank. To this end, a dummy variable is added to (4.1):

$$\Delta \log(Loans)_{i,t} = \alpha_t + \gamma_t \Delta \log(Loans)_{i,t-1} + \beta_{3,t} L/A_{i,t-1} + \lambda_t Log(A)_{i,t-1} + \mu_t K/A_{i,t-1} + \omega_t GD_i + \varepsilon_{i,t}. \quad (4.3)$$

The dummy variable GD_i categorizes banks that are owned by the government. The aim of this variable is to test the influence of ownership on loan growth in Turkey. Since government-owned banks can be argued to have no or less limitation on the availability of liquid funds, the impact of any financial, monetary and real shock on lending behavior of government banks will be different than private banks. Hence, these banks' loan growth are controlled by using a dummy variable.

Alternative Model 4

The biggest pitfall of this two step strategy (as argued by Kashyap and Stein, 2000: 415) is the potential biases in the level of β coefficients. The

main reason for a bias may be the multicollinearity of right hand side variables. Since all independent variables are related to total assets, there is likely to have multicollinearity in the model. Kashyap and Stein (2000) conduct robustness tests, to consider the problems related to the two-stage approach.[5] However, they also mention that the main point in the two-stage approach is the *correlation* of betas (sensitivities) with monetary policy indicator. Alternative model 5 will be conducted to overcome or reduce the influence of multicollinearity by reducing the number of independent variables:

$$\Delta \log(Loans)_{i,t} = \alpha_t + \gamma_t \Delta \log(Loans)_{i,t-1} + \beta_{4,t} L/A_{i,t-1} + \varepsilon_{i,t}. \qquad (4.4)$$

The loan growth is regressed on its first lag and liquidity proxy only to reduce the impact of multicollinearity on the results.

Alternative Model 5

The bank size is found to be influential on banks' responses to monetary policy shocks (Kashyap and Stein, 2000). To test whether this mechanism is valid for Turkey, the following empirical model is used:

$$\begin{aligned} \Delta \log(Loans)_{i,t} &= \alpha_t + \gamma_t \Delta \log(Loans)_{i,t-1} + \beta_{5,t} L/A_{i,t-1} + \beta_{6,t} L/A \cdot SD_i \\ &\quad + \lambda_t Log(A)_{i,t-1} + \mu_t K/A_{i,t-1} + \varepsilon_{i,t} \qquad (4.5) \end{aligned}$$

where SD is the size dummy and $L/A \cdot SD_i$ is the interaction variable. Since there is limited number of observations left when small and large banks are separately tested, the problem regarding degrees of freedom in the estimation may create first-step estimates to be doubtful. Hence, size dummy is used to handle this problem. For large banks $SD = 1$, and the liquidity sensitivity of large banks are estimated as $\beta_{5,t} + \beta_{6,t}$. For small banks $\beta_{5,t}$ is liquidity sensitivity estimate.

[5] Robustness tests of Kashyap and Stein is modified and applied to our data set as well. These results are reported in the following chapter.

Alternative Model 6

Final alternative model for the first step regression is related to foreign banks. In an emerging country, foreign banks are typically large global banks that have less concern on liquidity problem (Ceterolli and Golberg, 2008). In order to control their effect on liquidity-sensitivity, the following empirical model is used:

$$\Delta \log(Loans)_{i,t} = \alpha_t + \gamma_t \Delta \log(Loans)_{i,t-1} + \beta_{7,t} L/A_{i,t-1} + \lambda_t Log(A)_{i,t-1} + \mu_t K/A_{i,t-1} + \omega_t F_i + \varepsilon_{i,t}. \quad (4.6)$$

where F_i is foreign-owned bank dummy. This model is aimed to control the lending behavior of foreign banks in Turkey.

4.2.2 Step 2

In the second stage, β_t coefficients from alternative models are regressed on the following equation:

$$\beta_{j,t} = \phi + \varphi MP_{t-1} + \kappa GDP_{t-1} + \theta BRSA + \upsilon_t, \quad j = 1, 2, \ldots, 6 \quad (4.7)$$

where MP_{t-1} is monetary policy indicator. In this study, *quarterly overnight rate*[6] reported by Central Bank of Turkey is used as a monetary policy indicator. In the second-stage regression, first lag of GDP growth, GDP_{t-1} and $BRSA$ dummy variable are controlled for to understand the sensitivity of loan growth. The establishment of Banking Regulation and Supervision Agency (BRSA) of Turkey changed the regulatory environment of the banks in Turkey hence its impact have to be controlled to understand the impact of monetary shocks on bank lending.

[6]which are determined daily.

Addition to Second Stage Regression

As presented in Figures 4.1 and 4.2, overnight rates changed over the period of 1998:Q1-2009:Q1. Besides the huge peak in financial crisis period, a relatively narrow peak is observed in the third quarter of 2006. In order to capture these rises in overnight rates, a dummy variable is added to the second stage:

$$\beta_{j,t} = \phi + \varphi MP_{t-1} + \kappa GDP_{t-1} + \theta BRSA + \eta MPC + \upsilon_t, \quad j = 1, 2, \ldots, 6. \tag{4.8}$$

where MPC stands for the dummy of Monetary Policy Meeting which caused overnight rates to rise. This second stage model will only be used for Alternative Model 1 described on 4.2.1. This alternative model aims to deepen the empirical analysis in Turkish economical context.

4.2.3 Tests Regarding Heteroscedasticity and Autocorrelation of Error Terms

The second-stage-regression residuals (υ) are tested in terms of heteroscedasticity and autocorrelation (HAC). The test conducted for the error terms is *"coefficient t-test"* available on R statistical software, which is the software used for the model analyses of this thesis. The second stage regressions are reported with Newey and West Heteroscedasticity and Autocorrelation consistent (HAC) covariance matrix estimators (1987).

4.2.4 Hypotheses of Econometric Models

In the first step regression, loan growth sensitivities to different bank characteristics is the main interest. Table 4.3 summarizes these sensitivities denoted as β coefficients.

Table 4.3: Definitions for Sensitivities

β_1	Liquidity-sensitivity of loan growth
β_2	Cash-flow-sensitivity loan growth
β_3	Liquidity-sensitivity of loan growth with government control dummy
β_4	Liquidity-sensitivity of loan growth with two independent variables (for multicollinearity)
β_5	Liquidity-sensitivity of loan growth for small banks in single model
$\beta_5 + \beta_6$	Liquidity-sensitivity of loan growth for large banks in single model
β_7	Liquidity-sensitivity of loan growth with foreign affiliation control dummy

Time-series regressions conducted in the second step try to link different loan growth sensitivities to monetary shocks: changes in the overnight interest rates. In this section, the whole set of hypotheses is discussed in details.

The *first alternative model* tests the impact of monetary policy shocks to liquidity-sensitivity of loan growth. Following the evidence of Kashyap and Stein (2000), the expectation from this model is to observe a positive coefficient for monetary policy indicator. More precisely, an increase (a decrease) in the short-term interest rates will increase (decrease) liquidity-sensitivity of loan growth. Or, the liquidity-sensitivity of banks increases in monetary tightening. A shock that causes available funds for banks to contract is expected to lower the rate of growth of loan supply for banks that have less liquid asset in their assets. In this model, all banks in the sample are considered to search evidence on the link between liquidity-sensitivity of loan growth and overnight rates.

The *second alternative model* is a modified version of Campello (2002) in which the main focus is "income-sensitivity of loan growth". This model is to understand whether there exists another monetary transmission mechanism using Turkish data. The association between monetary shock and loan growth sensitivity is expected to be similar to the first model: A positive coefficient

for monetary policy (MP) indicator in the second regression. If there exists a significant and positive relationship between income-sensitivity and MP indicator, then this will lead to conclude that loan provisions by Turkish banks are significantly dependent (sensitive) to their cash-flows (internal funds). This result will confirm the findings by Campello (2002) and Kashyap and Stein (2000).

The *third alternative model* is a slightly different version of the first model since it includes a control variable for state-owned banks. The expected relation between MP and loan growth sensitivity is similar with the expectation of first model since it tests almost the same relationship. Since the loan growths of state-owned banks are controlled, private banks with liquidity constraint would be affected at a higher amount by monetary shock.

The *fourth model* is constructed for reducing the possible problem of multicollinearity. The liquid asset-to-asset and capital-to-asset ratio and logarithm of total assets might be highly correlated. Hence, the first-stage regressions are constrained such that there are only two independent variables (lag of loan growth and liquidity) are used. Since the first-stage estimations are more consistent, the sensitivity results in the second stage would be less doubtful.

The *fifth alternative model* provides a comparison between small and large banks in terms of the relationship between their loan growth sensitivities to liquidity and monetary policy changes. In the literature, the empirical evidence suggest that small bank's sensitivity to interest rate changes are higher than that of large banks. Especially, we will be able to test whether findings by Kashyap and Stein's (2000) are valid for Turkish banks in periods of monetary tightening. More precisely, the expectation is to find significant and positive relationship between liquidity-sensitivity and loan growth for small banks and less significant or insignificant results for large banks. The impact of monetary policy shocks on small banks' liquidity-sensitivity is expected to be higher since their access to external funds is limited relative to large

banks. In this model an interaction variable is used and problem of degrees of freedom is tried to be eliminated. Three government owned banks are included in the large banks; however their portfolio selections may significantly differ from that of private banks. Therefore an additional test is conducted by removing government-owned banks from the data. With remaining seventeen banks, this model is repeated (see findings in the Appendix).

The sixth model is controlling foreign affiliations of the existence banks in Turkey. A dummy variable is included in equation 4.1 to control for these banks. This model is similar to third model in the sense that these banks might be less sensitive to liquidity shocks due to monetary shocks. Hence, similar to the third model with the government control dummy, it is expected that after controlling for foreign banks, the sensitivity of the other domestic banks might be higher to monetary policy changes in the second step.

The alternative model for the second stage regressions is mentioned in equation 4.8. This model is similar to previous studies in US that uses several periods such as Romer dates that monetary tightening is unexpected (see for example, Kashyap et al., 1993; Oliner and Rudebusch,1996; Morgan, 1998). Over the period of 1998:Q1-2009:Q1, the ordinary meeting of the Monetary Policy Committee dated 20 June 2006, the Committee stated that there was no significant development that would affect the decision-making process. However, the increase in the movements in international financial markets continued to exert pressure on both exchange rates and medium and long-term interest rates in developing countries beyond the extent implied by economic fundamentals. Meanwhile, it is observed that there are significant influences parties because of the structure of the portfolio held by non-residents. Following these developments, the Monetary Policy Committee (MPC) gathered on 25 June 2006 to assess the developments. At its meeting of dated 25 July 2006, the Committee has reviewed policy rates and has decided to further strengthen monetary tightening in order to improve

medium-term inflationary expectations. Although it is just one event, it is expected to observe a significant coefficient for MPC variable. Otherwise, the results are expected to be same with alternative model 1.

4.3 Potential Biases and Limitations

There are several limitations and biases in the estimations that necessitate results to be interpreted with caution. The main reason for these potential biases is scarcity of data in the first stage regressions. One obvious bias is the possibility of survivorship bias. Since the banks that have survived through the 2000-2001 financial crisis are included in the sample, there is a high probability of an upward bias in the tests. The banks which are unhealthy prior to the crisis and bankrupted and/or taken over by Saving Deposit Insurance Fund (SDIF) after or during the crisis are excluded from the sample for two reasons. Unhealthy actions of bankrupted banks can be anticipated from their balance sheets prior to the financial crisis; hence they are dropped out because of their aberrant financial actions.

Additionally, since our data start from 1998:Q1, few observations would have been available for those banks that are failed in the financial crisis in 2001:Q. More precisely, even if they are included in the sample, the results may also be biased. Therefore, the sample for the tests includes 20 survivor deposit banks. Thus, probably there exists a bias towards the healthier institutions in the results.[7]

Exclusion of development and investment banks, participation banks and bankrupted banks and using 20 deposit banks may cause a limitation in terms of degrees of freedom in econometric tests. The first stage regressions are conducted cross-sectionally, therefore the degrees of freedom poses limitation

[7]The typical survivorship-bias argument starts from the observation that mutual funds often disappear following poor performance, however, in the banking literature, there are few studies that create biases due to survivorship bias (see for example, Demirguc-Kunt et al., 2000).

on the robustness of these regressions. To eliminate or reduce this problem, model 4 is proposed. By decreasing the number of independent variables included in the test, multicollinearity and degrees of freedom problems are tried to be reduced. Additionally, in the next section robustness checks are conducted for a broader investigation.

Another bias related to the first-stage regression is the potential bias in the level of β. Kashyap and Stein (2000:415) explain this bias with the following paragraph:

> *...Because of the demographic factors, some banks have an advantage at deposit taking, but few good lending opportunities. Rather than make bad loans, these banks have portfolios that are skewed towards securities. If the weak lending opportunities are only imperfectly controlled for by past loan growth, there may be a tendency for high values of B_{it-1} (liquidity variable) to be associated with slow growth of L_{it} (loan provision) will be biased downward.*

In the study of Kashyap and Stein (2000) it is also stated that the hypothesis of the study centers on the correlation of β with monetary policy indicator, hence the bias in the level of betas is not an issue (2002: 415). A different approach to eliminate this bias is including a demographic dummy variable in the first stage regression introduced by Campello (2002). This approach is not pursued in our model since there are problems regarding the number of independent variables which reduces the degrees of freedom. Hence there may be a downward bias in sensitivity levels as explained by Kashyap and Stein (2000).

In the estimation of the sensitivity of each bank on loan growth due to monetary shock, the use of loan data as a stock variable may have hindered whether banks stop providing new loans or recall their existing loans due to say monetary tightening. Since there is no flow data for bank loans, the impact of monetary shock may be underestimated.

CHAPTER 5

RESULTS

Results for Alternative Model 1:

Table 5.1 shows the regression results for model 1 with Newey-West HAC adjustment.[1] The coefficient of monetary policy indicator is positive and significant. For Turkey, there is a positive relationship between loan growth sensitivity to liquidity and overnight rates. As interest rates rise (due to monetary tightening), sensitivity of bank loan growth to liquidity increases. It is observed that GDP is not a significant variable influencing the loan growth sensitivity. This may be a consequence of disproportionate growth of loans and GDP. BRSA dummy which was included to control the influence of BRSA regulations is found to be significant for 10% level. One may expect that banks' loan growth sensitivity may decline in a more regulated period. As argued by Onis and Alper (2002), "..Excessive holdings of government securities by under-capitalized banks facilitate cheaper financing of the current government deficit as well as the maturing debt. As a result, the Treasury faces few incentives to regulate the banks concerned. The fragility of the system has been accentuated further by the rapid and yet risky behavior of small-scale banks whose growth has heavily relied on disproportionate holdings of government securities." However, during the regulated period, Turkish banks changed their asset portfolios remarkably and increased their concentration on more risk asset, loan. Hence, the period that is examined in this

[1] *: significant at 10% level, **: significant at 5% level, ***: significant at 1% level.

Table 5.1: Second stage results for Alternative Model 1

Regression Results				
	Estimate	Std. Error	t value	p-value
Intercept	-0.11938	0.065670	-1.8179	0.07676*
MP_{t-1}	0.12800	0.025151	5.0892	0.00000***
GDP_{t-1}	-0.07737	0.288727	-0.2680	0.79014*
$BRSA$	0.11614	0.061439	1.8903	0.06617

Test Statistics		
Adjusted R^2	0.1809	
F-statistic	4.093	on 3 and 39 DF
p-value of test	0.01282 **	

thesis is mainly the period that banks have held more loan portfolios and became more sensitive to liquidity shocks initiated by monetary authority.

Results for Alternative Model 2:

The second model tests the influence of monetary policy changes on the loan growth sensitivity on income from operations. Table 5.2 indicates insignificant results for this model. Therefore, it is concluded that there is no significant relationship between income from operations and monetary tightening in Turkey during the sample period. This identification strategy does not yield significant results for Turkish data. In Turkey, the savers typically prefer to invest deposit contracts since other financial institutions such as mutual funds and pension funds are very recently active in the market especially in the large metropolitan areas. However, banks through their branches all over the country are able to sell insured deposit contracts. Thus, the impact of possible monetary shock on interest revenues and expenses can be observed weak through the mechanism introduced by Campello (2002).

Results for Alternative Model 3:

The revised version of the first model is displayed on Table 5.3. With the government control dummy, the results are more significant and the overall test is also more significant than the first model. There is a significant positive relationship between monetary policy indicator and bank loan growth sensitivity to liquidity. The magnitude of the association between beta and

Table 5.2: Second stage results for Alternative Model 2

Regression Results				
	Estimate	Std. Error	t value	p-value
Intercept	0.1967	0.155678	1.2636	0.2139
MP_{t-1}	-0.0758	0.118577	-0.6392	0.5264
GDP_{t-1}	1.6063	0.953918	1.6839	0.1002
$BRSA$	-0.2641	0.168088	-1.5715	0.1242

Test Statistics		
Adjusted R^2	-0.006503	
F-statistic	0.9095	on 3 and 39 DF
p-value of test	0.4452	

Table 5.3: Second stage results for Alternative Model 3

Regression Results				
	Estimate	Std. Error	t value	p-value
Intercept	-0.15327	0.06990	-2.1927	0.03436**
MP_{t-1}	0.16357	0.02306	7.0925	0.00000***
GDP_{t-1}	0.13914	0.30859	0.4509	0.65457
$BRSA$	0.12286	0.06425	1.9123	0.06320*

Test Statistics		
Adjusted R^2	0.2649	
F-statistic	6.044	on 3 and 39 DF
p-value of test	0.00175***	

lagged monetary policy is bigger than the association found in the first model. Similarly BRSA dummy is significant and positively influencing loan growth sensitivity during the sample period.

Results for Alternative Model 4:

Results of model 4 are shown in Table 5.4. By contrast with the expectation, it is not possible to conclude that there is an improvement in significance level for this model. Omitting capitalization and size variables caused insignificant results for the model. The aim of this model is to eliminate (or reduce) multicollinearity, however it does not yield significant results.

Results for Alternative Model 5:

The model 5 is studied to distinguish different impacts of monetary shocks among large and small banks. Results for large banks are shown in Table 5.5. There is no significant relationship between large bank sensitivity and

Table 5.4: Second stage results for Alternative Model 4

Regression Results				
	Estimate	Std. Error	t value	p-value
Intercept	0.02776	0.05023	0.5526	0.58375
MP_{t-1}	0.03390	0.02712	1.2501	0.21890
GDP_{t-1}	-0.08044	0.30386	-0.2647	0.79264
$BRSA$	0.10761	0.07427	1.4490	0.15554

Test Statistics		
Adjusted R^2	0.07303	
F-statistic	1.827	3 and 39 DF
p-value of test	0.14370	

Table 5.5: Second stage results for Alternative Model 5 - Large Banks

Regression Results				
	Estimate	Std. Error	t value	p-value
Intercept	0.07999	0.03325	2.4055	0.02099**
MP_{t-1}	-0.03270	0.02127	-1.5373	0.13230
GDP_{t-1}	1.09136	0.17675	6.1747	0.00000***
$BRSA$	-0.04858	0.03144	-1.5453	0.13036

Test Statistics		
Adjusted R^2	0.02531	
F-statistic	1.364	on 3 and 39 DF
p-value of test	0.26810	

monetary shocks.[2] This is parallel with our expectations and the evidence on large banks in the literature. In Turkey, large banks are considered as too big to fail hence especially during the periods that there is financial and macroeconomic shocks, households and firms prefer to invest their savings to large banks. Thus, these banks are not affected from monetary shock during the analyzed period. However, it is observed that the beta coefficient that describes transmission mechanism is positively related to lagged GDP.

The results for small banks are reported in Table 5.6. There is a significant relationship between small bank's liquidity dependence and monetary policy indicator. Since the coefficient of MP_{t-1} is positive, it can be concluded that a rise in interest rates (due to monetary tightening) will lead small banks'

[2]Removing three government owned banks from data yields similar results. With remaining seventeen banks, sensitivity estimates of large banks are found to be not related with monetary policy changes in this model. Test statistics are also found to be insignificant. Results are reported in Data Appendix.

Table 5.6: Second stage results for Alternative Model 5 - Small Banks

Regression Results				
	Estimate	Std. Error	t value	p-value
Intercept	-0.13134	0.05091	-2.580	0.01376**
MP_{t-1}	0.14809	0.02572	5.758	0.00000***
GDP_{t-1}	-0.13174	0.27560	-0.478	0.63531
$BRSA$	0.114508	0.04471	2.561	0.014420**

Test Statistics		
Adjusted R^2	0.1494	
F-statistic	3.46	on 3 and 39 DF
p-value of test	0.02536**	

Table 5.7: Second stage results for Alternative Model 6

Regression Results				
	Estimate	Std. Error	t value	p-value
Intercept	-0.06929	0.05460	-1.2691	0.21213
MP_{t-1}	0.09173	0.02312	3.9669	0.00031***
GDP_{t-1}	0.0409312	0.2543153	0.1609	0.87299
$BRSA$	0.11786	0.06982	1.6880	0.09961*

Test Statistics		
Adjusted R^2	0.1612	
F-statistic	3.019	on 3 and 39 DF
p-value of test	0.02951**	

sensitivity to increase. Since their access to external capital markets is limited, they are dependent to their internal funds and in this case they are dependent to their liquid assets. Therefore, in contradictionary monetary policy periods, it is more likely for small banks to decrease their loan provisions when compared to large banks (which are found to be indifferent to monetary shocks).

Finally, the model with foreign affiliation dummy is shown in Table 5.7. The coefficient of overnight rate with Newey-West HAC assumption is found to be very significant and positive. The sensitivity of bank loan growth on monetary shock has lesser magnitude as compared to the coefficient found in model 1.

Overall the results for five alternative models[3] lead the following remarks

[3]The alternative model suggested as (4.8) is also tested but MPC dummy found to be insignificant and there is no significant change in the test results. Therefore the results are

to appear:

1. The identification strategy which uses liquidity-sensitivity of bank (introduced by Kashyap and Stein (2000)) yields significant results for Turkish data set, while the identification strategy introduced by Campello (2002) is insignificant for Turkish banking system. From these findings, it can be concluded that cash-flow-sensitivity of banks are not significant in terms of monetary policy shocks as expected, and however, liquidity-sensitivity of banks are significant. Thus, liquidity of banks is influential on the degree of the impact of monetary tightening.

2. Small banks are more liquidity-sensitive to monetary shocks. Since their access to external capital markets are expected to be limited, when there is a monetary tightening, their reserves are influenced and hence their loan supply decreases. For large banks, it is easier to absorb the impact of monetary shocks by using alternative external funds. Therefore there is no significant impact of monetary policy changes on their loan supply.

3. When the ownership type of banks (government vs. private) is controlled, the significance of monetary policy on liquidity-sensitivity increases. This may be a consequence of government banks' easier access to alternative external funds or government's financial funds.

4. Reducing number of exogenous variables and including foreign affiliation dummy to model 4.1 does not yield significant results. Foreign affiliated banks in Turkey are all categorized in small banks group.[4] Since small banks are found to be more sensitive to monetary policy changes, the influence of affiliations with foreign offices may not be visible on these banks in Turkey. Distinguishing the influence of their size and their foreign affiliations on liquidity sensitivity of banks is probably

not reported for this test.

[4]See Data Appendix for categories and ranking according to asset size of banks.

not possible with this econometric model for Turkey.

5.1 Robustness Check

In the methodology section, there are models proposed to check the robustness of the strategy including the model with less parameters and the model with interaction variables. However, there are some problems related to the nature of the data set used and the two-stage approach which may need further tests in terms of robustness. To this end, first step regression approach is studied as a reduced form model from loan demand and supply functions (see also Kashyap and Stein (2000)). Thus, the existence of bank lending channel is examined using the following model:

$$\begin{aligned}\Delta \log(Loans)_{i,t} &= \alpha_t + \gamma_t \Delta \log(Loans)_{i,t-1} + \beta_{1,t} L/A_{i,t-1} + \lambda_t Log(A)_{i,t-1} \\ &\quad + \mu_t K/A_{i,t-1} + \varphi MP_{t-1} + \kappa GDP_{t-1} + \upsilon_t \qquad (5.1)\end{aligned}$$

Both cross-sectional and time-series variables are included in the model hence there is a panel data set for the econometric analysis of the above model.[5] For the estimation of the φ coefficient, *fixed-effects model* is used. Therefore the variables are "time-demeaned". The short representation of the equation is:

$$(y_{it} - \bar{y}_i) = \alpha + \beta(X_{it} - \bar{X}_i) + \zeta_{it} \qquad (5.2)$$

where y_{it} is the loan growth of bank i at time t and $\bar{y}_i$ is the time-series mean of loan growth of bank i. X is the matrix of explanatory variables. Table 5.8 reports the fixed effect estimations of (5.1).

Test is found to be significant and critical variables are also significant including monetary policy indicator and liquidity proxy variables. The negative and significant coefficient of overnight rate confirms the negative impact of

[5]Newey and West (1987) HAC is assumed for the robustness tests.

Table 5.8: Fixed Effect Estimation Results for Robustness Test 5.1

Regression Results				
	Estimate	Std. Error	t value	p-value
Intercept	-0.00072	0.00233	-0.3079	0.75822
$\Delta \log(Loans)_{i,t-1}$	-0.09433	0.11667	-0.8085	0.41901
$L/A_{i,t-1}$	0.08738	0.02546	3.4320	0.00062***
$Log(A)_{i,t-1}$	-0.04811	0.01710	-2.8143	0.00500***
$K/A_{i,t-1}$	-0.07236	0.05143	-1.4071	0.15976
MP_{t-1}	-0.05138	0.02152	-2.3880	0.01715**
GDP_{t-1}	0.48020	0.07422	6.4696	0.00000***

Test Statistics		
Adjusted R^2	0.1496	
F-statistic	25.9	on 6 and 843 DF
p-value of test	2.2e-16***	

their rise to loan growth. As interest rates rise, loan growth decreases. GDP and liquidity of banks are positively related to the loan growth which confirms the theoretical explanations. Size is found negatively related to loan growth which is an interesting result. As size of the bank gets larger, the growth of loans gets smaller. However, as the amount of loan provided increases when banks are larger (larger asset size), the growth of these larger banks' loans would be lower rate as compared to smaller banks.

Another robustness test is conducted to check the results for alternative model 5, which compares (or distinguishes) large and small banks' sensitivities. Since there are seven large banks chosen for this study, subsampling the data set and conducting two-stage regressions on seven large banks and on remaining thirteen banks generates serious problems in terms of degrees of freedom. Hence the two-step approach is used to compare to large and small banks with the help of an interaction variable as explained in previous section. With the panel data and fixed-effect estimations, it is possible to subsample the data and run separate regressions on large and small banks without facing the problem of degrees of freedom. Hence, large banks are separately tested as in the form of equation (5.1) and the results are displayed in Table 5.9.

Regression results for robustness check of large banks imply that there

Table 5.9: Fixed Effect Estimation Results - Subsample of Large Banks

Regression Results				
	Estimate	Std. Error	t value	p-value
Intercept	-0.00154	0.00302	-0.5103	0.61020
$\Delta \log(Loans)_{i,t-1}$	-0.04462	0.10220	-0.4366	0.66270
$L/A_{i,t-1}$	0.11193	0.02314	4.8365	0.00000***
$Log(A)_{i,t-1}$	-0.01199	0.01281	-0.9361	0.35000
$K/A_{i,t-1}$	-0.11517	0.11443	-1.0065	0.31500
MP_{t-1}	-0.00154	0.00812	-0.1899	0.84950
GDP_{t-1}	0.48773	0.08210	5.9407	0.00000***

Test Statistics		
Adjusted R^2	0.2497	
F-statistic	17.64	on 6 and 294 DF
p-value of test	2.2e-16***	

Table 5.10: Fixed Effect Estimation Results - Subsample of Small Banks

Regression Results				
	Estimate	Std. Error	t value	p-value
Intercept	-0.00020	0.00329	-0.0622	0.95041
$\Delta \log(Loans)_{i,t-1}$	-0.09785	0.119872	-0.8163	0.41468
$L/A_{i,t-1}$	0.09514	0.05003	1.9019	0.05771*
$Log(A)_{i,t-1}$	-0.06040	0.02073	-2.9145	0.00371***
$K/A_{i,t-1}$	-0.07172	0.05589	-1.2833	0.19992
MP_{t-1}	-0.07550	0.03113	-2.4255	0.01561**
GDP_{t-1}	0.46434	0.09818	4.7294	0.00000***

Test Statistics		
Adjusted R^2	0.1423	
F-statistic	16.16	on 6 and 542 DF
p-value of test	2.2e-16 ***	

is no significant relationship with large banks' loan growth and monetary tightening. This result confirms the finding of two-stage strategy for large banks. In the fixed effects model, lagged values of liquid asset-to-asset ratio and GDP are found to be significantly and positively related to loan growth for large banks.[6] Liquid large banks have higher loan growth rate as compared to less-liquid large banks. Increasing GDP has positive impact on loan growth. The results for robustness check for small banks are shown in Table 5.10.

Monetary policy changes have significant and negative impact on loan

[6]This test is repeated for large banks when three government-owned banks excluded to test the two-stage strategy which excludes government banks. The results are similar to the findings of two-stage strategy. The results are reported in data appendix section.

growth of small banks. This result is again parallel with the findings of Model 5 on small banks. GDP and liquidity is positively related to loan growth similar to the results found for equation (5.1). These results confirm the robustness of models 1 and model 5 and the remarks driven from their findings. Hence, there is an impact of monetary policy shocks on small banks and liquidity is significant characteristics when there is monetary tightening in Turkey. However, the data limitation on the estimations of first-step coefficients remains for cautions interpretations of the findings.

CHAPTER 6

CONCLUSION

This thesis investigates bank lending channel by identifying the influence of monetary policy shocks on loan growth sensitivities of 20 Turkish deposit banks in the period 1998-2009. Turkish banking sector has gone through a radical restructuring program after the financial crisis of 2000-2001. The foundation of BRSA provided a new regulatory environment for Turkish banking system. Restructuring state-owned banks and changing the financial requirements of Turkish banks are argued to improve the banking system in general and reduce the fragility of the sector. Therefore, the decade of 1998-2009 is an interesting period to investigate the loan growth and the impact of monetary policy shocks on loan growth. This period is investigated in three main areas in this thesis:

1. Are monetary policy shocks influential on loan growth of banks in this new environment?

2. Which bank characteristics increase sensitivity of loan growth?

3. Is there a visible difference between small and large banks in terms of their loan growth sensitivities?

Following the two-stage strategy of Kashyap and Stein (2000), Campello (2002) and Cetorelli and Goldberg (2008), different sensitivities of banks are regressed on monetary policy indicator - overnight rate. The findings suggest evidence on liquidity-sensitivity of Turkish banks during the sample period.

The monetary policy shocks causes banks to become more dependent (or sensitive) to their liquid funds. This relationship is more obvious for small banks. Since it is harder for them to reach alternative external funds, monetary tightening increases their dependence on their liquid funds. And consequently, it may be hard for them to make loan provisions. This is another evidence for bank lending channel to be valid in Turkey. As in most of the previous studies, there may be an identification problem in the empirical evidence of this thesis. The bank lending channel suggests that monetary shock influence on loan supply of banks. However, the empirical model used in this thesis cannot identify whether the impact of monetary policy is on loan demand or supply. Nevertheless, by the help of bank characteristics including bank size, it is found that narrow monetary transmission mechanism is valid in Turkey.

One of the main missions and objectives of Central Bank is to keep the stability of the economy. It also includes the stability of short and long term interest rates. Since there is a relatively stable period for Turkish economy, bank lending channel and its consequences may not be important. But in this study, it is found that there is a degree of sensitivity in deposit banks. The magnitude of the sensitivity cannot be determined from the results however it is identified a relationship between monetary policy shocks and loan growth. Therefore, sustaining stability is significant for Turkish banks to sustain their fragility and current loan provisions. Abandoning or reducing inflation targeting monetary policy adjustments is also helpful to keep the stability in the banking sector.

BIBLIOGRAPHY

Agénor, Pierre-Richard. 2004. *The Economics of Adjustment and Growth.* (2nd eds.) Harvard University Press.

Aktas, Cihan and Bedri Kamil Onur Tas. 2007. "The Bank Lending Channel in Turkey: Effect of Capital Adequacy Ratio," *Banking and Financial Markets*, 1(1): 61-74.

Alfaro, Rodrigo and et al. 2003. "Bank Lending Channel and The Monetary Transmission Mechanism: The Case of Chile," *Central Bank of Chile Working Papers* No: 223.

Alper, C. Emre and Ziya Onis. 2002. Soft Budget Constraints, Government Ownership of Banks and Regulatory Failure: The Political Economy of the Turkish Banking System in the Post-Capital Account Liberalization Era. Bogazici University Working Paper. ISS/EC-2002-02.

Altunbas Yener, Leonardo Gambacorta and David Marques-Ibanez. 2009. "Securitisation and the Bank Lending Channel," *European Economic Review*, 53: 996-1009.

Ashcraft, Adam. 2006. "New Evidence on the Lending Channel," *Journal of Money, Credit, and Banking,* 38(3): 751-776.

Basci, Erdem, Ozgur Ozel and Cagri Sarikaya. 2007. "The Monetary Transmission Mechanism in Turkey: New Developments," *BIS Papers*, No: 35 - 475 - 499.

Bean, Charles, Jens Larsen, and Kalin Larsen. 2002. Financial Frictions and The Monetary Mechanism: Theory, Evidence and Policy Implications. European Central Bank, Working Paper 113.

Bernanke, Ben and Alan Blinder. 1988. "Credit, Money, and Aggregate Demand," *American Economic Review, Papers and Proceedings,* 78(2): 435-439.

Bernanke, Ben, and Alan Blinder. 1992. "The Federal Funds Rate and the Channels of Monetary Transmission," *The American Economic Review* 82: 901–921.

Bernanke, Ben S. and Ilian Mihov. 1998. "Measuring Monetary Policy," *Quarterly Journal of Economics*, 113(3): 869-902.

Bernanke, Ben and Mark Gertler. 1995. "Inside the Black Box: The Credit Channel of Monetary Transmission," *Journal of Economic Perspectives*, 9(4): 27-48.

Bernanke, Ben S., Mark Gertler, and Simon Gilchrist. 1999. "The Financial Accelerator in a Quantitative Business Cycle Framework." In John B. Taylor and Michael J. Woodford, eds., *Handbook of Macroeconomics*, (1st ed.) Amsterdam: Elsevier, 1(21): 1341-1393.

Boschen, John and Leonard Mills. 1995. "The Relation between Narrative and Money Market Indicators of Monetary Policy" *Economic Inquiry,* 33: 24-44.

Bredenkamp, Hugh, Mats Josefsson, Carl-Johan Lindgren. 2009. "Turkey's Renaissance: From Banking Crisis to Economic Revival". in Eduard Brau and Ian McDonald eds., *Successes of the International Monetary Fund: Untold Stories of Cooperation at Work*, New York: Palgrave Macmillan.

Brissimis, Sophocles N. and Matthaios D. Delis. 2008. "Identification of a loan supply function: A cross-country test for the existence of a bank lending channel", *Journal of International Financial Markets, Institutions and Money,* Elsevier, 19(2): 321-335.

Brooks, Petya Koeva. 2007. "Does the Bank Lending Channel of Monetary Transmission Work in Turkey?," *IMF Working Paper*, No. 272.

Brunner, Karl, and Allan H. Meltzer. 1988. "Money and Credit in the Monetary Transmission Process," *The American Economic Review*, 78(2): 446-451.

Campello, Murillo. 2002. "Internal Capital Markets in Financial Conglomerates: Evidence from Small Bank Responses to Monetary Policy," *Journal of Finance*, 57(6): 2773-2805.

Cavusoglu, A. Tarkan. 2002. "Credit Transmission Mechanism in Turkey: An Empirical Investigation," *ERC Working Papers in Economics,* 02/03.

Cecchetti, Stephen G. 1994. "Distinguishing Theories of the Monetary Transmission Mechanism," *Federal Reserve Bank of St. Louis*, May: 83-97.

Cetorelli, Nicola and Linda Goldberg. 2008. "Bank Globalization, Monetary Transmission, and the Bank Lending Channel," *Federal Reserve Bank of New York Staff Reports,* No: 333.

De Graevea, F. Kick, T and M. Koetter. 2008. "Monetary policy and financial (in)stability: An integrated micro/macro approach," *Journal of Financial Stability* 4(3): 205-231.

De Haan, Leo. 2001. "The Credit Channel in the Netherlands: Evidence From Bank Balance Sheets," *ECB Working Paper Series*, No. 98.

Demirguc-Kunt, Asli, Enrica Detragiache and Poonam Gupta. 2000. "Inside the Crisis: An Empirical Analysis of Banking Systems in Distress," *World Bank Policy Research Working Paper* No: 2431.

Di Noia, Carmine and Giorgio Di Giorgio. 1999. "Should Banking Supervision and Monetary Policy Tasks Be Given to Different Agencies?," *International Finance*, 2(3): 361-78.

Ehrmann, Michael and et. al. 2001. "Financial Systems and the Role of Banks in Monetary Policy Transmission in the Euro Area," *ECB Working Paper Series*, No. 105.

Friedman, Milton and Anna J. Schwartz. 1971. *A Monetary Policy of the United States, 1867-1960.* (1st ed.). New York: Princeton University Press.

Gambacorta, Leonardo. 2005. "Inside the Bank Lending Channel," *European Economic Review*, 49: 1737 - 1759.,

Hall, Simon. 2001. "Credit Channel Effects in the Monetary Transmission Mechanism," *Bank of England Quarterly Bulletin*, Winter 2001: 442-448.

Hicks, J. R. 1937. "Mr. Keynes and the "Classics"; A Suggested Interpretation," *Econometrica.* 5(2): 147-159.

Kamin, Steven, Philip Turner and Jozef Van 't dack. 1998. "The Transmission Mechanism of Monetary Policy in Emerging Market Economies: An Overview," *Bank for International Settlements*, Policy Papers No.3: 5 - 64.

Kashyap, Anil K., Jeremy C. Stein and David W. Wilcox. 1993. "Monetary Policy and Credit Conditions: Evidence from the Composition of External Finance," *The American Economic Review*, 83(1): 78-98.

Kashyap, Anil and Jeremy Stein. 1994. "Monetary policy and bank lending," in: N. G. Mankiw, ed , *Monetary Policy.* University of Chicago Press, 221-256.

Kashyap, Anil, and Jeremy Stein. 1995. "The Impact of Monetary Policy on Bank Balance Sheets," *Carnegie-Rochester Conference Series on Public Policy* 42: 151–195.

Kashyap, Anil, and Jeremy Stein. 1997. "The Role Banks in Monetary Policy: A Survey with Implications for the European Monetary Union," Federal Reserve Bank of Chicago *Economic Perspectives* (September/October): 2-18.

Kashyap, Anil, and Jeremy Stein. 2000. "What Do One Million Observations on Banks Have to Say About the Transmission of Monetary Policy?," *American Economic Review*, 90: 407–428.

Kishan, Ruby, and Timothy Opiela. 2000. "Bank Size, Bank Capital, and the Bank Lending Channel," *Journal of Money, Credit, and Banking,* 32: 121–141.

Kuttner, Kenneth N., and Patricia C. Mosser. 2002. "The Monetary Transmission Mechanism: Some Answers and Further Questions," *FRBNY Economic Policy Review*, May 2002: 15 - 26.

Meltzer, Allan H. 1995. "Monetary, Credit and (Other) Transmission Processes: A Monetarist Perspective," *The Journal of Economic Perspectives*, 9(4): 49-72.

Mishkin, Frederic S. 1978. "The Household Balance Sheet and the Great Depression," *Journal of Economic History*, 38(December): 918-37.

Mishkin, Frederic S. 1995. "Symposium on the Monetary Transmission Mechanism," *The Journal of Economic Perspectives*, 9(4): 3-10.

Modigliani, F. 1971. "Monetary Policy and Consumption", in *Consumer Spending and Monetary Policy: the linkages*, Federal Reserve Bank of Boston, Conference Series No: 5: p. 9-84.

Morgan, Donald P. 1998. "The Credit Effects of Monetary Policy: Evidence Using Loan Commitments," *Journal of Money, Credit and Banking*, 30(1): 102-118.

Newey, Whitney K., and Kenneth D. West. 1987. "A simple positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix", Econometrica 55, 703-708.

Oliner, Stephen D. and Glenn D. Rudebusch. 1996. "Is There a Broad Credit Channel for Monetary Policy?," *FRBSF Economic Review*, 1: 3-13.

Oosterloo, Sander and Jakob de Haan. 2004. "Central Banks and Financial Stability: A Survey," *Journal of Financial Stability* 1(2): 257-273.

Peek, Joe and Eric S. Rosengren. 1995. "Bank regulation and the credit crunch," *Journal of Banking and Finance* 19(3-4): 679-692.

Peek, Joe, Eric S. Rosengren, Geoffrey M. B. Tootell. 1999. "Is Bank Supervision Central To Central Banking?," *The Quarterly Journal of Economics* 114(2): 629-653.

Ramey, Valerie A. 1993. "How Important Is the Credit Channel in the Transmission of Monetary Policy?," *National Bureau of Economic Research*, Working Paper No: 4285.

Romer, Christina D. and David H. Romer.1989. "Does Monetary Policy Matter? A New Test in the Spirit of Friedman and Schwartz," in Olivier Jean Blanchard and Stanley Fischer, eds., *NBER Macroeconomics Annual*, No:4, 121-170.

Romer, Christina D. and David H. Romer. 1990. "New Evidence on the Monetary Transmission Mechanism," *Brookings Papers on Economic Activity*, 1990(1): 149-213.

Steinherr, Alfred, Ali Tukel and Murat Ucer. 2004. "Turkish Banking Sector: Challenges and Outlook in Transition to EU Membership," *European Investment Bank, Economic and Financial Report* No. 02.

Strongin, Steven. 1995. "The Identification of Monetary Policy Disturbances: Explaining the Liquidity Puzzle," *Journal of Monetary Economics* 35: 463-497.

Taylor John B. 1995. "The Monetary Transmission Mechanism: An Empirical Framework". Journal of Economic Perspectives, Vol. 9, No. 4 (Fall 1995), pp. 11 - 26.

Taylor, John B. 1995. "The Monetary Transmission Mechanism: An Empirical Framework," *Journal of Economic Perspectives*, 9(4): 11-26.

Vilmunen, Jouko. 2008. "Financial instability, supervision and central banks: An introduction" *Journal of Financial Stability* 4(3): 165-167.

Wrobél, Ewa and Malgorzata Pawlowska. 2002. "Monetary Transmission in Poland: Some Evidence on Interest Rate and Credit Channels". *National Bank of Poland Working Paper* No.24.

APPENDIX A

DATA APPENDIX

Table A.1: List of 19 Deposit Banks (as of December 31, 2008, in million TL)

	Total Assets	No. of Branches	No. of Employees	Category
T.C. Ziraat Bankasi	104,412	1,269	21,299	State-owned
Is Bankasi	97,552	1,039	20,924	Private
Garanti Bankasi	88,941	726	16,350	Private
Akbank	85,655	868	15,127	Private
Yapi ve Kredi Bankasi	63,723	861	14,795	Private
Vakiflar Bankasi	52,193	525	9,567	State-owned
Halk Bankasi	51,096	622	12,467	State-owned
Finans Bank	26,573	458	9,986	Foreign
Denizbank	19,225	400	7,376	Foreign
ING Bank	16,503	366	6,357	Foreign
Turk Ekonomi Bankasi	14,736	336	6,400	Private
HSBC Bank	14,696	335	6,853	Foreign
Fortis Bank	11,915	300	5,378	Foreign
Sekerbank	8,041	250	4,089	Private
Citibank	5,451	56	2,315	Foreign
Alternatif Bank	3,745	46	1,006	Private
Eurobank Tekfen	3,481	42	661	Foreign
Anadolubank	3,384	77	1,718	Private
Tekstil Bankasi	2,953	60	1,410	Private

Kocbank is not reported since it has merged with Yapi ve Kredi Bankasi in 2006.

APPENDIX B

ADDITIONAL TESTS

Two-Stage Regression Approach excluding Government-Owned Banks

The data set for the test does not cover the variables for three government banks and the first stage of the model has the following form:

$$\begin{aligned}\Delta \log(Loans)_{i,t} &= \alpha_t + \gamma_t \Delta \log(Loans)_{i,t-1} + \beta_{5,t} L/A_{i,t-1} + \beta_{6,t} L/A \cdot SD_i \\ &\quad + \lambda_t Log(A)_{i,t-1} + \mu_t K/A_{i,t-1} + \varepsilon_{i,t}\end{aligned}$$

The interaction variable is included in order to capture the specific influence of monetary policy shocks to small and large banks' sensitivities. The second stage of the model is:

$$\beta_{j,t} = \phi + \varphi MP_{t-1} + \kappa GDP_{t-1} + \theta BRSA + \upsilon_t$$

The results for small banks are same with the results shown in Table 5.6, since removing government banks from the data does not change the data set for small banks. Government-owned banks are all included in the large banks data set, hence only the results for large banks will be shown in this section.

The results are insignificant and hence strengthens the remarks and conclusions made on large banks. Estimation results are done with Newey-West HAC (1987).

Table B.1: Second stage results for Alternative Model 5 - Large Banks

Regression Results				
	Estimate	Std. Error	t value	p-value
Intercept	0.053729	0.139139	0.3862	0.7015
MP_{t-1}	0.012004	0.214534	0.0560	0.9557
GDP_{t-1}	1.553868	1.309082	1.1870	0.2424
$BRSA$	-0.153524	0.143918	-1.0667	0.2926

Test Statistics		
Adjusted R^2	-0.01994	
F-statistic	0.7263	on 3 and 39 DF
p-value of test	0.5425	

Fixed-Effect Model

The fixed effect model on large banks as reported in Table 5.9 is repeated by excluding government owned banks from the data set. The results for this robustness test is shown in Table A.3.

Table B.2: Fixed Effect Esitmation Results for Robustness

Regression Results				
	Estimate	Std. Error	t value	p-value
Intercept	-0.00187	0.00264	-0.7116	0.47771
$\Delta \log(Loans)_{i,t-1}$	-0.10558	0.07715	-1.3683	0.17307
$L/A_{i,t-1}$	-0.00101	0.05938	-0.0170	0.98643
$Log(A)_{i,t-1}$	-0.02561	0.01233	-2.0770	0.03935 **
$K/A_{i,t-1}$	-0.36882	0.14524	-2.5393	0.01203 **
MP_{t-1}	-0.00272	0.00918	-0.2967	0.76710
GDP_{t-1}	0.60029	0.14358	4.1807	0.0000 ***

Test Statistics		
Adjusted R^2	0.2724	
F-statistic	11.67	on 6 and 165 DF
p-value of test	7.022e-11 ***	

The results confirm the findings of two-stage strategy and robustness checks for large banks when government owned banks are excluded from the analysis. Monetary policy changes are not influential on loan growth of large banks in Turkey. Size and capitalization characteristics of banks are found to be significantly negatively related to loan growth and GDP is positively

related to large banks' loan growth.

APPENDIX C

DESCRIPTION OF VARIABLES

Change in Log Loans: This variable is computed by taking *natural logarithms of Total Loans* reported on the balance sheets of banks (www.tbb.org.tr) and then by taking first differences of log values.

Liquidity: It is the *Liquid Assets to Total Assets ratio* of banks as reported in their balance sheets. First lag of this variable is taken.

Size: It is computed as *the natural logarithm of Total Assets* of the bank. First lag of this variable is taken.

Capitalization Ratio: It is the *Shareholders' Equity to Total Assets ratio* as reported in the balance sheets of banks.

Income: It is *ratio of Net Income (Loss) to Total Loans* of banks.

Monetary Policy Indicator: *Overnight rates* are used as monetary policy indicator and the values are obtained from Central Bank of Turkey. (www.tcmb.gov.tr) The values are determined daily and averaged for quarterly analysis.

GDP: This variable is *the nominal Gross Domestic Product* of Turkey reported by Turkish Statistical Institute (www. tuik.gov.tr).

GD: Government control dummy. It takes a value of 1 when bank is owned by government and takes 0 value otherwise.

SD: Size dummy. It takes a value of 1 when bank is large bank and takes 0 value otherwise.

F: Foreign affiliation dummy. It takes a value of 1 when bank is affiliated to foreign bank and takes 0 value otherwise.

BRSA: Banking Regulation and Supervision Agency control dummy. It takes value of 1 for period 1998Q1:2000Q3 and value of 0 for period 2000Q4:2009Q1.

MPC: Dummy for Monetary Policy Meeting in June 2006. It takes a value of 1 when time is second quarter of 2006 and takes 0 value otherwise.