American Scientific Research Journal for Engineering, Technology, and Sciences (ASRJETS)
ISSN (Print) 2313-4410, ISSN (Online) 2313-4402

http://asrjetsjournal.org/

The Effect of Bank Size and Bank Capital on the Bank Lending Channel for Turkish Banks

Gökhan Meral*

Koç University, Ilıca Mah. Sarisin Sk. No:2/9 Narlidere, Izmir 35320, Turkey
Email: gokmeral@gmail.com

Abstract

This study investigates the existence of a bank lending channel in Turkey over the estimation period 2002Q4-2008Q4. Consistent with the bank lending channel, I search for evidence that small, undercapitalized banks are more sensitive to changes in monetary policy than large, well-capitalized banks. Results suggest that small, undercapitalized banks find it harder to raise time deposits than large, well-capitalized banks which support the existence of a bank lending channel however the insignificant relationship between the change in the monetary policy indicator (Central Bank overnight rates) and the growth rate of bank loans does not support the existence of a bank lending channel.

Keywords: Monetary Transmission Mechanism; Credit Channel, Bank Lending Channel; Capital Leverage Ratio; Contractionary Monetary Policy

1. Introduction

A major concern in macroeconomics has been the determination of real economic activity, including its dimensions like output, employment, income, and spending. To be able to understand the movements in real economy and its dimensions, monetary policy makers must accurately assess the timing and effect of their policies on the economy. In order to make this assessment, policymakers should understand the monetary transmission mechanisms through which monetary policy affects the economy. Economic research goes in two directions in the literature studying monetary transmission mechanisms. The first direction followed is the money view (or the interest rate channel), and the second direction is the credit view (or the credit channel) [1].

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* Corresponding author.
E-mail address: gokmeral@gmail.com.

This study focuses on the credit view (credit channel) of monetary transmission mechanism, and henceforth attention will be focused on this view. First, to accurately define the credit view, one should understand the 'money view' of neoclassical economics and the differences between the two competing views of monetary policy in detail. The traditional 'money view' of the monetary transmission mechanism is based on the so-called *money* or *interest rate channel*, stemming from the standard Keynesian IS-LM framework. According to this framework, a contractionary monetary policy leading to a rise in real interest rates, which in turn increases the cost of capital, causes a decline in investment spending, thereby leads to a decrease in aggregate demand and a decrease in output [1]. The interest rate channel operates through the liability side of the banks' balance sheets. When the central bank drains reserves from the banking system, this action lowers the demand deposits (DD) of banks and the money supply. The increase in interest rates and the reduction in money supply depress the economy, and if bank loans fall it is due only to a reduction in loan demand triggered by the economic depression. This is how the money or interest channel works [2].

The money view sees banks as passive intermediaries for funds between a central bank and borrowers. In contrast, the credit channel puts special emphasis on the role of banks in the aggregate economic activity. Assuming the existence of bank-dependent borrowers, the credit view states that a change in monetary policy (either an increase or a decrease in open-market interest rates) tends to change the external cost of financing in the same direction for bank-dependent borrowers. The money channel tries to explain the effect of policy through changes in the money supply-which change interest rates and spending in turn-, however if there exist i) substantial information-related frictions in financial markets, and ii) there exist borrowers those are primarily bank-dependent, then the credit channel provides a more plausible explanation for the transmission of monetary policy through banks to the real economy.

According to the credit view, monetary policy shocks may affect the real economic activity in two ways; first, a policy shock can influence the net worth of borrower firms (increasing their liabilities and decreasing their assets) and affect their ability to borrow. Monetary policy can affect firms' financial positions both directly and indirectly. Policy may have two direct affects; first it may increase the interest payments on firms' outstanding debt, second it may influence the value of their collateral assets. Indirectly, policy may affect the spending of firms' customers and cause a decline in firm revenue. This mechanism of the credit channel is called the borrower net worth channel (BNWC) or the balance - sheet channel.

The second mechanism through which the credit channel operates is the bank lending channel (BLC). BLC works as follows; contractionary policy decreases reserves and the decrease in reserves decreases demand/reservable deposits (DD), if some banks can not offset this decline in DD by increasing non-reservable/large time deposits (TD) or by decreasing securities holdings, then the contractionary policy will decrease their loan supply. Decrease in loan supply will affect bank-dependent borrowers and reduce their investment and consumption expenditures [3].

Existence of the BLC require three conditions: (1) existence of bank-dependent, high information cost borrowers, (2) existence of at least some banks which can not cover a decrease in demand deposits frictionlessly by raising large time deposits or by reducing securities (in other words monetary policy can shift the loan

supplies of at least some banks), and (3) prices must be sticky, so that monetary policy can have real effects on the economy without being neutralized. The last condition is necessary for both the money and the credit views. Depending on banks' cross-bank characteristic differences (for example asset size or liquidity), their sensitivity to monetary policy may be different. This study tries to find evidence on the existence of a bank lending channel in Turkey between 2002Q4:2008Q4, dividing banks both by asset size and by capital leverage ratio (equity capital/assets). The hypothesis to be tested is; small, undercapitalized banks are more responsive to monetary policy than large, well-capitalized banks. The intuition behind this hypothesis can be summarized as follows: small, undercapitalized banks find it more difficult to raise time deposits during periods of contractionary policy compared to large, well-capitalized banks, hence they may not be able to offset a drain in reserves as easily as large, well-capitalized banks can. This argument is supportive for the BLC [2].

This study contributes to the credit view literature in Turkey in two ways. First, to my knowledge, this is the first study that considers both asset sizes and capital leverage ratios of Turkish banks while investigating the existence of a bank lending channel in Turkey. Second, results including the effect of bank capital on the transmission of monetary policy underline the importance of regulatory policy on banking during economic crisis. The following section discusses the BLC literature that motivates my study.

2. Literature Review

Bernanke and Blinder [4] developed a simple model of aggregate demand, which is a variant of the textbook IS/LM model, aimed to compare the effects of money and credit (bank loans) on real economic activity. They find that money-demand shocks became more important relative to credit-demand shocks in the 1980s, and they suggest a more symmetric treatment of money and credit. Bernanke and Blinder [5] use aggregate bank data from 1959 to 1978 to identify a decline in bank loans after contractionary monetary policy. However, loans respond with a significant lag (6-9 months) and interestingly this response roughly corresponds to the response of unemployment. They conclude that the co-movement of unemployment and bank loans following a change in the funds rate is consistent with the credit view, hence monetary policy works at least in part through the credit channel as well as through the interest rate channel.

There are studies favoring the money view and studies favoring the credit view. Romer, Romer, Goldfeld and Friedman [6] find two types of evidence supporting the money view; first, banks are able to raise funds with little cost during tightening periods, so the impact of restrictive policy on bank lending will be small. Second; because reserve requirements on bank deposits are high, contractionary policy is more likely to operate through bank liabilities (deposits) rather than bank assets (bank lending). Bernanke and Gertler [7] do not see the credit channel as a distinct alternative to the interest rate channel. Instead they see it as a complementary tool to the conventional interest rate effects which help explaining the magnitude, timing and composition of policy effects on the economy in a more reasonable way. Using vector auto-regressions (VARs), they try to identify the effects of policy on economy by looking at output, demand and spending responses to monetary policy shocks. They point out shortcomings of the conventional money view in explaining these responses. Bernanke and Gertler [7] also investigate the housing market in the U.S., focusing on the borrowing and spending decisions of households, particularly their spending on costly durable items such as houses. They suggest that the high

sensitivity of housing investment to monetary policy shocks may be explained in part by the workings of both the bank lending and the balance sheet channels. They argue that the bank lending channel may have been in effect especially during the Regulation Q period when there were funding constraints for banks because of the imposed deposit rate ceilings. Their argument is that the deposit funding constraint for banks may have played a role in the decline of housing investment (which accounts for the largest fraction of the decline in economic activity) by disrupting the flow of mortgage loans. They also argue that the balance sheet channel may be another plausible explanation for the decrease in housing investment such that, consumer balance sheets having been deteriorated by increasing down-payment requirements and transactions costs may have caused a decline in housing demand and hence a decline in demand for mortgage loans.

The BLC literature includes studies focusing on different credit aggregates, or on balance sheets of firms. It is hard to distinguish between loan supply and loan demand effects looking at the aggregate data. Kashyap, Stein and Wilcox [8] use a mix of bank loans and commercial papers-issued by firms- to provide evidence of a credit channel. They argue that if the monetary policy operates solely through the money channel and if the bank loans fall after a tightening due only to a decrease in credit demand, then the demand for non-bank sources of credit- for example, the commercial paper demand- should decline as well. On the other hand, if the monetary policy operates through the credit channel, then a tightening reduces the supply of bank credit while it increases commercial paper issuance, to the extent that businesses have some ability to substitute between the two sources of finance. They find that shifts in monetary policy change the mix of loans and commercial paper where commercial paper issuance rises and bank loans fall. In addition, those shifts in loan supply seem to affect investment even controlling for interest rates and output. These results support the existence of a bank lending channel. Morgan [9] contributes to the literature on the different credit aggregates by comparing commitment and non-commitment loans where a loan commitment is defined as a contract which obligates banks to lend to a firm up to some limit, for some length of time, at specified terms. He finds that tight policy slows the growth of non-commitment loans relative to commitment loans. This finding coincides with reports of tighter credit by lenders and by smaller firms suggesting the divergence between commitment and non-commitment loans may reflect either a lending channel or a balance sheet channel of policy.

Disentangling declines in bank loans resulting from reduced loan demand from declines resulting from reduced loan supply has been the major concern in the BLC literature. Using micro-bank level-data is an attempt to overcome this problem in aggregate data. There are papers including Kashyap and Stein [10] that look for balance sheet effects by comparing the impact of monetary policy on the loan supply of small and large banks. Kashyap and Stein [10] separate banks by both asset size and liquidity (securities to asset ratio). Using quarterly data of U.S. commercial banks from 1976 to 1993; they find that small, less liquid banks are most responsive to monetary policy. Although they find evidence of a lending channel, the results do not allow them to make precise statements about the quantitative importance of the BLC in real economy.

The “credit crunch” studies in the monetary transmission mechanism literature focuses on the effect of bank capital on loan and output growth. Peek and Rosengren [11] find that poorly capitalized banks contracted more during New England banks’ credit crunch. Peek and Rosengren [12] provide evidence that undercapitalized banks are more engaged with derivatives activity and eager to take speculative positions which makes them

more vulnerable to a monetary policy shock. Berger and Udell [13] examine how risk-based capital (RBC) regulations affected the reallocation of U.S. commercial bank credit from loans to securities. Motivated by the above credit crunch literature, Kishan and Opiela [2] choose bank capital among the alternative bank balance sheet characteristics-that affect bank loan supplies- as a constraint on banks' ability to fund loans. They separate banks according to asset size and capital leverage ratio and provide evidence that the loan growth of small, undercapitalized banks; small, adequately capitalized banks and small, well-capitalized banks is significantly affected by monetary policy. They contribute to the literature in three ways; first, they suggest that policy has distributional effects on loan supplies of banks with different asset sizes and capital leverage ratios. Second, they find that the growth in large time deposits for small undercapitalized banks is unresponsive to policy which they use as evidence favoring the BLC against bank net worth channel (BNWC). In their more recent paper, Kishan and Opiela [14] investigate loan responses of low and high capital banks in expansionary and contractionary periods separately. They find that contractionary policy decreases the loans of small low-capital banks, and expansionary policy is not able to increase the loan growth of the low-capital banks relative to the high capital banks.

Erdoğan, Beşballı [15], Çavuşoğlu [3] and Işık [16] are some of the studies searching for evidence of a bank lending channel in Turkey. Çavuşoğlu [3] uses dynamic panel data modeling with Generalized Method of Moments estimations to empirically test the existence of a bank lending channel in Turkey. He does not find evidence of a bank lending channel in Turkey over the period 1988-1999, this outcome is reflected in the lack of a significant relationship between the change in the monetary policy indicator and the growth rate of the loan supply in the estimated models. Separating banks by asset size does not improve his results. Erdoğan, Beşballı [15] use VAR methodology to empirically analyze the BLC between 1996 and 2006, according to their findings the credit channel operates partially in Turkey. Işık [16] investigates the bank loan supply behavior of Turkish banks over the 1998Q1-2007Q3 period. She divides banks by both asset size and liquidity ratio and finds that small banks with less liquid balance sheets are more sensitive to monetary policy shock and takes this as evidence of a broad credit channel. I follow the above literature and use bank-level data in order to identify loan supply movements of banks distinguished by their asset-size and capital leverage ratio. I expect that there is evidence of a bank lending channel in the case that following a monetary tightening, the loan supply of small and/or less capitalized banks shrinks more than the loan supply of large and/or well-capitalized banks. However, in Turkey it is hard for banks in general to find external sources of funding that is why it may not be surprising if the loan supply movements of small banks do not differ significantly from the loan supply movements of large banks. This fact suggests that the results of this study will be conservative.

This study is mainly motivated by Kishan and Opiela [2] paper, and it expands the methodology used by them with panel pooled OLS fixed effects models. First, I divide banks by both asset size and leverage ratio and form four groups. Second, I divide banks by asset size and leverage ratio separately forming two groups for each criteria. Finally, I (1) consider a regression for the pooled sample adding dummies for capital and asset size. (2) I then consider a panel regression to control for bank-specific effects on the supply of bank loans. I look for evidence of a credit channel in general, and a bank lending channel in particular. To my knowledge, this study is the first to investigate the existence of a BLC in Turkey that distinguishes banks by both asset size and capital leverage ratio. Before moving on to the details of the methodology used, next section provides general

information about the Turkish banking sector over the estimation period 2002-2008.

3. Turkish Banking Sector 2002-2008

Turkish economy experienced a stable and high growth performance between 2002 and 2008, except for a rapid deceleration in the last quarter of 2008. Gross domestic product (GDP) followed an increasing trend in general. Total consumption expenditure followed a similar pattern with GDP. Figure 1 and Figure 2 show quarterly values of these two macro indicators and Figure 3 shows annual change in investment and consumption over the period 2002Q4-2008Q4.

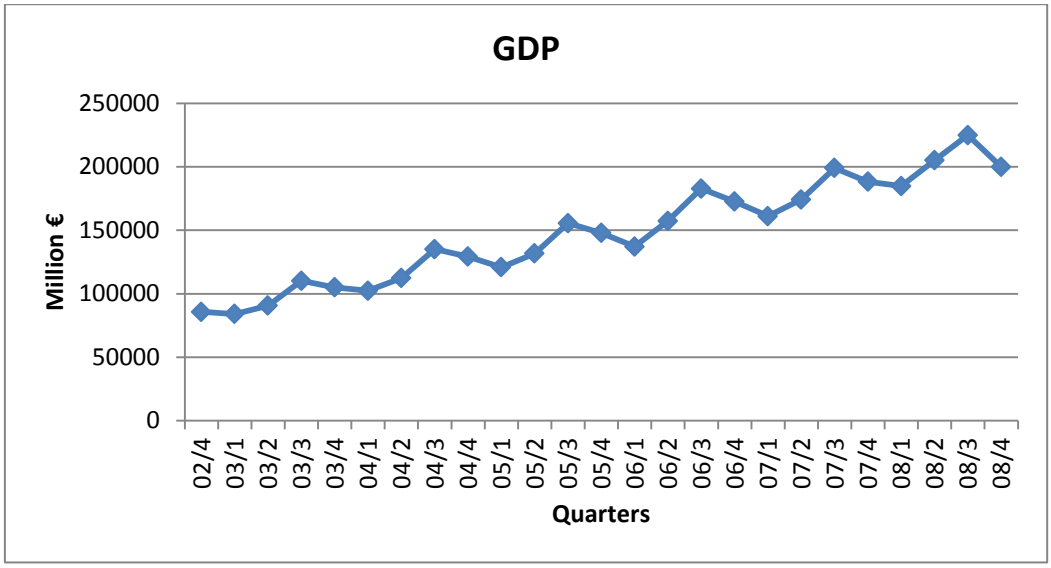

Figure 1: Gross Domestic Product (2002-2008)

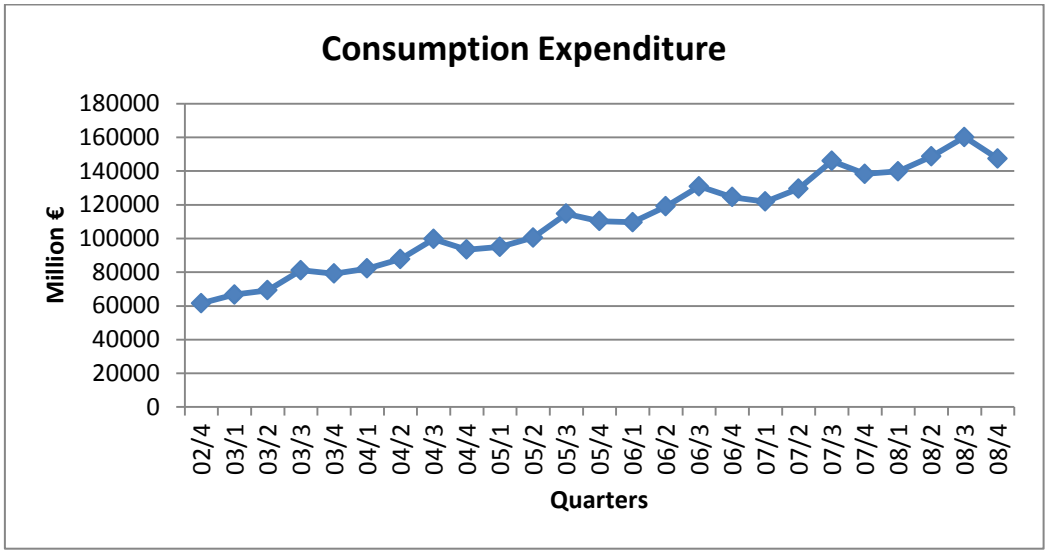

Figure 2: Consumption Expenditure (2002-2008). Data Source: Central Bank of Turkey

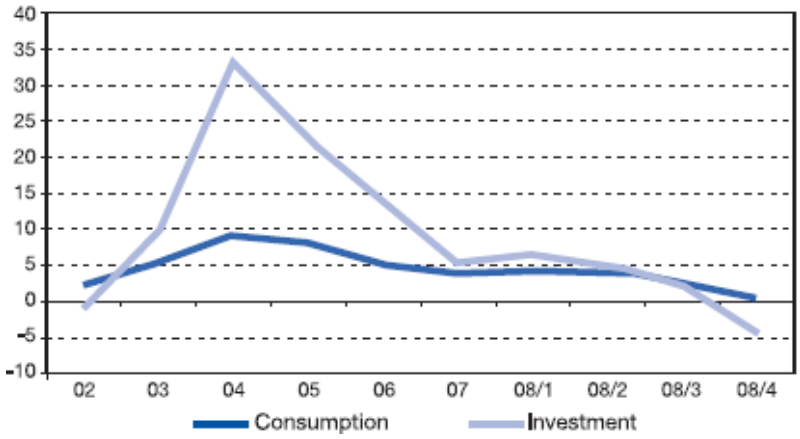

Figure 3: Annual change in Consumption and Investment (in constant price)

As banks are the major source of funding and investment, economy's expansionary pattern between 2002 and 2008 brought about an increase in both the bank loans to GDP and the bank deposits to GDP ratios. Figure 4 presents these two ratios annually.

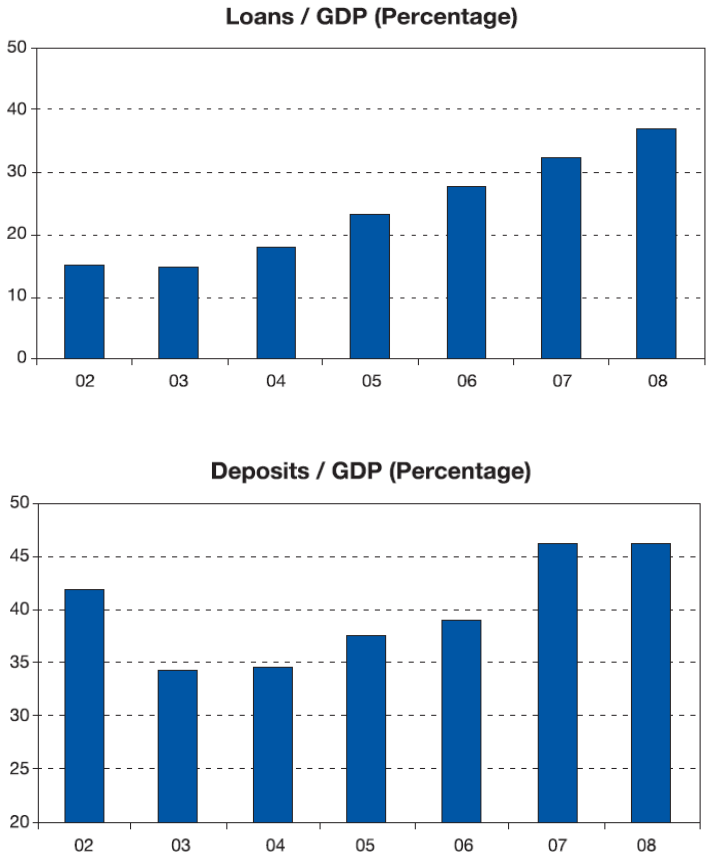

Figure 4: Annual Loans/GDP and Deposits/GDP ratios. Source: "*Banks in Turkey 2008*", The Banking Association of Turkey

Total number of banks in Turkey was 45 as the end of December, 2008. Out of 45 banks, 32 were deposit banks, and 13 were development and investment banks. There was also one bank owned by Saving Deposits and Insurance Fund (SDIF).

When the balance sheet components of banks are analyzed, we see an upward trend in total deposits, securities and loans. Figure 5 shows quarterly movements in total deposits and securities over the period 2002Q4-2008Q4.

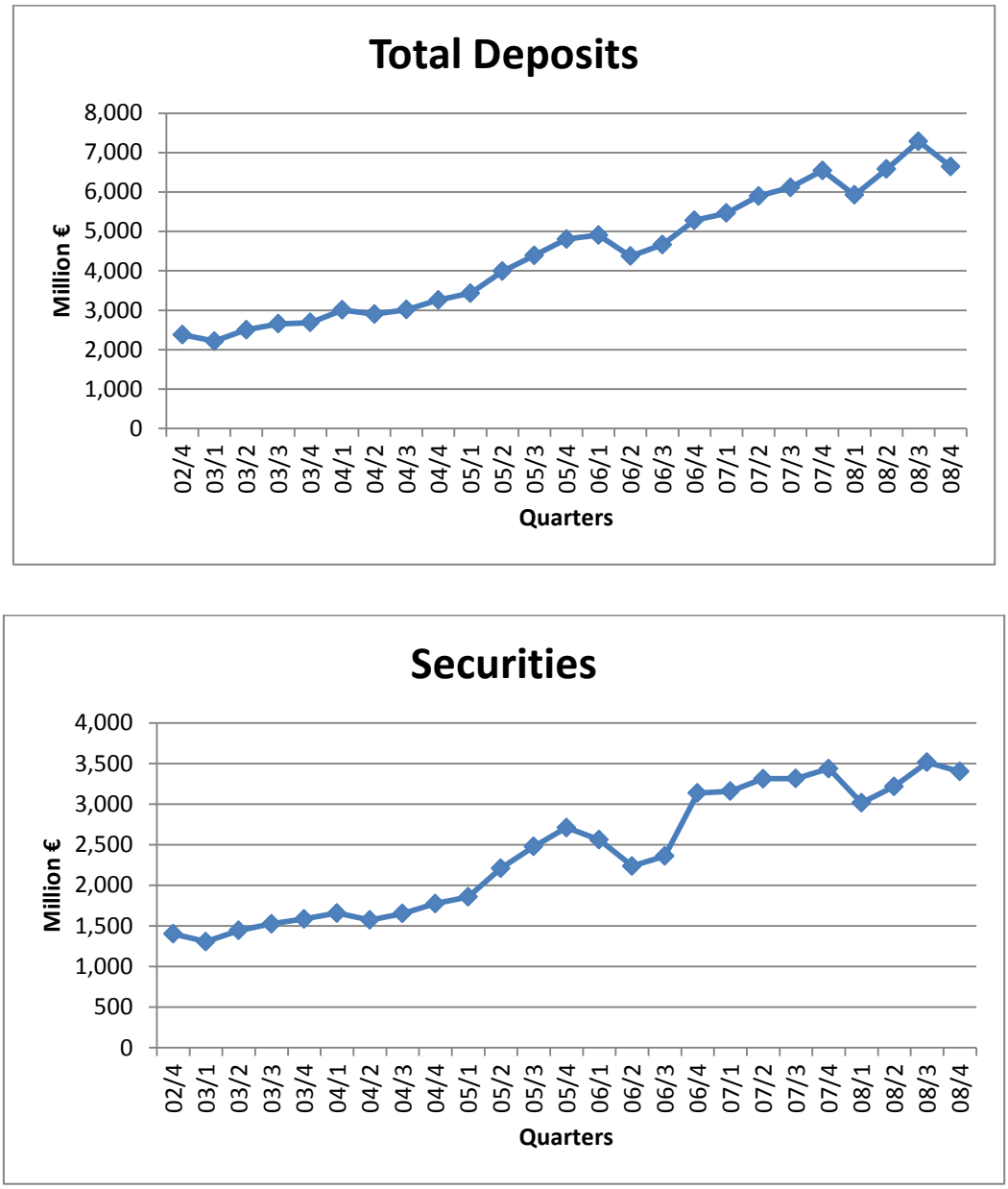

Figure 5: Total Deposits and Securities. Data Source: Turkish Banks Association

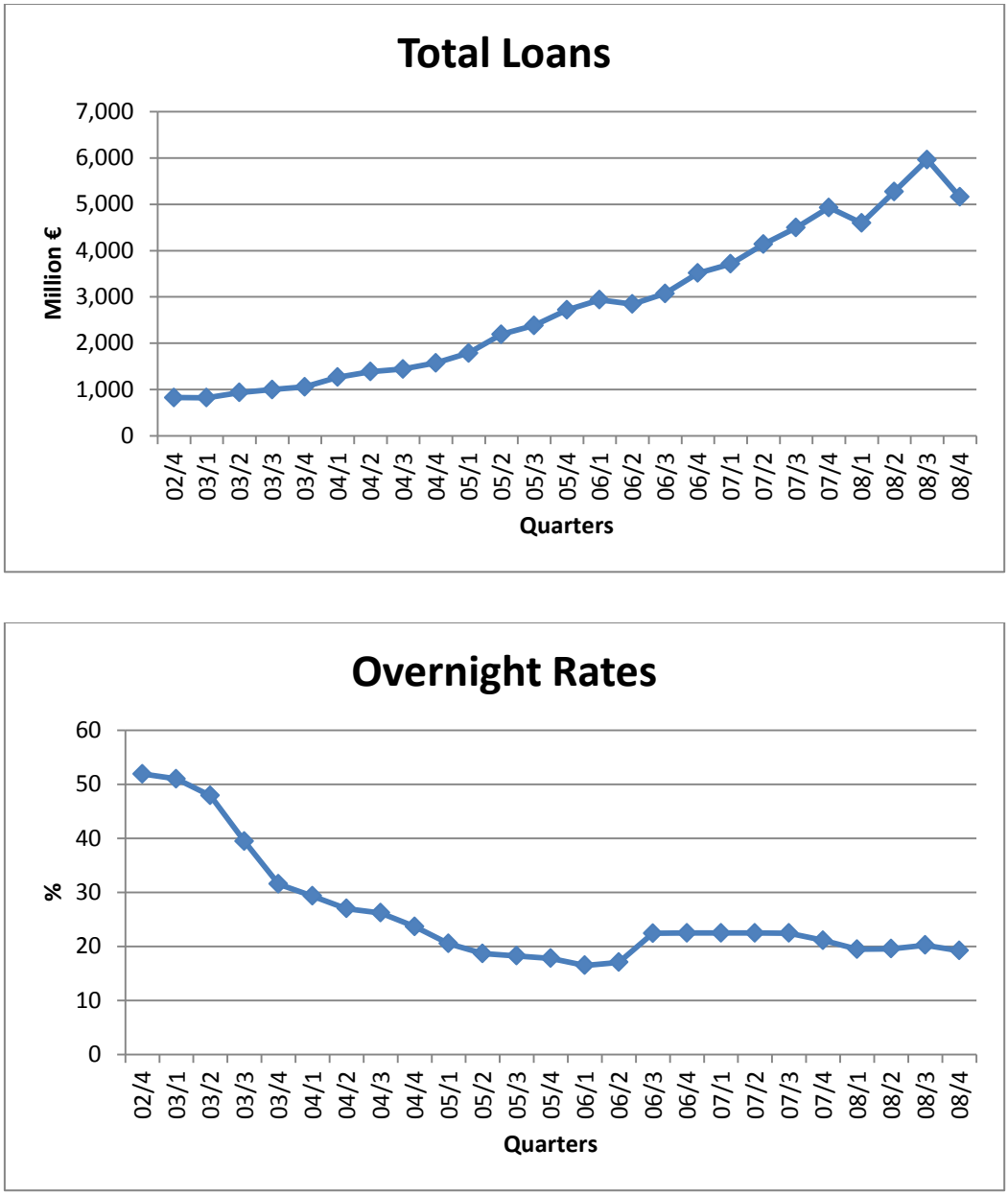

Figure 6: Bank Loans versus Overnight Rates. Data Source: Turkish Banks Association

Figure 6 shows quarterly movements of bank loans and Central Bank of Turkey's overnight rates. When we analyze the movements of bank loans and overnight rates; during the first five quarters, there is a decline in the overnight rates; on the other hand, loans follow an upward trend during the period and in the following five quarters. When we look at the third quarter of 2006, we see a jump in the overnight rate, however loans do not decline in that contractionary period, in contrast they follow an upward trend. In general, loans follow an upward trend through the 25 quarters from 2002Q4 to 2008Q4 and overnight rates follow a downward trend.

Table 1: Bank mean balance sheet ratios, 2002:Q4-2008:Q4

	(I)	(II)
Bank K/A Ratio Category	**Small banks(Assets<8 billion €)**	**Large banks(Assets>8 billion €)**
Mean-All banks		
Number of Banks	**25**	**7**
As a Fraction of Total Assets		
1. Securities	**0.533**	**0.396**
2. Total loans	**0.387**	**0.371**
3. Total Deposits	**0.478**	**0.680**
4. Demand Deposits	**0.085**	**0.108**
5. Large Time Deposits	**0.402**	**0.573**
6. Capital	**0.214**	**0.118**
7. Loan delinquency rate	**1.638**	**0.103**
8. Correlation coefficient between delinquency rate and capital/asset	**0.714**	**-0.381**
Mean-K/A<0.13		
Number of banks	**10**	**5**
As a Fraction of Total Assets		
9. Securities	**0.412**	**0.369**

10. Total loans	**0.481**	**0.362**
11. Total Deposits	**0.596**	**0.705**
12. Demand Deposits	**0.099**	**0.106**
13. Large Time Deposits	**0.497**	**0.599**
14. Capital	**0.109**	**0.105**
15. Loan delinquency rate	**0.035**	**0.126**
16. Correlation coefficient between delinquency rate and capital/asset	**-0.323**	**0.048**

Mean-K/A>0.13

Number of banks	**15**	**2**

As a Fraction of Total Assets

18. Securities	**0.614**	**0.464**
19. Total loans	**0.293**	**0.394**
20. Total Deposits	**0.400**	**0.618**
21. Demand Deposits	**0.075**	**0.112**
22. Large Time Deposits	**0.338**	**0.507**
23. Capital	**0.283**	**0.150**
24. Loan delinquency rate	**2.783**	**0.047**

25. Correlation coefficient between delinquency rate and capital/asset	**0.737**

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To analyze the cross-sectional differences in bank lending decisions, banks are divided into two asset-size categories and two capital leverage ratio groups. Banks with an asset size larger than 8 billion € are considered large banks where the others are considered small banks. Meanwhile banks with an equity capital to assets ratio greater than 13% are considered as well-capitalized, the others are considered as undercapitalized. This methodology is taken from Kishan and Opiela [2] who divide banks into six asset-size categories and three capital leverage ratio groups. This study divides banks into smaller number of categories because the number of banks available for analysis is far less than the number of banks used by Kishan and Opiela [2].

Table 1 shows the mean value of some basic balance sheet variables for each asset-size category for all banks and for the same size categories for banks divided into two leverage ratios. There are several points worth emphasizing:

(1) Securities to assets ratio decreases significantly when we move from the small banks to the large banks in both of the leverage ratio groups, (compare ninth row first and second columns and compare eighteenth row first and second columns)

(2) Loans to assets ratio is close for small and large banks in the whole sample, (second row column one and two) however for the undercapitalized group, loans/assets ratio decreases, (compare tenth row first and second columns) whereas for the well-capitalized group this ratio increases (compare nineteenth row first and second columns) while moving from the small banks to the large banks,

(3) Small banks depend less on deposits funding than large banks (third row first and second columns) and well-capitalized banks depend less on deposits funding than undercapitalized banks, (compare first column eleventh and twentieth rows, compare second column eleventh and twentieth rows)

(4) Demand deposits (DD) has the least importance in funding loans and DD/assets ratio is quite similar for all asset-size and leverage ratio groups, (look at twelfth row first and second columns, and twenty-first row first and second columns) and well-capitalized banks are less dependent on time deposits (TD) (compare first column thirteenth and twenty-second rows, and compare second column thirteenth and twenty-second rows) (2) is not compatible with the bank characteristics of Kishan and Opiela (2000) sample. Regardless of leverage ratio, loans to assets rise with bank size in their sample. (3) is not compatible with Kishan and Opiela (2000) bank sample, either. Their implication is that larger and better capitalized banks are less dependent to deposits than smaller and less-capitalized banks. Kishan and Opiela (2000) bank sample implies that large, well-capitalized banks depend less on DD and more on TD however in this sample large, undercapitalized banks depend on TD more [implication (4)].

Having observed the general outlook of the economy, the banking sector and the bank balance sheet

characteristics in Turkey over the estimation period 2002Q4-2008Q4, now we are ready to move to the methodology section of the study.

4. Methodology and Data

This study is mainly motivated by the methodology used by Kishan and Opiela [2]. Consistent with the bank lending channel, my hypothesis is that an increase (decline) in overnight rates should decrease (increase) the loan supply of banks and this decline should be more pronounced for the small and less-capitalized banks. Although an increase in overnight rates is expected to increase time deposits, loans will still fall because the increase in time deposits will not be high enough to cover the decrease in demand deposits. The testable hypotheses are; ∂LN/∂rON<0 and ∂TD/∂rON>0; where LN, TD and rON stand for loans, time deposits and Central Bank of Turkey overnight rates in order. The data is obtained from the Turkish Banking Association and from the Central Bank of Turkey. The data set consists of the overnight interest rates, and the bank level variables; total loans, demand deposits, large time deposits, securities and capital for 25 quarters over the period 2002Q4-2008Q4.

This section is divided into two sub-sections. In the first sub-section, the methodology used by Kishan and Opiela [2] is introduced and it is estimated with a few modifications. The second sub-section, utilizes panel pooled OLS estimation model with the fixed effects estimation technique.

4.1. Ordinary Least Squares Model

Banks are separated into four groups by both asset-size and capital leverage ratio, and then they are divided into two groups first by asset-size and then by capital leverage ratio separately.

The variables used in the first step regressions of the methodology include; grLN (growth rate of loans), grLN_{t-1},..., grLN_{t-4} (four lagged values of grLN), chrate_{t-1},.., chrate_{t-4} (four lagged values of the change in overnight rates), grTD (current period growth in large time deposits), grSEC (current period growth in securities), plus three seasonal dummy variables (D_1, D_2, D_3). The econometric model is;

$$grLN = \alpha\_it + \beta\_1\ (\square grLN\square\_(t-1)\ ) + \beta\_2\ (\square grLN\square\_(t-2)\ ) + \beta\_3\ (\square grLN\square\_(t-3)\ ) + \beta\_4\ (\square grLN\square\_(t-4)\ ) + \beta\_5\ (\square chrate\square\_(t-1)\ ) + \beta\_6\ (\square chrate\square\_(t-2)\ ) + \beta\_7\ (\square chrate\square\_(t-3)\ ) + \beta\_8\ (\square chrate\square\_(t-4)\ ) + \beta\_9\ (grTD) + \beta\_10\ (grSEC) + \beta\_11\ (D\_1\ ) + \beta\_12\ (D\_2\ ) + \beta\_13\ (D\_3\ ) + \varepsilon\_it \qquad (1)$$

Using the Ordinary Least Squares (OLS) estimation technique, the growth rate of loans is regressed on the above mentioned variables. First, pooled OLS estimation technique is used to capture the difference in the sum of coefficients of the (lagged) change in overnight rate variables for different capital leverage and asset size groups. Second, this estimation technique is used to see the change in policy response for only asset size classes. Third, the same estimation technique is used to see the change in policy response for only leverage ratio classes. α_{it} captures the bank level fixed effects. Both α_{it} and ε_{it} are assumed to be independently and identically distributed. For stationarity, growth rate of the variables are used. Time deposits and securities are included to

capture the 'funding' effects on loans. For each group of banks, the OLS estimations are run separately and one coefficient is reported per group in the results. The main interest is on the sum of the coefficients of $chrate_{t-1}$,.., $chrate_{t-4}$ (β_5+β_6+β_7+β_8) and on the coefficient of $grTD$, β_9. Consistent with my hypothesis, a negative sign associated with the overnight rate coefficient will imply that an increase in overnight rates will cause a decline in loans and a positive sign associated with the $grTD$ coefficient will imply that an increase in time deposits will affect loans positively. For small and undercapitalized banks, the sum of the coefficients of the lagged values of overnight rates is expected to be negative and the coefficient of the growth in time deposits is expected to be positive. For large and well-capitalized banks, sum of the coefficients are expected to be positive (less negative) and the coefficient of $grTD$ is expected to be positive and more significant. The response of securities to changes in the overnight rates is indeterminate. Banks may choose to sell securities to fund loans or time deposits may be used for funding loans and securities may increase to balance asset risk. Hence, β_{10} may be either negative or positive [2].

4.2. Panel Ordinary Least Squares Model

In this section, I use a panel regression approach with pooled OLS estimation technique and fixed effects models. Unlike the previous sub-section, banks are not grouped and all banks are regressed at once. The aim of this method is to get more accurate econometric results with the small data set used (which consists of 30 banks). In order to observe the policy responses of different asset-size and capital leverage ratio classes, slope dummies are added to the regressions. By clustering banks, panel robust standard errors are obtained. Three different models are used; (i) first-difference model, (ii) log model, and (iii) log difference model. The first difference model is;

$$LN_t - LN_{t-1} = \beta_1[(LN_t - LN_{t-1})_{t-1}] + \beta_2[(LN_t - LN_{t-1})_{t-2}] + \beta_3[(LN_t - LN_{t-1})_{t-3}] + \beta_4[(LN_t - LN_{t-1})_{t-4}] + \beta_5[(r_t - r_{t-1})_{t-1}] + \beta_6[(r_t - r_{t-1})_{t-2}] + \beta_7[(r_t - r_{t-1})_{t-3}] + \beta_8[(r_t - r_{t-1})_{t-4}] + \beta_9(TD_t - TD_{t-1}) + \beta_{10}(SEC_t - SEC_{t-1}) + \beta_{11}(D_1) + \beta_{12}(D_2) + \beta_{13}(D_3) + \varepsilon_{it} \quad (2)$$

In the first difference model, change in loans ($\mathrm{LN_t - LN_{t-1}}$) is regressed on four lagged values of itself, four lagged values of the change in overnight rates ($\mathrm{r_t - r_{t-1}}$), change in TD ($\mathrm{TD_t - TD_{t-1}}$), change in SEC ($\mathrm{SEC_t - SEC_{t-1}}$), plus three seasonal dummy variables. The log model is;

$$ln\,LN_t = \beta_1[(ln\,LN_t)_{t-1}] + \beta_2[(ln\,LN_t)_{t-2}] + \beta_3[(ln\,LN_t)_{t-3}] + \beta_4[(ln\,LN_t)_{t-4}] + \beta_5[(r_{ON})_{t-1}] + \beta_6[(r_{ON})_{t-2}] + \beta_7[(r_{ON})_{t-3}] + \beta_8[(r_{ON})_{t-4}] + \beta_9(ln\,TD_t) + \beta_{10}(ln\,SEC_t) + \beta_{11}(D_1) + \beta_{12}(D_2) + \beta_{13}(D_3) + \beta_{14}(Dy_1) + \beta_{15}(Dy_2) + \beta_{16}(Dy_3) + \beta_{17}(Dy_4) + \beta_{18}(Dy_5) + \varepsilon_{it} \quad (3)$$

In the log model, log of loans ($\mathrm{ln\,LN_t}$) is regressed on four lagged values of itself, four lagged values of the overnight rates ($\mathrm{r_{ON}}$), log of TD ($\mathrm{ln\,TD_t}$), log of SEC ($\mathrm{ln\,SEC_t}$), three seasonal dummies and also on five yearly dummies for the 6 year estimation period.

The final model is the log difference model;

$$ln\,LN_t - ln\,LN_{t-1} =$$
$$\beta_1[(ln\,LN_t - ln\,LN_{t-1})_{t-1}] + \beta_2[(ln\,LN_t - ln\,LN_{t-1})_{t-2}] + \beta_3[(ln\,LN_t - ln\,LN_{t-1})_{t-3}] + \beta_4[(ln\,LN_t -$$
$$ln\,LN_{t-1})_{t-4}] + \beta_5[(r_t - r_{t-1})_{t-1}] + \beta_6[(r_t - r_{t-1})_{t-2}] + \beta_7[(r_t - r_{t-1})_{t-3}] + \beta_8[(r_t - r_{t-1})_{t-4}] +$$
$$\beta_9(ln\,TD_t - ln\,TD_{t-1}) + \beta_{10}(ln\,SEC_t - ln\,SEC_{t-1}) + \beta_{11}(D_1) + \beta_{12}(D_2) + \beta_{13}(D_3) + \varepsilon_{it} \quad (4)$$

In the log difference model, log change in loans ($\ln \mathrm{LN_t} - \ln \mathrm{LN_{t-1}}$) is regressed on four lagged values of itself, four lagged values of the change in overnight rates ($\mathrm{r_t} - \mathrm{r_{t-1}}$), log change in TD ($\ln \mathrm{TD_t} - \ln \mathrm{TD_{t-1}}$), log change in SEC ($\ln \mathrm{SEC_t} - \ln \mathrm{SEC_{t-1}}$) and three seasonal dummy variables.

Sum of the coefficients of lagged values of overnight rates (β_5+β_6+β_7+β_8) is expected to be negative and the coefficient of time deposits (β_9) is expected to be positive in all three models. When banks are divided into asset size and capital leverage ratio categories, the overnight rate coefficient associated with the small bank group is expected to be negative and greater in absolute value than the large bank group. Similarly, the overnight rate coefficient associated with the undercapitalized bank group is expected to be negative and greater in absolute value than the well-capitalized bank group. In addition, the time deposits coefficient is expected to be less positive for the small and the undercapitalized bank groups which will reflect the severity of funding loans by raising time deposits for small and undercapitalized banks. If these coefficients end up being significant with the predicted signs, then results will provide evidence of a bank lending channel.

There are some important points to mention about these models. First, the first-difference and the log-difference models drop the bank-specific effects variable (α_{it}). This helps to relieve the strong assumption in the previous sub-section that α_{it} is i.i.d. Second, by estimating the system as a panel dataset, all models will assume that the error term may change between different banks. Stationarity is still assumed as a time series property of the data. Finally, in the log model yearly dummies are added to control for the annual economic fluctuations. There are two effects of this modification; it increases the R-squared values in estimation results significantly, however it decreases the degrees of freedom. In the difference models-both first difference and log difference-the yearly dummies drop out in the same way the bank-level fixed effects do.

5. Emprical Results

This section is divided into two parts. The first sub-section shows the results of the OLS estimation for four groups of banks (divided by both asset-size and leverage ratio), and 2 groups of banks divided by asset-size and 2 groups of banks divided by leverage ratio. The second sub-section presents the results for panel pooled OLS (fixed effects) estimation for the first-difference, the log, and the log difference models.

Table 2 below shows the number of banks grouped by both asset size and capital leverage ratio. Number of banks in each group of the 4-group regression is as follows; 10 banks in the small, undercapitalized category; 5 banks in the large, undercapitalized category; 13 banks in the small, well-capitalized category and 2 banks in the large, well-capitalized category. Number of banks in each group of the 2-group asset-size based regression is as follows; 23 banks in the small category and 7 banks in the large category. Number of banks in each group of the 2-group leverage ratio based regression is as follows; 15 banks in the undercapitalized category and 15 banks in

the well-capitalized category.

Table 2: Number of banks in each group

Bank K/A Ratio Category	**All banks**	**Small banks**	**Large banks**
		(Assets<8 billion €)	**(Assets>8 billion €)**
All banks		**23**	**7**
Undercapitalized banks (K/A<0.13)	**15**	**10**	**5**
Well-capitalized banks (K/A>0.13)	**15**	**13**	**2**

Table 3: The effect of the change in overnight rates on the growth rate of loans[1]

4 GROUPS

Banks with Capital/Asset Ratio<0.13		
	Bank Size	
Variable	Small Banks	Large Banks
$\sum_1^4$ Change in ON rates	-0,0101	-0,0728
	(0.955)	(0.482)
Change in Securities	0.0560	-0.0354
	(0.210)	(0.518)
Change in Time Deposits	-0.0016	0.6864
	(0.000)***	(0.000)***
R^2	0.3521	0.6279
No of observations:	200	100
Banks with Capital/Asset Ratio>0.13		
	Bank Size	
Variable	Small Banks	Large Banks
$\sum_1^4$ Change in ON rates	2,6792	-0,2379
	(0.389)	(0.066)*
Change in Securities	-0.0437	0.2003
	(0.804)	(0.177)
Change in Time Deposits	0.0347	0.4898

	(0.056)*	(0.003)**
R^2	0.0581	0.7498
No of observations:	260	40

NOTES: P-values in paranthesis

[1] Each specification also includes four lagged values of the dependent variable and three seasonal dummy variables. * = Significant at 10 percent level. ** = Significant at 5 percent level.*** = Significant at 1 percent level.

5.1. Results of Ordinary Least Squares Regression

Table 3 shows the estimates of the effect of policy on loans. The sums of the coefficients associated with changes in the overnight rates are negative for small, undercapitalized; large, undercapitalized and large, well-capitalized banks. However the overnight rate coefficients reported for undercapitalized banks are insignificant and smaller in absolute value than those of the large, well-capitalized banks. The sum of the coefficients of the change in overnight rates is negative and significant at 10 percent level for the large, well-capitalized banks group. The overnight rate coefficient of the small, well-capitalized group is positive and large, but it is not significant. The coefficient associated with the overnight rates for small, undercapitalized bank category was expected to be negative, significant and greater in absolute value than the overnight rate coefficient associated with large and well-capitalized banks. The overnight rate coefficient of the small, undercapitalized bank group is negative but not significant. Consequently, the overnight rate coefficient values in Table 3 do not provide evidence consistent with our hypothesis that small, undercapitalized banks are most responsive to a monetary policy shock.

The coefficients of the change in securities are insignificant for all bank groups. However, the coefficients of the change in time deposits are significant and positive for all groups except the small, undercapitalized group. This result may provide evidence for the existence of a bank lending channel in the sense that the small or undercapitalized banks may find it difficult to raise time deposits during contractionary periods, compared to the large or well-capitalized banks. But this alone is not enough to provide evidence for a lending channel, since the effect of this severity of financing for small, undercapitalized banks is not reflected on the sum of the coefficients associated with changes in the overnight rates. Dividing banks separately first by asset-size and then by capital leverage ratio may be helpful in order to distinguish the effects of asset-size and capital leverage ratio on the sensitivity of bank loans to changes in the overnight rates.

Table 4: The effect of the change in overnight rates on the growth rate of loans[2]

2 GROUPS (Asset-based)

	Bank Size	
Variable	Small banks(<8 billion €)	Large banks(>8 billion €)
$\sum_1^4$ Change in ON rates	1.4902	-0.1009

	(0.404)	(0.215)
Change in Securities	-0.0452	-0.0233
	(0.777)	(0.646)
Change in Time Deposits	-0.0008	0.6851
	(0.462)	(0.000)***
R^2	0.0351	0.6315
No of observations	460	140

NOTES: P-values in paranthesis

[2]Each specification also includes four lagged values of the dependent variable and three seasonal dummy variables. * = Significant at 10 percent level. ** = Significant at 5 percent level. *** = Significant at 1 percent level.

Table 5: The effect of the change in overnight rates on the growth rate of loans[2]

2 GROUPS(Capital-based)

	Capital/Asset Ratio	
Variable	K/A<0.13	0.13<K/A
$\sum_1^4$ Change in ON rates	0.0396	2,2819
	(0.754)	(0.398)
Change in Securities	0.0650	-0.0408
	(0.168)	(0.818)
Change in Time Deposits	-0.0015	0.0351
	(0.000)***	(0.052)*
R^2	0.2853	0.0511
No of observations	300	300

NOTES: P-values in paranthesis

[2]Each specification also includes four lagged values of the dependent variable and three seasonal dummy variables. * = Significant at 10 percent level. ** = Significant at 5 percent level. *** = Significant at 1 percent level.

Table 4 and Table 5 show the effects of policy on total loan growth depending on banks' asset-size and capital to assets ratio, in turn. In Table 4, the sum of coefficients of the change in overnight rates are both insignificant and the estimate is positive and large for small banks, whereas it is negative and small for large banks. The signs are opposite to what our hypothesis predicts however the coefficient values are insignificant. When we analyze

the movements of time deposits for small and large banks, the coefficient of the change in time deposits is negative for small banks and positive (and significant) for large banks. This result is consistent with the hypothesis that larger banks may find it easier to raise time deposits during contractionary periods. Change in securities estimates are both negative but insignificant. Hence, it is hard to state that both large and small banks find it difficult to raise securities in times of recession leaning on the change in securities estimates of Table 4. In Table 5, sum of the change in overnight rates coefficients are positive and insignificant for both undercapitalized and well-capitalized groups. Coefficients of the change in securities are insignificant and not much different in both capital groups. Table 5 provides evidence on the severity of financing for undercapitalized banks. The coefficient of the change in time deposits is (unexpectedly) negative and significant (at 1 percent level) for undercapitalized banks, whereas it is positive and significant (at 10 percent level) for well-capitalized banks. The negative coefficient associated with the change in time deposits for undercapitalized banks suggests that an increase in time deposits decreases bank loan supply which is not consistent with the bank lending channel. This coefficient was expected to be positive for both capital groups and less positive for the undercapitalized group. Negative sign of this coefficient may be due to the small data set available. Table 3 and Table 4 provide evidence that it is harder for small banks to raise time deposits than large banks during contractionary periods. This is consistent with the bank lending channel. Although there is evidence in favor of the bank lending channel (behavior of large time deposits), this evidence is not supported by the behavior of overnight interest rates. Evidence of a bank lending channel in Turkey is not overwhelming.

Table 6: The effect of the change in overnight rates on the change in loans[3]

First Difference Model with Fixed Effects

(4 lags of the change in overnight rates used)

No of observations: 600	
Variable	
$\sum_1^4$ Change in ON rates	15.6600
	(0.099)*
Change in Securities	0.0501
	(0.143)
Change in Time Deposits	0.4350
	(0.000)***
R^2	0.5817

First Difference Model with Fixed Effects

(3 lags of the change in overnight rates used)

No of observations: 630	
Variable	
$\sum_1^3$ Change in ON rates	14.9860
	(0.051)*
Change in Securities	0.0453

	(0.175)
Change in Time Deposits	0.4391
	(0.000)***
R^2	0.5728

First Difference Model with Fixed Effects

(2 lags of the change in overnight rates used)

No of observations: 660	
Variable	
$\sum_1^2$ Change in ON rates	17.3776
	(0.012)**
Change in Securities	-0.0087
	(0.799)
Change in Time Deposits	0.4943
	(0.000)***
R^2	0.4283

NOTES: P-values in paranthesis

[3]Each specification includes as many lagged values of the dependent variable as the lagged values of the change in overnight rates and three seasonal dummy variables. * = Significant at 10 percent level. ** = Significant at 5 percent level. *** = Significant at 1 percent level.

Table 7: The effect of the overnight rates on bank loans[4]

Log Model with Fixed Effects

(4 lags of the change in overnight rates used)

No. of observations: 610	
Variable	
$\sum_1^4$ ON rates	0.0024
	(0.780)
Log of Securities	0.0100
	(0.793)
Log of Time Deposits	0.0232
	(0.250)
R^2	0.9799

Log Model with Fixed Effects

(3 lags of the change in overnight rates used)

No. of observations: 639	
Variable	
$\sum_1^3$ ON rates	0.0036

	(0.617)
Log of Securities	-0.0037
	(0.920)
Log of Time Deposits	0.0095
	(0.622)
R^2	0.9799

Log Model with Fixed Effects

(2 lags of the change in overnight rates used)

No. of observations: 668	
Variable	
$\sum_1^2$ ON rates	0.0144
	(0.020)**
Log of Securities	0.0229
	(0.532)
Log of Time Deposits	0.0174
	(0.354)
R^2	0.9838

NOTES: P-values in paranthesis

[4]Each specification includes as many lagged values of the dependent variable as the lagged values of the change in overnight rates, three seasonal dummy variables and five yearly dummy variables. * = Significant at 10 percent level. ** = Significant at 5 percent level. *** = Significant at 1 percent level.

Table 8: The effect of the change in overnight rates on the log change in loans[5]

Log Difference Model with Fixed Effects

(4 lags of the change in overnight rates used)

No. of observations: 579	
Variable	
$\sum_1^4$ Change in ON rates	-0.0003
	(0.963)
Log change in Securities	0.0220
	(0.620)
Log change in Time Deposits	-0.0038
	(0.855)
R^2	0.0726

Log Difference Model with Fixed Effects

(3 lags of the change in overnight rates used)

No. of observations: 608	

Variable	
$\sum_1^3$ Change in ON rates	-0.0007
	(0.903)
Log change in Securities	-0.0141
	(0.751)
Log change in Time Deposits	0.0002
	(0.991)
R^2	0.0679

Log Difference Model with Fixed Effects

(2 lags of the change in overnight rates used)

No. of observations: 637	
Variable	
$\sum_1^2$ Change in ON rates	-0.0110
	(0.030)**
Log change in Securities	0.0357
	(0.413)
Log change in Time Deposits	0.0128
	(0.521)
R^2	0.0391

NOTES: P-values in paranthesis

[5]Each specification includes as many lagged values of the dependent variable as the lagged values of the change in overnight rates and three seasonal dummy variables. * = Significant at 10 percent level. ** = Significant at 5 percent level. *** = Significant at 1 percent level.

5.2. Results of Panel Ordinary Least Squares Regression

Table 6, Table 7, and Table 8 provide the estimates of the panel data pooled OLS regressions for the three models specified. All banks are included in panel data regressions. Sums of the coefficients for four, three and two lagged values of the change in overnight rates (except for the log model where overnight rate is used) are reported for each model. The aim of adding three and two lagged values of the variable is to see whether the results show any improvement when number of observations are increased. The bias caused by using four lagged values-which results with a loss of four period's observations per bank- is resolved in part by decreasing the number of the lags for both the growth rate of loans (log of loans for the log model) and the change in overnight rates (overnight rates for the log model).

Table 6 provides the estimates for the first-difference model with four, three and two lagged values in turn. Sums of the coefficients of the change in overnight rates are positive and very large for all three cases. Moreover, the estimates are significant at 10 percent level for the four and the three lags cases and significant at 5 percent level for the two lags case. This econometric result suggests that an increase in the overnight rates-

causing a decrease in the money supply and a contraction in the overall economy-increases the total supply of bank loans which contradicts with the existence of a bank lending channel. Estimates for the change in securities variable are insignificant in all three cases. Estimates for the change in time deposits are positive and significant at 1 percent level in all three cases. During recessions banks' ability to fund loans by raising time deposits may be a plausible explanation for the increase in bank loans however, this implication is not enough to explain the underlying reason for the increase in loan supply.

Table 7 shows the regression results of the log model for three different lag cases. Sum of the coefficients of the overnight rates' lagged values are positive but quite small compared to Table 5. Unlike Table 6, these coefficients are not significant except for the two lags case. The coefficient values for the log of securities are insignificant. Log of time deposits coefficients are positive but insignificant in all three cases. Since most of the results are econometrically insignificant, one may not be able to make plausible explanations based on Table 7.

Table 8 shows the results of the panel data regression run with the log-difference model. In all three cases, sum of the coefficients of lagged values of the change in overnight rates is negative, quite small and insignificant except for the two lags case. The negative sign of the coefficients and the 5 percent significance observed at the two lags case may provide evidence for the existence of a bank lending channel. However, Table 8 results should be interpreted cautiously because the R^2 values are quite low which mean that the model is not successful in predicting movements of the dependent variable in question. Coefficients of the log change in securities and the log change in time deposits variables are insignificant.

Table 9: The effect of bank asset size on bank loans[6]

(Asset dummies added)

First Difference Model with Fixed Effects

(4 lags of the change in overnight rates used)

No. of observations: 600	
Variable	
$\sum_1^4$ Change in ON rates	0.1043
	(0.992)
Change in Securities	0.0325
	(0.353)
Change in Time Deposits	0.4267
	(0.000)***
$\sum_1^4$ Asset Slope − Dummies	90.5981
	(0.000)***
R^2	0.4646

Log Model with Fixed Effects

(4 lags of the change in overnight rates used)

No. of observtions: 630

Variable	
$\sum_1^4$ ON rates	0.0051
	(0.558)
Log of Securities	0.0703
	(0.036)**
Log of Time Deposits	-0.0138
	(0.380)
$\sum_1^4$ Asset Slope − Dummies	0.0032
	(0.598)
R^2	0.9798

Log Difference Model with Fixed Effects

(4 lags of the change in overnight rates used)

No. of observations: 600	
Variable	
$\sum_1^4$ Change in ON rates	-0.0035
	(0.979)
Change in Securities	0.0497
	(0.241)
Change in Time Deposits	0.0137
	(0.041)**
$\sum_1^4$ Asset Slope − Dummies	0.0023
	(0.874)
R^2	0.0884

NOTES: P-values in paranthesis

[6]Asset dummies are added to the previously defined first- difference, log and log difference models with four lagged cases. * = Significant at 10 percent level. ** = Significant at 5 percent level. *** = Significant at 1 percent level.

Table 10: The effect of bank capital on bank loans[7]

(capital dummies added)

First Difference Model with Fixed Effects

(4 lags of the change in overnight rates used)

No. of observations: 600	
Variable	
$\sum_1^4$ Change in ON rates	36.6112
	(0.006)***
Change in Securities	0.0466

	(0.173)
Change in Time Deposits	0.4326
	(0.000)***
$\sum_1^4$ Capital Slope − Dummies	-39.4620
	(0.022)**
R^2	0.5628

Log Model with Fixed Effects

(4 lags of the change in overnight rates used)

No. of observations: 610	
Variable	
$\sum_1^4$ Change in ON rates	0.0044
	(0.618)
Log Securities	0.0091
	(0.810)
Log Time Deposits	0.0264
	(0.191)
$\sum_1^4$ Capital Slope − Dummies	-0.0046
	(0.384)
R^2	0.9803

Log Difference Model with Fixed Effects

(4 lags of the change in overnight rates used)

No. of observations: 579	
Variable	
$\sum_1^4$ Change in ON rates	0.0026
	(0.770)
Log change in Securities	0.0192
	(0.667)
Log change in Time Deposits	-0.0030
	(0.885)
$\sum_1^4$ Capital Slope − Dummies	-0.0062
	(0.623)
R^2	0.0764

NOTES: P-values in paranthesis

[7]Capital dummies are added to the previously defined first- difference, log and log difference models with four lagged cases. * = Significant at 10 percent level. ** = Significant at 5 percent level. *** = Significant at 1 percent level.

Table 9 presents the estimation results for the first-difference, the log and the log-difference models with four lagged values of the change in overnight rates used, adding an interactive dummy measuring the effect of bank asset size on loans. The coefficient is formed by summing the coefficients of four slope-dummy variables representing the large banks. Slope-dummies are equal to the corresponding lag of the change in overnight rates variable if the bank is in the large bank category, and they are equal to zero otherwise. The sum of four asset slope-dummy coefficients is positive in all three models, and interestingly it is quite large and significant at 1 percent level in the first-difference model's case where it is small and insignificant in the other two models' cases. When we sum up the coefficient associated with the overnight rates and the coefficient associated with the asset-size dummy, we see that it is quite large in the first-difference model but quite small in the two other models. The coefficient of the asset-size dummy in the first model suggests that larger banks are more responsive to changes in overnight rates however the same coefficients in the other two models do not support this finding.

In Table 10, instead of the asset slope-dummies, the capital slope-dummies are added to the regressions run with the above mentioned three models. The coefficient is formed in the same way with the asset-size coefficient, where capital slope-dummies are equal to the corresponding lag of the change in overnight rates variable if the bank is in the well-capitalized category, and zero otherwise. The coefficient for the capital dummy is negative in all three models furthermore it is quite large (in absolute value) and significant at 5 percent level in the first-difference model's case. The sum of the overnight rate coefficient and the capital dummy coefficient is close to zero in the first difference model, which suggests that the sensitivity of the well-capitalized banks to the overnight rates is low but when we look at the overnight rate coefficient only (not the sum), it suggests that the sensitivity increases for undercapitalized banks.

Panel data results show some evidence of the bank lending channel. However, the evidence is not robust under alternative specifications. This may be due to the small data set used which is a common problem for researchers who do empirical work in Turkish data.

6. Conclusion

This study investigates the effects of changes in the Turkish Central Bank overnight rates on bank loan supplies. Banks are divided by their asset-size and equity capital to assets ratio to search for a bank lending channel. This study hypothesizes that small, under-capitalized banks should be more responsive to changes in overnight rates than large, well-capitalized banks consistent with the bank lending channel view. To test the hypothesis, I first use the approach taken by Kishan and Opiela [2] and then I introduce panel data pooled OLS estimation technique with three fixed effects models over the 2002Q4-2008Q4 period.

Results provide significant evidence that small banks may not be able to raise time deposits as easily as large banks during contractionary periods. This finding is supportive for the bank lending channel. In addition, panel data results on the effect of capital on bank loan behavior provide some evidence that the undercapitalized banks are more sensitive to changes in overnight rates which further supports the existence of bank lending channel. However the panel data results including the effect of asset size on bank loan behavior does not support our

hypothesis, and the coefficients associated with the change in overnight rates in both the OLS and the panel OLS approaches are insignificant which does not support the existence of a BLC. This result may be due to the small data set available in Turkey.

Even though the results are not very strong, I find some evidence that bank capital may be important for the monetary transmission mechanism in Turkey. For building a strong banking system, bank capital seems to play an important role. Increasing capital requirements may help creating sounder bank intermediation, and also suggested by the results of this study, this may lead to a banking system which is less fragile to the changes in the monetary policy.

7. Data Appendix

Data is quarterly and it starts from the fourth quarter of 2002 and ends with the fourth quarter of 2008. As of June30, 2009; there are 45 banks operating in Turkey. 32 of them are deposit banks. Within deposit banks, 3 banks are state-owned, 11 banks are privately-owned and 17 banks are foreign banks. There is one bank operating under the control of the Deposit Insurance Fund. Out of 32 deposit banks, 2 banks are eliminated because these banks did not report loans for more than half of the estimation period. Because growth rates of and the changes in the bank balance sheet items are used in regressions, first observations are dropped for each bank. In addition, using 4 lagged values of the change in the overnight rates drops 4 observations for each bank (using 3 and 2 lagged values drops 3 and 2 observations in the same way). So, with a total of 30 banks and 20 periods, 600 bank-quarters of observations are used except the log model where directly the logged values of the variables are taken and without dropping the first observations for 30 banks and using 21 periods of observations per bank, 630 bank-quarters are used.

Quarterly detailed balance sheets of the banks are obtained from the Turkish Banking Association and the equity capital to assets ratios are constructed by using these balance sheets. The data for loans, securities, demand deposits and time deposits for each bank over the period 2002Q4-2008Q4 are also provided by these quarterly balance sheets. The data source for the GDP series and the consumption expenditures series is the Turkish Central Bank. The quarterly overnight rates are also supplied by the Turkish Central Bank. The following web-sites are utilized:

Turkish Banking Association, http://www.tbb.org.tr

Central Bank of Turkey, http://www.tcmb.gov.tr

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