The Bank Lending Channel In Turkey: Effect of Capital Adequacy Ratio

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Abstract

This paper empirically analyzes the effect of monetary policy changes on loan supply of Turkish banks and presents the evidence that bank lending channel of monetary policy transmission mechanism is operating through the capital adequacy of Turkish banks. By using the CAR as an indicator of capital constraint we show that banks that do not have capital constraints respond more to monetary policy. Also, banks with different CAR react differently to monetary policy changes. We show that the asymmetric effect of CAR may help to explain the mixed results in the empirical literature about the bank lending channel.

Keywords: *Monetary Transmission Mechanism, Bank Lending Channel, Capital Adequacy Ratio*
JEL Classification: *E42, E51, E52, G21*

Özet - Türkiye'de Banka Kredi Kanalı: Sermaye Yeterlilik Rasyosunun Etkisi

Bu çalışma, ampirik olarak para politikası değişikliklerinin Türk bankalarının kredi arzı üzerindeki etkisini incelemekte ve parasal aktarım mekanizmasının kredi kanalının Türk bankalarının sermaye yeterliliklerinden etkilendiğini göstermektedir. Sermaye kısıtlaması için Sermaye Yeterlilik Rasyosu (SYR) kullanıldığında, sermaye kısıtlaması olmayan bankalar para politikasına daha fazla tepki vermektedirler. Farklı SYR seviyeleri olan bankaların tepkileri de farklıdır. Literatürdeki kredi kanalı hakkındaki karışık sonuçlar, SYR göz önünde bulundurularak açıklanabilir.

Anahtar Kelimeler: *Parasal Aktarım Mekanizması, Banka Kredi Kanalı, Sermaye Yeterlilik Rasyosu*
JEL Sınıflaması: *E42, E51, E52, G21*

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1. Introduction

Although there has been a numerous literature developed for the empirical validity of the bank lending channel in monetary policy transmission, the studies report mixed results. For example, Golodniuk (2006) finds positive relationship between consumer loans and interaction between capitalization and monetary policy. The results of Ignacio and Martinez-Pages (2001) are mostly against the existence of a bank-lending channel in the period under analysis.

In this paper, taking an emerging market economy as our laboratory, we investigate whether the asymmetric effect of CAR might be one of the reasons of these mixed results. Banks are categorized as capital unconstrained in two different ways. First, a bank is capital unconstrained if its CAR level is above the average. The average CAR of the Turkish banks is 18.3%. Second, if it has CAR above 12%. The Bank Regulation and Supervision Agency of Turkey recently announced that banks whose capital adequacy ratios are lower than 12% will not be allowed to open new branches. We do not use 8% for classification because almost all of the Turkish banks have CAR of 8% or above.

This paper empirically investigates three major questions. (1) What is the effect of monetary policy changes on the loan supply of Turkish banks? In other words, does the bank lending channel work for the Turkish economy? (2) Do capital constraint banks and capital unconstrained banks react differently to monetary policy changes? (3) Do different classifications of capital unconstraint banks (depending on different levels of CAR of banks) matter for the bank lending channel?

Using banking sector and macroeconomic data for the Turkish economy, our study provides the following answers for these questions. First, there is negative and significant relationship between the loan supply of the Turkish banks and the monetary policy changes. In all of the regression specifications where change in the loan supply is the dependent variable, the coefficient of the change in interbank interest rate, indicator of monetary policy, is negative and significant. Thus, bank lending channel is operational in the Turkish economy. Second, capital constraint banks react differently to monetary policy changes. In line with the theoretical results of Peek and Rosengren (1995), the loan supply of capital unconstrained banks decrease when the interbank interest rate increases (monetary policy changes) and the loan supply of capital constrained banks remain unchanged. Finally, regressions with different classifications of unconstrained banks conclude that classification methodology is an important component of the analysis. The coefficients of the interest rate and the interaction variables are different for regressions which uses different

methodologies for classification. These results indicate that capital adequacy ratio might explain some of the mixed results of the previous literature.

This study contributes to the literature on bank lending channel mainly in two ways. First, we provide empirical evidence that supports the theoretical findings of Peek and Rosengren (1995) for an emerging market economy. Finally and more importantly, we exhibit that by using the CAR as an indicator of capital constraint, the bank lending channel is found to be significant. Unlike some of the previous studies which find positive or insignificant results for the effect of monetary policy, we find that the loan supply of capital unconstrained banks decrease when the interbank interest rate increases which is the claim of many theoretical studies.

2. The Bank Lending Channel

Schematically, we can show the operation of the bank lending channel as follows:

M↑ => Bank Deposits↑ => Bank Loans↑ => Investment↑ => Y↑

M = money supply

Y = output.

As shown in Bernanke and Blinder (1988), the necessary conditions that must hold for bank lending channel to be operative are:

1. Firms must not be able to completely compensate reduced supply of commercial bank loans from other sources.

2. The Central Bank must be able to affect the supply of loans.

3. There must be an imperfection in the adjustment of the aggregate price level.

Following Kashyap and Stein (1995) and Bernanke and Blinder (1988), Peek and Rosengren (1995) construct a simple model of bank. The bank is assumed to have three assets, namely loans, securities and reserves, and three categories of liabilities, which are bank capital, transactions deposits and nontransactions deposits. They show that when the capital constraint is binding (the bank is capital-constrained), there are two factors that increase nontransactions deposits: increase in capital and an increase in the federal funds. However, total deposits are unchanged when the federal funds rate increases because an increase in the federal funds rate causes offsetting changes in transactions and nontransactions deposits. Thus, the impact of a change in monetary policy will be much weaker when a substantial share of banks is capital constrained. The model of Peek and Rosengren (1995) yields two testable hypotheses among the others.

1) Total deposits at capital constrained banks should be unaffected by changes in the interest rate, while deposits at capital unconstrained banks should be negatively related to changes in the interest rate.

2) The effect of the changes in the interest rate on loans should be negative for unconstrained banks and the effect will be much higher for them than constrained banks.

The empirical results that will be presented in the following section show that both hypotheses above are proved for Turkey. Changes in loans in Turkey are negatively related to changes in the interest rate and unconstrained banks whose capital adequacy ratio is higher than average respond much more to changes in the interest rate.

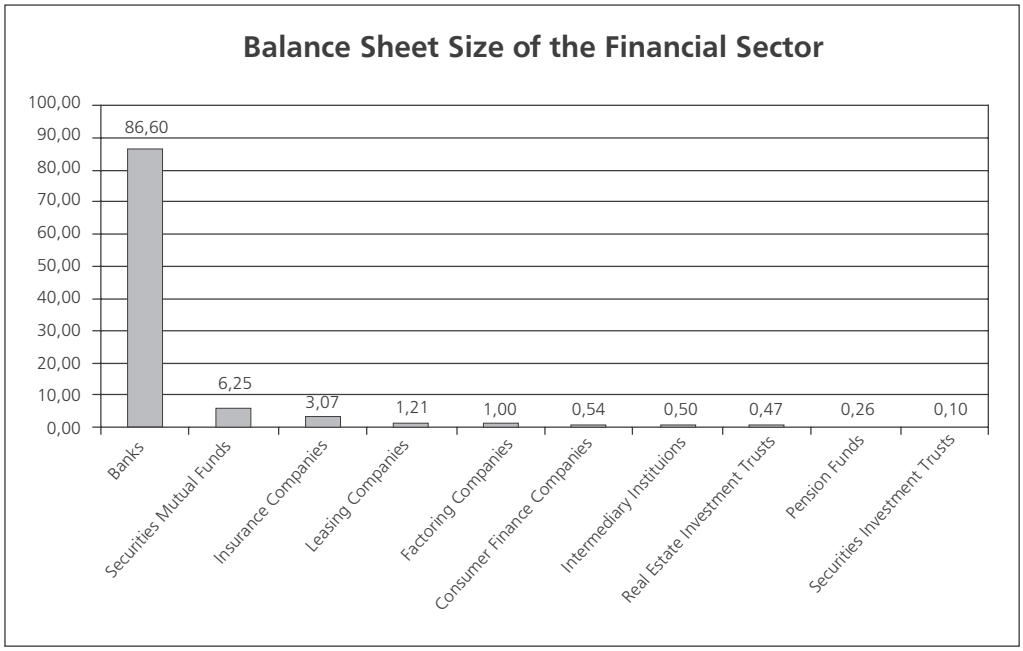
3. Dominance of Turkish Banks as the Source of Intermediated Loans

Before presenting the estimation methodology and the results, we have to show that the three conditions of the bank lending channel specified in Kashyap and Stein (1995) hold for the Turkish banking system. Cavusoglu (2002) analyzes 58 deposit money banks covering the period of 1988-1999 in Turkey. That study implements different empirical methodology and investigates different time period than this paper. Although the conditions for the bank lending channels hold for the Turkish economy that study does not find any significant relationship between the change in the monetary policy indicator and the growth rate of the loan supply in the estimated models.

Similar to most of the developing countries, domestic loan in Turkish banking system is exclusively dependent on the lending capacity of Turkish banking system. The banking sector is the largest and most important part of the Turkish financial system. Especially when CBRT (Central Bank of Republic of Turkey) and ISE (Istanbul Stock Exchange) market capitalization (market value of the publicly held companies) is omitted, it is observed that the banking sector reached about 86 % of total financial sector. According to Financial Stability Report (FSA, 2006), in 2005, total asset size of the Turkish financial sector amounted to 469,9 billion New Turkish Liras and about 87 percent of financial sector assets are composed of bank assets (including development and investment banks and participation banks). As seen in the figure below, banks dominate the Turkish financial system. Therefore, non-bank financial institutions hardly play a serious role in loan supply. Other sources of external financing such as stock exchange and alternative non-financial credit institutes are not important. Thus, we can say that the necessary conditions for the bank lending channel to be operative hold in Turkey.(1)

(1) *Second condition is analyzed in section 5 and 6. Section 5 and 6 show that monetary policy affects supply of loans. We assume that there is an imperfection in the adjustment of the aggregate price level in Turkey. This assumption is a standard assumption made by many empirical and theoretical studies which investigate the transmission mechanisms of monetary policy.*

Figure 1: Balance Sheet Size of the Financial Sector



4. Data and Empirical Methodology

Following the theoretical model of Peek and Rosengren (1995), we test the hypothesis that capital constrained and unconstrained banks react differently to a change in monetary policy. In addition, we also investigate whether the bank capital and bank asset play an important role on the response of loans to change in the monetary policy.

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

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

The effect of monetary policy on bank loans depends on the strength of balance sheet of a bank. Therefore, we include a second set of explanatory variables that interacts with the change in it and a measure that shows the balance sheet strength of a bank. Empirical papers like Golodniuk (2006) and Ignacio and Martinez-Pages (2001) typically use assets size (A_{it}), liquidity (LQ_{it}), or capitalization (CA_{it}) as sepa-

rating variables. Liquidity is defined as the ratio of liquid assets[2] to total assets. Asset size is measured by total assets. Capitalization is defined as the shareholders' equity to total assets.

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

We also included lagged values of dependent and explanatory variables into the model for mainly two reasons. First, there is a close bank-customer relationship that develops and may create lock-in effects thus making it costly for the borrower to change her bank. In that sense, previous change in bank loans affect the current change in the loans. Second, monetary policy only effects lending behavior with a lag due to contractual commitments (e.g. floating and fixed charges on movable and immovable assets, respectively). Hence, lagged values of the explanatory variables affect current loans with a lag.

Since the main purpose of this paper is to test whether capital constraints play an important role in the response of loan supply of banks to monetary policy, we introduce a dummy variable to identify the distinction between capital-constrained and unconstrained banks. Capital adequacy ratio is a measure of the amount of a bank's capital expressed as a percentage of its risk weighted credit exposures. Thus, we can use Capital Adequacy Ratio (CAR) as an indicator to see whether a bank is capital-constrained or unconstrained. CAR is important in assessing the risk of the banks. Basel standards set the minimum CAR at 8 percent.

However, in order to differentiate between capital constrained and capital unconstrained banks, first, we calculated the average capital adequacy for all banks in years 2002,2003, 2004, 2005 and 2006, and then assign 1 if the specific bank's CAR is above the average CAR, and 0 if the bank's CAR is below the average CAR.

After constructing the dummy variable, to investigate the effects of capital constraint on the relationship between loan supply and monetary policy, we create an

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

interaction variable defined as the interaction between our dummy (1 if unconstrained, 0 if constrained) and the change in our exogenous indicator -short-term nominal interest rate-.

Therefore, the model is as follows:

$$\Delta LN_{i,t} = \alpha_i + \beta \Delta LN_{i,t-1} + \sum_{j=0}^{1} \gamma_j \Delta i_{t-j} + \sum_{j=0}^{1} \delta_j \Delta i_{t-j} \quad *\text{Dummy}_i + \sum_{j=0}^{1} \theta_j BS_{i,t-j} + \sum_{j=0}^{1} \mu_j TDE_{i,t-j} + \varepsilon_{i,t}$$

i denotes the bank (i=1 to 34). t denotes the time dimension.

where ΔLN_{it} is the change of loan supply of bank i in year t.(3) Δi_{t-j} is the annualized, average weighted, CBRT overnight rate.

BSi,t includes total assets size ($\Delta TA_{i,t}$), liquidity ($LIQ_{i,t}$), and capitalization ($CAR_{i,t}$) as the balance sheet strength items of a bank. Capital adequacy ratio is used as a proxy for capitalization. $TDE_{i,t}$ is the growth rate of the total deposits.

Coefficients on Δi_{t-j} determine a response of loan supply of the bank to a monetary shock by an average bank which is not classified according to CAR. Coefficients of the interaction variable describe how a response differs from constrained and unconstrained banks. For an operational lending channel to exist, it is sufficient that all coefficients on Δi_{t-j} are negative and the coefficients on $BS_{i,t}$ are positive. The most important coefficient for the research question of this study will be the coefficient of the interaction variable (δ_j), which shows the impact of CAR on the effect of Bank Lending Channel. A significant δ_j indicates that the coefficient of the interest rate (monetary policy indicator) is different for the unconstrained banks (dummy = 1 if unconstrained). The size and sign of δ_j presents the difference of the coefficient of the interest rate for the constrained and unconstrained banks.

We use quarterly balance sheet data from 2001:4 to 2006:3 for 34 Turkish commercial banks.(4) This time period starts after the 2001 economic crisis. The CBRT changed its conduct of monetary policy after the crisis. The change in monetary policy alters the structure of the bank lending channel. To avoid the complications caused by the change in monetary policy while analyzing bank lending channel we se-

(3) *The theoretical model of Cavusoglu (2002) show that the first lag of the interest rate and the other variables affect loan supply. Many empirical studies like Golodniuk (2006) and Ignacio and Martinez-Pages (2001) use first lag of the dependent variable and other variables. The motivation for the inclusion of lagged variables and lag selection is explained in the previous page.*

(4) *We limit our sample to commercial banks, because development and investment banks do not collect a deposit that is important for our analysis. During this time period, the total number of commercial banks is 34.*

lected this time period[5]. The balance sheet data on those banks are taken from the statistical reports of the Banks Association of Turkey[6]. Therefore, we have 510 observations which consist of 15 quarterly data for 34 banks in our data set.

Since some bank-specific factors may affect the loan movements such as the corporate culture, quality of the managers, governance of the bank, etc., we use a fixed effects regression specification. The fixed effects model assumes that differences across units can be captured in differences in the constant term. Thus, the constant term is unique for each bank and is an unknown parameter to be estimated. It is unlikely that the bank-specific factors vary during the time period covered by this study. Also, Hausman's tests for the regression specifications prefer the fixed effects model. As a result, fixed effects regression specification is the appropriate methodology for this study.

5. Estimation Results [7]

This section displays the regression results with different regression specifications where different sets of explanatory variables are used. 10 different regression models are used in this analysis. First model in the first column is the simplest model where the change in the interbank interest rate is the explanatory variable. The last model in the 10th column is the most complicated model where interest rate, interaction variable, control variables and lagged values of variables are used as explanatory variables.

The regression results with different sets of explanatory variables are displayed below.

The dependent variable is change of total loans. The first column displays the names of the explanatory variables used in the regressions. The last two rows display the R^2 and the probability of the F statistic of the hypothesis that the constant terms for each bank (fixed effect term) are equal to each other and zero. The R^2 of the regressions are between 1% and 8%. These R^2 levels are common for bank lending channel studies. Altunbas et.al. (2002) investigates bank lending channel for the European countries. The R^2 levels in that study are between 5.5% and 13.4% for regressions with different asset sizes. These low R^2 levels might partly caused by heteroscedasticity. The White test and Breusch-Pagan tests usually reject the hypothesis

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(5) *An analysis of the effects of changes in monetary policy on the bank lending channel is an interesting and important question. But, it is beyond the scope of this study. We leave that analysis for future research.*

(6) *Available at http:www.tbb.org.tr/net/dönemsel/*

(7) *The regressions are done using Stata statistical software package.*

of homoscedasticity for this study. The F statistics displayed in the last row show that the constant terms are not equal to zero except for the ninth regression specification.

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

Table 1: Regression Results

Capital unconstrained banks are defined as the banks that have CAR above industry average (18.3%).

Effect of Monetary Policy Shocks on Loan Growth

Dependent Variable: Growth rate of Total Loans (ΔLN)[a]

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

[a] Values of t-statistics in paramentheses
* Significant at the 5 percent confidence level.
** Significant at the 1 percent confidence level.
*** R^2 overall value.
**** F test that all u_i=0

The main question in this analysis is whether capital-unconstrained banks are affected more by the monetary policy actions. To be able to answer this question, as discussed in the previous section, we include the interaction variable, which is the multiplication of the dummy variable with Δi in to the model. Thus, the coefficient of the interaction variable shows the difference of the response of capital-unconstrained banks (banks with above average CAR) from the response of capital-constrained banks. The dummy variable is equal to 1 when the CAR of that bank is above average. Thus, for those banks the coefficient of Δi_t becomes $\gamma_j+\delta_j$. When the dummy variable is equal to 0 then the coefficient of Δi_t is γ_j . δ_j is the difference in the coefficient when the dummy variable is equal to 1 (the bank is capital-unconstrained.) The results of the second regression are presented at the third column. The coefficient of the interaction variable is significant at one percent level and the coefficient is negative and the value of the coefficient is -3.31 which is much larger than the coefficient in the first regression. Both interest rate and interaction variables are used as explanatory variables in the second regression. With the addition of the interaction variable, the coefficient of the interest rate became insignificant. As expected, these results show that the negative response of the capital-unconstrained banks to monetary policy significantly more than the response of capital-constrained banks.

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

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

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

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

The main message of the estimation result is that when there is a monetary tightening the loans at unconstrained banks decrease more than the loans at capital-constrained banks. Furthermore, when the interaction variable is included in the regression set, the significance of the interest rate decreases. Such a result implies that, the policy instrument of the CBRT (short-term interest rate) is effective only for the banks, which have capital adequacy ratio above the sector average. In this context, we may say that the monetary transmission mechanism through bank lending channel have asymmetric effects as the theoretical model predicts since the effect of monetary policy is different for capital-constrained and unconstrained banks. This asymmetry stems from the capital adequacy ratio (CAR) since we use CAR to identify banks as capital-constrained and capital-unconstrained. Thus, our results provide empirical support for Peek and Rosengren (1995). We used several control variables and applied different interest rates as the monetary policy indicators. The regression results are not sensitive to the selection of the interest rate. So, we believe that our results are robust and reliable because we implemented different regression specifications with different sets of explanatory variables and we implemented the study with different interest rates as the monetary policy indicator.

6. The Analysis of Identification of Capital Constraint Banks

In section 5, capital unconstrained banks are identified as the banks that have above average capital adequacy ratios. The Bank Regulation and Supervision Agency of Turkey recently announced that the banks whose capital adequacy ratios are lower than 12% will not be allowed to open new branches. Classification of banks as constrained and unconstrained is an integral part of this study. There are several different ways to categorize a bank as constrained. In section 5 we classified banks as unconstrained if CAR of that bank is above the industry average and the regression results show that when the central bank conducts tight monetary policy the loans at unconstrained banks decrease more than the loans at capital-constrained banks. This section investigates whether an alternative criteria of classification, CAR level of 12%, is important for the analysis of bank lending channel. Table

II shows that the coefficient of the interaction variable is significant at 10% and the coefficient is much lower compared to the results in table I. The classification methodology changes the empirical results so it is an important component of bank lending channel studies.

The regression results with different sets of explanatory variables are displayed below:

Table 2: Regression Results

Capital unconstrained banks are defined as the banks that have CAR over 12 percent.

Effect of Monetary Policy Shocks on Loan Growth

Dependent Variable: Growth rate of Total Loans (Δ LN)[a]

	1	2	3	4	5	6	7	8	9	10
ΔLN(-1)			0.02	0.011	0.02	0.010	0.02	0.014	0.02	-0.005
			(0.34)	(0.22)	(0.45)	(0.21)	(0.48)	(0.30)	(0.49)	(0.10)
Δi	**-1.13***	**-0.197**	**-1.10***	**-0.174**	**-1.10***	**-0.160**	**-1.11***	**-0.115**	**-1.08**	**-0.384**
	(-2.49)	**(0.28)**	**(-2.29)**	**(0.23)**	**(-2.25)**	**(0.21)**	**(-2.28)**	**(0.16)**	**(-1.88)**	**(0.49)**
Δi (-1)									-0.02	-0.061
									(-0.03)	(0.09)
Δi*Dummy		**-1.468**		**-1.454**		**-1.476**		**-1.539**		**-0.988**
		(1.73)		**(1.64)**		**(1.63)**		**(1.71)**		**(1.12)**
LIQ					-0.01	-0.002	-0.00	0.003	-0.02**	0.018
					(-0.60)	(0.51)	(-0.63)	(0.58)	(-2.93)	(2.82)**
LIQ(-1)									0.02**	0.020
									(3.58)	(3.20)**
CAR					-0.01	0.000	0.00	0.001	0.00	-0.008
					(0.79)	(0.01)	(0.83)	(0.18)	(0.13)	(1.27)
CAR(-1)									0.00	0.009
									(0.59)	(1.40)
ΔTA					0.26	0.000	0.28*	-0.000	0.38	-0.000
					(1.73)	(0.12)	(1.82)	(1.90)	(1.78)	(2.17)*
ΔTA(-1)									0.02	-0.000
									(0.10)	(3.99)**
ΔTDE							0.01	0.023	0.01	0.028
							(1.48)	(2.36)*	(1.82)	(2.81)**
ΔTDE(-1)									0.01*	0.047
									(2.41)	(4.83)**
R^2= ***	0.0123	0.0211	0.0160	0.0228	0.0334	0.0174	0.0418	0.0364	0.0684	0.1168
Prob>F****	0.0101	0.0104	0.0207	0.0443	0.0789	0.2141	0.0882	0.0529	0.1165	0.0000

[a] Values of t-statistics in parentheses
* Significant at the 5 percent confidence level.
** Significant at the 1 percent confidence level.
*** R^2 overall value.
**** F test that all u_i=0

The main message of the estimation result is that when there is a monetary tightening the loans at unconstrained banks decrease more than the loans at capital-constrained banks. Compared to the results at section 5, the interaction variable is significant at 10% not 5 %, but the results of the previous section still holds. The reason for this decrease in the significance level is that there are very few banks that are below 12% capital adequacy ratio. The main result we drew from Table II is that when the interaction variable is included in the regression set, the significance of the interest rate decreases. Such a result implies that, the policy instrument of the CBRT (short-term interest rate) is effective only for the banks, which have capital adequacy ratio above the sector average. The F statistics displayed in the last row show that the constant terms are not equal to zero except for the ninth regression specification. Comparison of table I and table II indicates that classification of banks as constrained and unconstrained effects the regression results significantly and studies about the bank lending channel should take into account this effect of categorization criteria.

7. Conclusion

Previous theoretical studies indicate that if bank lending channel exists, when there is a tightening (an easing) of monetary policy then the loans at unconstrained banks should decrease (increase) more than the loans at capital-constrained banks.

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

Our results provide the evidence of a bank lending channel of monetary policy, operating mainly through the capital adequacy of the banks. Banks' loan supplies reacts to monetary policy i.e. interest rates. Our results show that banks, that have capital adequacy rate above the average capital adequacy rate, respond more to monetary policy changes than the banks that have less than the average. This result is consistent with the theoretical predictions and implies that bank lending channel has explanatory power for the Turkish economy.

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