

## Impact of Monetary Policy on Bank' Balance Sheet in Pakistan

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### Abstract

This study empirically investigates the centric view of monetary policy. The study is carried out for Pakistan using annual data covering the period from 2006 to 2012. Fixed effects estimator is applied to investigate the impact of monetary policy measures on banks' loan supply. We find significant evidence on the existence of the negative relationship between monetary measures and bank loan supply. We also provide empirical evidence that monetary tightening puts more burdens on small banks as compared to large banks. Yet, we observe that during monetary tightening, aggregate lending by all the banks decreases, which consequently decreases the level of investment that affects the growth and output level of the economy. Evidence on monetary transmission is useful for developing the link between the financial and real sector of the economy. This study helps the policy makers to find different channels through which they can increase the effectiveness of monetary policy.

**Keywords:** monetary policy, centric view, bank loan supply, bank size, monetary transmission mechanism, fixed & random effects techniques, monetary tightening, lending view

### 1. Introduction

Mandate of the monetary policy is to control money and credit for achieving the objectives of output growth and financial stability in the economy. Traditional theories of monetary policy were mainly focused on money supply and its changes which ultimately change the interest rate and level of spending in the economy (Fiedman & Schwartz, 1963; King & Plosser, 1984; Sim, 1992). However, new theories of monetary policy highlighted the significance of the banks in monetary policy transmission mechanism by focusing on two points including how much banks depend on their deposit financing and how much borrowers are bank dependent?

Inflation is one of the serious issue that is being faced by Pakistan's economy over the last decade. Therefore, in order to stabilize prices, State Bank of Pakistan (SBP) has been using tight monetary policy since 2005. However, when a central bank tightens monetary policy, it is commonly believed that aggregate lending by the banks decreases. Further, there is also evidence that non-bank financing increases (like issuance of commercial paper) and small banks reduce their lending more than large banks because they cannot extract external source of finance due to the heavy cost.

Monetary policy can affect the economy through various channels including interest rate channel, credit channel, exchange rate channel, and the asset price channel. This study is mainly related to the credit channel of monetary policy transmission mechanism because it highlighted the role of banks in monetary policy transmission mechanism by focusing on the bank lending channel and the balance sheet channel (Bernanke & Gertler, 1995).

The basic purpose of this study is to show that banks play a vital role in the monetary policy transmission mechanism. Therefore, this study examines the response of banks to tight monetary policy, which is known as centric view of monetary policy. The operational mechanism of the centric view assumes that bank loan financing reduces in consequence of tightening of monetary policy. Thus, the tight monetary policy drains reserves from the banks because it reduces the excess reserves from all the banks that ultimately weaken their deposit base and make them unable to continue with their lending projects without using the external sources of finance like issuance of commercial paper, debt, equity etc (Gertler & Gilchrist, 1993; Kashyab & Stein, 1994; Cecchetti, 1995).

The main objective of this study is twofold. First, the study aims to investigate whether the centric view exists in Pakistan. Second, the study also aims to explore whether monetary tightening affects bank loan supply of small banks more than large banks. Several studies in the literature (e.g., Bernanke & Blinder, 1995; Kashyab et al.,

1993; Gertler & Gilchrist, 1993; Kashyab & Stein, 1995) have provided evidence of the differential effects of monetary policy on banks' loans across small and large banks for developed countries.

When we review the literature on monetary policy effects in the context of Pakistan, we find that several studies have investigated this issue at macro level, yet not at micro level. For example, Agha (2005) found that tight monetary policy reduces investment that ultimately decreases the domestic demand in the economy. He found evidence for the existence of an active interest rate channel as well as asset price channel in Pakistan. Hussain (2009) used VAR to investigate the impact of monetary policy on real GDP and inflation. Similarly, more recently, Rashid and Jehan (2014) found that monetary policy has considerable effects on macroeconomic indicators, namely, industrial out, prices, and the nominal exchange rate. There is limited work on micro foundation of monetary transmission mechanism in Pakistan. However, Shabbir (2012) is the first one who studied this issue using micro data for Pakistan. She found a strong evidence for the existence of balance sheet channel using firm level data. In particular, she found that the tight monetary policy decreases the net worth of both the SMEs and large firms. However, one should note that our study significantly differs from this study as we focus on credit channel by examining how monetary policy affects banks' ability to issue loans, whereas, the focus of her study was on the effects of monetary policy on firms' balance sheet. Further, our empirical framework significantly differs from her study as it enables us to see the differential effects of monetary policy on bank loan supply across small and large banks in a single equation.

The rest of the study is organized as follows. Section 2 reviews the existing literature on lending view of monetary policy transmission mechanism. Section 3 deals with data and methodology. Section 4 contains empirical results and their analysis. Section 5 includes conclusions and policy implications.

## 2. Literature Review

Theoretically and empirically first this idea has been given by Bernanke and Blinder in 1988. They introduced the bank loan supply as a new variable to the traditional IS-LM framework. They provided the evidence for the existence of the bank lending channel. They found that whenever there is a tight monetary policy, aggregate lending by all banks decreases. Kashyab and Stein (1994) further extended this idea and imposed two necessary conditions for the existences of the bank lending channel. First, on the assets side of bank balance sheet, loans and securities are not perfect substitutes of each other. Second, on the liability side, loans and other sources are not perfect substitute of each other.

Carrera (2011) found that tight monetary policy reduces the bank loan supply. Bernanke and Blinder (1992) justified this negative relationship as monetary tightening affects bank loan supply because banks refuse to make new loan contracts when old are expired. Kashyab and Stein (1995) compared the behavior of large and small banks against tight monetary policy. They concluded that small banks reduce their lending more as compared to large banks because large banks have power to neutralize the impact of monetary tightening. They get funding from issuance of commercial paper, equity etc.

Kashyab and Stein (1997) found that monetary policy hits mostly to those banks which have less liquid assets on their balance sheet items including cash ratios and securities. Similarly, by using the data for the period 1990 to 2002, Alfaro (2004) concluded that small banks and banks with less capital were bearing more burden of monetary policy. Santis and Surico (2013) concluded that high cost of capital is a problem of less capital, less liquid and small sized banks. They suggested that increasing the number of corporate and saving banks is the only way that brings significant improvement.

Black and Rosen (2007) investigated the credit channels of monetary policy for the period 1982 to 2006. They concluded that in bank lending channel banks reduced their loan supply while in bank balance sheet channel banks reallocated their assets and gave more loans to large firms as compared to small firms. Gertler and Gilchrist (1994) mentioned that in order to minimize their risk, banks extend their credit to large firms as compared to small firms.

Monetary tightening creates worse effects on the macro-economy. Bernanke and Blinder (1992) mentioned that monetary tightening raises the external finance premium and this rise in external finance premium affects the macroeconomic activities. Similarly, Ludvigson (1996) found that monetary tightening reduces the consumer loans which in turn reduce the real consumption in the economy. Gufa (2008) investigated the bank lending channel in the context of India and Pakistan. He concluded that tightening affects the bank credit variable which in turn affects the major macroeconomic activities.

As far as Pakistan specific literature is concerned, there are a number of studies that addressed this issue directly and indirectly by using macroeconomic data. Qayyum (2002) developed a monetary condition index of inflation

for Pakistan for the period started from 1999 to 2001. Agha (2005) found that tightening reduces investment that ultimately decreases the domestic demand in the economy. Hussain (2009) found that exchange rate is a significant monetary policy channel that can be used by regulatory authority to control the fluctuation in inflation and output variance in the economy. Rashid and Jehan (2014) found a significant long term relationship between monetary policy indicators and macroeconomic indicators. Surprisingly before 2012 there is no single study which has investigated the existence of bank lending channel or bank balance sheet channel by using micro data. Shabbir (2012) is the first one who addressed this issue by using micro level data. She investigated the existence of bank balance sheet channel for Pakistan for the period 1999 to 2010 and concluded that tightening affects more to SME as compare to large firms.

### 3. Data and Methodology

This section will explain data and methodology. We apply Fixed and Random Effects techniques for empirical analysis. First, we will explain the chain through which monetary policy is transmitted to real economy by using path diagram.

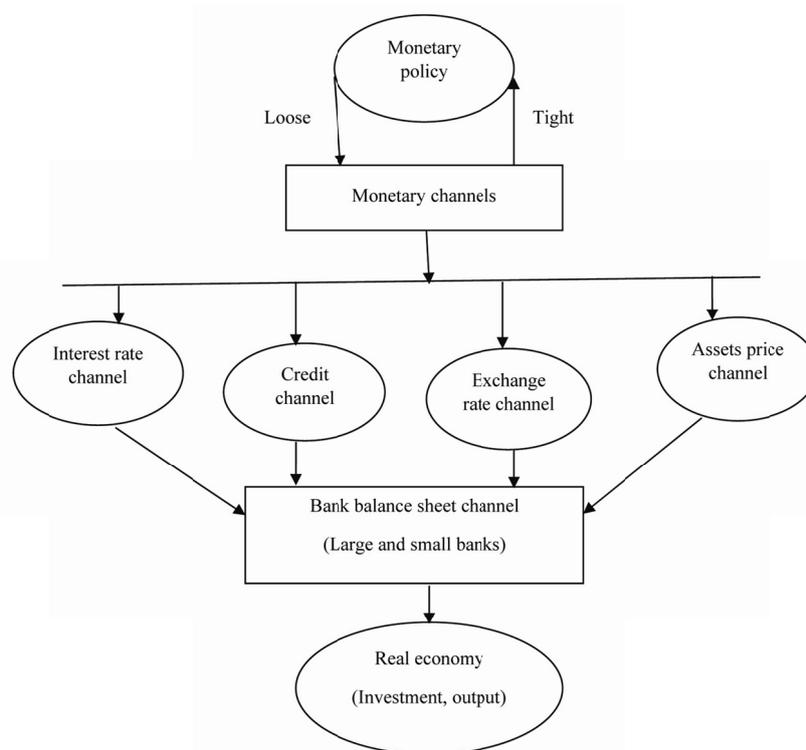


Figure 1. Impact of monetary policy on banks' balance sheet and real economy

#### 3.1 Model Specification

We start our empirical investigation by estimating the following baseline model:

$$Y_{it} = \alpha_i + \beta_1 M_t + X_{it}\lambda + Z_t\gamma + \mu_t + \varepsilon_{it} \quad (1)$$

$Y_{it}$  = Loan supply;

$\alpha_i$  = Individual specific effect;

$\mu_t$  = Year specific effect;

$\varepsilon_{it}$  = Error term;

$X_{it}$  = A set of bank specific variables which include size, liquidity, capital, credit risk, profitability, debt to equity ratio, and coverage ratio;

$Z_t$  = A set of macroeconomic factors which includes the GDP growth and inflation;

$M_t$  = A monetary policy measure proxies by the lending rate, deposit rate and the interest rate spread.

In order to show that monetary tightening exerts more burdens on small banks as compared to large banks, we have to categorize banks as small and large banks on the basis of their assets. For achieving this objective, we introduce a dummy variable. Thus, our extended model (2) is specified as under:

$$Y_{it} = \alpha_i + \beta_1 M_t + X_{it}\lambda + Z_t\gamma + \lambda M_t \times D_{it}^{bank\ size} + \mu_t + \varepsilon_{it} \quad (2)$$

$D_{it}^{bank\ size}$  is a dummy variable for bank size. Specifically,  $D_{it}^{bank\ size}$  takes value 1 for  $i^{th}$  bank in year  $t$ , if the bank assets are greater than the average of the assets of all the banks in that year, and zero otherwise.

### 3.2 Description and Selection of Variables

The description of particular variables and rationale of their selection for this study are discussed below. First, we start with bank loan supply as dependent variable. Bank loan supply is defined as ratio of gross loans to total assets. We have selected bank loan supply as dependent variable because we want to study the impact of monetary policy indicators as independent variables on the dependent variable. If bank loan supply decreases due to increase in interest rate, then we may conclude the existence of centric view (Pruteanu, 2004; Gufa, 2008; Chibundu, 2009).

We have taken lending rate, interest rate spread (lending interest rate – deposit rate) and deposit rate as measures of monetary policy in line with the existing literature (Kashyab & Stein, 1995). This study uses deposit rate as monetary policy indicator because along with lending rate the deposit rate is also a part of interest rate spread. This study uses three monetary policy indicators to check whether these monetary policy indicators give consistent results. We regress them separately and in the form of differences. Reserve ratio is also a very important measure in the context of monetary tightening and its impact on bank lending, but unfortunately relevant data was not available from the same source.

In line with existing literature, we use inflation and GDP growth rate as proxies for macroeconomic conditions (Shabbir, 2012). Following the previous literature, we select following independent variables based on particular bank characteristics:

1.	Bank size	Log of total bank asset
2.	Bank liquidity	Cash and cash equivalent divided by total assets
3.	Bank capital	Capital ratio, i.e. (total shareholder equity / total assets) * 100
4.	Coverage ratio	(interest payment by nonfinancial corporation / sum of interest payment and profit)*100
5.	Credit risk	Ratio of classified loans to total loans
6.	Bank profitability	(Profit after tax / total assets) * 100
7.	Debt to equity ratio	Commitments and contingencies divided by total equity

### 3.3 Data and Its Sources

Data on all the variables that are used in estimation have been taken from SBP's publications: "Financial Statement Analysis of the Financial Sector", Banking Statistics and Annual Reports of SBP for years 2006 to 2012. This study uses annual data from the period 2006 to 2012. Sample includes all the banks working in Pakistan. They are 40 in number. Data on monetary policy indicators and macroeconomic indicators have been taken from the World Bank. This study covers the period from 2006 to 2012.

### 3.4 Estimation Technique

For estimation of our empirical models and compilation of results we have applied fixed effects technique.

## 4. Results and Discussions

This section provides empirical results and their analyses. First, we use summary statistics to explore the important aspects of the dataset.

### 4.1 Descriptive Analysis

We present summary statistics in Table 1 to explore the important aspects of the distribution of our data set.

Table 1. Summary statistics of selected data

Variable	Mean	Std. Dev	Min	Max	Skewness	Kurtosis
Bank size	7.817	0.655	6.388	9.206	-0.072	2.113
Debt to equity ratio	5.860	11.689	-33.430	132.630	6.211	60.705
Bank loan supply	0.505	0.218	0.002	1.379	0.922	6.385

Coverage ratio	0.018	0.011	-0.020	0.130	3.974	36.643
Bank profitability	-0.003	0.027	-0.221	0.053	-2.853	18.455
Bank liquidity	0.142	0.149	0.017	0.971	3.512	16.721
Credit risk	0.169	0.201	0.001	0.995	2.282	8.227
Bank capital	0.035	0.792	-6.045	0.788	-5.965	39.604
Lending interest rate	13.172	1.261	10.987	14.537	-0.575	1.885
Interest rate spread	6.111	0.391	5.540	6.813	0.421	2.279
Deposit rate	7.06	1.580	4.174	8.680	-0.785	2.069
Inflation	12.133	4.080	7.598	20.286	0.777	2.700
GDP growth	3.421	1.558	1.606	6.177	0.470	1.990

Mean is the common measure of the central tendency while standard deviation reflects both the deviation from the mean and the frequency of that deviation. Standard deviation is often used instead of the variance because the scale of variance tends to be larger than the scale of raw data while the standard deviation is on the same scale as most of the data. All the data are in annual frequency and has been shown in Pak rupees (in thousands).

Mean value of bank size is 7.817, while its standard deviation is 0.655, which means that there is less diversification in the values of bank size. Mean value of debt to equity ratio is 5.860 while its standard deviation is 11.689 which shows that there is a diversification in the values of debt to equity ratio. Mean value of bank loan supply is 0.505 and its standard deviation is 0.218. It shows that there is less diversification in the value. Mean value of the coverage ratio is 0.018 while its standard deviation is 0.011 these values are close to each other so we conclude that there is less diversification in data. Mean value of bank profitability is -0.003, which is negative. It might be because most of the values of this distribution are negative. As central tendency shows only the middle point of distribution so if most of the values are negative, then its central value also becomes negative.

Mean of bank liquidity is 0.142 while its standard deviation is 0.149, these values show less diversification in the data. Mean value of credit risk is 0.169 and its standard deviation is 0.201, it shows diversification in the data. Mean value of bank capital is 0.035, while its standard deviation is 0.792, which means that there is a diversification in the data. Mean value of GDP growth is 3.421 and its standard deviation is 1.558 while mean value of inflation is 12.133 and its standard deviation is 4.080. It shows that there is less diversification in the data of macroeconomic indicators. If we consider monetary policy indicators then mean value of lending interest rate is 13.172 and its standard deviation is 1.261. Similarly, mean value of interest rate spread is 6.111 while its standard deviation is 0.391, and mean value of deposit rate is 7.061 and its standard deviation is 1.580. Data of monetary policy indicators shows less diversification although standard deviation is increasing but it is still less than its mean value.

There are two other characteristics of data set that provide useful information, namely Skewness and Kurtosis. Measurement of Skewness is important because values in the frequency distribution are concentrated at either at the low end or at the high end of the measuring scale on the horizontal axis. These values are not equally distributed. Bank size, bank profitability, bank capital, lending interest rate and deposit rate are negatively skewed which means that curve of these variables is tails off toward the low end of the scale. While debt to equity ratio, bank loan supply, coverage ratio, bank liquidity, credit risk, GDP growth, interest rate spread and inflation are positively skewed because curve of all these variables tails off toward the high end of the scale.

Similarly, Kurtosis measures the peakedness of the distribution. If we look at our data set and compare the values of kurtosis and standard deviation, both move almost in the same direction. For example, values of kurtosis and the standard deviation of debt to equity ratio are these values are 60.705 and 11.689, respectively. Thus, we conclude that when peakedness increases, deviation in the data set also increases.

#### 4.2 Results of Hausman Test

Hausman test is used to ascertain the suitability of fixed effect or random effect technique. If the Hausman test shows the significant result, then it is safe to use fixed effect technique and vice versa. Hausman's specification test can be used to test hypotheses in terms of bias or inconsistency of an estimator.

#### 4.3 Regression Analyses

Now, we start estimation with our baseline model. To estimate the impact of monetary policy indicators on bank loan supply after controlling GDP growth and inflation, we run three regressions. The results are given in Table 2.

In Model 1a of Table 2, we regress bank loan supply on bank specific characteristics with lending interest rate as monetary policy indicator as well as GDP growth and inflation as macroeconomic indicators. Bank size appears negative and statistically significant. The estimated coefficient implies that if bank size increases, then bank loan supply will decrease by 0.018. Literature provides different justifications for this negative sign. Ehrmann (2001) argued that the effect of size is never significant in normal times, and its role as an indicator of informational asymmetries appears to be quite poor. Another possible explanation of negative sign for bank is that smaller banks lend more aggressively to private borrowers in order to increase their market share. Pruteanu (2004) pointed out that during tight monetary policy bank size appears negative but it turns positive during easy monetary policy. According to Hulagu (2012), the negative coefficient suggests that small banks lend more under tight monetary policy.

Debt to equity ratio appears positive and statistically significant. The point estimator implies that if there is 1% increase in debt to equity ratio, then bank loan supply will increase by 0.50% on average. Bank lending literatures have neglected the role of bank financing composition in influencing bank loan supply. We try to fill this gap by analyzing the debt to equity ratio. If a bank arranges money by its own financing composition, then it can easily continue with its lending channel.

Coverage ratio appears negative and statistically significant. The point estimation implies that if there is 1% increase in coverage ratio, then bank loan supply will decrease by 0.10% on average. Coverage ratio is the ratio which is most widely used indicator to measure the immediate impact of tight monetary policy on firm's financial health and change in factor demand of firm. Bank profitability and bank liquidity both appear negative and statistically insignificant. Farinha (2001) found that liquidity do not appear as relevant bank characteristics in determining a differential impact of monetary policy on the supply of bank loan. Credit risk appears negative and statistically significant. The estimation implies that if credit risk increases, then bank loan supply decrease by 0.052. "Less the proportion of classified loans, more the banks react to monetary policy" (Pruteanu, 2004).

Table 2. Impact of monetary policy indicators on bank loan supply after controlling GDP growth and inflation

Variables	Model 1a	Model 1b	Model 1c
Bank size	-0.018 (0.050)**	-0.001 (0.075)*	-0.059 (0.092)*
Debt to equity ratio	0.050 (0.000)***	0.050 (0.000)***	0.000 (0.725)
Coverage ratio	-0.001 (0.001)***	-0.001 (0.002)***	1.554 (0.050)**
Bank profitability	-0.071 (0.488)	-0.096 (0.344)	-1.251 (0.000)***
Bank liquidity	-0.053 (0.161)	-0.005 (0.100)*	-0.401 (0.004)***
Credit risk	-0.052 (0.010)***	-0.005 (0.040)**	-0.274 (0.000)***
Bank capital	-0.021 (0.050)**	-0.002 (0.046)**	-0.247 (0.000)***
Lending interest rate	-0.010 (0.004)***		
Interest rate spread		0.003 (0.000)***	
Deposit rate			-0.027 (0.001)***
GDP growth	0.004 (0.280)	0.088 (0.003)***	-0.018 (0.100)*
Inflation	0.002 (0.050)**	0.031 (0.002)***	0.005 (0.100)*
constants	1.590 (0.000)***	1.060 (0.195)	1.261 (0.001)***

Note. \*\*\*, \*\*, and \* denote significance level at 1%, 5% and 10%, respectively. Numbers in parentheses represent p-values.

Bank capital appears negative and statistically significant. The coefficient suggests that if bank capital increases, then bank loan supply decreases by 0.021. Bank capital influences the capacity to raise uninsured form of debt and a bank's ability to contain the effect on lending of a deposit drop (Gambocorta, 2001). Bank lending literature shows that with less capital, a bank is not able to offer loans during monetary tightening. During tightening banks have limited funds because central bank reduces the excess reserves which make them unable to offer more loans that is why they are offering less loans. Lending interest rate appears negative and statistically significant which indicates the existence of centric view of monetary policy.

In Model 1b of Table 2, we regress bank loan supply on bank specific characteristics with interest rate spread as monetary policy indicator as well as GDP growth and inflation as macroeconomic indicators. Bank size appears negative and statistically significant. The point estimation implies that if bank size increases, then bank loan supply will decrease by 0.001. Debt to equity ratio appears positive and statistically significant. The estimated coefficient suggests that if there is 1% increase in debt to equity ratio, then bank loan supply will increase by 0.50% on average.

Coverage ratio appears negative and statistically significant. The point estimation implies that if there is 1% increase in coverage ratio, then bank loan supply will decrease by 0.10%. Bank profitability and bank liquidity appear negative and statistically insignificant. Credit risk appears negative and statistically significant. The estimation implies that if credit risk increases, then bank loan supply will decrease by 0.005.

Bank capital appears negative and statistically significant. The coefficient implies that if bank capital increases then bank loan supply will decrease by 0.002. Interest rate spread appears positive and statistically significant. If there is 1% increase in interest rate spread, then bank loan supply will increase by 0.30% on average. GDP growth appears positive and statistically significant. The estimation implies that if GDP growth increases, then bank loan supply decreases by 0.088. Inflation appears positive and statistically significant. The estimation implies that if there is 1% increase in inflation then bank loan supply increases by 0.031.

In Model 1c of Table 2, we regress bank loan supply on bank specific characteristics and deposit rate as monetary policy indicator as well as GDP growth and inflation as macroeconomic indicators. Bank size appears negative and statistically significant. The estimation implies that if bank size increases then bank loan supply decrease by 0.059. Debt to equity ratio appears positive and statistically insignificant. Coverage ratio appears as positive and statistically significant. The point estimation implies that if there is 1% increase in coverage ratio, then bank loan supply will increase by 55.47% on average.

Bank profitability appears negative and statistically significant. The estimation implies that if bank profitability increases, then bank loan supply will decrease by 1.251. Bank liquidity appears negative and statistically significant. The estimation implies that if bank liquidity increases, then bank loan supply decreases by 0.401. Credit risk appears negative and statistically significant. The estimation implies that if credit risk increases, then bank loan supply decreases by 0.274.

Bank capital appears negative and statistically significant. The estimation implies that if bank capital increases, then bank loan supply decreases by 0.247. Deposit rate as monetary policy indicator appears negative and statistically significant. The point estimation implies that if there is 1% increase in deposit rate, then bank loan supply will decrease by 2.79% on average. This negative relationship provides evidence for the existence of centric view of monetary policy. GDP growth appears negative and statistically significant. The estimation implies that if there is increase in GDP growth, then bank loan supply will decrease by 0.0189. Inflation appears positive and statistically significant. The estimation implies that if inflation increases, then bank loan supply decreases by 0.005.

Now, we classify banks on the basis of their size. There are 242 numbers of observations from which 179 observations fall under the category of small banks while 63 are treated as large banks observations. Monetary tightening is assumed to have greater impact on the lending behavior of small banks as compared to large banks.

We considered banks on the basis of their size. We create dummy variable and divide our data set in two parts by assigning 0 to small banks and 1 to large banks.  $D_{it}^{banksize}$  is a dummy variable for bank size. Specifically,  $D_{it}^{banksize}$  takes value 1 for  $i^{th}$  bank in year  $t$ , if the bank's assets are greater than the average of the assets of all the banks in year  $t$ , and zero otherwise.

To estimate the impact of tight monetary policy on large and small banks, we run three regressions with extended Model 2. The results are given in Table 3.

The results in Model 2a of Table 3 show that the interaction term between dummy and lending interest rate appears positive and statistically significant. This indicates that the impact of monetary policy on large banks is

weaker ( $-0.029 + 0.005 = -0.024$ ). When we put  $D=0$  in extended Model 2, dummy term turns to zero but when we put  $D=1$ , then coefficient of dummy appears positive and statistically significant (0.005). The coefficient of monetary policy indicator turns out as negative and statistically significant ( $-0.029$ ). When we subtract these two coefficients, the resulting number is negative but this resulting negative value is smaller than the coefficient value of lending interest rate which indicates that the small banks are more affected as compare to large banks. This evidence is consistent with the theory of tight monetary policy. Tightening creates more burden on small banks as compare to large banks (Bernanke & Blinder, 1995; Kashyab et al., 1993; Gertler & Gilchrist, 1993; Kashyab & Stein, 1995, 1997).

In Model 2b of Table 3, interaction term between dummy and interest rate spread appears negative and statistically insignificant. The results ( $0.068 - 0.002 = 0.066$ ) show that impact of monetary policy is stronger for small banks as compare to large banks. It provides empirical evidence that during monetary tightening, interest rate rises and aggregate lending by all the banks decreases but small banks reduce their lending more than the large banks because it is costly for them to raise funding from the external sources of finance.

In Model 2c of Table 3, the interaction term between dummy and deposit rate appears positive and statistically significant. The estimations ( $-0.025 + 0.013 = -0.012$ ) show that the impact of monetary policy on large banks is weaker than on small banks. Large banks can neutralize the impact of monetary tightening because they can get funding from the external sources of finance, such as issuance of commercial papers, increasing equity, borrowing from financial market, etc.

Table 3. The impact of monetary policy indicators on bank loan supply after categorizing banks as small and large banks

Variable	Model 2a	Model 2b	Model 2c
Bank size	-0.053 (0.262)	-0.075 (0.126)	-0.026 (0.567)
Debt to equity ratio	0.002 (0.753)	0.005 (0.937)	0.001 (0.809)
Coverage ratio	0.434 (0.089)*	0.491 (0.086)*	0.514 (0.069)*
Bank profitability	-0.268 (0.000)***	-1.278 (0.000)***	-0.337 (0.000)***
Bank liquidity	-0.439 (0.002)***	-0.418 (0.003)***	-0.422 (0.002)***
Credit risk	-0.288 (0.000)***	-0.273 (0.001)***	-0.281 (0.000)***
Bank capital	-0.247 (0.000)***	-0.246 (0.000)***	-0.251 (0.000)***
Lending interest rate	-0.029 (0.005)***		
Lending interest rate × $D_{\text{Bank Size}}$	0.005 (0.095)*		
Interest rate spread		0.068 (0.010)***	
Interest rate spread × $D_{\text{Bank Size}}$		-0.002 (0.766)	
Deposit rate			-0.025 (0.004)***
Deposit rate × $D_{\text{Bank Size}}$			0.013 (0.010)***
GDP growth	-0.015 (0.236)	0.002 (0.982)	-0.018 (0.144)
Inflation	0.005 (0.117)	0.009 (0.004)***	0.005 (0.095)*
Constants	1.425 (0.000)***	0.657 (0.188)	0.017 (0.007)***

Note. \*\*\*, \*\*, and \* denote significance level at 1%, 5% and 10%, respectively. Numbers in parentheses represent p-values.

As far as other bank specific variables are concerned, their impacts are consistent with our previous estimation results. Bank size, liquidity, credit risk and capital appear negative and statistically significant in all the models. Coverage ratio appears positive and statistically significant. The literature gives justification that monetary policy hits mostly to those banks which have less liquid assets on their balance sheets like cash ratio, securities etc. (Kashyab & Stein, 1995; Alfer, 2003).

Our results are in line with the finding of literature that large banks, somehow maintain to tap resources internally and externally, while small banks fail to get access to the credit markets and other sources of external finance. Thus, monetary tightening creates more burdens on the shoulders of small banks than on the large banks.

#### 4.3 Conclusions and Policy Implications

The study is contributing to the existing literature in two ways. First, it examined the centric view of monetary policy in Pakistan. Second, the study also provides empirical evidence that monetary tightening creates more burden for small banks as compared to large banks. The study covers the period from 2006 to 2012. For estimation, we used fixed and random effect technique. The study used bank specific characteristics as independent variable while lending interest rate, interest rate spread and deposit rate as monetary policy indicators, and GDP growth and inflation as macroeconomic indicators. Our results provide significant evidence of the presence of the negative relationship between monetary measures and bank loan supply. The results also show that small banks are more affected by monetary tightening as compared to large banks.

The study has several implications for the implementation of monetary policy. First, since centric view plays a pivotal role in monetary transmission, therefore the monetary authority has to monitor the stability in the interest rate in order to stabilize the bank's loan supply. This is because any change in monetary policy variable, may affect the bank loan supply and subsequently affect the economic activity. Second, the monetary authority has to consider the microeconomic aspects of bank's behavior in formulating monetary policy. This study helps the policy maker to find different channels through which they can increase the effectiveness of monetary policy.

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