Monetary Policy and Bank Hetrogeneity: Effectiveness of Bank Lending Channel in Pakistan

Sabbah Rahooja and Asif Ali and Jameel Ahmed and Fayyaz Hussain and Rizwana Rifat

State Bank of Pakistan

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Abstract

We investigate, using vector autoregressions (VAR) and Panel Data Analysis, the role of banks in monetary policy transmission in Pakistan. Empirical evidence suggests that the 'bank lending channel' is at work at the aggregate level. Loans, deposits and government securities all reduce after a shock to the monetary policy. When we examine bank heterogeneity in terms of size, liquidity and capitalization, the results are mixed. Size is found to be a relevant characteristic. Capitalization, measured by excess capital, is also somewhat effective. Thus, small sized and capital constrained banks respond more to monetary policy signals. Liquidity and the traditional measure of capital, on the other hand, are found to be weaker characteristics. Moreover, the results suggest that the market for loans has a stationary size distribution (no monopolistic tendencies) in Pakistan.

JEL Classification: C32, C33, E44, E52, G21

Keywords: Monetary Policy Transmission, Bank Lending

Sabbah Rahooja < sabbah.rahooja@sbp.org.pk > is Assistant Director in Monetary Policy Department, State Bank of Pakistan, Karachi. Asif Ali < asif.ali@sbp.org.pk > is Senior Joint Director in Monetary Policy Department, State Bank of Pakistan, Karachi. Jameel Ahmed < jamil.khilji@sbp.org.pk > is Deputy Director in Monetary Policy Department, State Bank of Pakistan, Karachi, Fayyaz Hussain < fayyaz.hussain@sbp.org.pk > is Deputy Director in Monetary Policy Department, State Bank of Pakistan, Karachi and Rizwana Rifat < rizwana.rifat@sbp.org.pk > is Joint Director in Off-site Supervision & Enforcement Department, State Bank of Pakistan, Karachi. The views expressed in this paper represent those of the authors and not necessarily that of State Bank of Pakistan.

1 Introduction

This paper concerns with investigating whether in a country like Pakistan, in which the financial sector is dominated by banks, monetary transmission takes place through the Bank Lending Channel (BLC) and what could be the major factors that contribute to the existence (or non-existence) of this channel in the country.

In bank lending channel (BLC), as traditionally conceived[1], a central bank during monetary contraction phase reduces banks' reserves through open market operations. This fall in reserves results in reduction in reservable deposits and a simultaneous increase in government bond holdings of the banks. If banks are unable to compensate for the fall in reservable deposits by raising additional deposits to meet reserve requirements, they will be required to make further adjustments on the asset side of their balance sheet. Since loan commitments make it difficult for banks to immediately reduce lending, they generally respond by selling off their liquid securities to reconcile with the decline in deposits[2]. If liquid securities are sufficient and cost effective, the decline on the asset side may entirely be restricted to a decline in securities with no impact on loans. Otherwise, the amount of loans provided by the banks is reduced in the medium to long term.

This traditional notion of BLC has, however, been challenged by researchers later on. Notably, Bernanke and Gertler (1995) have argued that the earlier explanation of BLC referred to pre 1980 period in the United States, when institutional structure supported the assumptions of the Bernanke and Blinder (1988) model. For example, banks at that time under regulation 'Q' could not pay interest rates on deposits above ceilings and reserve requirements were much more severe. In recent years, though, there are no such regulatory requirements and markets for bank liabilities have become deep. Moreover, the conduct of monetary policy has shifted from using quantities to using prices (interest rates)[3].

The existence of BLC has, therefore, been argued primarily on the basis of non-existence of a perfectly elastic demand for bank liabilities partly due to 'external finance premium'[4] that the banks have to pay. The cost and availability of external funds depend upon the perceived creditworthiness of the borrowing institution which,

[1](See e.g., Bernanke and Blinder, 1988; Bernanke, 1993; Kashyap and Stein, 1995)

[2]The underlying assumption behind the behavior of the banks is that loans and bonds are not perfect substitutes (Bernanke, 1993).

[3]This refers to the pre-crises period of 2008 when monetary policy was exclusively being conducted through interest rates and terminologies such as 'quantitative easing' were not common.

[4]External finance premium is defined as the difference between funds generated from external sources(issuance of equity or bonds) and internal sources (retained earnings)

in turn, depends upon its assets quality (primarily credit quality) (Bernanke, 2007). Any increase in interest rates is assumed to alter the investor's perception about the quality of the credit portfolio of the bank[5] and hence its creditworthiness, thereby increasing the external finance premium for the bank. The banks are assumed to transfer this premium on generating funds to the bank-dependent borrowers in terms of cost or availability of credit or both.

So, when a central bank increases interest rates it increases the risk premium that the banks have to pay on raising funds. This would result in an increase in the costs of funds for the banks more than the increase dictated by the interest rates alone. The supply of loans shifts inwards and the bank dependent borrowers feel the squeeze. Their own external finance premium is raised resulting in a decline in off-take of loans, thereby reducing the output and hence aggregate demand. This is how BLC amplifies the monetary policy signals.[6,7]

Both the theoretical explanations of BLC are based on some key assumptions. First, to a large extent, the economy has to be a bank dependent economy. This would imply that there are some borrowers who would be unable to generate funds from other sources after bank loans have been curtailed. Second, changes in interest rate and the conduct of open market operations should largely be in the same direction[8]. This would allow the BLC to work both through the traditional and revised channels. Third, the direction of changes in external finance premium and interest rate should also be in the same direction, if indeed increase in interest rate increases the risk premium and vice verse. Fourth, there needs to be a positive correlation between changes in policy rate and increase in non-performing loans, so as to confirm the investor's perception about higher rates leading to more defaults.

The BLC hypothesis has been tested popularly across United States, Euro area as well as developing economies at the aggregate level (e.g. Bernanke and Blinder, 1992; Ehermann et al., 2001; Hernando et al., 2001; Al-Mashat, 2003). However, the difficulty in separating the impact of monetary policy on loan supply or loan demand using aggregate data has led researchers to focus on investigating the response of

[5]mainly due to information asymmetries (moral hazard and adverse selection) resulting in higher non-performing loans.

[6]Apart from the above two explanations, literature has continued to refine the theory of how BLC might exist (e.g. See Disyatat, 2011). But, these alternative explanations are not the focus of current empirical investigation.

[7]In addition to above theoretical explanations it has also been suggested that apart from loan commitments, banks may in fact also desire to retain customers and in doing so can decide not to pass on the impact of monetary tightening to borrowers in the form of increased cost of funds.

[8]Increase in policy rate accompanied by mop-ups, for example.

banks to the monetary policy shocks based on their individual balance sheet characteristics (Kashyap and Stein, 1995, 2000). They contend that the loan supply behavior differs among banks because they differ in their abilities to insulate their loan portfolios from monetary policy shocks. These differences are mainly derived from bank specific characteristics such as size, liquidity and degree of capitalization. It is argued that small, less liquid and least capitalized banks may not be able to insulate their loan portfolios from a tight monetary policy and hence would amplify the monetary policy signal (Ehermann et al., 2001).

Empirical literature that has used disaggregated bank data to identify BLC, presents a mixed picture. Kashyap and Stein (2000), Farinha et al. (2001) and Brooks (2007) found empirical evidence in support of the existence of BLC in United States of America, Portugal and Turkey, respectively. On the other hand, Coll et al. (2005) found bank lending channel of monetary transmission mechanism to be non-existent in Venezuela. Similarly, Favero et al. (1999) tested the existence of a bank lending channel for four European countries and found no evidence of a lending channel. However, they did find that small banks use their excess liquidity to expand loans during a contractionary phase; contrary to the predictions of the lending hypothesis.

The motivation for this study is primarily based on our understanding of the structure of the banking sector in Pakistan, besides the regulatory environment. The country is a bank-dependent economy with banking sector constituting 74 percent share in total financial assets. Most of the borrowings by the private sector takes place through banks and capital markets are not fully developed. Banks rely heavily on deposits for their source of loanable funds as raising funds externally, through sale of shares or bonds, is costly.

The regulatory environment has also been challenging. In 2008, State Bank of Pakistan has introduced a floor on interest rate paid on savings deposits, which has effectively raised the marginal cost for the banks. The reserve requirements, on the other hand, have been lax throughout recent history and have seldom been used for routine monetary policy operations. Interest rate is the dominant tool used for conducting monetary policy. (Few sentences about BLC evidence as per data..). Thus Pakistan, apparently, has some of the theoretical underpinnings needed for the existence of BLC.

Moreover, there are currently limited studies that have attempted to test the Bank Lending Channel in Pakistan. Notably three studies have investigated how bank lending responds to changes in monetary policy. Agha et al. (2005) test the bank lending channel at an aggregate level using VAR and find that monetary policy

tightening in particular, negatively affects domestic demand in Pakistan and that banks play an important role in propagating monetary policy shocks to the real sector.

Choudhary et al. (2012) also provides evidence that a credit channel exists in Pakistan and contend that the role of banks in intermediation is a 'non-neutral' one. They empirically test the existence of a bank lending channel by using loan information bank-borrower wise. They find that bank size and borrower type influences how loan prices are determined. They also conclude that despite a similar mix of strong and weak borrowers at both strong and weak banks, smaller banks with weaker balance sheet responds strongly to changes in policy.

Recently, Zaheer et al. (2013), using quarterly data, have found BLC to be at work in Pakistan for conventional banks. They conclude that small banks with liquid balance sheets cut their lending less than other small banks and that big banks maintain their lending irrespective of their liquidity position.

This paper attempts to add to the growing literature about BLC in Pakistan. Similar to Zaheer et al. (2013), we use bank-wise balance sheet data to investigate whether heterogeneity among banks, affects their loan supply behavior as proclaimed under the bank lending channel. We measure bank heterogeneity by a number of bank characteristics including size, liquidity and capitalization. Following Gambacorta (2005), we also measure the capital constraint of the bank by introducing a new measure which captures capital in excess of regulatory requirements. We use a longer sample than Zaheer et al. (2013) and present long term elasticities.

We also employ a number of empirical techniques to test the effectiveness of BLC. Initially, we group the banks as per their characteristics and use VAR to test the potency of the relationship between monetary policy and bank lending after controlling for the demand factors. Later, we employ panel estimators (Generalized Method of Moments (GMM) and its variants) to confirm the results.

We find evidence that the bank lending along with deposits and liquid assets contracts significantly after monetary tightening at the aggregate level. So, after a monetary policy shock the reduction in lending does not imply a simple reallocation of assets from advances to government securities but there is significant reduction in cash and government bonds as well, a necessary condition for bank lending channel to work

Results also suggest that the heterogeneity characteristics 'size' and 'capitalization' as measured by capitalization 2 are relevant for the effectiveness of BLC in Pakistan. Small banks react more strongly than other banks and so do banks with

less capital in excess of regulatory requirements. Liquidity and Capitalization 1 are found to be weaker distinguishing characteristics. However, our assumptions about the *linear* impact of liquidity supporting the growth of advances is confirmed. Results also confirm the assumption about market for loans having stationary size distribution (no monopolistic tendencies).

Rest of the paper is organized as follows. Section 2 gives an overview of the banking sector in Pakistan. Section 3 presents data and subsection 3.1 discusses summary statistics of the banks' balance sheets in Pakistan. Section 4 covers methodology adopted. Section 5 presents results and finally Section 6 concludes.

2 Banking Sector Characteristics in Pakistan

The current banking sector structure in Pakistan is a result of financial sector reforms initiated during the 1990s with an intent to creating a financial system that was competitive, efficient, practiced good governance and followed market-based fundamentals. Reforms covered seven important areas: financial liberalization, institutional strengthening, domestic debt, monetary management, banking laws, foreign exchange and capital markets. These reforms led to significant retraction of government control over financial institutions[9] and a spurt in new entrants[10].

With the reforms continuing, financial sector started to witness a wave of mergers and acquisitions, reducing the number of financial institutions from 197 in 2000 to 178 in 2002 (SBP, 2003). Within the banking sector, mergers and acquisitions as a result of an increase in minimum paid-up capital, tax incentives and removal of legal hurdles (SBP, 2003), led to a fall in the number of banks from 44 in 2000 (SBP, 2008) to 38 by 2012 (SBP, 2013a). This, however, did not lead to an increase in market concentration; after mergers market concentration of the top five financial institutions actually declined (SBP, 2011).

Banks in Pakistan have always constituted the largest share in total financial assets. In 2011 this share was more than 74 percent (SBP, 2012). National Savings Schemes of Central Directorate of National Savings (CDNS)) constituted the second highest share of 17 percent with the remaining share (4.7 percent) represented by Non Bank Financial Institutions (NBFIs)). From corporate borrowers' perspective,

[9]Public sector ownership in overall financial sector (including banks, Non-Bank Financial Institutions (NBFIs) and Central Directorate of National Savings (CDNS)) declined from 94.7 percent in 1990 (SBP, 2002) to 38.9 percent in 2005 (SBP, 2006).

[10]The number of financial institutions increased from 63 in 1990 (SBP, 2002) to 197 in 2000 (SBP, 2003).

bank loans are a major source of financing due to lack of depth in the equity market. The debt equity ratio of 1.93 percent in 2012 indicates that the corporate sector is financing its growth through bank borrowings (SBP, 2013b). Therefore, banking sector in Pakistan incontrovertibly dominates the financial sector and serves as major source of financing in the economy.

Deposits constitute the largest source of funds for the banking sector. In 2012 deposits financed 75 percent of the total assets of the banking sector. The year-on-year (YoY)growth in deposits is 16.8 percent in 2012. While, due to buildup of retained earnings, improvements in revaluation surplus and some equity injections to meet the minimum capital requirements, the YoY growth in equity turn out to be 12.5 percent in 2012. The reliance on deposits, though not uncommon, makes it expensive for the banks to arrange funding from alternative sources thereby increasing their external finance premium. A high correlation of 0.7 between the SBP discount rate or policy rate and the spread between policy rate and average cost of funds[11], during the period 2004-2012, suggest that banks cost of funds rise more than the rise dictated by increase in interest rate alone. This implies that in the event of a rise in interest rates banks face an increase in cost of raising additional external funds which hampers their capacity to compensate for a fall in deposits on their liability side, lending credence to the existence of a bank lending channel in Pakistan[12].

Deposits of the banking system are protected under an implicit guarantee of the Government of Pakistan thereby making the banking system susceptible to excessive risk taking behavior on their asset side. This could be one of the reasons that non-performing loans to advances ratio (gross) in Pakistan has remained above 10 percent since 2008. Moreover, a positive correlation of 0.56 exists between non-performing loans and short term interest rate (TB3). This provides support for the BLC argument which postulates that in an increasing interest rate environment, investors will perceive banks as riskier avenues for their investments, therefore, making it difficult for banks to attract additional external financing. However, it is pertinent to note that after facing a rise in NPLs during 2008, banks became risk averse and increasingly began to channel their funds towards government securities, considerably altering their portfolio mix. This conscience decision on part of banks could have made BLC less potent.

Prior to reforms, monetary management was conducted through direct controls in-

[11]We use average rate paid on funds here which is Mark-up/Return/Interest Expense divided by average funds.

[12](See Horváth et al., 2006) for similar comments in case of Hungary.

volving allocation of bank-wise credit ceilings and maintenance of a prescribed credit to deposit ratios. The cash reserve requirement (CRR) was generally quite stringent and statutory liquidity requirement (SLR) was kept high [13]. SBP also provided subsidized financing for exports, agriculture, locally manufactured machinery, refinancing to Federal Bank for Cooperatives and Agriculture Development Bank of Pakistan. Therefore, monetary transmission mechanism was distorted, credit distribution was skewed and probably out of line with real demand.

Post-reforms, however, witnessed a gradual shift towards adoption of indirect instruments as tools of monetary policy. Up until August 2009, broad money (M2) expansion served as an intermediate target for targeting CPI inflation and GDP growth, achieved through use of Reserve Money (RM) as operational target. After August 2009, interest rate corridor was introduced with the overnight money market repo rate serving as the operational target of monetary policy, supported by appropriate liquidity management, mainly through Open Market Operations (OMOs). This can be seen in figure 1 where episodes of monetary tightening (easing), are supported by greater number and volumes of mop-ups (injections) by the central bank. Therefore,one of the key assumptions of the traditional channel under which BLC operates, is being partially met in case of Pakistan. Moreover, SBP has also used CRR and SLR as policy instruments solely to manage liquidity levels and ensure stability but monetary policy framework remains fairly independent of the use of these tools to supplement monetary policy decisions.

3 Data

Quarterly balance sheet data of 32 commercial banks in Pakistan from June 2002 to September 2012 has been used in this study; a total of 42 quarters. Commercial banks include public sector banks, local private banks and foreign banks. At the start of the period under review, there were 37 commercial banks which have reduced to 34 by September 2012. Exclusion of 2 new banks from the sample further reduced it to 32 banks[14]. The period under review has witnessed emergence of 7 new banks and there were 16 bank mergers. When dealing with mergers and acquisitions of banks, we adopt the treatment of reconstructing the balance sheet backwards of the merged

[13]Prior to reforms, SLR was gradually increased from 15 percent of demand and time liabilities in 1948 to 40 percent in 1992. During the reforms in 1990s this ratio was gradually reduced and currently stands at 19 percent of demand liabilities.

[14]ICBC and Sindh Bank with 8 and 5 observations, respectively, were removed.

entities as the sum of the merging banks [15]. After all these adjustments the total observations worked out to be 1,268 for the raw data.

We construct bank characteristic variables as per literature (Ehermann et al., 2001; Gambacorta, 2005). Size is measured as log of total assets, liquidity as liquid assets to total assets and capitalization as shareholders' equity to total assets[16]. There is some debate in the literature about measurement of capital constraint of the bank. Some authors simply use capital in hand (as mentioned earlier) while others suggest using capital in excess of regulatory requirement as an indicator of bank's true capital constraint (Gambacorta and Mistrulli, 2004; Gambacorta, 2005). Following the later approach, however, is not simple in our case.

In case of Pakistan there are two separate capital requirements in place; one is the minimum capital requirement (MCR), which is an absolute measure and the other is the capital adequacy ratio (CAR), which is in fractional terms. To be adequately capitalized, a bank has to meet both these prudential requirements of the State Bank of Pakistan. If a bank violates any one of the two requirements it is termed as capital deficient. Therefore, it is imperative to look at both the requirements in tandem to ascertain the excess capital position of a bank. In our sample some banks are compliant in terms of MCR but deficient in terms of CAR. We, therefore, decided to construct a separate measure named 'Capitalization 2' which reflects the true extent of excess capital held by a bank in a particular period. It captures the 'minimum' of the two capitals held by each bank in excess of the regulatory requirement[17].

Liquidity and Capitalization 1 have been normalized with respect to their averages over the entire sample. Size and Capitalization 2 are in nominal terms and to remove trends they are normalized with respect to the average of each single period[18]. Since Capitalization 2 represents minimum of the two excess capital requirements (CAR and MCR) in nominal terms, there are some observations for which the values of the variable turn out to be negative. Therefore, Capitalization 2 is first transformed using Inverse Hyperbolic Transformation[19] and then normalized.

[15] See Peek and Rosengren (1995); Kishan and Opiela (2000); Farinha et al. (2001) and Gambacorta (2005) for similar treatment.

[16] Shareholders' equity includes Share Capital, Reserves and Unappropriated profits

[17] Appendix C provides details about merger treatment of banks, variables used and their construction and the data cleaning process.

[18] We follow Ehermann et al. (2001); Farinha et al. (2001); Gambacorta and Mistrulli (2004) and Gambacorta (2005) in this practice.

[19] $y = \ln\left(x + \sqrt{(x^2+1)}\right)$

$$
\begin{aligned}
\text{Size}_{it} &= \log TA_{it} - \frac{\sum_{i=1}^{N} \log TA_{it}}{N_t} \\
\text{Liquidity}_{it} &= \frac{LA_{it}}{TA_{it}} - \left(\sum_{t=1}^{T} \frac{\sum_{i=1}^{N} \frac{LA_{it}}{TA_{it}}}{N_t} \right) \\
\text{Capitalization1}_{it} &= \frac{SE_{it}}{TA_{it}} - \left(\sum_{t=1}^{T} \frac{\sum_{i=1}^{N} \frac{SE_{it}}{TA_{it}}}{N_t} \right) \\
\text{Capitalization2}_{it} &= Cap2T_{it} - \frac{\sum_{i=1}^{N} Cap2T_{it}}{N_t}
\end{aligned}
$$

Where TA is Total Assets, LA is Liquid Assets, SE is Shareholders' Equity, N is the total number of banks, T is the total number of quarters and $Cap2T$ is the transformed value of Capitalization 2.

The stance of monetary policy is measured using short term interest rate[20]. To control for the demand side factors we have included industrial production index (IPI), consumer price index (CPI) and fiscal deficit (FD)[21]. All the variables except short term interest rate are real, in log form and seasonally adjusted.

3.1 Summary Statistics of Banks' Balance Sheet

Table 1 presents the summary statistics (mean values of some selected balance sheet variables) of all banks during the sample period (June 2002 to September 2012). Banks have been grouped into three subcategories under size, liquidity and the two measures of capital availability based on percentile ranking of each bank, in each quarter and category. The criteria used to split the sample is further explained in the footnote to table 1.

Some clear patterns emerge from the data. Small banks are more liquid but hold fewer government securities in their liquid assets portfolio. This maybe because small banks are net lenders in the interbank market and need bigger buffer stocks of cash due to their inability to raise external finance easily on short notice Kashyap and Stein (1995).

The assets side of small banks shows that they have relatively lower exposure in loans compared to medium and large banks. The exposure in loans increases

[20]We have used interest rate on 3-months Treasury Bill rate (TB3), overnight interest rate (ONR) and SBP Repo rate as our measures of monetary policy. The results presented here are on the basis of TB3. Results based on other measures are similar in nature.

[21]Fiscal deficit has been included as a control because government borrowing from banking sector in Pakistan has usually been excessive and it is expected that it will capture any crowding out effect.

with bank size[22]. This implies that, on the one hand, smaller banks with limited market outreach, posited by a small branch network, cannot reach some segments of loan demand and, on the other hand, these banks maybe putting a larger weight to liquidity concerns (as evident from their liquidity ratios). On the liability side, the deposit to liability ratio of small banks is lower than ratio for large banks; an observation consistent with the literature Favero et al. (1999); Farinha et al. (2001). The volume of borrowings from central banks by small banks is also low.

Small banks are better capitalized in terms of CAR and Capitalization 1. This means that small banks are considered resilient and are likely to absorb shocks emanating from changes in monetary policy. However, small banks have lower average excess capital as measured by Capitalization 2; implying that they are capital constraint. If excess capital does in fact play a role for small banks then the question whether their loan supply is responsive to monetary policy shock, becomes an empirical one.

Less liquid banks—both least and mid liquid— are larger in size and relatively less capital constrained as per capitalization 2. These banks have higher loans to deposits ratio. Highly liquid banks, on the other hand, are smaller, have more deposits and make less loans. Thus the more liquid the bank the smaller is its balance sheet size. Also, its earning assets are concentrated in government securities. Thus, it is expected that highly liquid banks may be able to shield their portfolio from adverse monetary policy shock.

The contrasting pictures emerging from classification of banks as per size and liquidity suggest that the interplay between the two factors might be nullifying the effects of each other. It becomes important to test empirically whether large and highly liquid banks are affected the least during monetary contraction phase or not.

As per Capitalization 1, highly capitalized banks are small and more liquid but with lowest proportion of government securities in liquid assets. They have least advances to assets and deposits to liabilities ratios. These pretty much mirror the observations made for small banks. Similar observations were made in earlier literature as well. Farinha et al. (2001) observe that highly capitalized banks have lowest proportion of government securities; similar to observations made in our data. Vihriala (1997) found that in Finland the lower the degree of capitalization of a bank, the more expansive was its loan supply.

Using Capitalization 2 as a measure, highly capitalized banks come out to be large

[22]This is in line with Farinha et al. (2001)'s study for Portuguese banks but contrary to Favero et al. (1999) observations for Greek banks where small banks have a higher ratio of loans to assets.

and mid-liquid with loan exposure not much different from others. They are more profitable than the rest of the banks. So, it is expected that highly capitalized banks would be able to withstand adverse shocks.

It is interesting to note, the contrast between the two sets of statistics when the banks are grouped as per Capitalization 1 and Capitalization 2. Least capitalized banks, as per Capitalization 1, are those with highest asset base and advances but low CAR. On the contrary, as per Capitalization 2, least capitalized banks are those with lowest asset size, advances and CAR. This suggests that banks with higher Capitalization 1 ratio (usually small banks) can still be capital deficient (not meeting the SBP prudential requirements), and would not have the capacity to insulate their lending portfolio during monetary tightening. It means that the argument that smaller banks with minimum level of excess capital would find it difficult to raise funds and insulate their loan portfolio from a monetary policy shock cannot be adequately captured by using Capitalization 1. Capitalization 2 captures the capital constraint of the bank satisfactorily.

4 Methodology

In the first step of our analysis, we employ vector auto regression (VAR) methodology to examine the effect of unanticipated monetary policy shock on industrial production, prices and the bank balance sheet variables. We identify the following VAR representation:

$$Y_t = \sum_{i=1}^{p} \Psi_i Y_{t-i} + \Gamma X_t + \epsilon_t \tag{1}$$

where Y_t is a vector of endogenous variables, X_t is a vector of exogenous variables including intercept, Ψ_j and Γ are matrices of coefficients and ϵ_t is a vector of innovations.

To keep VAR parsimonious we have used four variables of interest. We have followed the widely used recursive identification scheme proposed by Bernanke and Blinder (1992). It is argued in this scheme that the macro economic variables (such as real output and prices) are observed contemporaneously by the policy makers and the policy variable affect these macroeconomic variable with a lag. Thus macro economic variables like output (IPI) , prices (CPI) and bank balance sheet variables (B) i.e advances, government securities or deposits appear first and short term interest rate (R) is placed last in the Choleski order. So our Y matrix takes the form:

$$Y_t = [IPI \quad CPI \quad B \quad R]$$

We treated lag of fiscal deficit as an exogenous variable to control for demand for credit by the government sector. We also included a dummy variable to control for the balance of payment crisis of 2008 which resulted in outflow of foreign currency deposits from the country.

$$X_t = [FD\,(-1) \quad d]$$

Since the focus of the analysis is to identify the bank lending channel, so apart from aggregate data we employed VAR on disaggregated data. For this purpose, we have divided the banks into three sub-categories low, medium and high based on size, liquidity and the two measures of capital. So in all, we have estimated thirty nine different VARs.

According to Sims et al. (1990) estimating the VARs in levels (when some variables are non stationary) does not affect the estimators consistency though it may affect their efficiency. As our objective, at this stage, is not to determine efficient estimator but to examine the relationship among variables, we have estimated the VARs in levels (Favero, 2004; Aleem, 2010). Further, we have used optimal lag length of two by looking largely at Bayesian Information Criteria and residual diagnostics. Several other studies using quarterly data for this purpose have also used two lags as the optimal lag length[23].

In the second stage of the analysis, following Kashyap and Stein (1995, 2000); Ehermann et al. (2001); Gambacorta and Mistrulli (2004); Gambacorta (2005) and several others, we employ the following empirical specification to test whether banks react differently to monetary policy shocks[24].

$$\begin{aligned}\Delta Z_{it} =& \mu_i + \sum_{j=1}^{4} \alpha_{ij} \Delta Z_{it-j} + \sum_{j=0}^{4} \beta_j \Delta R_{t-j} + \sum_{j=0}^{4} \xi_j \Delta X_{t-j} + \gamma_i C_{it-1} \\ &+ \sum_{j=1}^{4} \zeta_{ij} C_{it-1} \Delta R_{t-j} + \epsilon_{it}\end{aligned} \tag{2}$$

with $i = 1, \ldots, N$ and $t = 1, \ldots, T$, where N is the number of banks, Z_{it} the

[23]For instance see Ramaswamy and Sloek (1998); Morsink and Bayoumi (2001); Al-Mashat (2003); Disyatat and Vongsinsirikul (2003) and Aleem (2010)

[24]The theoretical framework behind the empirical model is reported in Ehermann et al. (2001); Gambacorta and Mistrulli (2004) and Zaheer et al. (2013)

loans, deposits or liquidity of bank i in quarter t, R_t the monetary policy indicator, X_t the industrial production, fiscal deficit and inflation, C_{it} the bank characteristics i.e. size, liquidity, Capitalization 1 and Capitalization 2.

In order to capture the complete picture of 'bank lending channel' in Pakistan, we take changes in loans as the dependent variable in model 2 followed by changes in deposits and liquidity. This allows us to test the BLC assertion that deposits, liquidity and loans all react inversely to a monetary policy shock. We are also interested in knowing whether bank specific characteristics i.e. size, liquidity and capitalization have any direct linear effects. Therefore, besides β_j's for interest rate, the parameters of interest in the regression analysis are ξ_j's for bank characteristics and ζ_{ij}'s on the interaction terms. If indeed BLC is at work then we expect to have $\frac{\partial Z_{it}}{\partial R_{it}} < 0$ for Z equals advances, deposits and liquidity and significant positive values for ζ_{ij}'s i.e. $\frac{\partial^2 Z_{it}}{\partial C_{it} \partial R_{it}} > 0$. For direct linear effects of bank characteristics we assume that higher liquidity and capitalization would support stronger loan growth and hence $\frac{\partial Z_{it}}{\partial C_{it}} > 0$ for C equals liquidity and capitalization. For C equals size we expect $\frac{\partial Z_{it}}{\partial C_{it}} < 0$ based on the assumption that market for loans has a stationary size distribution (Topi and Vilmunen, 2001).

The analysis of the sample data has suggested the possibility of bank heterogeneity in size along with liquidity to be of some consequence. This simply means that small and least liquid banks should react strongly to the monetary policy shock than just the small but highly liquid or least liquid but bigger bank. To check this hypothesis we have estimated the following model:

$$\begin{aligned}\Delta Z_{it} =& \mu_i + \sum_{j=1}^{4} \alpha_{ij} \Delta Z_{it-j} + \sum_{j=0}^{4} \beta_j \Delta R_{t-j} + \sum_{j=0}^{4} \xi_j \Delta X_{t-j} + \lambda_i S_{it-1} + \delta_i L_{it-1} + \gamma_i S_{it-1} L_{it-1} \\ &+ \sum_{j=1}^{4} \upsilon_{ij} S_{it-1} \Delta R_{t-j} + \sum_{j=1}^{4} \omega_{ij} L_{it-1} \Delta R_{t-j} + \sum_{j=1}^{4} \zeta_{ij} S_{it-1} L_{it-1} \Delta R_{t-j} + \epsilon_{it}\end{aligned} \tag{3}$$

where Z_{it} now is the loans and deposits of bank i in quarter t, S_{it} is size and L_{it} is liquidity.

If indeed our hypothesis is true and the interaction between size and liquidity is important for the transmission of monetary policy impulses through the bank lending channel then we expect $\frac{\partial^3 Z_{it}}{\partial S_{it} \partial L_{it} \partial R_{it}} < 0$.

Along with the GMM estimator suggested by Arellano and Bond (1991), we estimate both models 2 and 3 using instrumental variable approach of Anderson and

Hsiao (1982) and the system GMM methodology suggested by Blundell and Bond (1998)[25]. The rationale is to ensure robustness of the results across estimators, besides consistency and efficiency of the estimates. Relevant post estimation diagnostics are performed for each estimator.

5 Results

We first report the results based on VAR and then panel estimation.

5.1 VAR Results

Figure 2 displays the responses of the balance sheet variables, at the aggregate level, to an unanticipated shock to the monetary policy over a horizon of 15 quarters. A positive innovation (one-standard-deviation shock) in interest rate causes a reduction of 0.5 percent in deposits initially. The decline in deposits continue till the next quarter (0.6 percent) but then slowly start to recover. By the fifth quarter, after the shock, deposits have recovered somewhat and they maintain their new level going forward. Thus, a positive monetary policy shock permanently declines the deposits of the banks.

The impact on government securities is more pronounced and by the third quarter a reduction of 2.3 percent has already taken place. That point onwards, however, the government securities start to build up and by the end of eighth quarter they have fully recovered. Going forward there is some buildup of government securities above the initial level but it tapers off by the end of 15th quarter and the government securities converge to their initial level.

There is a permanent decline in loans, however. By the fifth quarter loans reduce by 1.2 percent and then start to pick up. Eventually, loans settle at a level which is 0.4 percent less than the initial level.

So we can observe the BLC at work in figure 2. After the monetary policy shock, as the deposits fall, there is some decline in loans but there is a significant reduction in government securities. The ease of liquidating government bonds against the contractual nature of loans explains the difference in rates of decline in the two assets of the banks (Bernanke and Blinder, 1992). To compensate for the fall in deposits banks, initially, sell their government securities to protect their loan portfolio. But once the

[25] We also estimated the model using fixed effects, but unlike Zaheer et al. (2013) found the *'Nickell bias'* to be substantive (Nickell, 1981).

permanent nature of reduction in deposits become apparent, loans fall and the banks re-accumulate their government securities portfolio to ward off future risks. The build up of loans is not drastic partly due to a decline in lending ability of the banks and partly due to subdued demand effects. Thus, the primary impact of fall in deposits, in response to a monetary policy shock, is reflected entirely in loans (Bernanke and Blinder, 1992; Aleem, 2010).

To carry further our analysis, we next report the VAR results based on the bifurcation of the sample into three categories based on bank characteristics i.e. size, liquidity and capitalization.

5.1.1 Size

Figure 3 provides graphical illustration of the dynamic affect of interest rate innovations on real advances, real government securities holdings and real deposits held by small, medium and large categories of banks. In the sense of Kashyap and Stein (1995, 2000), if a positive innovation in policy rate has greater dampening affect on government securities and loans of small banks than that of large banks, the evidence may be termed in favor of the bank lending channel. We first discuss IRFs of small, Medium and large Banks separately and then compare the IRFs of these heterogeneous categories to be able to comment upon the working of the bank lending channel.

For small banks, the deposits do not decline immediately after the monetary policy shock. They start falling after the second quarter and decline by 2.1 percent by the 5th quarter. Thereafter, they recover somewhat but settle at a level which is 0.5 percent lower than the initial level. The initial comfort provided by deposits, allows the small banks to accumulate government securities and advances in the first quarter probably reflecting the earning motive. As the deposits start to fall the government securities and advances also decline.

Government securities holdings of small banks, in response to monetary policy shock, start declining after the second quarter. This decline is, however, relatively moderate i.e. 1.2 percent up to fourth quarter. This is followed by a quick replenishment in the subsequent quarters. The securities holdings of the small banks in the end settle at a level which is 2.4 percent higher than the initial level. This is understandable because small banks, as noted earlier, have a strong preference for liquid assets.

The real lending of small banks increases by 2.0 percent till the end of second quarter. Subsequently, the fall in lending is quite rapid and by the fifth quarter it

declines to a level which is 2.0 percent less than the initial level. Thereafter, lending of small banks witnesses some partial recovery but real lending settles at a level lower than initial level after the shock. Hence, an unanticipated monetary policy shock has a permanent contractionary impact on deposits and lending of the small banks.

For medium size banks, monetary policy shock has a negative impact on deposits immediately. Deposits decline by 1.5 percent by the second quarter. From there onwards, deposits recover somewhat but continue to decline and reach at level which is 1.2 percent lower than the initial level by the fifteenth quarter. The response of government securities holding by the medium size banks to monetary policy shock depicts relatively large swings. For instance, in the first two quarters, government securities holdings by the medium size banks fall sharply by 2.2 percent followed by a quick rise in the subsequent quarters. By the end of seventh quarter after the shock, stock of these securities reaches 1.7 percent higher than the initial level. The sharp fall in the first two quarters possibly reflects revaluation losses owing to rise in policy rate while the reversal in the following quarters may depicts banks revived interest in these securities due to better return. Afterwards, the stock of government securities starts declining again as the deposits decline and advances recover somewhat. In the end they settle down at lower than pre-shock level.

The lending of the medium size banks fall immediately after the monetary policy shock. It decreases by 2.3 percent during the first four quarters. From the fifth quarter onwards, it recovers partially and settles down at a stable path by the tenth quarter. The lending in the final quarter is 1.3 percent lower than the initial level. Thus monetary policy shock reduces deposits, government securities holdings and lending of the medium size banks on permanent basis.

Looking at the IRFs of large size banks, total deposits fall by 0.8 percent during the first three quarters. Thereafter, deposits recover and stabilize at 0.3 percent lower than the initial level. Government securities holdings of the large banks fall by 2.7 percent in the first four quarters. This fall in stock of government securities may be due to several reasons. First, with the supply side constraints on account of fall in deposits, the large banks may liquidate some of the government securities to meet their loan commitments. Second, as mentioned earlier, revaluation losses may also lead to fall in government securities. Nonetheless, with the fall in lending and pick in deposits, these banks start replenishing their stock of government securities from the fifth quarter onwards. They are quite successful in this effort as they end up with their stock of government securities only marginally lower (0.2 percent) lower than the initial level.

In the first two quarters, Large banks are able to shield their lending from monetary policy shock. In the subsequent quarters, however, lending by the large banks shows contraction. Specifically, it declines by 0.9 percent up till seventh quarter and then recovers a bit. Towards the end, the lending stabilizes around 0.3 percent below the pre-shock level. This shows that monetary policy shock has permanent negative impact on the deposits, government securities and lending of large banks.

Clear evidence of the bank lending channel does not emerge if we observe the relative strength of the IRFs of small, medium and large banks for advances, deposits and government securities in figure 5. The dynamic impact of monetary policy shock is relatively stronger on the lending of medium banks than that of small banks. Large banks, however, are able to keep decline in their advances portfolio lower than small banks. This is not fully in line with the prediction of BLC, where monetary policy shock is expected to have stronger dampening impact on lending of the small banks than that of medium and large size banks. In our case, it is the medium sized banks which are affected more than small banks.

In case of deposits, the negative impact of monetary policy shock is visible for medium and large banks at initial stage but not for small banks. However, once the deposits of the small banks start to decline their fall is heavier. But, deposits of small banks also recover rapidly and at the end their deposits reach a level which is lower than large banks but higher than medium banks.

The behavior of government securities is also unexpected. Initially, the decline is more for medium banks than for large and small banks. Later, however, the recovery is bigger for medium banks. In the end, government securities settle at a level lower than initial level for medium and large banks but at higher levels for small banks. This behavior could be explained due to the strong desire of small banks for keeping a sizable portion of their assets in liquid form to ward against adverse shocks. Thus although interest rate has dampening impact on bank lending, government securities, deposits and thereby aggregate demand (real output and prices) in all the cases, its identification through heterogeneity in size of the banks is not clear cut and requires further investigation.

5.1.2 Liquidity

For the bank lending channel to work, BLC predicts that innovation to policy rate has larger negative impact on the lending of less liquid banks compared with medium or most liquid banks. To see this, we discuss the IRFs of less liquid, medium liquid and most liquid banks (Figure 3) followed by a discussion about their comparative

strength (Figure 4).

For the least liquid banks, unanticipated monetary policy shock leads to a fall in deposits, government securities and loans in the first two quarters. Following which a quick but temporary recovery takes place and the three variables of interest eventually settle down on a path, lower than their initial levels. These swings in IRF could be due to several opposing forces at work. These banks have lowest liquidity but have a bigger size and their advances to deposits ratio (ADRs) are the highest (see Table xx). They are net borrowers in the interbank market and also borrow from State Bank of Pakistan. So these banks have generally utilized their maximum capacity to lend. Therefore, an adverse shock has an immediate impact on their balance sheets. But, by virtue of their bigger size with extended branch network and their ability to borrow they are able to recoup some of the initial losses. However, after fully utilizing their capacity to borrow, they are unable to sustain the momentum and eventually suffer.

Medium liquid banks appear to shield their balance sheet from Monetary policy shock. After falling by 1.9percent by the end of seventh quarter, deposits increase and by the fifteenth quarter deposits stabilize at 0.4 percent above the initial level. Thus, monetary policy shock have negligible impact on the deposits of medium size banks. The impact of monetary policy shock on government securities holdings of medium liquid banks is not much different from that of deposits. For instance, government securities holdings of this category of banks declines by 2.5 percent in the first four quarters. From fifth quarter onwards, they start replenishing the stock of these securities and end up with the stock of government securities at 0.7 percent higher than the initial level.

The impact of monetary policy shock on the lending of medium liquid banks is nominal. In fact, lending increases by 3.9 percent in the first two quarters after the shock. This considerable increase in lending is possibly due to two reasons. First, the medium liquid banks may cater the market share lost by less liquid banks and second fair degree of liquidity allows these banks to meet their loan commitments by drawing down on their liquidity. From third quarter onward, however, lending by these banks starts declining and by the end of sixth quarter it falls by 2.1 percent. Nevertheless, lending by the medium liquid banks recover convincingly in the quarters to follow. Finally, the lending by these banks stabilizes at a relatively higher level than the pre-shock value.

With respect to most liquid banks, monetary policy shock seems to have no impact on the real deposits, real government securities holding and real lending. For example,

despite steep fall in the first two quarters, deposits of the most liquid banks increase considerably. The sharp fall in deposits in the first two quarters may be explained by the fact that most of the banks in this category are small size banks. Toward the end, deposits of the most liquid banks are only marginally lower (0.2 percent) than the initial level.

IRF of the government securities holding of the most liquid banks depicts similar trend as deposits. In the initial two quarters, stock of government securities depletes while it recovers in the latter quarters. Finally, the stock of government securities end up at almost the pre-shock level. Despite considerable decline in the initial two months, lending of the most liquid banks recovers markedly in the subsequent period. It appears that monetary policy shock has no significant impact on the lending of the most liquid banks.

The above discussion implies that BLC may be at work in case of liquidity. When we look at figure 5 a somewhat vague picture emerges, though. It is the most liquid banks that experience the highest decline in advances initially after the monetary policy shock. Although their advances, at the end of the simulation period, are at a level higher than least liquid banks, they are lower than medium liquid banks. BLC implies stronger impact on low and medium liquid banks than for most liquid banks. Thus, further investigation is required to get a definitive picture.

5.1.3 Capital

The cumulative IRFs of banks –bifurcated on the basis of Capitalization 1 and Capitalization 2– to policy rate shock are depicted in figure 4. Bank Lending Channel is assumed to work if monetary policy shock has relatively greater dampening impact on the lending of less capitalized banks than well capitalized banks. For this analysis we first analyze the IRFs of less capitalized, medium capitalized and well capitalized banks and then conduct their comparative analysis.

In case of Capitalization 1, IRFs of less capitalized banks suggests that monetary policy shock has contractionary impact on real deposits, real lending and real government securities. Deposits of the less capitalized banks, for example, declines by 14.0 percent in the first two quarters. Though deposits recover in the subsequent period, they still end up at a level 1.0 percent lower than the initial level.

Government securities holdings of the less capitalized banks responds to monetary shock in the similar fashion as deposits. In the first two quarters stock of government securities falls sharply followed by partial recovery in the latter period. As the IRF stabilizes, government securities are 1.6 percent lower than the initial level.

Lending of the less capitalized banks is also negatively affected by the monetary policy shock. This impact is quite strong in the initial two quarters when lending by these banks falls by 14.1 percent. This impact is moderated to great extent in the following quarters. Specifically, the lending stabilizes at 1.0 percent lower than the initial level. Thus monetary policy shock has a permanent negative impact on lending by the less capitalized banks.

For the medium capitalized banks, impact of monetary policy shock on deposits, government securities and lending is negligible. Specifically, deposits of the medium capitalized banks increase by 5.6 percent in the first two quarters after the shock. From there onward deposits stabilizes at almost the initial level. Thus monetary policy shock does not seem to affect deposits of medium capitalized banks on permanent basis.

The monetary shock does not appear to effect the government securities holding of medium capitalized banks also. After around 3.0 percent increase in the first three quarters, stock of government securities falls and revert back to the initial level.

In line with the changes in deposits, lending of the medium capitalized banks appears to be less affected by monetary policy shock. After some movements, the impact of monetary policy shock on lending by the medium size banks completely dies down in the twelfth quarter.

For the well capitalized banks, monetary policy shock negatively impacts deposits, lending and holdings of government securities in real terms. Nonetheless, this impact is relatively moderate when compared with that of least capitalized banks. Initially, deposits of well capitalized banks fall (3.1 percent in the first two quarters). However, in the subsequent period, deposits recover noticeably and stabilize at 0.6 percent lower than the initial level.

The impact of monetary policy shock on government securities holdings of the well capitalized banks is slightly negative. Though government securities holdings fall by 2.5 percent in the initial two quarters, these banks replenish this stock from quarter three onwards. As a result government securities holding almost reverts back to the initial level.

Though moderately, lending of the well capitalized banks is negatively affected by the monetary policy shock. Specifically this effect appears to be strong in the first two quarters when lending decline by 2.1 percent. However, as these banks are in a good position to raise funds from external sources, their lending recovers in the subsequent quarters. This process continues till lending stabilizes to a new path which is 0.8 percent lower than the initial level. Thus monetary policy shock has a dampening

but moderate impact on the lending of well capitalized banks.

Figure 6 shows that the innovation in policy rate has greater dampening impact on the lending of less capitalized banks than that of well capitalized banks. But, it is the medium capitalized banks which are effected the least. Thus, results as per Capitalization 1 present are not conclusive.

In case of Capitalization 2, the results are mixed as well. Figures 4 and 6 show that the lending of the least capitalized banks is affected more than the lending of well capitalized banks but it recovers rapidly and at the end of the simulation period of fifteen quarters it is not only well above the initial level but also more than medium and well capitalized banks. The situation is similar in case of government securities and deposits. Thus, further investigation is also required in this case to get a definitive picture.

5.2 Panel Estimation

The main results of the estimation are summarized in Tables 2 to 13, which present long run elasticities [26]. We perform the estimations by considering each bank characteristic separately. We look at the complete chain of BLC in estimations as our dependent variable includes bank deposits, liquidity and loans.

5.2.1 Heterogeneity Factor: Size

As per the results shown in Table 2, the direct impact of monetary policy on loan growth is negative but its interaction with size has a dampening effect on the fall in growth of loans. The interaction term has the expected positive sign and is statistically significant in two specifications (Columns 2 and 5). Thus, banks with larger size are, to some extent, able to shield their loan portfolio from negative monetary shocks in Pakistan.

Although, in case of deposits and liquidity, the monetary policy has an expected negative impact on their growth (Tables 3 and 4), the distributional impact of size is inconclusive. Generally, the interaction term has a an unexpected negative sign and is statistically not different from zero except for one regression (Column 9, Table 3). This implies that for deposits and liquidity, contrary to expectations, size is not an important characteristic for banks in Pakistan. Large banks face similar problems like small banks when mobilizing regular deposits, despite better geographical coverage. They have larger volume of deposits but their funding needs are also large. As

[26] Long-run elasticities have been computed from the models using Delta Method.

reported in Table 1, large banks have the lowest liquid assets to deposits ratio but a higher advances to deposits ratio. Where large banks could have an edge over small banks, in raising funds and shielding their loan portfolio, is the interbank market. Large banks are usually the net borrowers in the interbank market while small banks are the net lenders (1).

The *linear* impact of size on growth of advances is as per expectations. The significant negative coefficient implies that the growth in loans is not an increasing function of size. The market for loans in Pakistan has a stationary size distribution or has a tendency to converge to a stationary size distribution (Topi and Vilmunen, 2001). In other words, the market for loans has not been monopolized by large banks alone.

So, in the aftermath of an adverse monetary shock all banks, whether small or large, witness a decline in their deposits, liquid assets and advances. The larger banks, however, are able to shield their loan portfolio from declining to a certain degree. So size matters for growth in advances but not for deposits and liquidity.

5.2.2 Heterogeneity Factor: Liquidity

The direct impact of monetary policy on growth in advances and deposits remains negative (Tables 5 and 6). Higher liquidity seems to support the growth in advances though, as the *linear* impact of liquidity on growth in advances is positive and significant. The overall impact of monetary policy on growth in advances of average liquid bank is, however, inconclusive. The interaction term is alternating in sign and is statistically insignificant throughout models. This indicates liquidity to be a weaker factor for BLC in Pakistan besides probably some noise in the data.

These results could also be due to the fact that highly-liquid banks in our sample are generally smaller in size and, as shown earlier, small banks are the hardest hit after a monetary contraction. It may also be due to the fact that liquidity gives the bank only temporary ability to face adverse shocks. As the consequences of the shock grow, banks' substitution of advances for government securities cannot continue. Banks eventually rebuild their liquid assets at the cost of advances (See VAR results).

For deposits, the more liquid the bank the higher is the decline in its deposit growth. Not only is the *linear* term negative and significant but the interaction term is also negative and statistically significant. Thus, higher liquidity seems to be accelerating the fall in deposits.

5.2.3 Heterogeneity Factor: Capitalization

In case of capitalization, the monetary policy shock continue to adversely impact growth in advances directly (Table 7 and Table 10). The *linear* term is, however, positive and significant for capitalization 1 but negative and significant for capitalization 2. This implies that having excess capital does not in itself supports growth in advances.

Though the traditional measure, capitalization 1, does not seem to fully capture the distributional impacts of changes in monetary policy on advances (Tables 7), capitalization 2 that measures excess capital does (Tables 10). The interaction term has the expected positive sign and is statistically significant in some regressions (Columns 8 and 9, Table 10). This means that banks with more excess capital available at their disposal are able to stem the fall of advances after monetary tightening.

In terms of deposits growth, capitalization 1 and capitalization 2 both have opposite impacts. The interaction term is positive and significant in regressions for capitalization 1 but negative and significant for capitalization 2 (Tables 7 and 10). Banks with higher capitalization 1 are affected less but banks with higher capitalization 2 see their deposits fall rapidly. This seems perplexing at first but is understandable if one considers the accounting identity. As assets equal liabilities plus equity, the capital in excess of the regulatory requirements allow the banks to absorb the adverse shock through equity and not necessarily through increase in deposits.

The impact on liquidity is usually positive but insignificant in both cases (Tables 9 and 12). However, size as control is significant in both cases. This suggests that size of the banks is a relevant characteristic for banks in Pakistan.

5.2.4 Does Liquidity in Combination with Size matter?

Table 13 presents the results of the regressions involving interaction of monetary policy with liquidity and size as explanatory variable on growth in advances and deposits. The direct impact of monetary policy on growth in advances is negative and is statistically significant in only one regression (Column 2). In that particular regression, the double interaction term has an unexpected positive sign but is statistically insignificant. The double interaction is significant in another regression in which the direct impact of monetary policy is insignificant (Column 3). This suggest that size in combination with liquidity is not a strong factor in identifying BLC. Neither, given the size, additional liquidity nor, given the liquidity, additional size has any dampening impact on growth in advances.

6 Conclusion

In this paper, we have used two different methodologies (VAR and panel data analysis) to investigate the role of banks in transmission of monetary policy in Pakistan. Our results show that the bank lending contracts significantly after monetary tightening at the aggregate level. There is significant contraction in deposits and liquid assets of the banks too. Thus, after monetary policy shock a reduction in lending does not imply a simple reallocation of assets from advances to government securities but there is significant reduction in cash and government bonds as well, a necessary condition for bank lending channel to work (Kashyap and Stein, 1995; Stein, 1998).

We have also investigated the impact of heterogeneity in banks— in terms of size, liquidity and capitalization—for the transmission of monetary policy signals. Our assumptions about the *linear* impact of liquidity supporting the growth of advances is confirmed. Results also confirm the assumption about market for loans having stationary size distribution (no monopolistic tendencies). Capitalization, as measured by capitalization 1, supports growth in advances. But capitalization, as measured by capitalization 2, does not.

Size and capitalization 2 turn out to be relatively stronger factors in identifying a bank's reaction to monetary policy. Small banks react more strongly than other banks and so do banks with less capital in excess of regulatory requirements. Liquidity and Capitalization 1 are found to be weaker distinguishing characteristics.

The research performed in this paper can be extended in several different directions in future. First, we can examine the relationship at a higher frequency e.g on monthly basis rather than quarterly. Second, we can expand the sample to include all types of banks in Pakistan e.g. microfinance banks. Third, we can explore other theoretical explanations of bank lending channel e.g. the risk taking channel. Fourth, we can include other heterogeneity factors like risk profile of each bank to identify BLC.

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A Tables

Table 1: Summary Statistics

Rs in millions

	All	Size			Liquidity			Capitalization 1			Capitalization 2		
		Small	Medium	Large	Low	Medium	High	Least	Medium	Most	Least	Medium	Most
No of Institutions	32	15	22	14	26	29	27	20	26	18	22	28	21
No of Observations	1268	363	507	398	377	513	378	386	507	375	380	504	384
Assets	164,634	15,004	85,387	402,057	197,094	216,911	61,314	229,703	212,788	32,553	50,974	98,405	364,037
Cash	18,155	2,670	8,221	44,934	19,682	24,969	7,385	24,366	23,975	3,894	4,968	10,608	41,110
Advances	82,283	5,638	41,483	204,162	107,524	107,938	22,292	117,256	106,420	13,651	25,857	48,790	182,080
Investments	45,429	3,476	24,292	110,619	45,959	61,613	22,937	63,452	59,226	8,224	12,443	26,822	102,494
Net Interbank Position	(2,316)	697	(5,867)	(539)	(3,500)	(4,028)	1,190	(1,952)	(3,370)	(1,265)	(518)	(3,682)	(2,301)
Liquid Assets	59,325	7,186	31,995	141,695	57,212	80,535	32,648	82,260	76,537	12,448	16,442	36,508	131,710
Government Securities	35,041	2,649	19,169	84,803	31,248	48,517	20,535	49,467	45,212	6,439	9,084	21,377	78,661
Liabilities	145,136	11,483	75,086	356,271	173,790	191,277	53,939	212,661	182,588	24,995	44,731	90,693	315,952
Deposits	122,648	9,445	60,172	305,483	146,082	162,725	44,886	178,027	156,715	19,586	37,950	71,575	273,497
Borrowings from SBP	6,433	397	5,553	13,076	8,042	8,189	2,449	9,434	7,963	1,282	2,275	5,304	12,026
Equity	12,878	3,165	7,074	29,130	15,321	16,389	5,677	11,397	19,033	6,081	3,711	7,747	28,683
ShareCap	7,005	3,403	7,283	9,937	9,743	7,273	3,911	7,567	7,422	5,863	4,507	6,954	9,544
Reserves	3,387	28	760	9,796	3,502	5,004	1,078	3,380	5,587	419	417	1,051	9,391
Un-appropriated Profits	2,480	(289)	(969)	9,398	2,076	4,096	689	449	6,024	(223)	(1,235)	(257)	9,748
Ratios													
Advances to Assets	0.50	0.38	0.49	0.51	0.55	0.50	0.36	0.51	0.50	0.42	0.51	0.50	0.50
Government Securities to Assets	0.21	0.18	0.22	0.21	0.16	0.22	0.33	0.22	0.21	0.20	0.18	0.22	0.22
Government Securities to Liquid Assets	0.59	0.37	0.60	0.60	0.55	0.60	0.63	0.60	0.59	0.52	0.55	0.59	0.60
Advances to Government Securities	2.35	2.13	2.16	2.41	3.44	2.22	1.09	2.37	2.35	2.12	2.85	2.28	2.31
Total Investments to Assets	0.28	0.23	0.28	0.28	0.23	0.28	0.37	0.28	0.28	0.25	0.24	0.27	0.28
Deposits to Liabilities	0.85	0.82	0.80	0.86	0.84	0.85	0.83	0.84	0.86	0.78	0.85	0.79	0.87
Liquid Assets to Deposits	0.48	0.76	0.53	0.46	0.39	0.49	0.73	0.46	0.49	0.64	0.43	0.51	0.48
Advances to Deposit Ratio	0.67	0.60	0.69	0.67	0.74	0.66	0.50	0.66	0.68	0.70	0.68	0.68	0.67
CAR	0.14	0.33	0.12	0.13	0.12	0.14	0.19	0.10	0.15	0.23	0.09	0.13	0.14
Banking Characteristics													
Size	11.07	9.27	11.06	12.71	11.48	11.59	9.94	12.07	11.44	9.55	10.06	10.81	12.40
Liquidity (Liquid Assets to Assets)	0.36	0.48	0.37	0.35	0.29	0.37	0.53	0.36	0.36	0.38	0.32	0.37	0.36
Capitalization1	0.08	0.21	0.08	0.07	0.08	0.08	0.09	0.05	0.09	0.19	0.07	0.08	0.08
Capitalization2	3,577	18	1,259	9,776	3,076	5,105	2,003	1,764	6,786	1,104	(1,812)	1,676	11,405

Notes: (i) We follow Ignacio & Martinez-Pages (2001) in grouping the banks. The percentiles (p30 & p70) were calculated for each period and each observation was assigned to the corresponding group in each period. Therefore, one bank can appear in different groups at different time. (ii) A bank is categorized as 'small', 'least liquid' or 'least capitalized' if its total assets, liquid assets, capital or excess capital are below 30th percentile of the entire sector. It is categorized as 'large', 'highly liquid', 'most capitalized', if its total assets, liquid assets, capital or excess capital are above 70th percentile. Any bank falling between these two thresholds is termed as 'medium'.(iii) Sample Period is June 2002 to September 2012

Table 2: Micro-panel results: Effect of Bank Characteristic (Size) on Advances Growth

Dependent variable: Quarterly Growth of Advances	AH	AB	BB	AH	AB	BB	AH	AB	BB	AH	AB	BB	AH	AB	BB
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Monetray Policy (MP)	**-0.029**	**-0.033**	**-0.020**	**-0.030**	**-0.032**	-0.016	-0.035	**-0.043**	**-0.018**	-0.023	**-0.028**	**-0.013**	-0.023	**-0.029**	**-0.014**
	-1.665	**-3.008**	**-2.218**	**-1.635**	**-2.543**	-1.318	-1.206	**-1.662**	**-1.873**	-1.361	**-2.612**	**-1.929**	-1.318	**-2.526**	**-1.968**
Size	**-0.247**	**-0.205**	-0.006	**-0.232**	**-0.191**	-0.005	**-0.219**	**-0.206**	-0.004	**-0.219**	**-0.255**	-0.003	**-0.226**	**-0.231**	-0.003
	-5.160	**-2.921**	-1.584	**-4.780**	**-2.155**	-0.986	**-4.523**	**-2.617**	-1.262	**-4.662**	**-2.739**	-0.892	**-4.765**	**-2.948**	-0.999
IPI	0.373	-0.054	**0.891**	1.123	0.957	**0.888**	1.573	1.322	**1.219**	0.328	-0.093	**0.941**	0.359	-0.052	**0.858**
	0.490	-0.119	**4.589**	1.105	1.256	**4.074**	1.290	1.328	**2.718**	0.454	-0.169	**4.704**	0.476	-0.090	**4.417**
Fiscal Deficit				-0.041	-0.003	0.257	-0.103	-0.134	-0.081						
				-0.360	-0.030	1.589	-0.731	-0.926	-1.020						
Inflation							0.424	0.284	0.014						
							0.200	0.183	0.013						
Liquidity										0.001	-0.047	0.032	-0.037	-0.055	-0.004
										0.010	-0.305	0.254	-0.257	-0.373	-0.033
Capitalization 1										-0.188	0.213	**-0.569**			
										-0.548	0.506	**-2.652**			
Capitalization 2													0.000	0.001	0.000
													0.022	0.332	0.121
Size*MP	0.004	**0.011**	0.007	0.004	**0.011**	0.005	0.005	0.008	0.004	0.000	0.004	0.001	0.001	0.004	0.002
	0.410	**2.045**	1.095	0.436	**1.947**	0.690	0.472	0.857	0.786	-0.018	0.512	0.269	0.112	0.544	0.384
RMSE	0.176	0.128	0.133	0.175	0.125	0.133	0.175	0.138	0.131	0.173	0.133	0.133	0.174	0.131	0.133
AR(1)/AB Test for AR(1)	0.000	0.114	0.120	0.000	0.143	0.136	0.000	0.040	0.056	0.000	0.028	0.030	0.000	0.040	0.050
AR(2)/AB Test for AR(2)	0.000	0.680	0.813	0.000	0.778	0.844	0.000	0.573	0.276	0.000	0.359	0.147	0.000	0.596	0.216
Unit Root (DF)	0.000	0.596	0.000	0.000	0.088	0.000	0.000	0.170	0.000	0.000	0.776	0.000	0.000	0.748	0.000
Unit Root (PP)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hansen Test (p-value)		0.322	0.047		0.127	0.024		0.191	0.966		0.192	0.940		0.158	0.931
Observations	1076	1076	1108	1076	1076	1108	1076	1076	1108	1076	1076	1108	1076	1076	1108

Panel Regression Methods: AH is Anderson and Hsiao (1982) estimator, AB is Arellano and Bond (1991) difference GMM estimator, BB is Blundel and Bond (1998) system GMM estimator. Figures in bold indicate significance at 10 percent or lower. For AH, we use third lag of the endogenous variable in levels (which is first difference in our case). For AB and BB, we use third and further lags of the endogenous variable but restrict the size of the instrument matrix to be less than or equal to the number of panels in our sample Roodman (2009).

Table 3: Micro-panel results: Effect of Bank Characteristic (Size) on Deposit Growth

Dependent variable: Quarterly Growth of Deposits	AH	AB	BB	AH	AB	BB	AH	AB	BB	AH	AB	BB	AH	AB	BB
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Monetray Policy (MP)	**-0.027**	-0.010	-0.006	**-0.033**	-0.011	-0.008	-0.022	-0.005	-0.006	**-0.028**	-0.013	**-0.011**	**-0.035**	-0.017	**-0.009**
	-1.665	-0.677	-0.929	**-1.984**	-0.820	-1.381	-0.852	-0.264	-0.622	**-1.716**	-1.222	**-2.150**	**-2.177**	-1.456	**-2.290**
Size	**-0.328**	**-0.233**	-0.003	**-0.323**	**-0.237**	-0.006	**-0.312**	**-0.226**	-0.001	**-0.300**	**-0.261**	0.000	**-0.367**	**-0.273**	-0.001
	-7.013	**-2.647**	-1.089	**-6.864**	**-2.430**	-1.466	**-6.662**	**-2.621**	-0.189	**-6.262**	**-3.739**	0.001	**-7.678**	**-3.631**	-0.355
IPI	-0.163	0.070	**0.404**	0.748	**0.937**	**0.932**	0.335	0.630	0.609	-0.091	0.411	**0.835**	-0.071	0.454	**0.517**
	-0.236	0.149	**2.049**	0.827	**1.935**	**4.333**	0.315	0.796	1.324	-0.133	0.938	**4.087**	-0.106	1.238	**2.634**
Fiscal Deficit				**-0.179**	**-0.161**	-0.020	-0.121	-0.118	**-0.107**						
				-1.771	**-2.062**	-0.235	-0.966	-1.318	**-2.524**						
Inflation							-1.490	-2.038	-0.653						
							-0.780	-1.371	-0.793						
Liquidity										**0.230**	0.244	**0.233**	0.155	0.155	0.100
										1.745	1.452	**1.906**	1.205	1.231	1.064
Capitalization 1										**-1.153**	-0.574	**-1.104**			
										-3.600	-0.638	**-2.220**			
Capitalization 2													-0.001	-0.004	-0.001
													-0.227	-1.084	-0.318
Size*MP	-0.002	-0.004	-0.002	-0.001	-0.005	-0.001	-0.001	-0.003	**-0.005**	-0.001	0.002	-0.003	0.004	0.003	-0.002
	-0.192	-0.759	-0.832	-0.157	-0.927	-0.266	-0.154	-0.563	**-2.010**	-0.075	0.457	-1.415	0.468	0.604	-0.715
RMSE	0.153	0.111	0.123	0.151	0.108	0.128	0.150	0.112	0.120	0.145	0.107	0.114	0.148	0.111	0.120
AR(1)/AB Test for AR(1)	0.000	0.103	0.097	0.000	0.122	0.076	0.000	0.102	0.025	0.000	0.118	0.018	0.000	0.125	0.027
AR(2)/AB Test for AR(2)	0.000	0.203	0.183	0.000	0.382	0.152	0.000	0.330	0.057	0.000	0.355	0.018	0.000	0.363	0.080
Unit Root (DF)	0.000	0.320	0.000	0.000	0.069	0.000	0.000	0.125	0.000	0.000	0.145	0.000	0.000	0.121	0.000
Unit Root (PP)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hansen Test (p-value)		0.174	0.058		0.072	0.133		0.124	0.861		0.031	0.978		0.067	0.515
Observations	1076	1076	1108	1076	1076	1108	1076	1076	1108	1076	1076	1108	1076	1076	1108

Panel Regression Methods: AH is Anderson and Hsiao (1982) estimator, AB is Arellano and Bond (1991) difference GMM estimator, BB is Blundel and Bond (1998) system GMM estimator. Figures in bold indicate significance at 10 percent or lower. For AH, we use third lag of the endogenous variable in levels (which is first difference in our case). For AB and BB, we use third and further lags of the endogenous variable but restrict the size of the instrument matrix to be less than or equal to the number of panels in our sample Roodman (2009).

Table 4: Micro-panel results: Effect of Bank Characteristic (Size) on Liquid Asset Growth

Dependent variable: Quarterly Growth of Liquid Assets	AH	AB	BB	AH	AB	BB	AH	AB	BB	AH	AB	BB	AH	AB	BB
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Monetray Policy (MP)	-0.051	-0.061	-0.024	**-0.066**	**-0.076**	-0.031	-0.053	-0.065	-0.018	-0.051	**-0.070**	**-0.041**	-0.052	**-0.073**	**-0.043**
	-1.527	-1.592	-1.366	**-1.914**	**-1.978**	-1.310	-1.024	-1.011	-0.606	-1.532	**-1.800**	**-1.717**	-1.548	**-1.876**	**-1.820**
Size	**-0.798**	**-0.673**	-0.003	**-0.826**	**-0.729**	-0.004	**-0.829**	**-0.767**	-0.004	**-0.778**	**-0.721**	-0.002	**-0.799**	**-0.757**	-0.005
	-7.159	**-3.273**	-0.480	**-7.264**	**-3.448**	-0.600	**-7.207**	**-3.060**	-0.921	**-7.014**	**-4.055**	-0.284	**-7.208**	**-3.927**	-0.741
IPI	-2.099	-1.991	0.046	-2.936	-1.435	0.658	**-4.246**	-2.736	0.036	**-2.249**	-1.679	0.353	-2.085	-1.959	0.308
	-1.529	-1.347	0.075	-1.626	-0.625	1.061	**-1.971**	-1.077	0.038	**-1.658**	-1.040	0.543	-1.530	-1.359	0.512
Fiscal Deficit				-0.079	-0.260	-0.166	0.156	0.069	-0.025						
				-0.397	-1.100	-0.452	0.618	0.202	-0.146						
Inflation							-1.871	-1.207	-0.878						
							-0.473	-0.248	-0.450						
Liquidity															
Capitalization 1										-0.493	-0.156	**-1.211**			
										-0.797	-0.257	**-1.767**			
Capitalization 2													**0.026**	**0.027**	-0.215
													2.564	**2.114**	-0.575
Size*MP	-0.019	-0.014	-0.017	-0.019	-0.022	-0.015	-0.019	-0.020	-0.012	-0.022	-0.025	-0.022	-0.017	-0.023	-0.013
	-1.112	-0.551	-1.588	-1.125	-0.794	-1.405	-1.122	-0.696	-1.649	-1.289	-0.841	-1.619	-0.971	-0.848	-1.379
RMSE	0.223	0.156	0.167	0.221	0.156	0.169	0.217	0.155	0.166	0.222	0.157	0.168	0.220	0.156	0.166
AR(1)/AB Test for AR(1)	0.000	0.003	0.002	0.000	0.004	0.001	0.000	0.002	0.000	0.000	0.003	0.001	0.000	0.003	0.001
AR(2)/AB Test for AR(2)	0.000	0.769	0.828	0.000	0.830	0.502	0.000	0.486	0.689	0.000	0.729	0.372	0.000	0.558	0.365
Unit Root (DF)	0.000	0.754	0.000	0.000	0.745	0.000	0.000	0.849	0.000	0.000	0.770	0.000	0.000	0.484	0.000
Unit Root (PP)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hansen Test (p-value)		0.049	0.021		0.028	0.032		0.001	0.448		0.045	0.036		0.024	0.041
Observations	1076	1076	1108	1076	1076	1108	1076	1076	1108	1076	1076	1108	1076	1076	1108

Panel Regression Methods: AH is Anderson and Hsiao (1982) estimator, AB is Arellano and Bond (1991) difference GMM estimator, BB is Blundel and Bond (1998) system GMM estimator. Figures in bold indicate significance at 10 percent or lower. For AH, we use third lag of the endogenous variable in levels (which is first difference in our case). For AB and BB, we use third and further lags of the endogenous variable but restrict the size of the instrument matrix to be less than or equal to the number of panels in our sample Roodman (2009).

Table 5: Micro-panel results: Effect of Bank Characteristic (Liquidity) on Advances Growth

Dependent variable: Quarterly Growth of Advances	AH	AB	BB	AH	AB	BB	AH	AB	BB	AH	AB	BB	AH	AB	BB
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Monetray Policy (MP)	-0.008	-0.008	**-0.018**	-0.008	-0.009	**-0.020**	-0.022	-0.031	**-0.017**	-0.012	**-0.015**	**-0.016**	-0.012	**-0.019**	**-0.019**
	-0.453	-0.857	**-2.601**	-0.430	-0.835	**-2.400**	-0.737	-1.270	**-1.699**	-0.692	**-1.706**	**-2.374**	-0.671	**-1.881**	**-3.008**
Liquidity	**0.207**	**0.209**	0.022	**0.205**	0.217	0.020	**0.200**	**0.204**	0.023	**0.180**	**0.226**	0.017	**0.178**	**0.189**	0.017
	4.700	**2.153**	0.899	**4.629**	1.603	0.835	**4.552**	**2.008**	1.246	**4.323**	**1.826**	1.070	**4.092**	**1.782**	1.018
IPI	0.556	0.179	**0.850**	**1.712**	**1.421**	**0.923**	**2.302**	**1.889**	**1.156**	0.476	0.361	**0.920**	0.583	0.380	**0.848**
	0.725	0.230	**4.468**	**1.694**	**1.853**	**4.471**	**1.899**	**1.689**	**2.593**	0.632	0.695	**5.623**	0.748	0.635	**6.069**
Fiscal Deficit				-0.077	-0.068	**0.331**	-0.103	-0.110	-0.081						
				-0.666	-0.701	**2.925**	-0.720	-0.767	-1.014						
Inflation							1.246	1.123	0.113						
							0.581	0.642	0.103						
Size										**0.375**	0.299	**0.358**	**0.376**	0.343	**0.469**
										1.910	1.151	**2.965**	**1.876**	1.252	**3.693**
Capitalization 1										-0.031	0.201	-0.415			
										-0.085	0.379	-1.317			
Capitalization 2													-0.001	0.000	-0.002
													-0.173	0.042	-0.467
Liquidity*MP	-0.011	-0.036	-0.001	-0.016	-0.025	0.004	-0.022	-0.011	-0.001	0.011	-0.033	0.023	0.009	-0.027	0.024
	-0.277	-0.571	-0.052	-0.408	-0.379	0.158	-0.571	-0.297	-0.068	0.311	-0.842	1.203	0.246	-0.680	1.208
RMSE	0.182	0.134	0.134	0.180	0.132	0.131	0.179	0.140	0.133	0.175	0.133	0.123	0.175	0.130	0.127
AR(1)/AB Test for AR(1)	0.000	0.121	0.117	0.000	0.132	0.143	0.000	0.093	0.064	0.000	0.025	0.044	0.000	0.039	0.051
AR(2)/AB Test for AR(2)	0.000	0.754	0.798	0.000	0.741	0.979	0.000	0.649	0.403	0.000	0.583	0.740	0.000	0.996	0.479
Unit Root (DF)	0.000	0.254	0.001	0.000	0.565	0.004	0.000	0.507	0.001	0.000	0.134	0.000	0.000	0.063	0.000
Unit Root (PP)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hansen Test (p-value)		0.088	0.081		0.026	0.117		0.165	0.953		0.080	0.688		0.087	0.996
Observations	1076	1076	1108	1076	1076	1108	1076	1076	1108	1076	1076	1108	1076	1076	1108

Panel Regression Methods: AH is Anderson and Hsiao (1982) estimator, AB is Arellano and Bond (1991) difference GMM estimator, BB is Blundel and Bond (1998) system GMM estimator. Figures in bold indicate significance at 10 percent or lower. For AH, we use third lag of the endogenous variable in levels (which is first difference in our case). For AB and BB, we use third and further lags of the endogenous variable but restrict the size of the instrument matrix to be less than or equal to the number of panels in our sample Roodman (2009).

Table 6: Micro-panel results: Effect of Bank Characteristic (Liquidity) on Deposits Growth

Dependent variable: Quarterly Growth of Deposits	AH	AB	BB	AH	AB	BB	AH	AB	BB	AH	AB	BB	AH	AB	BB
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Monetray Policy (MP)	-0.019	-0.009	-0.008	-0.022	-0.010	-0.008	-0.021	-0.018	-0.005	**-0.028**	-0.022	**-0.013**	**-0.032**	-0.023	**-0.012**
	-1.143	-0.564	-1.087	-1.307	-0.746	-1.368	-0.789	-0.818	-0.464	**-1.709**	-1.479	**-1.951**	**-2.003**	-1.331	**-1.777**
Liquidity	**-0.140**	-0.143	-0.020	**-0.136**	**-0.126**	-0.021	**-0.139**	**-0.171**	**-0.032**	**-0.242**	**-0.275**	**-0.033**	**-0.223**	**-0.251**	**-0.029**
	-3.516	-1.599	-1.325	**-3.457**	**-1.652**	-1.382	**-3.564**	**-2.962**	**-2.587**	**-5.673**	**-3.568**	**-2.172**	**-5.390**	**-4.430**	**-2.631**
IPI	0.633	**0.769**	**0.576**	**2.050**	**1.750**	**0.941**	**1.880**	**1.808**	0.564	0.205	0.175	**0.554**	0.408	0.376	**0.428**
	0.908	**1.914**	**2.013**	**2.267**	**3.475**	**3.340**	**1.763**	**1.996**	1.247	0.290	0.393	**3.161**	0.585	0.730	**2.328**
Fiscal Deficit				**-0.227**	**-0.203**	-0.023	-0.171	**-0.154**	**-0.126**						
				-2.191	**-2.741**	-0.253	-1.335	**-1.754**	**-3.032**						
Inflation							-0.392	-0.440	-0.781						
							-0.200	-0.388	-0.957						
Size										**0.431**	0.103	**0.640**	**0.507**	0.245	**0.658**
										2.290	0.263	**2.742**	**2.786**	0.433	**2.510**
Capitalization 1										**-0.933**	-0.572	-0.286			
										-2.829	-1.115	-1.108			
Capitalization 2													-0.004	-0.003	-0.004
													-0.724	-0.547	-1.585
Liquidity*MP	**-0.082**	-0.070	-0.006	**-0.075**	-0.017	-0.001	**-0.075**	-0.007	0.005	**-0.062**	-0.018	0.004	**-0.055**	-0.031	0.003
	-2.338	-0.899	-0.313	**-2.168**	-0.187	-0.074	**-2.178**	-0.106	0.448	**-1.806**	-0.394	0.209	**-1.623**	-0.548	0.187
RMSE	0.171	0.126	0.123	0.168	0.125	0.127	0.167	0.136	0.119	0.154	0.123	0.106	0.155	0.124	0.105
AR(1)/AB Test for AR(1)	0.000	0.105	0.105	0.000	0.122	0.084	0.000	0.052	0.031	0.000	0.028	0.053	0.000	0.049	0.059
AR(2)/AB Test for AR(2)	0.000	0.130	0.183	0.000	0.173	0.142	0.000	0.137	0.085	0.000	0.011	0.487	0.000	0.007	0.335
Unit Root (DF)	0.000	0.001	0.000	0.000	0.006	0.000	0.000	0.014	0.000	0.000	0.018	0.000	0.000	0.000	0.000
Unit Root (PP)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hansen Test (p-value)		0.164	0.095		0.235	0.131		0.258	0.097		0.042	0.146		0.026	0.074
Observations	1076	1076	1108	1076	1076	1108	1076	1076	1108	1076	1076	1108	1076	1076	1108

Panel Regression Methods: AH is Anderson and Hsiao (1982) estimator, AB is Arellano and Bond (1991) difference GMM estimator, BB is Blundel and Bond (1998) system GMM estimator. Figures in bold indicate significance at 10 percent or lower. For AH, we use third lag of the endogenous variable in levels (which is first difference in our case). For AB and BB, we use third and further lags of the endogenous variable but restrict the size of the instrument matrix to be less than or equal to the number of panels in our sample Roodman (2009).

Table 7: Micro-panel results: Effect of bank characteristic (Capitalization 1) on Advances Growth

Dependent variable: Quarterly Growth of Advances	AH	AB	BB	AH	AB	BB	AH	AB	BB	AH	AB	BB
	1	2	3	4	5	6	7	8	9	10	11	12
Monetray Policy (MP)	-0.022	**-0.024**	-0.016	-0.022	**-0.023**	-0.012	-0.024	-0.027	-0.016	-0.020	-0.023	**-0.018**
	-1.192	**-2.303**	-1.304	-1.128	**-1.662**	-0.896	-0.789	-0.962	-1.369	-1.110	-1.511	**-2.147**
Capitalization 1	0.177	0.116	0.021	**0.215**	0.089	0.002	0.199	0.040	0.019	-0.159	-0.217	-0.007
	1.373	0.588	0.392	**1.650**	0.372	0.034	1.526	0.136	0.483	-1.235	-0.651	-0.254
IPI	0.861	0.297	**0.798**	**2.089**	**1.377**	**0.906**	**2.393**	**1.728**	**1.162**	0.723	0.134	**0.959**
	1.085	0.627	**3.643**	**1.993**	**1.833**	**3.671**	**1.901**	**1.683**	**2.626**	0.921	0.213	**5.258**
Fiscal Deficit				-0.095	-0.040	0.199	-0.159	-0.152	-0.096			
				-0.795	-0.424	1.274	-1.073	-1.045	-1.218			
Inflation							0.254	-0.283	-0.246			
							0.114	-0.178	-0.235			
Size										0.342	0.177	**0.515**
										1.637	0.608	**5.418**
Liquidity										0.134	0.118	0.110
										0.881	0.600	0.715
Cap1*MP	-0.008	-0.033	-0.017	-0.012	-0.024	0.014	0.004	0.018	0.006	0.019	-0.020	0.037
	-0.088	-0.291	-0.184	-0.123	-0.189	0.134	0.045	0.084	0.104	0.214	-0.115	0.668
RMSE	0.186	0.138	0.135	0.184	0.137	0.135	0.183	0.145	0.131	0.178	0.137	0.126
AR(1)/AB Test for AR(1)	0.000	0.097	0.107	0.000	0.097	0.106	0.000	0.058	0.056	0.000	0.022	0.047
AR(2)/AB Test for AR(2)	0.000	0.639	0.731	0.000	0.588	0.636	0.000	0.578	0.310	0.000	0.441	0.248
Unit Root (DF)	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.019	0.000
Unit Root (PP)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hansen Test (p-value)		0.199	0.070		0.060	0.020		0.146	0.970		0.057	0.997
Observations	1076	1076	1108	1076	1076	1108	1076	1076	1108	1076	1076	1108

Panel Regression Methods: AH is Anderson and Hsiao (1982) estimator, AB is Arellano and Bond (1991) difference GMM estimator, BB is Blundel and Bond (1998) system GMM estimator. Figures in bold indicate significance at 10 percent or lower. For AH, we use third lag of the endogenous variable in levels (which is first difference in our case). For AB and BB, we use third and further lags of the endogenous variable but restrict the size of the instrument matrix to be less than or equal to the number of panels in our sample Roodman (2009).

Table 8: Micro-panel results: Effect of Bank Characteristic (Capitalization 1) on Deposits Growth

Dependent variable: Quarterly Growth of Deposits	AH	AB	BB	AH	AB	BB	AH	AB	BB	AH	AB	BB
	1	2	3	4	5	6	7	8	9	10	11	12
Monetray Policy (MP)	-0.008	0.004	-0.003	-0.013	0.002	-0.006	-0.017	-0.002	-0.004	-0.023	-0.013	**-0.014**
	-0.503	0.350	-0.606	-0.756	0.199	-1.064	-0.636	-0.106	-0.378	-1.460	-0.848	**-2.320**
Capitalization 1	**0.505**	0.386	0.004	**0.496**	0.230	0.019	**0.465**	0.242	-0.012	**0.303**	0.263	**-0.029**
	4.329	1.029	0.120	**4.295**	0.890	0.476	**4.047**	1.112	-0.379	**2.717**	1.235	**-1.797**
IPI	0.578	0.380	**0.549**	**2.065**	**1.776**	**0.949**	**2.047**	**1.570**	0.605	0.645	**0.471**	**0.557**
	0.822	0.999	**2.296**	**2.265**	**3.092**	**4.164**	**1.906**	**1.819**	1.178	0.942	**1.026**	**3.608**
Fiscal Deficit				**-0.242**	**-0.236**	-0.017	-0.171	**-0.143**	**-0.102**			
				-2.322	**-2.882**	-0.198	-1.327	**-1.642**	**-2.288**			
Inflation							-0.027	-0.651	-0.654			
							-0.014	-0.597	-0.734			
Size										**0.778**	0.544	**0.839**
										4.031	1.037	**3.405**
Liquidity										**0.403**	0.297	**0.355**
										2.895	1.440	**2.328**
Cap1*MP	0.063	0.080	**0.069**	0.053	0.086	0.054	0.057	0.034	**0.075**	0.062	0.134	**0.033**
	0.754	0.822	**1.911**	0.644	0.724	1.604	0.690	0.381	**2.617**	0.796	1.371	**1.707**
RMSE	0.164	0.123	0.123	0.162	0.120	0.127	0.160	0.125	0.120	0.144	0.114	0.103
AR(1)/AB Test for AR(1)	0.000	0.067	0.100	0.000	0.085	0.084	0.000	0.081	0.025	0.000	0.032	0.069
AR(2)/AB Test for AR(2)	0.000	0.032	0.185	0.000	0.124	0.150	0.000	0.196	0.052	0.000	0.068	0.387
Unit Root (DF)	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.023	0.000	0.000	0.000	0.000
Unit Root (PP)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hansen Test (p-value)		0.291	0.079		0.083	0.090		0.116	0.818		0.042	0.086
Observations	1076	1076	1108	1076	1076	1108	1076	1076	1108	1076	1076	1108

Panel Regression Methods: AH is Anderson and Hsiao (1982) estimator, AB is Arellano and Bond (1991) difference GMM estimator, BB is Blundel and Bond (1998) system GMM estimator. Figures in bold indicate significance at 10 percent or lower. For AH, we use third lag of the endogenous variable in levels (which is first difference in our case). For AB and BB, we use third and further lags of the endogenous variable but restrict the size of the instrument matrix to be less than or equal to the number of panels in our sample Roodman (2009).

Table 9: Micro-panel results: Effect of Bank Characteristic (Capitalization 1) on Liquidity Growth

Dependent variable: Quarterly Growth of Liquid Assets	AH	AB	BB	AH	AB	BB	AH	AB	BB	AH	AB	BB
	1	2	3	4	5	6	7	8	9	10	11	12
Monetray Policy (MP)	-0.016	-0.022	-0.022	-0.023	-0.032	-0.029	-0.041	-0.050	-0.018	-0.037	-0.045	**-0.057**
	-0.470	-0.636	-1.184	-0.644	-0.962	-1.266	-0.760	-0.846	-0.627	-1.198	-1.304	**-2.745**
Capitalization 1	**0.616**	0.233	0.010	**0.593**	0.160	0.004	**0.529**	0.107	0.014	**-0.339**	-0.207	-0.040
	2.661	0.558	0.262	**2.601**	0.349	0.125	**2.368**	0.202	0.551	**-1.687**	-0.624	-0.676
IPI	-0.079	-0.008	0.085	0.634	1.772	0.646	0.228	0.840	0.186	-1.746	-1.242	-0.009
	-0.055	-0.006	0.138	0.342	0.890	1.083	0.106	0.336	0.193	-1.363	-1.276	-0.024
Fiscal Deficit				-0.218	**-0.374**	-0.205	0.061	0.065	-0.013			
				-1.041	**-1.738**	-0.558	0.233	0.224	-0.078			
Inflation							1.093	0.810	-0.669			
							0.266	0.187	-0.348			
Size										**0.808**	**0.916**	0.350
										2.413	**1.936**	1.137
Liquidity												
Cap1*MP	0.132	0.162	0.159	0.125	0.151	0.158	0.103	0.175	0.131	0.164	0.082	0.134
	0.780	0.472	0.748	0.750	0.501	0.828	0.630	0.561	1.051	1.116	0.289	0.592
RMSE	0.237	0.166	0.168	0.236	0.166	0.169	0.233	0.165	0.166	0.215	0.147	0.145
AR(1)/AB Test for AR(1)	0.000	0.003	0.002	0.000	0.002	0.001	0.000	0.002	0.000	0.000	0.004	0.002
AR(2)/AB Test for AR(2)	0.000	0.697	0.778	0.000	0.702	0.470	0.000	0.926	0.706	0.000	0.448	0.697
Unit Root (DF)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Unit Root (PP)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hansen Test (p-value)		0.042	0.019		0.035	0.029		0.002	0.585		0.117	0.037
Observations	1076	1076	1108	1076	1076	1108	1076	1076	1108	1076	1076	1108

Panel Regression Methods: AH is Anderson and Hsiao (1982) estimator, AB is Arellano and Bond (1991) difference GMM estimator, BB is Blundel and Bond (1998) system GMM estimator. Figures in bold indicate significance at 10 percent or lower. For AH, we use third lag of the endogenous variable in levels (which is first difference in our case). For AB and BB, we use third and further lags of the endogenous variable but restrict the size of the instrument matrix to be less than or equal to the number of panels in our sample Roodman (2009).

Table 10: Micro-panel results: Effect of Bank Characteristic (Capitalization 2) on Advances Growth

Dependent variable: Quarterly Growth of Advances	AH	AB	BB	AH	AB	BB	AH	AB	BB	AH	AB	BB
	1	2	3	4	5	6	7	8	9	10	11	12
Monetray Policy (MP)	-0.020	**-0.021**	**-0.021**	-0.018	**-0.020**	**-0.024**	-0.024	**-0.039**	**-0.018**	-0.016	**-0.023**	**-0.018**
	-1.076	**-2.383**	**-3.261**	-0.962	**-1.940**	**-2.688**	-0.813	**-1.684**	**-1.817**	-0.911	**-2.134**	**-2.570**
Capitalization 2	0.000	-0.001	-0.001	0.000	0.000	-0.001	0.000	-0.001	**-0.001**	0.001	0.000	0.000
	0.062	-0.755	-1.529	0.066	-0.377	-1.390	0.077	-0.643	**-2.083**	0.534	0.027	-1.431
IPI	0.780	0.129	**0.940**	**1.825**	1.151	**0.994**	**2.309**	2.193	**1.233**	0.747	0.429	**0.934**
	0.996	0.254	**5.242**	**1.755**	1.475	**4.375**	**1.854**	2.016	**2.750**	0.955	0.657	**5.329**
Fiscal Deficit				-0.057	-0.028	**0.334**	-0.128	-0.154	-0.084			
				-0.484	-0.331	**2.879**	-0.873	-1.031	-1.057			
Inflation							0.389	0.713	0.048			
							0.177	0.451	0.046			
Size										**0.379**	0.335	**0.516**
										1.811	1.094	**4.520**
Liquidity										0.133	0.108	**0.107**
										0.862	0.508	**0.719**
Cap2*MP	0.001	0.001	0.001	0.001	0.001	0.001	0.001	**0.003**	**0.001**	0.000	0.001	0.000
	0.358	0.557	0.789	0.362	0.356	0.785	0.345	**1.735**	**1.687**	-0.140	0.275	0.483
RMSE	0.190	0.139	0.134	0.188	0.137	0.132	0.187	0.147	0.132	0.179	0.134	0.127
AR(1)/AB Test for AR(1)	0.000	0.132	0.125	0.000	0.144	0.146	0.000	0.101	0.068	0.000	0.050	0.057
AR(2)/AB Test for AR(2)	0.000	0.773	0.769	0.000	0.768	0.969	0.000	0.677	0.467	0.000	0.928	0.406
Unit Root (DF)	0.000	0.009	0.000	0.000	0.001	0.003	0.000	0.010	0.001	0.000	0.000	0.000
Unit Root (PP)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hansen Test (p-value)		0.227	0.235		0.047	0.100		0.162	0.944		0.072	0.999
Observations	1076	1076	1108	1076	1076	1108	1076	1076	1108	1076	1076	1108

Panel Regression Methods: AH is Anderson and Hsiao (1982) estimator, AB is Arellano and Bond (1991) difference GMM estimator, BB is Blundel and Bond (1998) system GMM estimator. Figures in bold indicate significance at 10 percent or lower. For AH, we use third lag of the endogenous variable in levels (which is first difference in our case). For AB and BB, we use third and further lags of the endogenous variable but restrict the size of the instrument matrix to be less than or equal to the number of panels in our sample Roodman (2009).

Table 11: Micro-panel results: Effect of Bank Characteristic (Capitalization 2) on Deposits Growth

Dependent variable: Quarterly Growth of Deposits	AH	AB	BB	AH	AB	BB	AH	AB	BB	AH	AB	BB
	1	2	3	4	5	6	7	8	9	10	11	12
Monetray Policy (MP)	-0.010	0.003	-0.007	-0.014	-0.002	-0.007	-0.017	-0.006	-0.007	-0.024	-0.016	**-0.016**
	-0.642	0.303	-1.001	-0.853	-0.149	-1.218	-0.655	-0.327	-0.763	-1.583	-0.919	**-2.796**
Capitalization 2	0.000	0.001	-0.001	0.000	0.000	-0.001	0.000	0.000	**-0.001**	0.000	0.000	0.000
	-0.201	0.561	-1.162	-0.234	-0.017	-1.644	-0.243	-0.092	**-1.774**	0.087	0.033	-0.103
IPI	0.390	**0.435**	**0.506**	**1.812**	**1.320**	**0.874**	**1.711**	**1.567**	0.602	0.436	0.255	**0.561**
	0.571	**1.724**	**2.076**	**2.041**	**2.533**	**4.140**	**1.636**	**1.953**	1.418	0.646	0.565	**4.770**
Fiscal Deficit				**-0.231**	**-0.183**	-0.025	-0.144	-0.131	**-0.107**			
				-2.277	**-2.387**	-0.294	-1.148	-1.556	**-2.615**			
Inflation							-0.102	-0.416	-0.690			
							-0.053	-0.368	-0.894			
Size										**0.738**	0.478	**0.872**
										3.849	0.956	**3.653**
Liquidity										**0.379**	0.261	**0.383**
										2.747	1.276	**2.665**
Cap2*MP	**-0.003**	-0.002	0.000	**-0.003**	-0.002	0.000	**-0.003**	-0.001	0.000	**-0.003**	-0.001	-0.001
	-2.082	-0.958	0.188	**-2.065**	-0.942	0.391	**-2.081**	-1.122	-0.686	**-1.986**	-1.021	-1.007
RMSE	0.168	0.125	0.123	0.165	0.123	0.127	0.164	0.131	0.120	0.146	0.116	0.101
AR(1)/AB Test for AR(1)	0.000	0.091	0.101	0.000	0.117	0.076	0.000	0.060	0.029	0.000	0.035	0.061
AR(2)/AB Test for AR(2)	0.000	0.076	0.216	0.000	0.180	0.157	0.000	0.223	0.081	0.000	0.010	0.460
Unit Root (DF)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000
Unit Root (PP)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hansen Test (p-value)		0.119	0.129		0.031	0.166		0.125	0.847		0.033	0.118
Observations	1076	1076	1108	1076	1076	1108	1076	1076	1108	1076	1076	1108

Panel Regression Methods: AH is Anderson and Hsiao (1982) estimator, AB is Arellano and Bond (1991) difference GMM estimator, BB is Blundel and Bond (1998) system GMM estimator. Figures in bold indicate significance at 10 percent or lower. For AH, we use third lag of the endogenous variable in levels (which is first difference in our case). For AB and BB, we use third and further lags of the endogenous variable but restrict the size of the instrument matrix to be less than or equal to the number of panels in our sample Roodman (2009).

Table 12: Micro-panel results: Effect of Bank Characteristic (Capitalization 2) on Liquid Asset Growth

Dependent variable: Quarterly Growth of Liquid Assets	AH	AB	BB	AH	AB	BB	AH	AB	BB	AH	AB	BB
	1	2	3	4	5	6	7	8	9	10	11	12
Monetray Policy (MP)	-0.020	-0.024	-0.029	-0.025	-0.039	-0.032	-0.039	-0.053	-0.024	-0.038	-0.047	**-0.058**
	-0.600	-0.651	-1.423	-0.751	-1.152	-1.454	-0.751	-0.969	-0.847	-1.272	-1.542	**-3.267**
Capitalization 2	-0.003	-0.003	**-0.003**	-0.003	-0.006	-0.002	-0.003	-0.003	-0.002	-0.001	-0.002	0.000
	-1.291	-0.753	**-1.656**	-1.289	-1.394	-1.449	-1.304	-0.501	-1.485	-0.375	-0.710	-0.371
IPI	-0.266	0.222	0.001	0.422	2.102	0.658	-0.043	0.600	0.215	-1.600	-0.990	-0.003
	-0.192	0.142	0.002	0.235	1.017	1.050	-0.021	0.273	0.229	-1.283	-0.987	-0.009
Fiscal Deficit				-0.206	**-0.433**	-0.136	0.072	0.070	-0.010			
				-1.013	**-1.884**	-0.362	0.283	0.237	-0.059			
Inflation							0.720	0.902	-0.557			
							0.180	0.222	-0.297			
Size										**0.831**	**0.895**	0.349
										2.514	**1.813**	1.114
Liquidity												
Cap2*MP	0.001	0.001	0.002	0.001	0.001	0.003	0.001	0.002	0.002	-0.001	-0.001	0.003
	0.242	0.124	0.700	0.245	0.247	1.116	0.249	0.421	1.200	-0.438	-0.300	1.157
RMSE	0.236	0.165	0.167	0.234	0.166	0.168	0.231	0.167	0.164	0.210	0.146	0.145
AR(1)/AB Test for AR(1)	0.000	0.003	0.002	0.000	0.002	0.001	0.000	0.001	0.000	0.000	0.003	0.001
AR(2)/AB Test for AR(2)	0.000	0.737	0.806	0.000	0.723	0.384	0.000	0.986	0.725	0.000	0.497	0.667
Unit Root (DF)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Unit Root (PP)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hansen Test (p-value)		0.014	0.015		0.017	0.030		0.002	0.822		0.087	0.039
Observations	1076	1076	1108	1076	1076	1108	1076	1076	1108	1076	1076	1108

Panel Regression Methods: AH is Anderson and Hsiao (1982) estimator, AB is Arellano and Bond (1991) difference GMM estimator, BB is Blundel and Bond (1998) system GMM estimator. Figures in bold indicate significance at 10 percent or lower. For AH, we use third lag of the endogenous variable in levels (which is first difference in our case). For AB and BB, we use third and further lags of the endogenous variable but restrict the size of the instrument matrix to be less than or equal to the number of panels in our sample Roodman (2009).

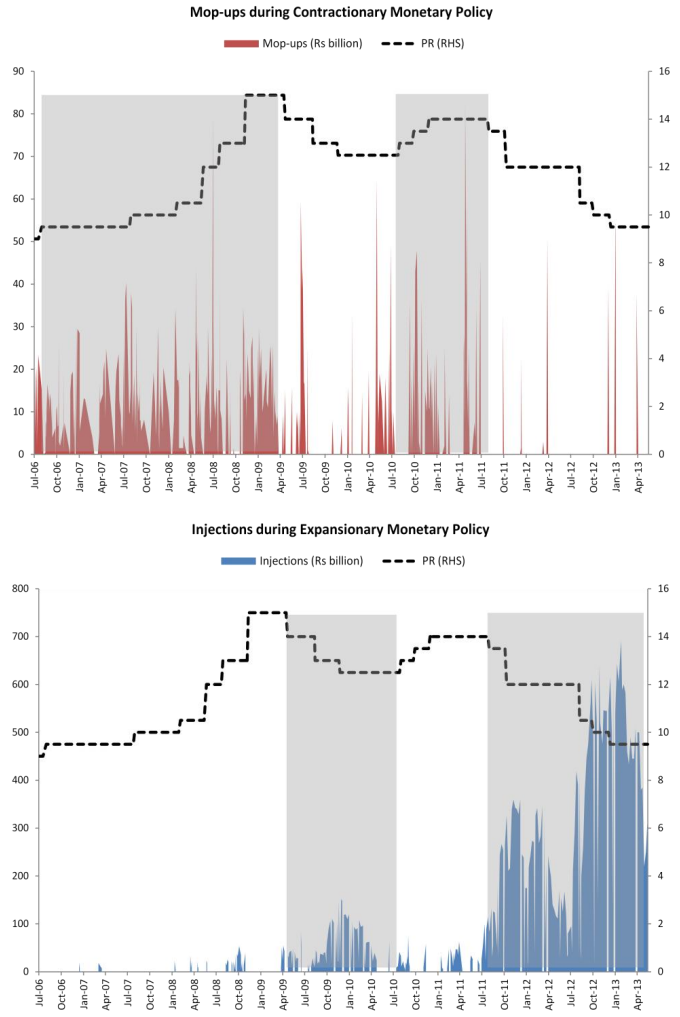
Table 13: Micro-panel results: Effect of bank characteristics - Size & Liquidity - on growth of Advances and Deposits

Dependent variable: Quarterly Growth of	Advances			Deposits		
	AH	AB	BB	AH	AB	BB
	1	2	3	4	5	6
Monetary Policy (MP)	-0.018	**-0.024**	-0.011	-0.020	-0.009	0.000
	-0.943	**-2.409**	-1.457	-1.112	-0.872	0.062
Size	**-0.222**	**-0.222**	-0.003	**-0.374**	**-0.276**	-0.004
	-4.631	**-2.737**	-0.614	**-7.400**	**-3.294**	-0.975
Liquidity	**0.132**	0.185	-0.005	**-0.157**	**-0.142**	**-0.042**
	2.049	1.598	-0.306	**-2.625**	**-2.862**	**-2.359**
Size*Liquidity	-0.033	-0.006	**-0.037**	0.012	0.001	-0.006
	-0.891	-0.075	**-2.657**	0.347	0.029	-0.401
IPI	0.286	-0.198	**0.806**	-0.228	0.364	**0.558**
	0.376	-0.351	**4.807**	-0.329	0.743	**2.833**
Size*MP	0.002	0.007	0.005	0.001	0.001	-0.003
	0.195	0.711	0.906	0.073	0.129	-0.974
Liq*MP	0.002	-0.005	0.029	0.015	0.006	0.019
	0.041	-0.134	1.259	0.318	0.236	1.328
Size*Liquidity*MP	0.008	0.002	**0.032**	**0.094**	0.048	**0.054**
	0.211	0.037	**2.206**	**2.793**	0.899	**2.777**
RMSE	0.171	0.130	0.136	0.151	0.112	0.118
AR(1)/AB Test for AR(1)	0.000	0.028	0.055	0.000	0.133	0.036
AR(2)/AB Test for AR(2)	0.000	0.625	0.262	0.000	0.445	0.124
Unit Root (DF)	0.000	0.962	0.000	0.000	0.447	0.000
Unit Root (PP)	0.000	0.000	0.000	0.000	0.000	0.000
Hansen Test (p-value)		0.113	0.896		0.036	0.685
Observations	1076	1076	1108	1076	1076	1108

Panel Regression Methods: AH is Anderson and Hsiao (1982) estimator, AB is Arellano and Bond (1991) difference GMM estimator, BB is Blundel and Bond (1998) system GMM estimator. Figures in bold indicate significance at 10 percent or lower. For AH, we use second lag of the endogenous variable in levels (which is first difference in our case). For AB and BB, we use second and further lags of the endogenous variable but restrict the size of the instrument matrix to be less than or equal to the number of panels in our sample Roodman (2009).

B Graphs

Figure 1: Money Market Interventions of State Bank of Pakistan



Note: Shaded areas are contractionary (top figure) or expansionary (bottom figure) phases of monetary policy.

Figure 2: Response of Aggregate Advances, Deposits and Govt. Securities to one S.D. shock to Policy Rate

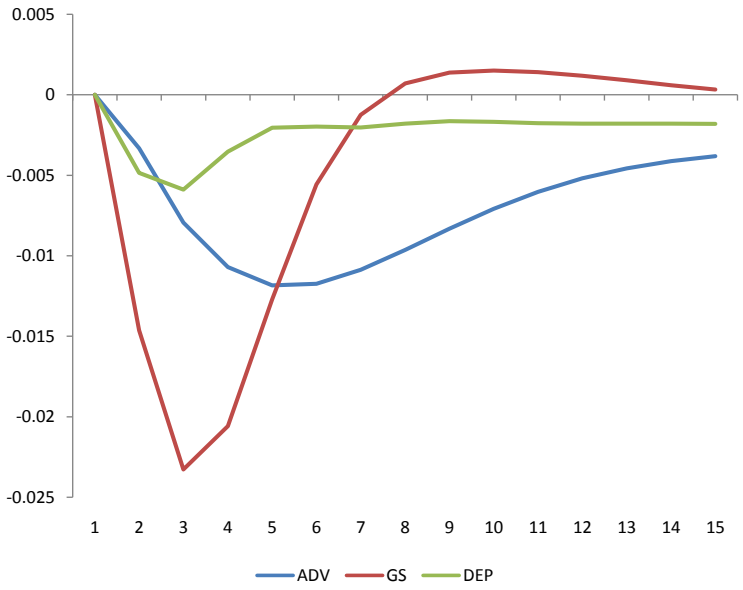


Figure 3: Response of Advances, Deposits and Govt. Securities to one S.D. shock to Policy Rate -
Behavior of RESPONSES *by* BANK CHARACTERISTIC

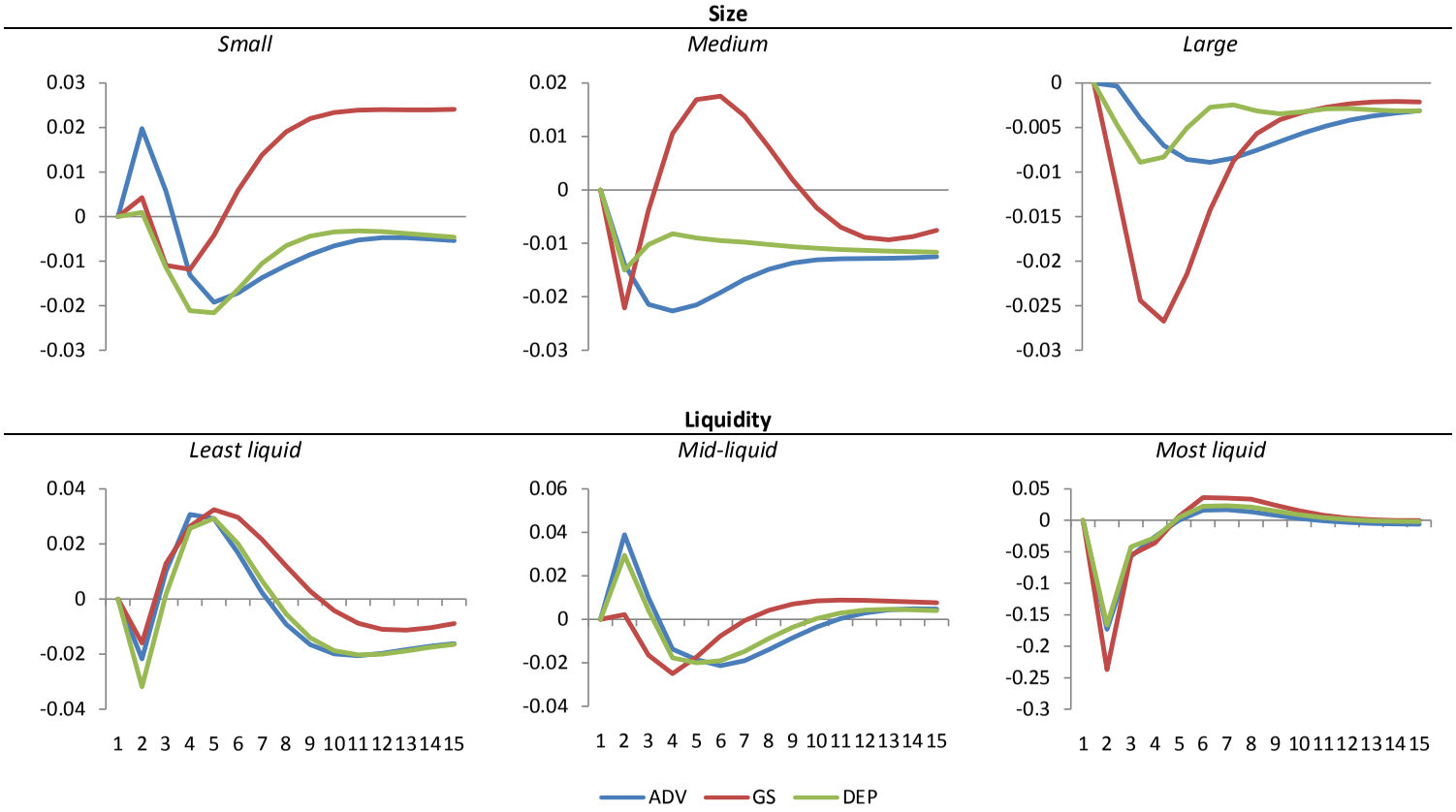


Figure 4: Response of Advances, Deposits and Govt. Securities to one S.D. shock to Policy Rate -
Behavior of RESPONSES *by* BANK CHARACTERISTIC

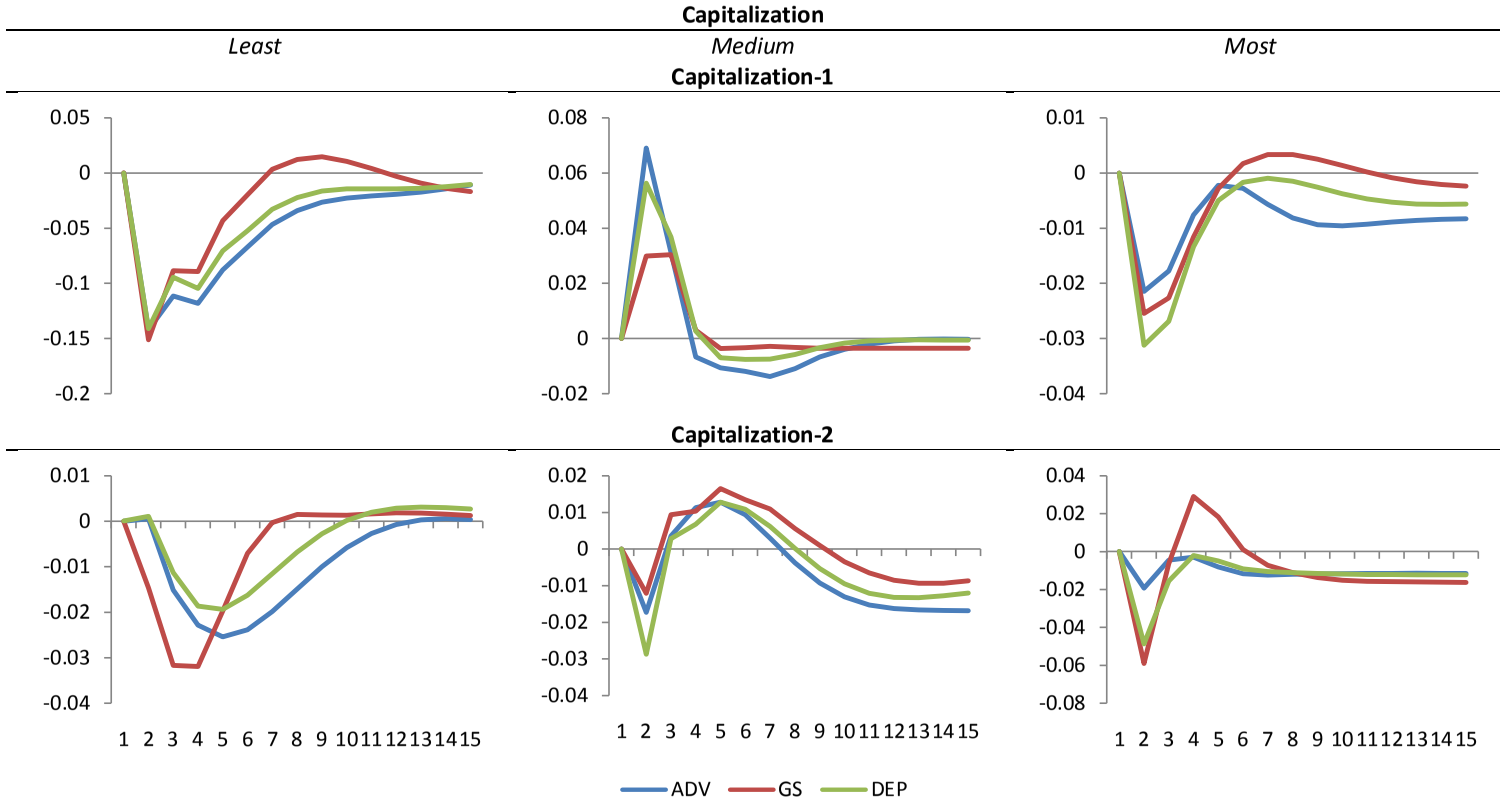


Figure 5: Response of Advances, Deposits and Govt. Securities to one S.D. shock to Policy Rate -
Behavior of RESPONSES *within* BANK CHARACTERISTIC

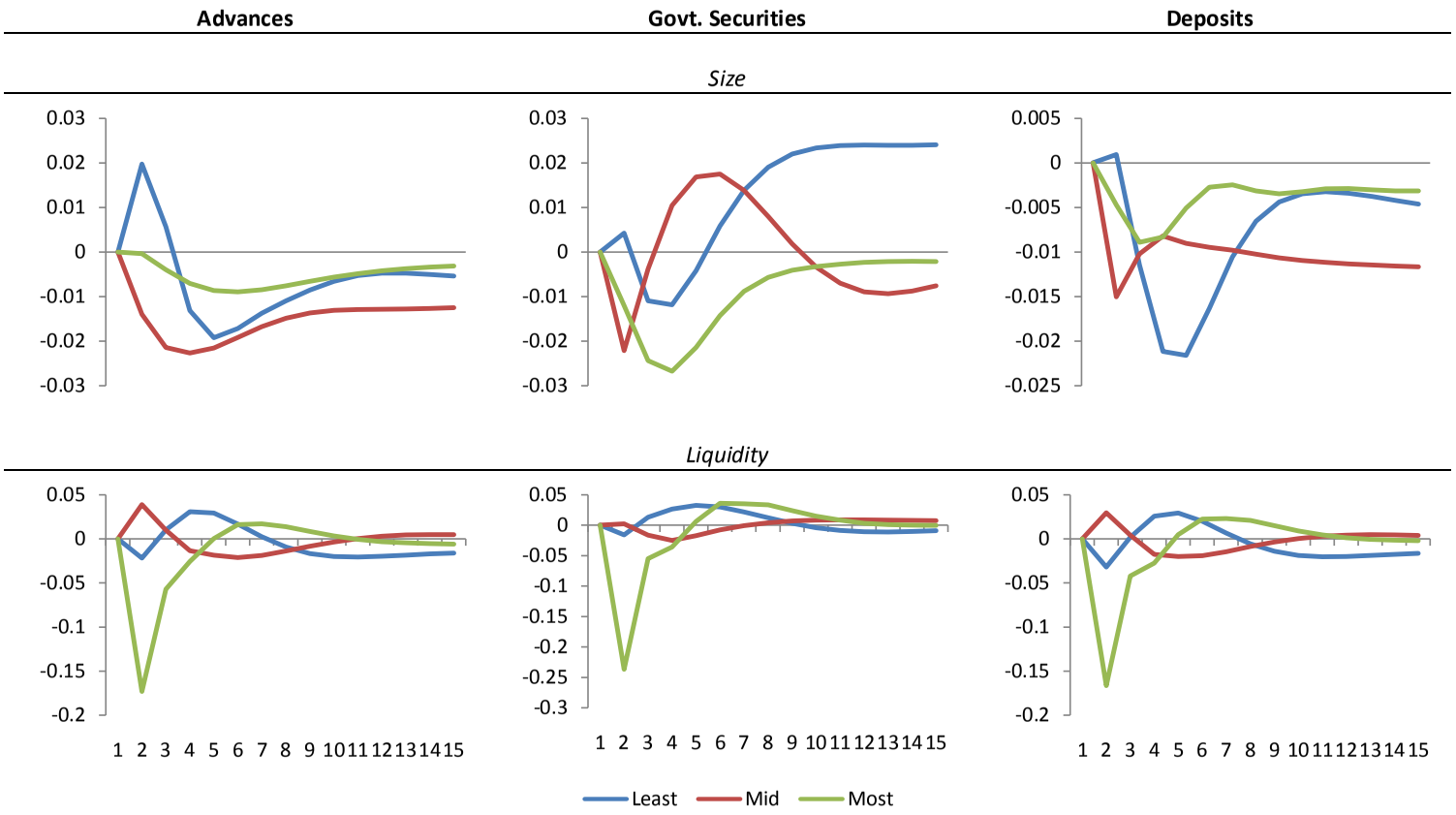
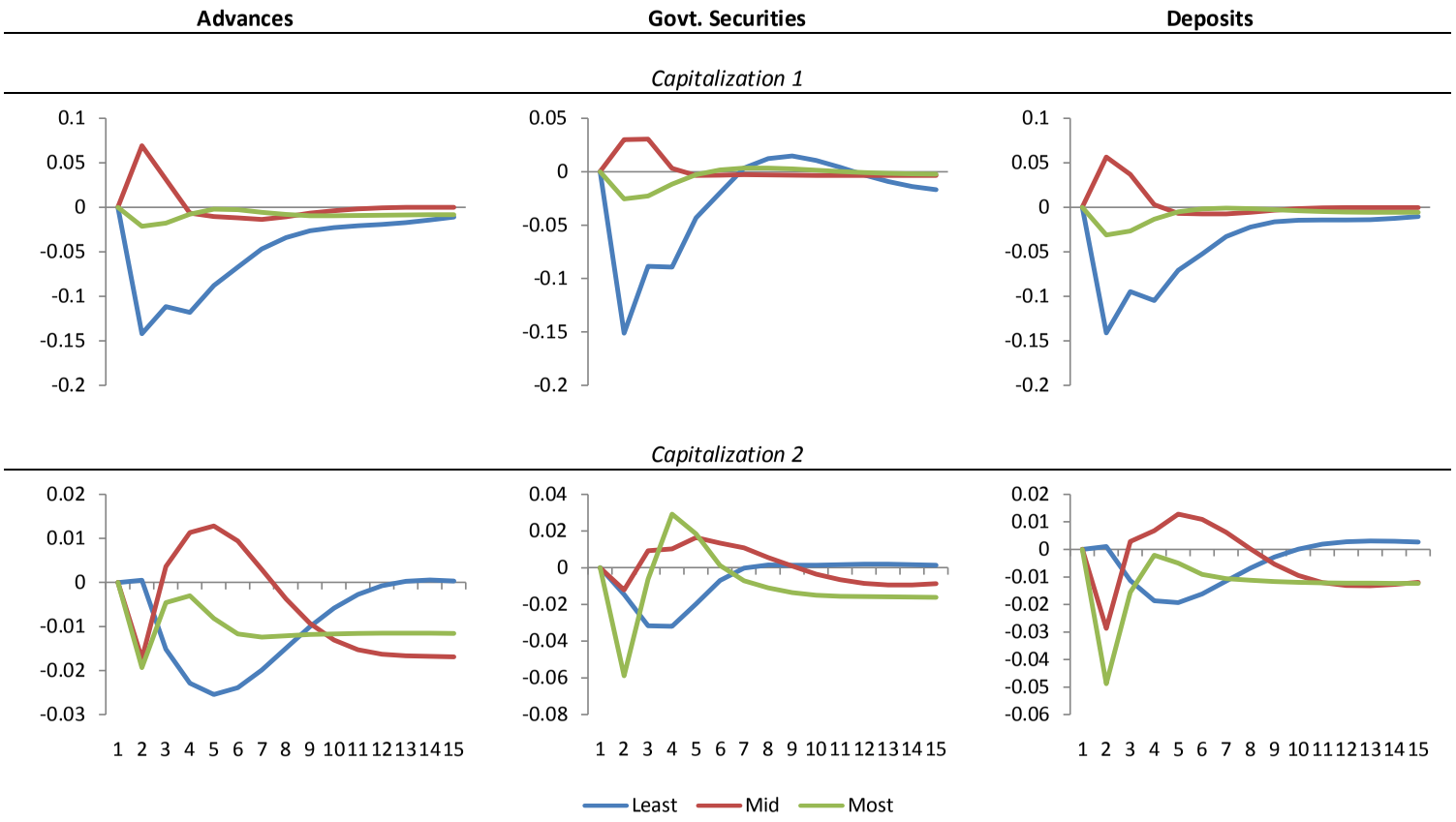


Figure 6: Response of Advances, Deposits and Govt. Securities to one S.D. shock to Policy Rate -
Behavior of RESPONSES *within* BANK CHARACTERISTIC



C Variable Description

i) Variable Description

Variable Name	Description
Assets	Total Assets include; 1 Cash and Due from other Banks 2 Balances with banks 3 Lending to Financial Institution 4 Investments-Gross 5 Advances-Gross 6 Fixed Assets 7 Deferred Taxes 8 Other Assets
Liabilities	Total Liabilities include; 1 Bills Payable 2 Borrowings From Financial Institution 3 Deposits And Other Accounts 4 Sub-ordinated Loans 5 Liabilities Against Assets Subject To Finance Lease 6 Deferred Tax Liabilities 7 Other Liabilities
Advances	Gross Advances
Liquid Assets	Liquid Assets include; 1 Cash & Balances With Treasury Banks 2 Balances With Other Banks 3 Lending To Financial Institutions 4 Federal government securities 5 Provincial govt. securities
Deposits	As given in balance sheet
Share Capital	As given in balance sheet
Reserves	As given in balance sheet
Total Eligible Capital	Tier 1 + Tier 2 Capital. Where Tier 1 = Share capital + Reserves Tier 2 Capital = Sub-ordinated Debt
Government Securities	Government Securities include; 1 Federal government securities 2 Provincial govt. securities

Investments Total Investments Gross

1 Federal government securities
2 Provincial govt. securities
3 Fully paid up ordinary shares
4 TFCs, Debentures, Bonds, & PTCs
5 Other investments
6 Total Investments Gross

Size Computed as log(Assets)

Liquidity Computed as Liquid Assets divided by Total Assets

CAR Defined as Capital Adequacy Ratio.

Computed as;

$$CAR = \left(\frac{Total\ Eligible\ Capital}{Total\ AssetsRisk\ Weighted\ Assets}\right) \times 100$$

Capitalization1 Computed as

$$Capitalization\ 1 = \frac{(Share\ Capital + Reserves\ \mp \text{ Unppropriated Profits})}{Total\ Assets}$$

Capitalization 2 Defined as the minimum of two excess capital held by banks over and above that required by Minimum Capital Requirement (MCR) and Capital Adequacy Requirement (CAR). Workings are as follows;

Capitalization 2= Minimum of CapA & CapB

Where;

$\text{Cap A}^1 = \text{Total Eligible Capital} - \text{ Minimum Capital Required}$

$\text{Cap B} = (\text{Bank's CAR} \times \text{Risk Weighted Assets}) - (\text{Regulatory CAR} \times \text{Risk Weighted Assets})$

ii) Dataset

a) Data Source

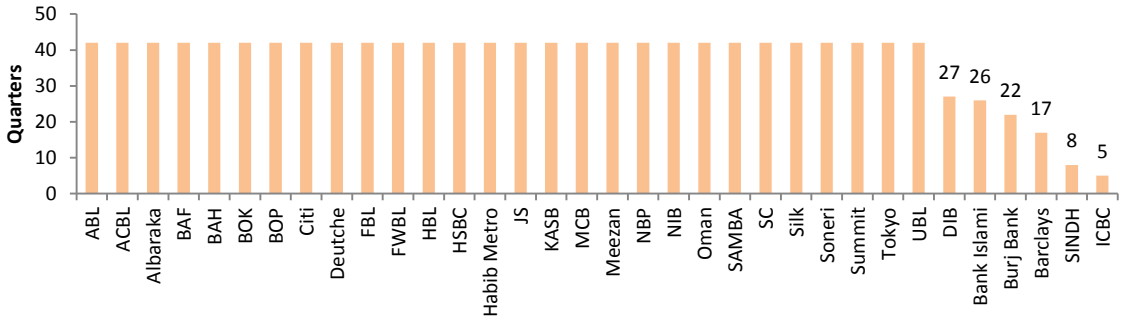
[1] When calculating excess capital based on MCR, Tier 1 capital is to be used. However, we use total eligible capital as a proxy because;

Quarterly balance sheet data for 32 commercial banks has been used. Commercial banks include public sector banks, local private banks and foreign banks. Specialized banks are not included in the study.

b) Coverage

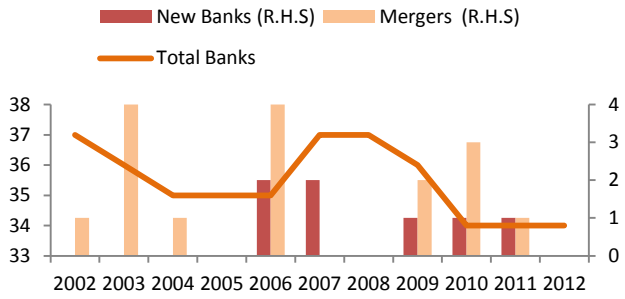
The period under study is from June 2002 to September 2012; a total of 42 quarters. The dataset is unbalanced because 6 banks are new. ICBC & Sindh Bank are dropped from the sample because of insufficient panel observations (figure below)

The total observations are 1,281.



c) Sample characteristics

At the start of the period under review, there were 37 commercial banks which have come down to 34 by September 2012. The exclusion of ICBC and SINDH Bank causes the number of banks to reduce to 32. The period under review has witnessed emergence of 7 new banks and 16 mergers. Figure below presents the evolving topography of the banking sector since 2002.



d) Merger Treatment

Literature cautions against untreated mergers in the dataset. It says that if mergers are not accounted for or treated, then jumps in the balance sheets of acquirer bank can falsely imply that the balance sheet grew as a result of economic activity. Since there were considerable numbers of mergers during the period under study, we adopt the popular treatment of

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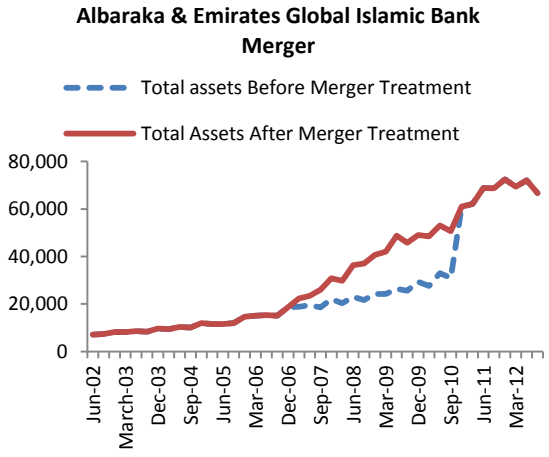
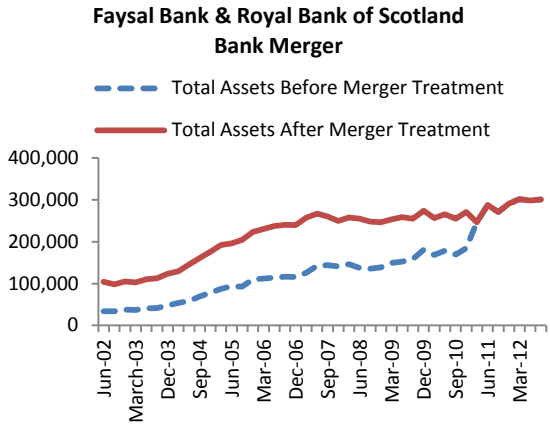
1. The data for Tier is unavailable before 2005.
2. Since Tier 1 constitutes 92% of total eligible capital (TEC) that is why TEC is taken as a proxy when computing excess capital based on MCR. The excess capital calculated this way will be slightly overstated for very few banks.

reconstructing the balance sheet backwards of the merged entities as the sum of the merging banks before merger[2]. In practice, it is assumed that these took place at the beginning of the sample period, summing the balance-sheet items of the merging parties. For example, if bank A is incorporated by bank B at time t, bank B is reconstructed backward as the sum of the merging banks before the merger. Banks that underwent mergers and were subsequently treated are as follows;

	Acquirer Bank	Merged Bank	Period to be Merged	
1	Albaraka	EGIBL	2007	2010
2	Summit	Rupali	2002	2006
		Dawood/renamed Atlas	2004	2010
		Bolan/renamed Mybank	2002	2011
		Bank of Ceylon	2002	2003
3	SCB Pak	Union bank	2002	2005
4	NIB	PICIC	2002	2009
		Credit Agricole	2002	2003
5	Habib Metropoliotan	Habib Bank AG Zurich	2002	2006
6	SAMBA/Crescent Mashreq	Doha	2002	2003
		Trust	2003	2004
7	Faysal	Prime	2002	2006
		ABN/RBS	2007	2010

Figures below show graphically the impact of the merger treatment on two banks as an example;





[2] Peekan d Rosengren (1995); Kishan and Opiela (2000); Gambacorta (2004)