



<b>Title</b>	Do highly liquid banks insulate their lending behavior?
<b>Authors(s)</b>	Kapoor, Supriya
<b>Publication date</b>	2017-09-09
<b>Publication information</b>	Kapoor, Supriya. "Do Highly Liquid Banks Insulate Their Lending Behavior?" University College Dublin. Geary Institute, September 9, 2017.
<b>Series</b>	UCD Geary Institute Discussion Paper Series, 2017/09
<b>Publisher</b>	University College Dublin. Geary Institute
<b>Item record/more information</b>	<a href="http://hdl.handle.net/10197/9400">http://hdl.handle.net/10197/9400</a>

Downloaded 2026-06-08 01:11:18

The UCD community has made this article openly available. Please share how this access benefits you. Your story matters! (@ucd\_oa)



© Some rights reserved. For more information



**UCD GEARY INSTITUTE FOR PUBLIC POLICY  
DISCUSSION PAPER SERIES**

# **Do highly liquid banks insulate their lending behavior?**

Supriya Kapoor  
UCD Geary Institute for Public Policy

Geary WP2017/09  
September 11, 2017

UCD Geary Institute Discussion Papers often represent preliminary work and are circulated to encourage discussion. Citation of such a paper should account for its provisional character. A revised version may be available directly from the author.

Any opinions expressed here are those of the author(s) and not those of UCD Geary Institute. Research published in this series may include views on policy, but the institute itself takes no institutional policy positions.

# Do highly liquid banks insulate their lending behavior?

Supriya Kapoor\*  
University College Dublin

## Abstract

The role of banks in the transmission of monetary policy has been of significance lately. We aim to analyse the bank lending behaviour during changes in monetary policy. We test for loan supply shifts by segregating banks based on their liquidity along with size and capital ratio. This paper employs uninsured, non-reservable liabilities such as time deposits and investigates whether banks are able to insulate themselves during a monetary policy change. We find that the loan supply shock can be neutralized post monetary policy changes. Furthermore, the less liquid and small banks are unable to carry out such operations and are more affected by monetary shocks. This has important implication in the working of commercial banks and effects of monetary policy.

Keywords: bank lending channel, time deposits, monetary policy, liquidity  
JEL Classification: E52, G21, E50

---

\* PhD candidate at the School of Economics, University College Dublin, Ireland. Email: [supriyakapoor18@gmail.com](mailto:supriyakapoor18@gmail.com)

## 1. Introduction

The credit channel of monetary policy transmission has been widely discussed at the aggregate level;<sup>1</sup> a tight monetary policy by the central bank reduces volume of the reserves leading to a fall in the supply of loans. However, at the bank level, studies such as Kashyap and Stein, (1995); Houston et al., (1997); Campello, (2002); Westerlund (2003); Cetorelli and Goldberg (2008); suggests that the financial positions of individual banks have significant effect on the way they react to policy changes. The studies such as Ashcraft (2003) and Kishan and Opiela (2009)<sup>2</sup> use time deposits to identify insulation mechanisms by the banks based on their asset size and capitalization. This study builds on their work and examines the relationship between central bank's policy actions and individual bank's lending behavior with respect to its liquidity, size and capital. We investigate whether liquid banks' reallocate funds through uninsured/non-reservable liabilities such as time deposits, insulating their loan supply behavior. To the best of our knowledge, none of the studies have focused on the role of bank liquidity in raising time deposits to deal with monetary policy shocks.

The existing literature on the insulation mechanisms of banks includes studies such as Kashyap and Stein (1995), Gambacorta (2005), and Cetorelli and Goldberg (2008), to name a few. Amongst them, Kashyap and Stein (1995) provides empirical evidence on the theoretical model of Bank Lending Channel (BLC). The study uses quarterly bank-level data from the United States of America to show that banks give out fewer loans if they own less total assets. Gambacorta (2005) use the Italian micro bank level data from 1986-2001 and tests the cross-sectional differences in the effectiveness of bank lending channel. The findings suggest that the effects of monetary policy differ across banks. Further, Cetorelli and Goldberg (2008) document a systematic relationship between monetary policy shocks and globalization of banks through internal capital markets. The study suggests that large and global banks can make use of their international, internal capital markets to shield their lending behavior as a response to monetary policy changes.

---

<sup>1</sup> See Bernanke and Blinder, (1988); Bernanke and Blinder, (1992); Bernanke and Gertler, (1993); Hoshi et al.(1993);Ramey (1993) and Bernanke and Gertler (1995).

<sup>2</sup> The study by Kishan and Opiela (2009) finds that small and under-capitalized banks are most responsive to monetary policy shocks and are unable to raise time deposits to shield their lending behavior.

The studies as mentioned above, show that the bank-specific characteristics such as size, liquidity and capital are important factors towards the lending behavior of banks. An important policy implication is the linkage between monetary policy and the business cycle. This is critical because the financial positions of banks vary when there are changes in economic performance or stages of the business cycle. Since each business cycle has its unique feature, banks' financial position will also vary across cycles. Hence, this line of research may help policy makers judge the importance of the credit channel. Lastly, asymmetric bank responses to monetary policy shocks result in different effects for different banks either based on their geographical location or their specific characteristics. The banks may also be extending loans to different types of businesses and hence, monetary policy implementation will result in asymmetric effects across regions and industries.

This paper addresses the question of whether liquid banks raise time deposits to shield their loan supply against monetary policy shocks. We use balance sheet panel-data on individual banks in India from 1995-2014. Liquidity serves as an important bank-specific characteristic because liquid banks may attract customers' confidence during uncertain times and some depositors might move their deposits towards banks that are liquid in their balance sheets. Additionally, a liquid bank might be more flexible in offering higher interest rates on time deposits than the one offered on saving accounts. Hence, our study/analysis on bank liquidity amidst changes in monetary policy is an important contribution to the existing literature. The findings suggest that liquid banks are less responsive to changes in monetary policy due to their ability to insulate their lending behavior through time deposits. In addition, size is also found to be a significant characteristic for lending behavior of banks, much in line with existing studies. The results suggest that the loan growth of small banks is significantly affected by policy changes.

In the next sections, we discuss the previous literature and outline our data and approach, followed by presentation of results and conclusion.

## **2. Literature Review**

There is ample evidence that empirically supports the bank lending channel and how changes in monetary policy alter the supply of loans. However, recent literature has started to focus on the insulation mechanisms adopted by banks during monetary shocks in order to maintain

their supply of loans. Previous evidence on monetary policy transmission is associated with the work of Bernanke and Blinder (1992); Kashyap, Stein and Wilcox (1993). Bernanke and Blinder (1992) highlighted the existence of the BLC by estimating reduced form equations of credit supply. They employed interest rate on Federal funds as an indicator of future movements in real macroeconomic activities and find an inverse relationship between bank loans and a contractionary monetary policy.

A primary drawback of using aggregate data lies in the inability to distinguish between credit demand and credit supply responses, given that monetary shocks affect both (Romer and Romer, 1990; Westerlund, 2003). Using disaggregated data over aggregate measure is that the former is more informative. A monetary contraction results in credit reduction either due to a fall in loan supply or a reduction in borrowers' lending. With the use of aggregate data, it is challenging to identify the BLC separately. Attempts in the literature have been made to carry out analysis by sub-structuring data at the bank-level. Few such studies are discussed below in the remaining section.

Studies by Kishan Opiela (2000); Altunbas et al. (2002); Angeloni et al (2003); Ehrmann et al. (2003) in France, Germany, Italy and Spain; Huang (2003) and Gambacorta (2005) in the UK and for the Euro area; Ashcraft (2006); Cetorelli and Goldbeg (2012) in the US have uncovered the role of banks in monetary transmission. Kashyap and Stein (1995) empirically supports the theoretical model of BLC, where they exploit quarterly U.S. bank-level data and exhibit the response of large banks on their lending activity during a contractionary monetary policy. They found that lesser the total assets a bank owns, fewer loans will it give out. Other researchers employ different bank characteristics to different countries and datasets. As an alternative, Altunbas et al. (2002) applied the concept of BLC on the European bank balance sheets from 1991- 1999 and by categorizing the data on the basis of asset and capital ratio, they witnessed a weak response of monetary policy on under-capitalized banks. Gambacorta (2005) experimented with the Italian micro bank level data from 1986-2001 and found that stronger banks, in terms of liquidity are relatively less responsive to the monetary policy changes than the illiquid banks. On the similar lines, Kashyap and Stein (2005) again study U.S. data from 1976-2003 and are able to demonstrate the existence of BLC and found out results consistent with Gambacorta (2005). Hosono (2006) uses Japanese bank data for the time period ranging from 1975-1999 and concludes that monetary policy has weaker effect on undercapitalized

banks. All these studies attempted to show the existence of bank lending channel and large, liquid and well-capitalized banks are unresponsive and unaffected to that end.

Several recent papers focus on the roles played by banks to insulate their lending behavior during changes in the monetary policy. Working with the aggregate data, Kashyap, Stein and Wilcox (1993) show that using a mix of bank loans and commercial paper for financing companies during monetary policy contraction can serve as an alternate composition for firms' external finance. They did find an increase in the issuance of commercial paper serving as a substitute to bank loans during such shock, concluding that a reduction in bank loans is not a reflection of a fall in credit demand due to a slow economy but it's indeed due to the tight monetary policy. Oliner and Rudebusch (1996b) revisited the work by above authors and brought about two developments, first, using a different mix of external finance and second, divided the data according to bank size. Their results weren't consistent with the BLC in particular, however the evidence was broadly relating to the credit channel overall.

Talking about insulation mechanisms, when banks experience a shock, they can either raise non-reservable liabilities to make up for the lost reservable deposits, or sell off their assets and securities in order to shrink their assets. This was empirically analyzed by Kashyap and Stein (2000). A large bank which owns more liquid assets will have an option of selling securities and thus insulating its lending behavior, whereas a less liquid bank will be forced to deplete its loan portfolio. Ashcraft (2003) illustrates that stand-alone banks face severe financial constraints than affiliated banks when measured by sensitivity of loan growth to insured deposit growth. Using data on insured commercial banks from Call Reports of Income and Condition, he first revealed that bank holding company reduces the financial constraints faced by its subsidiaries. Next, he explores the possibility where affiliated banks are able to shield their lending behavior in times of a monetary shock by issuing large certificate of deposits (CDs) and federal funds. Other authors studies the banking behavior on the same lines<sup>3</sup>.

Cetorelli and Goldberg (2008) study the response of bank lending of global banks<sup>4</sup>. The paper documents a systematic relationship between monetary policy effectiveness and globalization

---

<sup>3</sup> Banks are also able to have access to non-reservable/ uninsured liabilities if banks are affiliated with a multibank holding company as studied by Houston et al. (1997). The authors show that loan growth at subsidiary banks is more sensitive to bank holding company's cash flow than to the banks own cash flow. Campello (2002) studies the banking behaviour on the same lines and finds out that small banks that are affiliated with large multibank hold companies, have a less sensitive lending behaviour to monetary policy tightening as compared to small stand-alone banks.

<sup>4</sup> Cetorelli and Goldberg (2012) define global banks as banks with global operations, developing growing networks of physical branches and subsidiaries in foreign countries.

of banks through internal capital markets. Large, global banks can make use of their international, internal capital markets in response to monetary policy. A change in domestic monetary policy causes changes in banks' loan portfolio and is consistent with international monetary policy transmission. The results suggest that a domestic policy shock impacts the domestic bank lending and the economy as a whole, and at the same time the shock is transmitted to the foreign markets. Peek and Rosengren (1997, 2000) also specifies changes in banking behavior and thus international transmission shocks, where the authors focus on the capital problems stemming from the decline in Japanese stock prices.

Kishan and Opiela (2009) focus on insulation mechanisms by banks during changes in monetary policy. Using data from 1980- 1995, the authors use cross-sectional differences in bank financing and lending decisions and divide the dataset into six asset and three capital leverage ratio categories. They use bank's capital-to-asset ratio as a proxy for bank's ability to raise time deposits. The paper contributes positively to the existing literature and finds that when banks raise large time deposits in order to shield their lending behavior, it appears that small and undercapitalized are the ones that are most responsive to monetary policy. We build on the above work and provide quantitative evidence by adding in the model, the measure of liquidity for all banks, constructed as the ratio of liquid assets to total assets.

Banks are subject to differential balance sheet characteristics. We discuss whether high liquid banks are likely to be more insulated during changes in monetary policy and is raising time deposits a feasible mechanism for this. However, to reach the above conclusion it is a pre-requisite that the banks must respond in their lending with a policy shock. Hence, we begin by testing the existence of BLC. The literature above aims to provide a foundation and support for a new insight that the current research proposes to contribute in the subsequent sections.

### **3. Data Description**

The sample comprises annually balance sheet information for individual banks taken from yearly publication of Reserve Bank of India, Statistical Table relating to Banks in India. A few banks operated continuously from 1995 and other few operated continuously at a later stage in our data. Hence, we have an unbalanced panel that consists of 138 commercial banks with 1805 bank-year observations. We exclude the data on regional rural banks because these banks exist for the development of rural and backward areas focusing on financial inclusion rather than monetary policy transmission. Since these primarily focus on the basic banking services in the rural areas, the lending responses of these banks might be different from commercial

banks; hence it is difficult to get consistent results with the inclusion of regional banks and cooperatives.

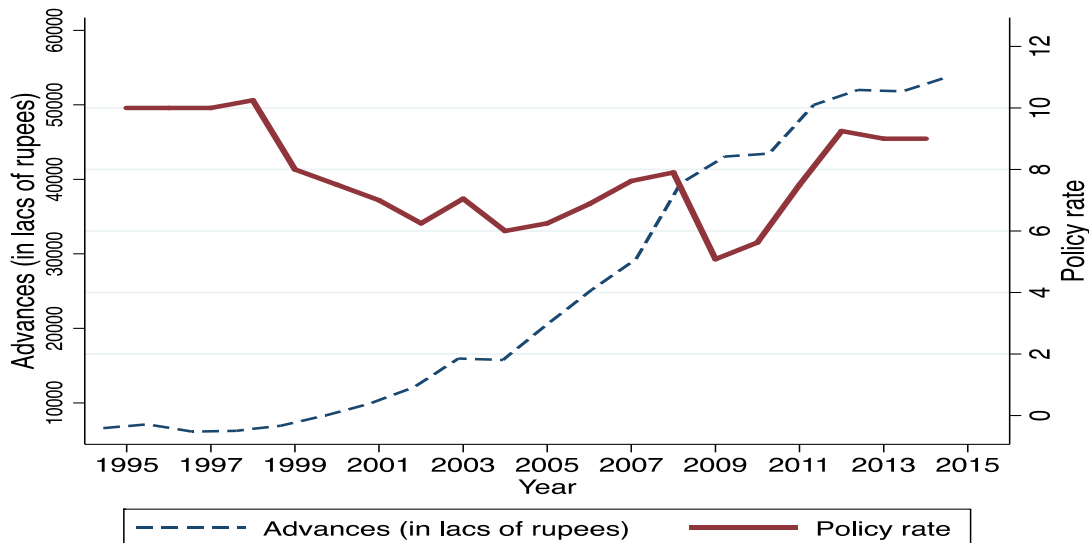


Figure 1 Monetary Policy indicator and loan

To measure changes in monetary policy that influences banks' the cost of funds, we use repurchase or repo rate<sup>5</sup> suggested by a variety of researchers (Pandit et al., 2006; and Sumitra and Toto, 2012). In regard to policy regime, the central bank alters this benchmark interest rate to control inflation and credit in the economy (Aleem, 2010; Mohanty, 2012). The repo rate has been an effective policy rate since 2000, while the central bank used bank rate as the monetary policy variable for the earlier period.<sup>6</sup> Accordingly, we use bank rate (till 2000) and repo rate (post 2000) as primary policy rates as the measure for monetary policy.<sup>7</sup>

We use Reserve Bank of India (RBI) data to calculate our three bank-specific characteristics.<sup>8</sup> Size is calculated as the log of total assets. We measure liquidity as the ratio of liquid assets to total assets.<sup>9</sup> The tier 1 capital ratio<sup>10</sup> is used as a proxy for capitalization. The paper employs

<sup>5</sup> The repo rate is the rate at which the central bank lends money to commercial banks for short term.

<sup>6</sup> Bank rate can be defined as the interest rate charged by central bank on loans to commercial banks. When central bank finds inflationary pressures have started in the economy, it raises the bank rate. Borrowing from central bank becomes costly and commercial banks borrow less. This leads to banks raising their lending rates. Borrowers borrow less from banks and result in contraction of credit. In India, bank rate has been used as the prime policy rate till 2000. Thereafter, it was fixed at 6% (Sumitra and Toto, 2012).

<sup>7</sup> See Sumitra and Toto (2012) about a discussion on advantages of repo rate and central bank policy rate prior to 2000.

<sup>8</sup> The literature by Black et al. (2010), Topi and Vilmunen (2003), Havrylchyk and Jurzyk (2005) among others, suggests these characteristics are important

<sup>9</sup> Liquid assets include cash, balances with RBI, balances with banks in India, balances with banks outside India and government and other securities.

<sup>10</sup> Basel III defines Tier 1 ratio as the ratio of bank's core equity capital to its total risk weighted assets. It is a measure of bank's financial strength.

log of total advances as a measure of banks' lending. Figure 1 shows the policy rate regime in India for our data. We observe a pronounced inverse relationship between total advances and the policy rate. However, this inverse relation seems to have weakened post 2007.

A series of data-cleaning procedures are adopted such as reporting of repeated time values within the panel and dealing with mergers and birth of new banks. The banking sector has witnessed several mergers and amalgamations in the domestic commercial banks including private sector banks such as ICICI, HDFC and UTI (now Axis Bank). We treat such banks as new individual banks in our data. We deflate the values of all variables by using the consumer price index (2010 as the base year). GDP growth rate, inflation rate and exchange rate (between USD and Indian rupee) are used as the main macroeconomic variables to control for overall economic health and loan demand effects. The inclusion of these variables allows us to capture the cyclical movements and serves to separate out changes in total loans that are caused by movements in loan demand.

Table 1 below gives descriptive profile of the main variables used in the analysis. The values are expressed in Indian Rupee (INR). The description is for all the banks used in the data; therefore we see high standard deviation and wide difference between the minimum and maximum values of each variable. We include all the commercial banks in India and the data ranges from very small to very big banks (State Bank of India, Axis Bank, Bank of India, Dena Bank). The table also reports features of some macroeconomic variables used. The annual average quantity of loans made by banks was INR 2,430 million. During the sample period, the average rate of GDP growth was recorded as 6.8%. The mean value of exchange rate volatility was nearly 45, and in stable times it was as low as 32.43.

**Table 1: Descriptive Statistics of key variables (INR million unless specified)**

Variable	Observation	Mean	Standard Deviation	Minimum	Maximum
<b>Banking and Financial variables</b>					
Advances	1728	2430	6100	0.004	86000
Time deposits	1717	2330	4930	0.0003	56600
Total Assets	1760	4460	10300	0.078	127000
Liquidity <sup>11</sup>	1776	1500	3390	0.058	37200
Capital Adequacy ratio (%)	1650	26.08	52.3	-18.8	885
<b>Monetary policy Indicator</b>					
Repo rate (%)	1765	7.85	1.55	5.08	10.25
<b>Macroeconomic Factors</b>					
GDP growth rate (%)	1765	6.8	2.00	3.8	10.3
Inflation rate (%)	1774	7.3	3.00	3.7	13.2
Exchange rate (INR/\$US)	1765	45.28	6.75	32.43	61

In order to empirically interpret our research question, the next section discusses empirical specification to test the behavior of time deposit growth on bank lending for different banks based on their characteristics. However, a pre-requisite to the above is to test the existence of bank lending channel for our data.<sup>12</sup> Investigating the bank-lending channel is also useful for monetary authority in designing appropriate policies to achieve price stability or inflation targeting. This serves as a potential policy implication.

#### 4. The econometric model

We follow the approach of Kishan and Opiela (2000) and divide the banks on the basis of liquidity and size into two categories. Further, we also use capitalization to divide banks into three categories. These categories are as follows; a bank that has more than total assets INR500 million (INR= Indian Rupees) is categorized a large bank, whereas a bank <INR 500million is a small bank. The categories based on capitalization are; tier 1 capital ratio: <10% (undercapitalized), ≥10% and <15% (adequately capitalized) and >15% (well-capitalized). We use time deposits as a measure of uninsured/non- reservable liabilities to investigate

<sup>11</sup> Sum of cash in hand, balances with RBI, with banks in India, with banks outside India and money call and short notice

<sup>12</sup>  $Advance_{it} =$

$\alpha_i + \sum_{j=1}^n \alpha_j Advance_{it-j} + \sum_{j=0}^n \beta_j RRate_i + \sum_{j=0}^n \delta_j X_{it} * RRate_i + \sum_{j=0}^n \gamma_j GDPgr_t + \sum_{j=0}^n \varphi_j \ln(Exch)_t + \sum_{j=0}^n \omega_j inf_t + \varepsilon_{it}$  In this equation, subscript  $i$  (cross section) denote a bank indicator and  $t$  (time series) is a year indicator.  $Advance_{it-j}$  is the growth in loan supply captured by the log of total advances. Among the explanatory variables, we use lagged dependent variable ( $Advance_{it-j}$ ), monetary policy indicator ( $RRate_i$ ) that is captured by policy rate.  $X_{it}$  denote bank characteristics such as bank size, liquidity and capitalization. To account for the loan demand effects, the model incorporates the use of macroeconomic variables such as GDP growth ( $GDPgr_t$ ), inflation rate ( $inf_t$ ) and log of exchange rate ( $\ln(Exch)_t$ ). In order to exhibit differential response to macroeconomic and monetary developments, the policy indicator interacts with all the three bank characteristics. Thus the interaction term can be interpreted as the effect of monetary policy indicator on bank specific characteristics of each bank. To test the direct effect of monetary policy, the primary interest is on the coefficient of monetary policy indicator, whereas to study the existence of bank lending channel, the interaction between monetary policy and bank characteristics is analyzed.

whether liquid banks insulate themselves during domestic monetary changes. This behavior of the banks is examined by regressing large time deposits on the monetary policy indicator and lagged values of GDP growth rate.

$$TDeposits_{it} = \alpha_1 + \sum_{j=1}^n \beta_1 TDeposits_{it-j} + \sum_{j=0}^n \beta_2 RRate_i + \sum_{j=0}^n \beta_3 GDPgr_{t-j} + \sum_{j=0}^n \beta_4 dliquid_i * RRate_i + \varepsilon_{it} \quad \dots (1)$$

$TDeposits_{it}$  indicates time deposits for each bank,  $RRate_i$  is the monetary policy indicator, i.e., repo rate,  $GDPgr_{t-j}$  denotes the lag of GDP growth rate and  $dliquid_i$  represents liquidity. It is a categorical variable, where '0' denotes low liquid banks and '1' otherwise. It is to be noted that we are interested in knowing the importance of liquidity during banks' insulation mechanism. The more liquid a bank is, the less pressure it should have on its balance sheet during any monetary shock.<sup>13</sup>

We include lags of the dependent variable and estimate the model in lagged differences in order to capture the pro-cyclical time deposit behavior of commercial banks in the dataset. Due to the inclusion of lagged dependent variable, the explanatory variables are correlated with the error terms. In such a case, the dynamic panel model suffers from Nickel (1981) bias and needs to be corrected. Arellano and Bover (1995) and Blundell and Bond (1998) have introduced and extended the generalized methods of moments (GMM) estimators, which deals with the endogeneity problem.

The bank liquidity used in the analysis is important because it deals with day-to-day analysis of future cash inflows and outflows and hence affects the bank's balance sheet and profitability. Also, we use time deposits, since they are important component of liabilities for financial intermediaries (See Ashcraft, 2003). Intuitively, monetary policy will have a small effect on lending behavior of banks if they are easily able to replace the loss in lending with external finance, such as term deposits, which acts as a marginal source of funds during contractionary monetary policy.

---

<sup>13</sup> A low liquid bank is defined as any bank whose ratio of liquid assets to total assets lies below the median value. From the data, we find that median for liquidity is 37%. We perform analysis for different quintiles of liquidity and get similar results.

## 5. Results

In this section we present the empirical findings. We begin by presenting the results that indicate the existence of bank lending channel, as shown in Table 2, followed by answering whether high liquid banks insulate their loan growth by raising time deposits

The estimates in Table 2 demonstrate the effect of monetary policy on loan supply along with its differential impact based on characteristics of the banks (liquidity, size, and capital). The findings of the full sample regression results are presented in Column IV and suggest consistency with the existing literature; since contractionary monetary policy leads to decline in bank loan supply, as indicated by negative coefficient on 'Repo rate'. The negative coefficient implies that banks reduce their supply of loans when repo rate increases such that a unit increase in the repo rate leads to an expected reduction in loan supply by almost 55 percent. The positive interaction between bank liquidity and repo rate also implies the effect of monetary policy on individual bank's lending depending on their balance sheet strength as depicted by each bank's liquidity. Since the interaction terms turn out to be positive for all the three bank characteristics, it implies large, liquid and well-capitalized banks are able to insulate their lending behavior from monetary shocks.

To test the effects of bank lending on responsive to monetary policy, we run regression on different sub-samples using bank characteristics, i.e., size, liquidity and capital ratio. The results are shown in Column I, II and III in Table 2. For liquid and high-capitalized banks (Table 2, Column II and III), all the variables are statistically significant and those capturing key monetary policy effects are appropriately signed. The parameter estimate of interest: the interaction term between monetary policy and bank characteristics is significant and positive, consistent with the theoretical expectations. However, this is not true for bank size (Column I). The size variable on its own as well as interaction term) is carrying a wrong sign, but is statistically significant at conventional levels. The findings from this estimation suggest that monetary policy does not significantly influence bank size on its own.

The test results suggest that the efficacy of monetary policy transmission in the banking system is stronger for large, liquid and well-capitalized banks. We extend this analysis and further discuss the empirical results for banks ability to raise time deposits and shield their lending behavior during monetary shocks.

**Table 2: Loan supply dynamics in the event of Monetary Policy changes**

Variables	( I )	( II )	( III )	( IV )
First lag of dependent variable	.03 (.07)	-.31*** (.115)	-.28** (.148)	-.27*** (.024)
Repo rate	.45*** (.152)	-.59*** (.111)	-.48*** (.077)	-.55*** (.069)
Reporate*size	-.025*** (.007)			.009*** (.002)
Reporate*liquid		.51* (.217)		.43*** (.069)
Reporate*capratio			.35*** (.098)	.31*** (.022)
Other controls	YES	YES	YES	YES
Time Dummies	YES	YES	YES	YES
Observations	1403	1403	1378	1378
Number of groups	126	126	125	125
AR(2) p-value	.638	.384	.303	.244
Hansen test p-value	.530	.608	.637	.201

Robust standard errors in parentheses

\*\*\*p<0.01, \*\*p<0.05, \*p<0.1

Table 3 presents empirical results for insulation mechanisms of liquid banks through time deposits. We hypothesize that BLC is ineffective for some banks as they are able to maintain their loan supply even at the time of monetary contractions. This is because during contractionary policy by the central bank, the commercial banks must reduce their reservable deposits. However, if they are able to supplement these deposits by raising time deposits (TD), their loan supply will remain unchanged. As seen from the previous results, a small, less liquid and under-capitalized bank is more responsive to monetary policy and would be unable to raise funds through alternative sources. Thus we would expect time deposits to be non-responsive for these banks.

Most of the variables included in the model are significant. The evidence of raising time deposits by some banks should be reflected by a positive and statistically significant coefficient. The sum of coefficients on policy indicator and its interaction with liquidity, i.e.,  $\beta_2 + \beta_4$  explains the effect of monetary policy on large time deposits for high liquid banks, whereas the coefficient on monetary policy indicator shows the effect for low liquid banks. Most coefficients for low liquid banks are statistically insignificant. This means that low liquid banks are responsive to monetary shocks and do not or are unable to raise time deposits. However, large and high liquid banks appear to raise time deposits. This is indicated by the positive and statistically significant coefficients (highlighted in bold in Table 3). This could be due to these banks' easier access to other funding opportunities. Most coefficients on  $(\beta_2 + \beta_4)$  are statistically significant. However, the coefficients with a negative and statistically significant sign indicates that a bank can access funds through either selling securities or internal capital

market operations or other opportunities, if not by raising time deposits.

Liquidity is an important bank characteristic and its significance has been further highlighted post the global financial crisis. Liquidity provides banks with a cushion to protect against capital losses or any other unexpected expenses. Hence, a liquid bank is in a better position to face monetary shocks. In addition, bank behavior differs according to bank size. As seen from the results, large banks are less adversely affected by contractionary policy due to their ability to raise time deposits and maintain loan supply.

**Table 2: The effect of monetary policy on growth rate of time deposits**

Size	Capitalization	Number of observations	Co-efficient on monetary policy indicator ( $\beta_2$ )	Co-efficient on interaction of monetary policy variable and liquidity ( $\beta_4$ )	( $\beta_2 + \beta_4$ )
Small	Undercapitalized	56	-.10	-.004	-.104
Small	Medium-capitalized	119	.24	-.39	-.15
Small	Well-capitalized	261	-.11	-.04	-.15*
Large	Undercapitalized	99	.19**	.17	<b>.02***</b>
Large	Medium-capitalized	684	.007	.04***	<b>.033***</b>
Large	Well-capitalized	151	-.42	.09***	<b>.51***</b>

Robust standard errors in parentheses

\*\*\*p<0.01, \*\*p<0.05, \*p<0.1

## 6. Conclusion

There is ample evidence that empirically supports the bank lending channel and how changes in monetary policy alter the supply of loans. However, recent literature has started to focus on the insulation mechanisms adopted by banks during monetary shocks in order to maintain their supply of loans. Kishan and Opiela (2000) show that the small, undercapitalized banks are not able to finance their lending behavior through large time deposits. We add on to their analysis by including liquidity and find that the use of liquidity as a balance sheet strength indicator of monetary policy describes banks' loan response to policy through raising time deposits. The results are statistically significant and economically important. The mechanism that we study implies that, liquidity is significant in bank portfolio and should be considered wisely when formulating or amending monetary policy.

First, we find that the lending behaviors of large, liquid and well-capitalized banks are less sensitive to changes in monetary policy. Second, using data on time deposits, we show that liquidity is an important characteristic and large and liquid banks are able to raise alternative funds such as time deposits to continue lending during tight monetary policy. Monetary policy will have a small effect on lending behavior of banks if they are easily able to replace the loss in lending with external finance.

## References

- Aleem, Abdul [2010]. "Transmission mechanism of monetary policy in India", *Journal of Asian Economics*, 21, 186-197.
- Ashcraft, A. (2006). New Evidence on the lending channel. *Journal of Money, Credit and Banking* 38, 751-776
- Bernanke, B. S., & Blinder, A. S. (1988). Credit, money and aggregate demand. *American Economic Review (Papers and Proceedings)*, 435-39.
- Bernanke, B.S., & Blinder, A. S. (1992). The Federal Funds Rate and the Changes of Monetary Transmission. *American Economic Review* 82, 901-22
- Bernanke, B. S., & Gertler, M. (1995). Inside the Black Box: The Credit Channel of Monetary Policy Transmission. *Journal of Economic Perspectives*, 27-48.
- Black, L.K., Hancock, D., Passmore, W. (2010). The bank lending channel of monetary policy and its effect on mortgage lending. FEDS working paper 2010-39. Federal Reserve Board of Governors.
- Blundell R., & Bond S. (1998). Initial Conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics* 87, 111-143.
- Campello M. (2002). Internal Capital Markets in Financial conglomerates: Evidence from small banks response to monetary policy. *Journal of Finance*, 57(6), 2773-2805.
- Cetorelli, N., Goldberg, L. (2012). Banking Globalization and Monetary Transmission. *Journal of Finance*
- Ehrmann, M., Gambacorta L., Martinez Pagés, J., Sevestre, P., & Worms A. (2003b). The Effects of Monetary Policy in the Euro Area. *Oxford Review of Economic Policy*, 19(1), 58- 72.
- Gambacorta, L. (2005). Inside the Bank Lending Channel. *European Economic Review*, 1737-1759.
- Havrylchyk, Olena, Jurzyk, Emilia (2005). Does the bank lending channel work in a transition economy? A case of Poland. Mimeo, European University Viadrina
- Houston, J., Marcus, D., & James C. (1997). Capital Market frictions and the role of Internal Capital Markets in banking?. *Journal of Financial Economics* 46, 135-164.
- Kashyap, A., & Stein, J. (1995). The Impact of Monetary Policy on Bank Balance Sheets. *Carnegie-Rochester Conference Series on Public Policy* 42, 151-95.
- Kashyap, A., & Stein, J. (2000). What Do a Million Observations on Banks Say About the Transmission of Monetary Policy. *American Economic Review*, 407-428.
- Kishan, Ruby, & Opiela, T. (2000). Bank Size, Bank Capital, and the Bank Lending Channel. *Journal of Money, Credit and Banking*, 121-141.

Mohanty, D. (2012). Evidence on interest rate channel of monetary policy transmission in India. RBI Working Paper 6. RBI: Mumbai.

Pandit, B.L., Mittal, A., Roy, M., & Ghosh, S. (2006). Transmission of Monetary Policy and Bank Lending Channel: Analysis and Evidence from India. Department of Economic Analysis and Policy, Reserve Bank of India. Study No. 25

Prasad, A., & Ghosh S. (2005). Monetary policy and corporate behavior in India, IMF Working Paper No. 25, Washington D.C.

Reserve Bank of India (2003), Report on currency and finance, RBI: Mumbai. Reserve Bank of India, Handbook of statistics on Indian economy 2003-04, RBI: Mumbai. Reserve Bank of India, Statistical tables relating to banks in India (various years), RBI: Mumbai.

Topi, J. and J. Vilmunen (2003). Transmission of monetary policy shocks in Finland: evidence from bank level data on loans, Monetary Policy Transmission in the Euro Area, (Cambridge University Press), forthcoming.