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Balance sheet strength and the bank-lending channel: Evidence from an emerging market

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Abstract

The bank lending channel view of monetary policy argues that bank loan supply should fall during periods of tight monetary policy. Employing a sample of over 122 Indian commercial banks for the period between 2005-17, we investigate the role of cross-sectional heterogeneity in bank balance sheet strength in the effectiveness of bank lending channel. We show that both small and large banks with liquid balance sheets are able to maintain their supply of loans during periods of tight monetary policy. Furthermore, we find that higher capital ratios can also enable banks to maintain their loan supply, in particular among smaller financial institutions. The mechanism at play is a time deposits insulation channel, whereby banks with strong balance sheets can raise time deposits during periods of contractionary monetary policy.

Keywords: Bank-lending channel, Time Deposits, Monetary Policy, Liquidity, Capital Ratios

JEL codes: E52, E58, G21.

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1 Introduction

The credit channel of monetary policy transmission has been widely discussed at the aggregate level (Bernanke & Gertler 1995) as well as at the bank-level (Kashyap & Stein 1995, Cetorelli & Goldberg 2012): a tight monetary policy by the central bank reduces banks' reserves resulting in a fall in loan supply. Underlying this argument is the view that banks cannot substitute the shock to funding with other sources of finance such as issuing large certificate of deposits, attracting money market funds and other securities. However, research such as Kishan & Opiela (2000), Cetorelli & Goldberg (2012), among others, shows that the financial position of individual banks is a key component that drives their reaction to monetary policy shocks and banks can sometimes maintain their loan supply by raising external finance from other sources during contractionary monetary policy.¹

While there is large empirical evidence on the role of bank characteristics in the effectiveness of monetary policy, the results are not always conclusive or consistent. In influential works, Kashyap & Stein (1995, 2000), Kishan & Opiela (2000) show that the bank lending channel works only through the balance sheet of small banks. Particularly, they find that small banks with low liquid balance sheets reduce their lending more than small and highly liquid banks, while large banks can completely insulate their loan supply during tight monetary policy. On the other hand, Campello (2002) finds that even small banks when they are a part of large bank holding companies are less sensitive to policy changes, whereas small banks that operate on a stand-alone basis and with no access to internal capital market become highly sensitive to monetary contractions. Furthermore, Cetorelli & Goldberg (2012) argue that domestically-oriented large banks are unable to insulate their loan supply behaviour relative to global banks. These studies clearly confirm that bank-specific characteristics have disparate and non-trivial implications on the bank lending channel. Therefore, the impact of monetary contractions on the response of bank balance sheets is not obvious.

Motivated by the above studies, in this paper, we first examine the role of bank size, liquidity and capital ratios in determining the loan supply reaction of banks to changes in monetary policy. Second, we add to the bank lending channel literature by considering how banks' ability to raise time deposits (TD)² make them less sensitive to contractionary monetary policy. Our empirical analysis comprises a sample of 122 Indian commercial banks over the period of 2005

¹According to the Modigliani-Miller theorem, banks are indifferent between demand deposits and certificate of deposits, hence following a monetary policy shock, banks can adjust the liability side of their balance sheets without changing the loan behaviour. (see Romer et al. (1990))

²Time deposits have fixed maturity, usually preventing early withdrawals of deposited funds. The interest rate conditions on these deposits are communicated to the customers beforehand, which is in contrast to the demand and savings deposits; that can be accessed at all times and generally come with floating interest rates.

to 2017. To investigate the existence of a bank-lending channel and the response of banks in raising alternate sources of financing during monetary policy contraction, we employ a panel fixed effects methodology that allows us to control for both problems of endogeneity and unobservable heterogeneity.

The literature on the cross-sectional differences in the effectiveness of the credit channel, in general and bank lending channel, in particular, is mostly analysed in developed countries, especially the United States and Europe.³ The evidence in developing countries is far from conclusive and the monetary transmission is still not sufficiently well understood.⁴ Our analysis aims to enrich the knowledge about monetary policy transmission mechanism in an emerging economy such as India by obtaining empirical evidence on the impact of monetary policy on bank lending. Our choice of country reveals that even with a financial system heavily dependent on the banking sector and with an under-developed stock market that has been lacking the quality of services relative to financial systems in developed countries (Bhaumik et al. 2018), some banks are able to lessen the influence of monetary policy changes on loan supply.

At first glance, it may seem obvious that an increase in monetary policy interest rate would reduce the credit supply of banks. However, since banks' core function is to maximize profits by acting as intermediaries between savers whose deposits are lent out to the borrowers, some banks might be motivated to maintain their loan supply through external sources of finance even in the event of tight monetary conditions. Therefore, we formulate and test hypotheses to investigate the effectiveness of the bank lending channel and the insulation mechanism that affects financial firms' ability to maintain loan supply.

The main findings in this study provide evidence on the ineffectiveness of the bank lending channel for commercial banks in India. Our results complement the findings of Kashyap & Stein (2000) that split the data based on asset size and suggests that within small banks, it is the high liquid banks that are less sensitive to changes in monetary policy. In addition to the response of small banks, we also find evidence for large banks. Particularly, we find that both small and large banks with highly liquid balance sheets are better able to shield their loan supply during the episodes of contractionary monetary policy.

³Stein (1995), Kashyap & Stein (1995), Kishan & Opiela (2000), Cetorelli & Goldberg (2012) among others investigate the bank lending channel in the U.S., whereas Altunbaş et al. (2002), Gambacorta (2005), Ehrmann et al. (2001) study the role of banks in monetary transmission in the euro area.

⁴Studies have investigated the bank lending channel in developing countries, however have found opposing views. Fungáčová et al. (2016) shows that BLC does not play a major role in monetary policy transmission in China, while Bhatt & Kishor (2013) finds that monetary policy shocks affect the amount of bank loans in India. Similarly, Amidu & Wolfe (2013) show that an increase in banking sector competition weakens the effectiveness of monetary policy on bank lending, while Khan et al. (2016) suggests that the effect of monetary policy on banks' loans reduces as the level of competition decreases.

Furthermore, similar to previous studies such as Peek et al. (1995), Kishan & Opiela (2000), Altunbaş et al. (2002), Kishan & Opiela (2006), Disyatat (2011), we employ capital ratios as an additional measure of balance sheet strength and find that the capital ratio is important in assessing the impact of monetary policy on loan growth. We show a positive and statistically significant relation between tight monetary policy and credit supply for small banks with higher capital ratios, however for well-capitalized large banks we do not find any empirical evidence for the effect of contractionary monetary policy on bank lending.

Finally, we bring systematic evidence to the question of how these banks can make up for the shortfall in demand deposits due to contractionary monetary policy. We show that both small and large banks with high liquid balance sheets and capital ratios are able to offset a drain of reserves due to monetary tightening with an increase in time deposits. This implies that conventional monetary policy changes might be less effective in reducing the loan supply of banks through the bank lending channel. The results are robust to a number of different sensitivity tests. Specifically, we use an alternative measure for liquidity and capital ratio as well as alternative definitions for bank size. We also examine bank responses to their lending behaviour by splitting our data for domestic versus foreign banks, among other robustness checks.

The remainder of the paper is organised as follows: Section 2 reviews the previous literature. Section 3 describes some institutional characteristics of the Indian banking sector. After the discussion on the data and econometric model in Section 4, Section 5 presents evidence on the response of the banks' balance-sheet items to monetary policy tightening. The robustness checks are discussed in Section 6. The study concludes in Section 7.

2 Literature Review

2.1 The Bank-Lending Channel

Monetary policy decisions by central banks can affect the economy through various channels, including; the interest rate channel (an increase in monetary policy rate increases both real interest rates and the cost of capital, thereby causing investment, consumption and finally aggregate demand to fall), asset price channel (impact of monetary policy on domestic asset prices including bonds, stock market and real estate prices), balance sheet channel (transmission of monetary policy to real economy through financial position of borrowers), and bank lending channel (the effects of monetary policy actions on banks' credit supply) (Mishkin 1995). In this study, we focus on the *bank lending channel* (BLC), which suggests that mon-

etary policy contractions lead to a decrease in deposits such that banks cannot easily replace the lost deposits with other sources of funds (Bernanke et al. 1993). For the existence of the BLC, it must satisfy two conditions;⁵ first, when the central bank implements a contractionary monetary policy, a reduction in the bank deposits must reduce the loan supply of banks; i.e., banks should not be able to maintain the asset side of the balance sheet since bank loans and all other assets such as securities are assumed to be imperfect substitutes. Second, borrowers must view bank loans and other sources of finance as imperfect substitutes and hence they should not be indifferent between the two sources.

Banks play a key role in explaining the transmission of monetary policy and this was first highlighted in the seminal papers of Bernanke & Blinder (1988) and Peek et al. (1995) at the aggregate level, where the monetary policy transmission mechanism is discussed theoretically.⁶ Further, Bernanke (1990) investigates the existence of the BLC by estimating reduced form equations of credit supply. The study employs interest rate on federal funds as an indicator of future movements in real macroeconomic activities and finds an inverse relation between bank loans and monetary policy contractions. Similarly, Ludvigson (1998) uses composition of automobile loans between banks and non-bank institutions and finds evidence consistent with the BLC; a contractionary monetary policy reduces the supply of bank loans.

Thorbecke & Alami (1992) corroborate the findings of Bernanke & Blinder (1988) and show, using a different methodology, that unexpected decreases in federal funds rate lower stock prices. More recently, Disyatat (2011) presents a contemporary mechanism and reformulates the bank lending channel by presenting a model that proves the traditional money multiplier concept to be uninformative. The study assumes bank capital as endogenous; thus monetary policy contractions reduce banks' level of capital followed by a fall in net interest margins. Ultimately, this leads to reductions in loan supply by banks.

Although the above-mentioned studies support the existence of the BLC, role of different bank-specific characteristics in monetary transmission explains how the BLC remains ineffective for some banks, leading them to maintain their loan supply during monetary contractions. The ineffectiveness of the BLC has been studied in the U.S. (Kashyap & Stein 2000, Ashcraft 2006, Cetorelli & Goldberg 2012); euro area (Kishan & Opiela 2000, Ehrmann et al. 2001, Altunbaş et al. 2002, Angeloni et al. 2003); and United Kingdom (Huang 2003), among others. According to a few studies in the U.S., the response of bank credit supply to a shift in monetary

⁵These conditions have been discussed and supported in Kashyap & Stein (1995), Oliner et al. (1995, 1996), Jimborean (2009)

⁶For an articulation of the theoretical model on the response of banks to monetary policy, see Peek et al. (1995), Kishan & Opiela (2000).

policy is affected by three major balance sheet strength indicators, namely asset size (Kashyap & Stein 1995, 2000, Kishan & Opiela 2000), liquidity (Kashyap & Stein 2000, Kashyap et al. 2002) and capitalization (Peek et al. 1995, Kishan & Opiela 2000, 2006). On the one hand, banks with liquid balance sheets are better able to protect their loan portfolios (Stein 1995, Kashyap & Stein 2000, Kashyap et al. 2002); while on the other hand, under-capitalized banks are less likely to insulate their lending behaviour through external sources of finance (Peek et al. 1995, Kishan & Opiela 2000, Van den Heuvel 2012).

The empirical studies from Europe are rather inconsistent. For instance, the study by De Bondt (1999) uses two measures of monetary policy, namely short-term interest rates and monetary condition index. When short-term interest rates are used as a proxy for monetary policy, the study provides evidence of the BLC in Germany, Belgium and the Netherlands, however find no evidence in France, Italy and the United Kingdom. In the second part of the study, when monetary condition index is employed to measure the policy stance, the results show that BLC exists in France and Italy. Favero et al. (1999) also explores the BLC in Germany, France, Italy and Spain during the monetary restriction in 1992, but find no results that support the presence of bank lending channel for these countries.

The inconsistency in the findings in euro area are not just across the various countries, but overall results on the role of bank balance sheets in the euro area are also inconclusive (Angeloni et al. 2003, Ehrmann et al. 2001, Gambacorta 2005). Ehrmann et al. (2001) employs bank-level data for Germany, France, Italy and Spain and shows that monetary policy alters the bank lending behaviour, with the effects most dependent on only liquidity and not on bank size. In contrast to Ehrmann et al. (2001), Kakes & Sturm (2002) find that bank size plays an important role in the bank lending channel, and the credit supply of small German banks fall aggressively than large banks. Moreover, Altunbaş et al. (2002) investigate the BLC in Europe from 1990-99 and characterize banks on size and capitalization. The study finds a weak response of monetary policy on well-capitalized banks. Finally, Gambacorta (2005) employs Italian micro bank level data from 1986-2001 and find that stronger banks, in terms of liquidity are relatively less responsive to the monetary policy changes than the illiquid banks.

Recent literature uses the 2007-09 financial crisis as a lens to study the effectiveness of the bank-lending channel. Salachas et al. (2017) undertake a comparative analysis on the impact of monetary policy on bank loan supply in the periods including pre and post global financial crisis. They find that in the pre crisis period, higher short-term interest rates increased banks' dependence on their balance sheets. However, during the post crisis period, the monetary policy implementation within the bank lending channel was distorted. Furthermore, Kapan &

Minoiu (2018) find that banks with stronger balance sheets, in particular higher equity, were better able to maintain credit supply during the financial crisis. Alternatively, Sanfilippo-Azofra et al. (2018) suggests that loan supply of large banks that operate in countries with poorly developed financial systems continue to give out loans during monetary policy changes. Moreover, banks operating in countries with a more developed financial system observes a negative relation between monetary policy contractions and loan supply, but only after the beginning of the global financial crisis.

2.2 Insulation Mechanisms

The above discussions on the bank-lending channel support the notion that some banks are able to offset the drain in reservable deposits, due to contractionary policy, through other sources of funds, thus attenuating the effects of bank-lending channel. Kishan & Opiela (2000) show that banks' use of time deposits (TD) as an alternate source of funding varies with respect to their asset size and capitalization. They find that small and under-capitalized banks are responsive to monetary policy shocks and cannot raise TD to shield their lending behaviour. Gambacorta (2005) finds that drawing down cash and securities can insulate liquid and well-capitalized banks from monetary impulses. Similarly, Ashcraft (2006) employs bank-affiliation as an important cross-sectional difference among banks to show that affiliated banks have better access to alternate sources of finance such as large certificate of deposits and federal funds. As a result, these banks are better able to reduce the impact of contractionary monetary policy on their loan supply.

Holod & Peek (2007) show the existence of the BLC is weaker for publicly traded banks. Moreover, after controlling for size and capitalization, publicly traded banks can better access external funds including time deposits and by running down their securities to insulate the lending behaviour relative to non-publicly traded banks. According to Altunbas et al. (2009), banks can raise additional sources of financing through securitization, which acts as a shelter to banks' loan supply from the effects of monetary policy. In addition to this, Cetorelli & Goldberg (2012) analyses the monetary policy transmission mechanism through internationalization of banks. Specifically, they find that banks with global operations are better able to insulate their lending behaviour by activating internal capital markets between the head office and its foreign branches during domestic monetary policy shocks. On the contrary, large domestic banks without global operations are more responsive to changes in monetary policy.

Complementing the above findings, our study extends the literature by exploring the differences in asset size, liquidity and capital position of banks for an emerging economy with

relatively small financial and capital markets. India provides an interesting case study for our analysis for the following reasons; first, until now, only a few studies have focused on the BLC in India with mixed results (Pandit et al. 2006, Aleem 2010, Bhaumik et al. 2011, Mohanty 2012, Perera et al. 2014), hence it is not clear whether BLC exists in India or not. Moreover, to the best of our knowledge, this is the first study that explores the role of time deposits in insulating bank credit supply during monetary contractions in India. Second, unlike the structure of the banks in the U.S., the banking sector in India is majorly controlled and operated by public sector banks, hence it is worth assessing this topic with context to a different banking system and organisational structure, such as in India. Third, bank lending has been an important source of finance for many firms in India, especially the small and medium enterprises (SMEs). During the financial distress in 2007-08 followed by global liquidity crunch, domestic banks were critical as a source of funding even to the large corporates who otherwise raise funds in the international capital markets. In light of the above arguments, we believe that the results from this study will contribute to the literature from emerging markets and shed some light on how monetary policy changes operate in rapidly growing, yet a developing country such as India.

3 Overview of the Indian banking sector

The era of modern history in the Indian banking sector commenced in 1991 as a response to the balance of payments crisis, following which comprehensive reforms were initiated. The Narasimham Committee's recommendations brought in prudential regulations and norms in regard to greater competition in the banking sector, greater autonomy given to banks over disbursement and pricing of credit and the adoption of Basel Accord capital adequacy standards. During the same time, monetary policy assumed importance and many measures were suggested to improve the effectiveness of monetary policy as an instrument for promoting the basic objectives of price stability. Therefore, the role of the central bank in India, the Reserve Bank of India (RBI), has important implications on the functioning of the banking sector through the monetary policy (Saumitra & Toto 2012).

The commercial banks in India are classified in three categories: (i) public sector banks, where the majority of stake in the banks is held by the government; (ii) private sector banks, also called the nationalized banks where individuals and corporations are the majority shareholders; (iii) foreign banks that are headquartered outside the country but they operate from their wholly-owned subsidiaries or branches in India. Table 1 presents the frequency distribution of banks with their respective average asset size. Even though foreign banks constitute the

Table 1: Description of banks based on Bank Groups in India

Year	Foreign Banks		Public Sector Banks		Private Sector Banks	
	Count	Assets (\$ billion)	Count	Assets (\$ billion)	Count	Assets (\$ billion)
2005	29	0.80	28	9.62	29	2.24
2006	28	1.01	28	10.3	28	2.92
2007	29	1.27	28	11.7	25	4.01
2008	28	1.61	28	13.4	23	5.08
2009	31	1.61	27	15.6	22	5.23
2010	32	1.36	27	16.4	22	5.23
2011	34	1.33	26	18.7	21	6.12
2012	41	1.21	26	19.5	20	7.11
2013	43	1.12	26	20.3	20	7.54
2014	43	1.24	27	21.0	20	8.02
2015	43	1.18	27	21.8	20	8.81
2016	44	1.19	27	21.9	21	9.67
2017	44	1.17	27	22.5	21	10.7

highest number of banks, public sector banks account for the largest asset base relative to the other two groups.

For the central bank to strike a balance between price stability and growth in India, it has been argued that the political economy tilts the balance in favor of price stability such that the central bank has an ‘informal’ mandate to maintain an acceptable level of inflation (Reddy 2005, Bhattacharya et al. 2006). To achieve price stability and to signal its monetary policy stance, the RBI has a number of difference policy instruments. The cash reserve ratio and bank rate has been widely used in early 1990s, however more recently the central bank conducts its monetary policy through short-term interest rates, i.e., repo rate and reverse repo rate. While the bank rate has been used as an effective monetary policy tool in 1990s (1996-2002), the repo rate, the rate at which the banks can borrow from the RBI against approved securities, is used widely in recent times.

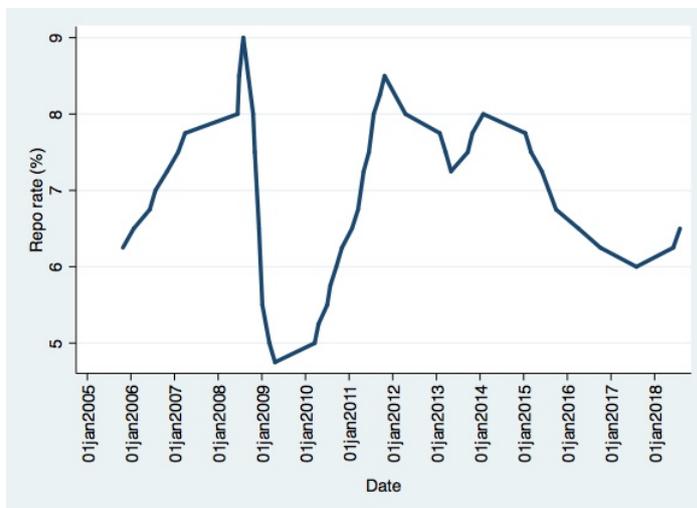
Following the developments in the banking sector, we postulate that our empirical strategy is justified for the case of India. On the one hand, the banking reforms led to greater autonomy of public sector banks, which allowed foreign subsidiaries, greater banking competition through expansion of branching network, permission to the incumbent banks to enter the market, existence of large privately owned firms, and restructuring and improvement in bank balance sheets, indicating the existence of the credit and bank lending channel consistent with the theoretical models (Bhaumik et al. 2018). At the same time, cross-sectional differences among banks in terms of size, age, risk appetite etc., suggests that some banks might be better in accessing alternative sources of funding than others during policy changes. Hence, it is not obvious whether a bank lending channel exists in India.

4 Data and identification strategy

The sample comprises of annual balance sheet information for individual banks taken from the yearly publication of Reserve Bank of India, *Statistical Tables relating to Banks in India*. The bank-level data shows that a few banks operated continuously from 2005 and a few others operated continuously at a later stage, hence, an unbalanced panel that consists of 122 commercial banks with 1,147 bank-year observations is used for the analysis in this study. We exclude the data on regional rural banks because these banks exist for the development of rural areas focusing on financial inclusion rather than monetary policy transmission.⁷

To measure changes in monetary policy, the repurchase or repo rate⁸ is used, as suggested by a variety of researchers (Pandit et al. 2006, Aleem 2010, Saumitra & Toto 2012, 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.⁹ Figure 1 shows the changes in Repo rate from 2005- 2017. During our sample period, we identify three episodes of contractionary monetary policy: 2005-2008, 2010-2011 and 2013-14.

Figure 1: Trends in Repo Rate



The figure shows the changes in the repo rate implemented by the central bank during 2005 -2017.

⁷Since regional rural banks 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.

⁸The repo rate is a repurchase agreement between the RBI and commercial banks where the latter sells the securities to the central bank and promises to buy back the same security at a predetermined date (short term) with an interest at the rate of 'repo'.

⁹Bank rate can be defined as the interest rate charged by central bank on loans to commercial banks for a longer period of time without selling or buying any securities. 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% (Saumitra & Toto 2012)

This study explores the differential response of bank credit supply across various banking sector characteristics such as size, liquidity and capital ratios, as suggested in Kashyap & Stein (2000), Topi & Vilmunen (2001), Havrylchyk & Jurzyk (2005), Black et al. (2010), among others. Size is calculated as the logarithm of total assets and we define liquidity as the ratio of liquid¹⁰ assets as a percentage of total assets. For capitalization, we employ the Tier 1 capital adequacy ratio, provided in the data.¹¹

For the purpose of our analysis, we consider two definitions for bank size, first, we divide banks into small and large based on median values of $\log(\text{TotalAssets})_{i,t}$. Second, we define asset categories as follows: banks in the bottom 75th percentile of the $\log(\text{TotalAssets})_{i,t}$ and banks in the top 75th percentile of $\log(\text{TotalAssets})_{i,t}$. Moreover, in one of the robustness checks employed in this study, we take an alternate definition of bank size by splitting the data into three asset categories: banks below the 25th percentile of the asset distribution; banks between the 25th and 75th percentile; and banks above the 75th percentile of $\log(\text{TotalAssets})_{i,t}$.

Table 2 reports difference of means for basic information on bank balance sheets for different asset size classes. In most cases, the differences are statistically significant across the balance sheet variables for all banks. For both Panel A and B, the difference between the mean values for assets, liquidity, ratio of total loans to assets and ratio of time deposits to assets is significant at 1 percent level. This implies that the large banks are likely to have higher total assets, loans and time deposits relative to small banks. In terms of securities, the difference in means between small and large banks is small and insignificant, suggesting that small banks hold roughly the same proportion of securities relative to the large banks. Even though there seems to be small differences in the holdings of securities to total assets between small and large banks, intuitively, we expect small banks to hold larger buffer securities as a precautionary measure to help them in the periods of distress (Agénor & El Aynaoui 2010).

While Table 2 gives a general overview of important bank balance sheet variables across asset sizes, our analysis is also based on other cross-sectional differences. Table 3 presents results for t-tests for the following categories of banks; small and highly liquid banks, large and highly liquid banks, small and well-capitalized banks and, large and well-capitalized banks. For liquidity we define banks above the 75th percentile of the ratio of liquid assets to total assets as highly liquid banks, and banks below the 25th percentile of the distribution are referred as illiquid banks or low liquid banks. Similarly, a bank is well-capitalized if the Tier 1 capital

¹⁰Liquid assets are calculated as the sum of cash in hand, balances with the RBI, balances with banks in India as well as outside India and money at call and short notice

¹¹Basel 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.

Table 2: Difference in Means for balance sheet variables of different asset sizes

Panel A				
	Small (N=513)	Large (N=631)	Difference	P-value
Total Assets (in millions)	308	8380	-8072***	0.00
Liquidity	0.43	0.31	0.13***	0.00
Loans/Total Assets	0.43	0.58	-0.15***	0.00
Securities	0.22	0.22	-0.00	0.49
Time Deposits/ Total Assets	0.36	0.53	-0.16***	0.00
Panel B				
	Small (N=771)	Large (N=373)	Difference	P-value
Total Assets (in millions)	1212	13,800	-12,600***	0.00
Liquidity	0.39	0.30	0.09***	0.00
Loans/Total Assets	0.48	0.59	-0.11***	0.00
Securities	0.22	0.22	0.01	0.13
Time Deposits/ Total Assets	0.42	0.52	-0.10***	0.00

Difference of Means recorded for the sample period: 2005 to 2017 for all commercial banks based on different bank sizes. Size definition 1 takes the value 1 for banks lie above the median of the log of Total Assets and 0 if banks are above the median of log of total assets (Panel A). Size definition 2 defines small banks if banks are below the 75th percentile of the $\log(TotalAssets)_{i,t}$ and large banks if they are in the top 75th percentile (Panel B). All variables are at yearly frequency. All aggregates are shown in mean values. Variable definitions are provided in Appendix A.

adequacy ratio is above 12% for private sector banks and above 9% for all other banks.

In Panel A and B of Table 3, the result of the t-test shows that large banks are significantly more likely to have higher liquidity on their balance sheets and raise more time deposits. For the ratio of total loans to assets, the difference in mean between small and large banks with high liquidity is small and insignificant. Although, this differential is significant at 1 percent level for well-capitalized banks, suggesting that large banks with high capital ratios extend more loans relative to small, under-capitalized banks. Motivated with these descriptive statistics, we would expect both small and large liquid banks to insulate their lending behaviour during monetary contractions.

Table 3: Difference in Means for balance sheet variables across cross-sectional differences

Panel A				
	Liquid Banks		Difference	P-value
	Small (N=98)	Large (N=159)		
Total Assets (in millions)	354	10,245	-9891***	0.00
Liquidity	0.23	0.26	-0.03***	0.00
Loans/Total Assets	0.60	0.61	-0.01	0.60
Securities	0.17	0.20	-0.03***	0.00
Time Deposits/ Total Assets	0.31	0.51	-0.21***	0.00
Panel B				
	Well-Capitalized Banks		Difference	P-value
	Small (N=131)	Large (N=249)		
Total Assets (in millions)	587	8915	-8328***	0.00
Liquidity	0.34	0.29	0.04***	0.00
Loans/Total Assets	0.56	0.60	-0.04***	0.00
Securities	0.22	0.22	0.01*	0.08
Time Deposits/ Total Assets	0.63	0.53	-0.10***	0.00

Difference of Means recorded for the sample period: 2005 to 2017 for all commercial banks based on different bank sizes. Size definition 1 takes the value 1 for banks lie above the median of the log of Total Assets and 0 if banks are above the median of log of total assets (Panel A). Size definition 2 defines small banks if banks are below the 75th percentile of the $\log(TotalAssets)_{i,t}$ and large banks if they are in the top 75th percentile (Panel B). A bank is liquid if the ratio of liquid assets to total assets are above the 75th percentile. A bank is well-capitalized if the Tier 1 capital ratio is above 12% for private sector banks and above 9% for all other banks. All variables are at yearly frequency. All aggregates are shown in mean values. Variable definitions are provided in Appendix A.

Based on the discussion and the descriptive statistics shown in Table 2 and 3, we propose the

following hypotheses for different bank asset classes; (i) banks with *liquid balance sheets* can maintain their loan supply by raising time deposits during periods of tight monetary policy, (ii) banks with *high capital ratios* can maintain their loan supply by raising time deposits during periods of tight monetary policy.

In order to test the above hypotheses and assess the effectiveness of the bank-lending transmission, we follow Kashyap & Stein (2000) and conduct a split-sample analysis by splitting the data into various asset classes. We divide our data into small and large bank categories based on the median and percentile values of $\log(TotalAssets)_{i,t}$. When investigating the transmission of monetary policy, many unobserved variables such as financial markets and banking industry characteristics, regulatory rules and institutions are important to consider. Hence, for our empirical strategy, we employ the fixed effects estimator that exploits cross-sectional variation of bank liquidity and capital ratio levels to estimate the impact of monetary policy on bank lending.¹² The empirical model is given by the following equation for bank i in year t :

$$Y_{i,t} = \alpha_i + \beta_1' MP_{t-1} + \beta_2 X_{i,t-1} + \beta_3' X_{i,t-1} \times MP_{t-1} + \beta_4 GDPgr_t + \delta' Controls + \epsilon_{i,t}, \quad (1)$$

where $Y_{i,t}$ measures the growth rate in loan supply for bank i in year t relative to year $t-1$.¹³ MP_t is a time dummy that is defined as 1 during episodes of the contractionary monetary policy in India and 0 otherwise. Precisely, $MP_t = 1$ in $t = 2005, 2006, 2007, 2008, 2010, 2011, 2013$ and 2014 . $X_{i,t-1}$ includes bank-specific characteristics that could affect the supply of lending: (i) liquidity, measured by the ratio of liquid assets to total assets; and (ii) capital ratio. β_2 measures the impact of liquidity and capital constraints in time $t-1$ on the growth of loans for given asset classes. The bank characteristics are included in the empirical analysis as lagged terms ($t - 1$) in order to mitigate the possible simultaneity problem between the bank characteristics and the dependent variable, i.e., loan supply. Across all specifications, we include bank fixed effects (α_i) to control for any unobserved bank-specific time-invariant characteristics.¹⁴

¹²In order to correctly choose between fixed or random effects, we conduct the Hausman test that suggested individual effects and our explanatory variables were systematically related, hence the choice of fixed effects is more appropriate.

¹³The growth rate in loan supply has been previously used in studies related to bank-lending channel such as Jimborean (2009), Gambacorta & Marques-Ibanez (2011), Olivero et al. (2011), Cantero-Saiz et al. (2014)

¹⁴The regressions do not use time fixed effects, since key variables such as monetary policy indicator (MP_t) and growth rate of GDP ($GDPgr$) remain same for all the banks in a given year. Inclusion of time fixed effects in such setting would have omitted these variables.

The explanatory variables also include a set of variables intended to control for bank characteristics. We include equity ratio, logarithm of net interest income (NII) and net interest margin (NIM)¹⁵ to control for banks' financial health. In addition, we also use the cost of funds, securities to total assets and reserves as a percentage of total assets in our regression analysis. To control for homogenous loan demand across banks, we include annual growth rate of real gross domestic product (GDP) at market prices and scale all the variables by the consumer price index (CPI) taking 2001 as the base year. The data for the macroeconomic indicators is collected from the World Bank database.¹⁶ For brevity, we discuss the definitions of all the variables employed in the study in Appendix A.

Our variable of interest is the coefficient of the interaction term between bank's lagged liquidity variable and time dummy corresponding to the contractionary monetary policy episodes. We argue that a statistically significant coefficient of the interaction term implies that banks adjust their loan supply heterogeneity in response to monetary changes. Bank liquidity is likely to influence a bank's ability and/or willingness to raise loan supply during times of tight monetary policy for three reasons. First, a highly liquid bank is likely to be in a better financial position to aggressively pursue depositors in times of tight monetary policy. Second, from a potential depositor's perspective, one of the benefits of a banking relationship is the possibility of borrowing either currently or in the future. A more liquid bank is more likely to be willing and able to accommodate this possibility. Third, since time deposits are mostly uninsured deposits in India, depositors may reason that a highly liquid bank has a low likelihood to default. Hence, potential depositors may be attracted to highly liquid banks. Thus, we expect $\beta_3 > 0$, that is, banks with high liquidity will be able to increase loan growth during periods of tight monetary policy.

The second bank-specific characteristic that we employ in our analysis is the capital ratio. We are interested in the coefficient of $CapitalRatio_i \times MP_t$ because the structure of the banking system and regulatory framework are important considerations in the transmission of monetary policy shocks (Gambacorta & Marques-Ibanez 2011). We expect the coefficient to be positive and statistically significant as well-capitalized banks may take advantage of low agency costs and may be able to raise debt under more favourable terms relative to other banks (Holmstrom & Tirole 1997, Bernanke & Blinder 1988, Stein 1995, Kishan & Opiela 2000). Also, banks with higher capital ratios will less likely to go bankrupt, lose market share or become unprofitable (Mariathasan & Merrouche 2014, Ng & Roychowdhury 2014, Berger

¹⁵Proxy for bank profitability and is calculated as the difference between the returns earned on the investment and the returns paid to the depositors and other creditors

¹⁶The data is available on: <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=IN>

& Bouwman 2009).

The explanatory variables also include a set of variables intended to control for bank characteristics. We include equity ratio, logarithm of net interest income (NII) and net interest margin (NIM)¹⁷ to control for banks' financial health. In addition, we also use the cost of funds, securities to total assets and reserves as a percentage of total assets in our regression analysis. To control for homogenous loan demand across banks, we include annual growth rate of real gross domestic product (GDP) at market prices and scale all the variables by the consumer price index (CPI) taking 2001 as the base year. The data for the macroeconomic indicators is collected from the World Bank database.¹⁸ For brevity, we discuss the definitions of all the variables employed in the study in Appendix A.

In order to assess if banks with strong balance sheets are capable to overcome financial market imperfections through access to external sources of finance such as time deposits, we re-estimate Equation 1 by employing growth rate in time deposits as the dependent variable. An attempt by the central bank to reduce the money supply in the economy by raising the policy rate leads to reductions in transaction or demand deposits. Moreover, asymmetric information and credit market frictions result in asymmetric bank responses to monetary policy shocks on the liability side of the balance sheet. Time deposits are seen as a marginal source of funding for banks during monetary tightening. However, the ease with which a bank can replace the shortfall of demand deposits with time deposits to maintain loan supply depends on the cross-sectional differences among banks (Peek et al. 1995).

Table 4 presents descriptive statistics of the main variables and controls used in the analysis. We include all the commercial banks in India and the data ranges from small to very large banks such as State Bank of India, Axis Bank, Bank of India, Dena Bank. During the period between 2005 and 2017, on average, the total loans were approximately 50% of the total assets. Also, the average amount of liquid assets in the banking system were \$257 billion and banks, on an average held 37% of total assets in liquid assets. Further, time deposits constitute approximately 44% of bank assets, which makes TD a potential source of external financing for a vast majority of banks.

In order to understand the loan distribution between small and large banks, Figure 2 shows the time-series plot of total loans to assets. The vertical axis is measured as the weighted mean of the ratio of loans to total assets. Even though the credit supply by small banks (depicted

¹⁷Proxy for bank profitability and is calculated as the difference between the returns earned on the investment and the returns paid to the depositors and other creditors

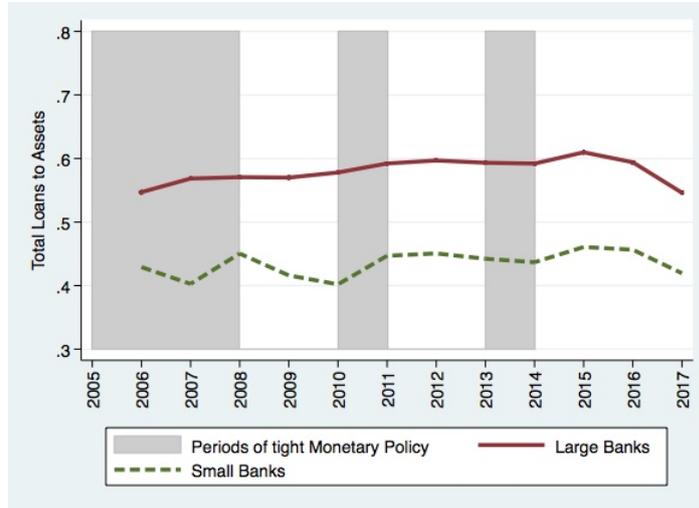
¹⁸The data is available on: <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=IN>

Table 4: Summary Statistics for bank characteristics and control variables

Variable	Observations	Mean	Std. Deviation	p25	p50	p95
Bank Size	1,113	21.0	2.41	19.25	21.6	24.2
Liquid Assets (in billion)	1,152	257	550	7.24	67.8	270
Capital Ratio	1,114	29.76	57.8	8.62	11.54	108.67
Return on Assets	1,112	0.97	1.90	0.52	1.03	3.42
Net Interest Margin	1,114	3.16	1.34	2.35	2.91	5.77
Net Interest Income	1,109	17.4	2.32	15.73	17.9	20.44
Liquid Assets/Total Assets	1,113	0.37	0.15	0.28	0.32	0.71
Reserves/Total Assets	1,094	0.065	0.05	0.041	0.056	0.15
Securities/Total Assets	1,113	0.22	0.086	0.19	0.22	0.36
Time Deposits/Total Assets	1,113	0.44	0.21	0.30	0.50	0.69
Total Loans/Total Assets	1,092	0.50	0.17	0.44	0.57	0.67
Non-performing loans/Total Loans	830	2.60	6.60	0.63	1.26	8.33

Summary statistics recorded from 2005 to 2017 for all commercial banks. All variables are at yearly frequency. All aggregates are in ratios unless specified. Bank size is measured as $\log(TotalAssets)_{i,t}$. Net Interest Income is taken in log terms. Variable definitions are provided in Appendix A.

Figure 2: Loan supply by small versus large banks



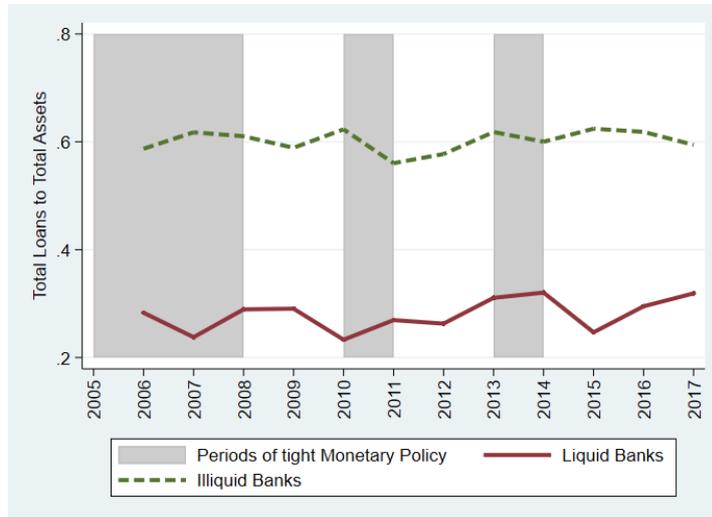
The figure shows the weighted average distribution of the ratio of total loans to total assets for small and large banks. Small banks are indicated by dashed line, whereas large banks are indicated by solid line.

by dashed line) is always lower than that of large banks, we do not see a substantial difference in the magnitude of total loans as a percentage of total assets. Moreover, the loan portfolio of small banks is relatively more volatile than the trend in credit supply for large banks. On the contrary, the growth in the loan distribution for large banks is consistently increasing. However, we observe a major dip in the loan supply of both small and large banks from 2015 onwards. It is evident from the figure that even during periods of tight monetary policy both small and large banks continued to extend loans.

Similar to Figure 2, we show graphical representation of loan supply for liquid and illiquid banks in Figure ???. We define liquid and illiquid banks based on the top 75th percentile and bottom 25th percentile of liquid assets as a percentage of total assets, respectively. The graph shows that even though the loan supply of illiquid banks is always greater than the supply of

loans for liquid banks, the latter are always seen increasing their credit supply during periods of tight monetary policy.

Figure 3: Loan supply by liquid versus illiquid banks

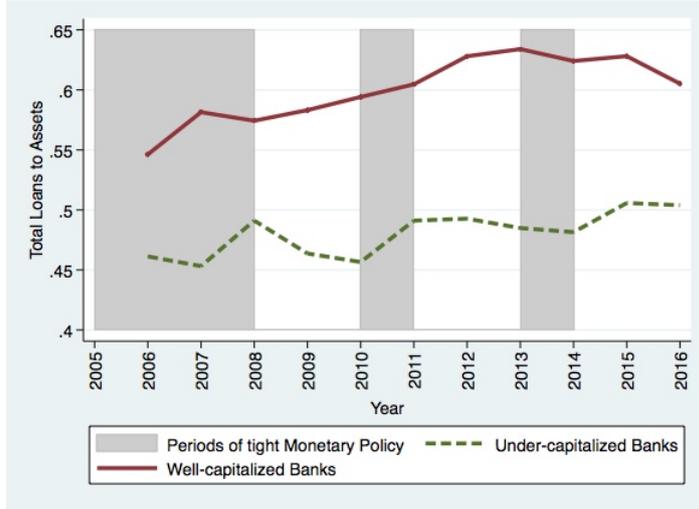


The figure shows the weighted average distribution of the ratio of total loans to total assets for liquid and illiquid banks. Illiquid banks are indicated by dashed line, whereas liquid banks are indicated by solid line.

Finally, we also present the graphical description of loan supply for banks with high and low capital ratios in Figure 4. The loan supply for both categories of banks is consistently increasing, however banks with low capital ratios extend 45% of total assets in loans on average. On the contrary, well-capitalized banks extend a higher proportion of loans, even though there is not much difference in the magnitude of loan supply for both the categories of banks. There is also a sharp decline in the loan supply by under-capitalized banks during 2008-09, we expect this to be an effect of the Great Recession on banks with lesser ability to absorb capital losses.¹⁹

¹⁹Brei et al. (2013) study the differences in the lending behaviour of banks with higher capital ratios between tranquil and crisis period. They find that some banks may not be able to translate high capital ratios into greater bank lending until their balance sheets are sufficiently strengthened.

Figure 4: Loan supply by well-capitalized versus under-capitalized banks



The figure shows the weighted average distribution of the ratio of total loans to total assets for well-capitalized and under-capitalized banks. Under-capitalized banks are indicated by dashed line, whereas well-capitalized banks are indicated by solid line.

5 Results

In this section, first, we discuss results for the existence of the BLC by assessing the impact of tight monetary policy on total loan growth based on liquidity. Second, the study provides evidence for the growth of time deposits as a result of changes in monetary policy across different levels of bank liquidity and capital ratios.

5.1 The response of total loans to changes in monetary policy: the role of *liquidity*

Table 5 presents the estimation results of the baseline loan equation with different specifications. Panel A reports results for the full sample, while Panel B and C present results for different assumptions on bank sizes, as mentioned earlier in Section 4. We employ two definitions of asset size; small banks: below 50th percentile of $\log(TotalAssets)_{i,t}$ and, large banks: above 50th percentile of $\log(TotalAssets)_{i,t}$ (the results are presented in Panel B). For the second definition, the sample is split based on 75th percentile of the $\log(TotalAssets)_{i,t}$, namely, size =1 for large banks if a bank is in the top 75th percentile of the $\log(TotalAssets)_{i,t}$ and =0 if bank is in the bottom 75th percentile of the $\log(TotalAssets)_{i,t}$ (the results are presented in Panel C).²⁰ The results in columns (1), (3), (5), (7) and (9) do not include full set of

²⁰We also run the loan supply and time deposits regressions for other definitions of asset sizes; first, small banks: below 25th percentile of the $\log(TotalAssets)_{i,t}$ and large banks: above the 25th percentile of the distribution. Second, below the 25th percentile of the $\log(TotalAssets)_{i,t}$ (small banks), between the 25th and 50th percentile (medium banks) and above 50th percentile of the $\log(TotalAssets)_{i,t}$ (large banks). Third, below the 25th percentile of the asset distribution; banks between the 25th and 75th percentile; and banks above the 75th percentile of $\log(TotalAssets)_{i,t}$. All results are consistent with our main findings, however for

control variables, whereas the rest of the columns present results using full regression specification. Our key variable of interest is the interaction term between monetary policy indicator and bank liquidity in each of these regressions respectively. The results presented in Table 5 are congruous with our a-priori expectations indicated in the previous section relating to the cross-sectional differences among banks and their varying responses to monetary changes.

The coefficient associated with the monetary policy indicator is negative and statistically significant across most specifications, suggesting that an increase in the repo rate leads to a reduction in credit supply by banks. Alternatively, the coefficient on lagged liquidity is positive and statistically significant in all the cases; implying that high liquidity is associated with greater loan supply. Most importantly, the interaction term between monetary policy and liquidity is positive and statistically significant for the entire sample as well as for both asset groups. These results imply that the effect of monetary policy on individual bank's credit supply depends on the balance sheet strength; particularly liquid banks can insulate their lending behaviour during periods of tight monetary policy.

In terms of magnitude, the coefficient on the interaction term for large banks is 0.737 (column 6, Table 5). In our data, the average amount of liquidity of a bank in the top 75th percentile of the ratio of liquid assets to total assets is 0.53, while a bank in the 25th percentile of the distribution has a ratio of liquid assets to total assets of 0.26. If we base our calculation on large bank coefficient differential of 0.737 we get a $0.20 \approx 20$ percent gap in the level of total loans across liquid and illiquid large banks.²¹ This implies that a large bank with liquid balance sheet is able to increase its credit supply by 20 percent more than a large, illiquid bank during periods of tight monetary policy.

The ineffectiveness of tight monetary policy on large banks can be attributed to various reasons. First, a sudden increase in repo rate by the central bank could induce large banks to better access short-term liabilities and convert them into illiquid loans. Second, some large banks are better known for their 'too big to fail' nature, which further diminishes the risk by investors due to the availability of bailouts if required. As a result large banks with liquid balance sheets can increase their loan supply even during periods of tight monetary policy.

Next, we turn to the loan response of small banks with cross-sectional differences in liquidity. The interaction term between policy rate dummy and lagged value of liquidity is positive

brevery, we do not show results for all the different definitions of bank size, but only for the third definition. The results are discussed in the robustness section.

²¹The calculation of 20 percent gap is as follow: Impact of monetary policy shock on loan supply for a liquid bank in the top 75th percentile of the distribution= $0.53 * 0.737 = 0.39$ and the impact for an illiquid bank in the bottom 25th percentile= $0.26 * 0.737 = 0.19$. Hence, the difference will give us the percent gap in the level of loans between liquid and illiquid large banks.

Table 5: The impact of monetary policy changes on loan supply: Liquidity

	Growth of Total Loans									
	Panel A		Panel B				Panel C			
	Full Sample		Small Banks		Large Banks		Small Banks		Large Banks	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\Delta \log(Loans)_{i,t-1}$	0.134 (0.117)	0.132 (0.115)	0.123 (0.122)	0.089 (0.132)	0.271*** (0.049)	0.217*** (0.064)	0.128 (0.121)	0.127 (0.122)	0.348*** (0.080)	0.120 (0.111)
$MonetaryPolicy_{t-1}$	-0.139** (0.058)	-0.154** (0.063)	-0.057 (0.091)	-0.099 (0.100)	-0.130* (0.068)	-0.179** (0.069)	-0.130** (0.062)	-0.158** (0.068)	0.013 (0.036)	-0.083* (0.043)
$Liquidity_{i,t-1}$	0.810* (0.445)	0.966** (0.368)	0.959* (0.543)	1.187** (0.448)	0.359** (0.160)	0.270 (0.193)	0.831* (0.479)	1.013** (0.400)	0.569*** (0.164)	0.167 (0.211)
$MonetaryPolicy_{t-1} \times Liquidity_{i,t-1}$	0.682*** (0.212)	0.728*** (0.218)	0.519** (0.252)	0.638** (0.250)	0.622*** (0.226)	0.737*** (0.248)	0.674*** (0.218)	0.732*** (0.222)	0.170 (0.128)	0.368** (0.145)
GDP growth	-0.004 (0.006)	-0.004 (0.007)	-0.013 (0.014)	-0.005 (0.015)	0.004 (0.004)	0.001 (0.003)	-0.006 (0.009)	0.002 (0.010)	0.005 (0.004)	0.008* (0.004)
Equity Ratio		-1.039 (0.841)		-1.063 (0.697)		-2.756*** (0.643)		-0.940 (0.815)		-2.200 (1.525)
Net Interest Income		0.104 (0.064)		0.167 (0.111)		-0.069 (0.042)		0.142* (0.081)		-0.159*** (0.055)
Net Interest Margin		0.041 (0.038)		0.010 (0.038)		0.088*** (0.021)		0.030 (0.041)		0.108*** (0.033)
Cost of funds		0.015 (0.028)		0.014 (0.040)		0.004 (0.047)		0.003 (0.034)		0.014 (0.056)
$\left(\frac{TimeDeposits}{Assets}\right)_i$		0.495* (0.267)		0.945** (0.450)		0.365** (0.167)		0.600* (0.337)		0.581** (0.246)
Cost of deposits		-0.029 (0.021)		-0.030 (0.027)		-0.022 (0.046)		-0.036 (0.022)		-0.055 (0.049)
Observations	792	784	362	354	430	430	562	554	230	230
R-squared	0.133	0.194	0.130	0.251	0.225	0.312	0.131	0.201	0.295	0.440
Number of Banks	95	95	53	53	51	51	78	78	28	28
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The dependent variable in Column (1)- (10) is the annual growth of total loans. Column (1) and (2) represents loan growth for the full sample. Panel B defines banks based on 50th percentile. Small banks are defined as the ones that lie below the 50th percentile of the $\log(TotalAssets)_{i,t}$ in Column (3) and (4) and large banks are defined as the one that lie in top 50th percentile of the $\log(TotalAssets)_{i,t}$ in Column (5) and (6). Panel C defines banks based on 75th percentile. Small banks are defined as the ones that lie below the 75th percentile of the $\log(TotalAssets)_{i,t}$ in Column (7) and (8), large banks are defined as the one that lie in top 75th percentile of the $\log(TotalAssets)_{i,t}$ in Column (9) and (10). $Size_i$ is a categorical variable that takes the value 0 for small banks and 1 for large banks. $MonetaryPolicy$ is the monetary policy indicator that takes the value of 1 during contractionary monetary policy episodes and 0 otherwise. $Liquidity$ is defined as the ratio of liquid assets to total assets. Constant terms included but not reported. Robust standard errors in parentheses. ***, **, * represent significance at the 1%, 5% and 10%, respectively.

and statistically significant suggesting that within the bank size classes, small banks with liquid balance sheets are less responsive to monetary policy changes.

Our results complement the findings of Kashyap & Stein (2000) that support the existence of a bank lending channel for small banks but with less liquid balance sheets. As presented in Section 4 (Table 3), the small and highly liquid banks majorly consists of foreign banks that have international linkages and can cater to more globally-oriented businesses, which may have different loan demand responses to changes in domestic monetary policy. Moreover, Cetorelli & Goldberg (2012) suggest that international linkages of banks may provide them with higher possibility to shield their lending behaviour from monetary policy.²² These results highlight the importance of liquidity in providing both large and small banks with a cushion to protect against capital losses or any other unexpected expenses as a liquid bank is better positioned to face monetary shocks.

5.2 The Working Mechanism of Time Deposits: *Liquidity*

Our results in Section 5.1 suggest that cross-sectional variations in bank liquidity play a key role in determining the bank lending channel in India. Motivated by the above results, we investigate the time deposits insulation channel, whereby banks with strong balance sheets are better placed to overcome market frictions and have better access to external sources of funding, such as time deposits during monetary policy tightening.

Table 6 present results for the effect of contractionary monetary policy on the growth rate of time deposits. As before, we present results for the full sample as well as different sub-samples of asset size categories. Most of the coefficients for monetary policy indicator are negative and statistically significant, suggesting that time deposits also drop during episodes of monetary policy contractions.

The coefficients for the interaction term between policy rate and liquidity is positive and statistically significant for both groups of banks (small and large) and for the full sample. Specifically, our results show that large banks with relatively liquid balance sheets have better access to external sources of finance and can replace the fall in their transaction deposits through TD. Quantitatively, a liquid bank will raise more time deposits than an illiquid bank by 20 percent (derived from column 6, Table 6) during monetary tightening.²³

Comparing the coefficients of the interaction terms between policy rates and liquidity in Table

²²For further analysis on foreign banks, we investigate the existence of bank lending channel for domestic and foreign banks in India. The results are presented in Section 6 (Robustness Checks).

²³Liquid Bank: $0.762 \times 0.53 = 0.40$ and an illiquid bank: $0.762 \times 0.26 = 0.20$; gap between the two is 20%.

5 and Table 6, we infer that relative to large and illiquid banks, banks with high liquidity on their balance sheets can completely offset their credit supply by raising time deposits during monetary contractions. Finally, for the small banks, the effect of

Table 6: The impact of monetary policy changes on Time Deposits

	Growth of Time Deposits									
	Panel A		Panel B				Panel C			
	Full Sample		Small Banks		Large Banks		Small Banks		Large Banks	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>MonetaryPolicy</i> _{t-1}	-0.191** (0.097)	-0.363* (0.211)	-0.169 (0.194)	-0.483** (0.234)	-0.156* (0.088)	-0.218** (0.094)	-0.226* (0.129)	-0.402*** (0.152)	-0.031 (0.088)	-0.083* (0.048)
<i>Liquidity</i> _{i,t-1}	0.615** (0.251)	0.630 (0.485)	0.658 (0.405)	0.874* (0.509)	0.039 (0.188)	-0.479 (0.338)	0.668** (0.306)	0.740** (0.372)	-0.366 (0.283)	-1.000*** (0.256)
<i>MonetaryPolicy</i> _{t-1} × <i>Liquidity</i> _{i,t-1}	0.647** (0.254)	1.123* (0.632)	0.726* (0.438)	1.266** (0.568)	0.708** (0.273)	0.762** (0.309)	0.671** (0.317)	1.170*** (0.402)	0.313 (0.298)	0.317** (0.148)
GDP growth	0.024** (0.010)	0.014* (0.008)	0.005 (0.021)	0.026 (0.024)	0.013*** (0.003)	0.005 (0.003)	0.027* (0.014)	0.017 (0.014)	0.008 (0.005)	0.003 (0.005)
Equity Ratio		-0.858 (1.071)		-1.070 (0.662)		-1.310 (0.857)		-0.918* (0.500)		-3.293 (2.276)
Net Interest Income		-0.091 (0.075)		-0.104 (0.109)		-0.141*** (0.050)		-0.075 (0.070)		-0.238*** (0.057)
Net Interest Margin		0.156** (0.061)		0.197*** (0.057)		0.043* (0.025)		0.164*** (0.040)		0.084** (0.032)
Cost of Funds		0.014 (0.043)		-0.000 (0.035)		-0.019 (0.014)		0.007 (0.025)		-0.022 (0.026)
Cost of Borrowings		0.000*** (0.000)		0.000 (0.000)		-0.000 (0.001)		0.000 (0.000)		-0.000 (0.002)
Return On Assets		0.006 (0.034)		0.001 (0.039)		0.055 (0.048)		0.004 (0.027)		-0.058** (0.025)
Return On Equity		0.001 (0.003)		-0.001 (0.008)		-0.001 (0.003)		0.000 (0.004)		0.003** (0.002)
Observations	888	831	414	357	474	471	642	585	230	230
R-squared	0.065	0.133	0.045	0.155	0.137	0.309	0.068	0.138	0.174	0.451
Number of Banks	102	97	59	54	53	51	86	81	28	28
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The dependent variable in Column (1)- (10) is the annual growth of time deposits. Column (1) and (2) represents loan growth for the full sample. Panel B defines banks based on 50th percentile. Small banks are defined as the ones that lie below the 50th percentile of the $\log(TotalAssets)_{i,t}$ columns (3) and (4) and large banks are defined as the one that lie in top 50th percentile of the $\log(TotalAssets)_{i,t}$ Column (5) and (6). Panel C defines banks based on 75th percentile. Small banks are defined as the ones that lie below the 75th percentile of the $\log(TotalAssets)_{i,t}$ columns (7) and (8), large banks are defined as the one that lie in top 75th percentile of the $\log(TotalAssets)_{i,t}$. $Size_i$ is a categorical variable that takes the value 0 for small banks and 1 for large banks. *MonetaryPolicy* is the monetary policy indicator that takes the value of 1 during contractionary monetary policy episodes and 0 otherwise. *Liquidity* is defined as the ratio of liquid assets to total assets. Constant terms included but not reported. Robust standard errors in parentheses. ***, **, * represent significance at the 1%, 5% and 10%, respectively.

monetary policy on the sensitivity of raising time deposits is statistically significant for all the coefficients of the interaction term, implying that small banks with highly liquid balance sheets are able to insulate their asset side of the balance sheet by raising time deposits. In terms of magnitude, a small bank with high liquidity will be able to raise time deposits by 34 percent more than bank with similar asset size but less liquid.²⁴

Liquid banks are subject to diversified depositor population and increased customer confidence (Armstrong & Caldwell 2008), hence we suggest that these banks are able to raise time deposits better than illiquid banks. However, the response by small banks is more than twice as large as the response by large banks with high liquidity. The overall results strongly support our hypothesis; highly liquid banks are better able to raise large time deposits from external sources relative to banks with weaker balance sheets. Exploiting this advantage in raising external finance, banks with high liquidity are also better able to shield their loan portfolios during monetary policy tightening.

5.3 The response of total loans and time deposits to changes in monetary policy: the role of *Capital Ratio*

In order to identify differential responses of loans and time deposits during contractionary monetary policy, we further investigate the role of capital ratios. Similar to the section above, we present results for full sample as well as heterogeneous analysis. Our results are motivated by the following idea: higher capital provides banks with a cushion to allow them to absorb adverse liquidity shocks without experiencing insolvency, thereby maintaining their loan supply. Table 7 provides evidence on the bank lending channel for well-capitalized banks. Column (1) and (2) show the impact of monetary policy on the supply of loans for the entire sample. Columns (3)-(4) and (7)-(8) report results for small banks, while columns (5)-(6) and (9)-(10) presents the findings for large banks with high capital ratios. Our primary variable of interest is the interaction term between the monetary policy dummy and lagged value of Tier 1 capital adequacy ratio, which can be interpreted as the effect of monetary policy on bank lending for banks with high capital ratios.

Our findings show a positive and statistically significant coefficient for most of the interaction terms, suggesting that higher policy rates by the central bank stimulates loan supply for banks with high capital ratios. In other words, credit supply is more sensitive to monetary policy if banks have lower capital ratios. A well-capitalized bank witnesses reduced agency problems with investors, thereby leading to an increase in credit supply (Holmstrom & Tirole 1997,

²⁴Liquid Bank: $1.266 \times 0.53 = 0.67$ and an illiquid bank: $1.266 \times 0.26 = 0.33$; gap between the two is 34%

Diamond & Rajan 2011). We find consistent results for small banks across all size definitions, however we find no evidence for the credit supply behaviour of large banks with high capital ratios during monetary tightening. The specification for investigating the impact of monetary policy on loan supply for well-capitalized banks include bank fixed

Table 7: The impact of monetary policy changes on loan supply: Capital Ratios

	Growth of Total Loans									
	Panel A		Panel B				Panel C			
	Full Sample		Small Banks	Large Banks	Small Banks	Large Banks	Small Banks	Large Banks		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\Delta \log(Loans)_{i,t-1}$	0.118 (0.133)	0.227* (0.115)	0.091* (0.050)	0.229*** (0.056)	0.315*** (0.094)	0.259*** (0.061)	0.110 (0.138)	0.222* (0.121)	0.031 (0.141)	-0.010 (0.142)
$MonetaryPolicy_{t-1}$	0.029 (0.038)	0.006 (0.027)	0.041 (0.078)	0.086 (0.084)	0.094*** (0.033)	0.074** (0.030)	0.034 (0.052)	0.041 (0.039)	-0.001 (0.050)	-0.001 (0.057)
$CapitalRatio_{i,t-1}$	0.001 (0.001)	0.000 (0.001)	0.001 (0.001)	-0.000 (0.001)	0.004 (0.005)	0.005 (0.005)	0.001 (0.001)	0.000 (0.001)	-0.001 (0.007)	0.002 (0.006)
$MonetaryPolicy_{t-1} \times CapitalRatio_{i,t-1}$	0.004* (0.002)	0.004** (0.002)	0.004** (0.002)	0.004* (0.002)	-0.004 (0.003)	-0.004 (0.003)	0.003* (0.002)	0.004** (0.002)	0.002 (0.005)	0.001 (0.006)
GDP growth	-0.008 (0.006)	0.009 (0.008)	-0.016 (0.017)	-0.001 (0.016)	0.004 (0.003)	0.008** (0.004)	-0.012 (0.014)	0.004 (0.009)	-0.012*** (0.003)	-0.007* (0.004)
Equity Ratio		-0.787 (1.140)		-0.491 (0.478)		-1.727*** (0.591)		-0.622 (1.133)		-1.974 (1.208)
Net Interest Income		0.030 (0.062)		0.126* (0.072)		-0.124*** (0.037)		0.066 (0.081)		-0.108*** (0.034)
Net Interest Margin		0.044 (0.044)		0.007 (0.037)		0.063*** (0.020)		0.040 (0.049)		0.052 (0.031)
Cost of Funds		0.026 (0.029)		0.045 (0.028)		-0.051*** (0.017)		0.008 (0.032)		0.011 (0.052)
Cost of Deposits		-0.037 (0.024)		-0.043* (0.026)				-0.039 (0.025)		-0.043 (0.050)
Cost of Borrowings		0.000*** (0.000)		0.000 (0.000)				0.000*** (0.000)		-0.001 (0.001)
$\left(\frac{TimeDeposits}{Assets}\right)_i$		0.652*** (0.246)						0.759** (0.320)		0.376* (0.183)
Observations	792	736	362	309	430	430	562	506	230	230
R-squared	0.079	0.199	0.104	0.203	0.178	0.282	0.077	0.190	0.495	0.546
Number of Banks	95	91	53	49	51	51	78	74	28	28
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The dependent variable in Column (1)- (10) is the annual growth of total loans. Column (1) and (2) represents loan growth for the full sample. Panel B defines banks based on 50th percentile. Small banks are defined as the ones that lie below the 50th percentile of the $\log(TotalAssets)_{i,t}$ Column (3) and (4) and large banks are defined as the one that lie in top 50th percentile of the $\log(TotalAssets)_{i,t}$ Column (5) and (6). Panel C defines banks based on 75th percentile. Small banks are defined as the ones that lie below the 75th percentile of the $\log(TotalAssets)_{i,t}$ Column (7) and (8), large banks are defined as the one that lie in top 75th percentile of the $\log(TotalAssets)_{i,t}$. $Size_i$ is a categorical variable that takes the value 0 for small banks and 1 for large banks. $MonetaryPolicy$ is the monetary policy indicator that takes the value of 1 during contractionary monetary policy episodes and 0 otherwise. $CapitalRatio$ is defined as the Tier 1 Capital Adequacy Ratio. Constant terms included but not reported. Robust standard errors in parentheses. ***, **, * represent significance at the 1%, 5% and 10%, respectively.

Table 8: The impact of monetary policy changes on Time Deposits

	Growth of Time Deposits									
	Panel A		Panel B				Panel C			
	Full Sample		Small Banks		Large Banks		Small Banks		Large Banks	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>MonetaryPolicy</i> _{t-1}	-0.035 (0.024)	-0.099*** (0.034)	-0.162** (0.078)	-0.192** (0.087)	0.093** (0.044)	0.045 (0.037)	-0.078** (0.038)	-0.117** (0.047)	-0.004 (0.068)	-0.030 (0.056)
<i>CapitalRatios</i> _{i,t-1}	0.002** (0.001)	0.003** (0.001)	0.002 (0.001)	0.002* (0.001)	-0.003 (0.006)	0.001 (0.007)	0.002* (0.001)	0.002* (0.001)	-0.004 (0.007)	0.012 (0.008)
<i>MonetaryPolicy</i> _{t-1} × <i>CapitalRatios</i> _{i,t-1}	0.006*** (0.001)	0.010*** (0.002)	0.008*** (0.002)	0.012*** (0.002)	-0.004 (0.004)	-0.004 (0.003)	0.007*** (0.001)	0.010*** (0.002)	0.005 (0.007)	0.005 (0.006)
GDP growth	-0.003 (0.005)	0.002 (0.004)	-0.008 (0.018)	-0.002 (0.015)	0.005* (0.003)	0.005 (0.004)	0.001 (0.008)	0.002 (0.006)	0.007 (0.005)	0.003 (0.004)
Equity Ratio		0.382 (0.907)		1.008 (1.137)		-1.569* (0.866)		0.615 (0.955)		-2.787** (1.329)
Net Interest Income		-0.052 (0.048)		-0.033 (0.084)		-0.136*** (0.050)		-0.030 (0.061)		-0.199*** (0.066)
Net Interest Margin		0.025 (0.033)		0.012 (0.057)		0.043 (0.029)		0.015 (0.041)		0.076*** (0.026)
Cost of Funds		0.012 (0.022)		0.039 (0.039)		-0.027* (0.016)		0.011 (0.029)		0.006 (0.027)
Cost of Borrowings		0.000 (0.000)		0.000** (0.000)		-0.000 (0.001)		0.000 (0.000)		0.001 (0.001)
Return On Assets		0.006 (0.033)		-0.011 (0.032)		0.048 (0.043)		0.008 (0.035)		-0.061* (0.032)
Return On Equity		0.001 (0.002)		0.008*** (0.003)		-0.001 (0.002)		0.001 (0.003)		0.006*** (0.002)
Observations	680	656	209	185	471	471	434	410	246	246
R-squared	0.289	0.393	0.333	0.484	0.213	0.293	0.297	0.404	0.305	0.446
Number of Banks	86	83	43	40	51	51	70	67	28	28
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The dependent variable in Column (1)- (10) is the annual growth of time deposits. Column (1) and (2) represents loan growth for the full sample. Panel B defines banks based on 50th percentile. Small banks are defined as the ones that lie below the 50th percentile of the $\log(\text{TotalAssets})_{i,t}$ Column (3) and (4) and large banks are defined as the one that lie in top 50th percentile of the $\log(\text{TotalAssets})_{i,t}$ Column (5) and (6). Panel C defines banks based on 75th percentile. Small banks are defined as the ones that lie below the 75th percentile of the $\log(\text{TotalAssets})_{i,t}$ Column (7) and (8), large banks are defined as the one that lie in top 75th percentile of the $\log(\text{TotalAssets})_{i,t}$. $Size_i$ is a categorical variable that takes the value 0 for small banks and 1 for large banks. $MonetaryPolicy$ is the monetary policy indicator that takes the value of 1 during contractionary monetary policy episodes and 0 otherwise. $CapitalRatio$ is defined as the Tier 1 Capital Adequacy Ratio. Robust standard errors in parentheses. ***, **, * represent significance at the 1%, 5% and 10%, respectively.

effects and GDP growth rate that controls for business cycle and time-dependent differences between well-capitalized and other banks, therefore the differences related to monetary tightening are unlikely to be due to the general differences between under and well-capitalized banks.

We argue that since the banking sector is regulated, capital plays an important role in analysing the transmission of monetary policy. Moreover, capital buffers maintained by banks sets an upper bound on its risk-weighted assets as percentage to equity (Goodhart et al. 2013). As a result, well-capitalized banks extend more loans as they have higher profit margins. In other words, banks with capital buffers can charge higher interest rate on loans and/or pay less interest on deposits due to the lower probability of facing bankruptcy risks.

Table 8 shows the detailed results from estimating the baseline specifications for growth rate of time deposits taken as the dependent variable. For the full sample, time deposits increase in response to a monetary policy tightening for banks with high capital ratios. Within the two groups of banks, the coefficient of the interaction term between policy rate indicator and lagged value of capital ratio is positive and statistically significant for small banks. We suggest that lending by small and well-capitalized banks is less affected by a monetary policy tightening due to their relative advantage in raising alternative sources of finance such as time deposits. Again, we find no evidence for large banks with high capital ratios.

A quick recap of our results so far reveal that during contractionary monetary policy, BLC is ineffective for banks with higher liquidity and capital ratios across varying bank sizes as they are able to maintain their loan supply. This is because during policy tightening, the commercial banks must reduce their reservable demand deposits. However, if they are able to supplement these deposits by raising alternative sources of finance such as time deposits (TD), their loan supply should be unaffected. Specifically, as seen from the results above, small and large liquid banks, and small banks with high capital ratios are less responsive to monetary policy and are able to raise funds through alternative sources during monetary tightening.

6 Robustness Checks

We conduct four sets of robustness checks in this paper. First, there is little consensus on the definition of bank sizes. Kashyap & Stein (2000), Kishan & Opiela (2000) split banks into six asset categories,²⁵ whereas Gambacorta (2005) splits the sample into two asset category,

²⁵Banks are divided into the following size categories: banks below 75th percentile of asset size, between 75th and 90th percentile; between 90th and 95th percentile, between 95th and 98th percentile, between 98th and 99th percentile and banks above the 99th percentile. Kishan & Opiela (2000) use an alternative measure for splitting

i.e., small (average bank size is below the third quartile) and large banks (average bank size above 95th percentile) and Campello (2002), Cetorelli & Goldberg (2012) define a small bank in the 90th percentile of size distribution.²⁶ Therefore, for heterogeneous analysis, we split our sample into three bank sizes, namely, small (banks with asset size below the 25th percentile), medium (asset size between 25th and 75th percentile) and large banks (asset size above the 75th percentile). The results for our heterogenous analysis is reported in Appendix B.

Second, we use alternative measures for bank liquidity and capital ratios to ascertain if the main findings are not affected by our choice of computations for various bank characteristics. We define bank liquidity as the ratio of securities-to-total assets (Kashyap & Stein 2000) and a bank's capital position is measured by the ratio of equity-to-total assets (Kishan & Opiela 2000, Tambini 2018). Third, we show that our results are robust when continuous variable for monetary policy is employed in the analysis instead of categorial variable. Specifically, we use the change in repo rate ($\Delta Repo_{t}$), which represents the measure of a monetary policy shock. Appendix C and D report the second and third set of robustness checks respectively.²⁷ Finally, we investigate the lending response of domestic and foreign banks to monetary shocks. Foreign banks have their head offices in countries outside India, hence we conjecture that foreign banks can respond to domestic monetary policy differently than domestic banks. The results are presented in Appendix E.

Table 9-12 presents results for loan specifications and time deposits employing an alternate definition of bank size to capture the effect of bank liquidity and capital ratio on the lending response of banks to monetary policy tightening. The estimated coefficients of interest are positive and statistically significant; consistent with the previous results. In relation to the time deposits insulation channel, the findings confirm an increase in time deposits by small, medium and large banks with high liquidity during monetary contractions (see Table 10). This might be due to a fall in the number of observations reducing statistical power to pick any significant impact. Further, the robustness checks confirm an increase in loan growth as well as time deposits growth for small banks with high capital ratio when monetary policy indicator is interacted with capital adequacy ratio. As before, we do not find any evidence for large banks with high capital ratios.

In the second robustness check, Table 13-16 report results for growth in loan supply and time deposits by taking different measures for liquidity and capital ratios (ratio of securities-to-

the sample into various bank sizes, however the groups are rough approximations of Kashyap & Stein (2000)
²⁶The definition of large bank is same for Campello (2002), Cetorelli & Goldberg (2012) as in Gambacorta (2005).

²⁷The results for all robustness checks are presented using the asset size definitions earlier employed in the main analysis (Section 5).

assets ratio and equity ratio, respectively). Consistent with previous results, the coefficients on the interaction term between monetary policy indicator and liquidity as well as the interaction between policy rate dummy and capital ratio is positive and statistically significant, however we observe that large banks with liquid balance sheets maintain their credit supply less intensively, relative to the main results, when monetary policy is tightened. In terms of equity ratio, we find that large banks with high equity ratios are able to increase their credit supply as well as raise large time deposits as a response to tight monetary policy. Therefore, we suggest that our results for large, well-capitalized banks are sensitive to different measures of capital ratios and different definitions of bank size employed. Overall, our results are robust to different assumptions for measures of liquidity and capital.

For the third robustness check, we include the policy rate as a continuous variable instead of categorical indicator. Monetary policy is defined as the yearly difference of the central bank repo rate, whereas liquidity and capital ratio are taken as same as before, i.e., lagged values of ratio of liquid assets-to-assets and Tier 1 capital adequacy ratio, respectively. The results for the response of total loans and time deposits to changes in monetary policy, using continuous interactions are presented in Table 17 through 20. The results confirm a positive relation between monetary contraction on credit supply and time deposit growth for small and large banks with highly liquid balance sheets. Similarly, the robustness results provide validation for the positive and statistically significant coefficients of the interaction term between monetary policy and capital ratio for small banks.

The results in Table 20 through 23 (Appendix E) provides evidence on the lending channel for domestic and foreign banks. Motivated by Cetorelli & Goldberg (2012), we show that both domestic and foreign banks with high liquid balance sheets are better able to maintain their loan portfolios during monetary policy tightening. On the contrary, for banks with high capital ratios, we find that only foreign banks increase their credit supply during monetary policy contractions. Further, the effect of monetary policy changes on growth rate of time deposits is robust to our various specifications about domestic and foreign banks. The consistency of results across all robustness checks confirm that the main results of the paper are not affected by any changes in the specifications and measurement of variables.

7 Conclusions

In this study we provide evidence on the ineffectiveness of the conventional bank lending channel in the transmission of domestic monetary policy. We also investigate the existence of

a time deposits insulation channel, whereby banks with better access to external sources of funds such as large time deposits are able to substitute lost transaction deposits and hence insulate their lending from the effects of monetary policy tightening. Using Indian commercial bank-level data, we show that the mechanism of time deposits modifies the efficiency of the traditional bank-lending channel for some banks with cross-sectional differences in liquidity and capital ratios.

Splitting the data based on asset size, the empirical results show the following. First, we find that the lending behaviour of small and large banks with liquid balance sheets are less sensitive to changes in monetary policy. Second, using data on time deposits, we show that liquidity is an important characteristic 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 the lending behaviour of banks if they are able to easily replace the loss in lending with external finance. Finally, we take the capital ratio as another bank characteristic and find similar results to liquidity; small and well-capitalized banks are better able to insulate their loan behaviour by raising time deposits during monetary tightening. We do not find consistent and robust results for large and well-capitalized banks, however the results are sensitive to different measures of capital ratio and asset sizes.

Investigating the bank-lending channel is useful for monetary authority in designing appropriate policies to achieve price stability or inflation targeting and serves as a potential policy implication. Further, the linkage between monetary policy and the business cycle is of policy relevance. This is critical because the financial positions of banks vary when there are changes in economic performance or stages of the business cycle. Hence, this line of research may help policy makers determine the relevance of the credit channel. Finally, 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 allows us to better understand the way in which the bank lending channel operates as a transmission mechanism of monetary policy in an emerging economy. The area of focus for future research will be to incorporate loan-level data to understand the transmission of policy changes and the effects of bank characteristics on loan behaviour at the borrower-level.

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A Variables used in the study:

- **Bank Size:** $\log(\text{TotalAssets})_{i,t}$
- **Capital Ratio:** Tier 1 Capital Adequacy Ratio = $\left(\frac{\text{Bank's Core Equity Capital}}{\text{Risk-Weighted Assets}}\right)_{i,t}$
- **Equity Ratio:** $\left(\frac{\text{Equity Capital}}{\text{Total Assets}}\right)_{i,t}$
- **Liquid Assets:** Cash in hand + Balances with RBI + Balances with Banks in India + Balances with Banks outside India + Money at call and short notice + Government Securities
- **Liquidity:** $\left(\frac{\text{Liquid Assets}}{\text{Total Assets}}\right)_{i,t}$
- **Loan Growth:** $\left(\frac{\log(\text{Loans})_t}{\log(\text{Loans})_{t-1}}\right)$
- **Net Interest Margin:** $\left(\frac{\text{Investment Returns} - \text{Interest Expenses}}{\text{Average Earning Assets}}\right)_{i,t}$
- **Return on Assets:** $\left(\frac{\text{Net Income}}{\text{Average Total Assets}}\right)_{i,t}$
- **Time Deposits Growth:** $\left(\frac{\log(\text{Time Deposits})_t}{\log(\text{Time Deposits})_{t-1}}\right)$
- **Weighted Growth Rate of Loans:** Loan Growth* $\left(\frac{\text{Loans}_i}{\text{Total Loans of the banking system}_i}\right)$

B Robustness Results 1

Table 9: The impact of monetary policy changes on loan supply: Liquidity

	Growth of Total Loans					
	Small Banks		Medium Banks		Large Banks	
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta \log(\text{Loans})_{i,t-1}$	-0.047 (0.089)	-0.037 (0.087)	0.280** (0.136)	0.229*** (0.048)	0.034 (0.106)	0.119 (0.111)
MonetaryPolicy_t	-0.176 (0.126)	-0.343** (0.139)	-0.174 (0.155)	-0.230* (0.125)	-0.057* (0.033)	-0.084* (0.045)
$\text{Liquidity}_{i,t-1}$	1.739*** (0.412)	1.818*** (0.521)	0.873* (0.478)	0.098 (0.257)	0.306* (0.156)	0.215 (0.208)
$\text{MonetaryPolicy} \times \text{Liquidity}_{i,t-1}$	0.556** (0.268)	0.828*** (0.275)	0.864* (0.511)	1.149*** (0.374)	0.251** (0.113)	0.379** (0.150)
GDP growth	-0.016 (0.027)	-0.022 (0.021)	0.007 (0.008)	0.009 (0.010)	-0.006 (0.004)	0.006 (0.004)
Equity Ratio		-1.270* (0.654)		-0.375 (0.418)		-1.798 (1.437)
Net Interest Income		0.124 (0.112)		0.078 (0.054)		-0.175*** (0.054)
Net Interest Margin		0.075 (0.059)		0.078** (0.034)		0.114*** (0.033)
Cost of Funds		-0.055 (0.039)		0.011 (0.020)		-0.039* (0.021)
$\left(\frac{\text{TimeDeposits}}{\text{Assets}}\right)_i$		-0.352 (0.489)		0.864*** (0.281)		0.574** (0.259)
Observations	165	157	397	397	230	230
R-squared	0.247	0.287	0.306	0.282	0.501	0.436
Number of Banks	28	28	55	55	28	28
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

The dependent variable in Column (1)- (6) is the annual growth rate of total loans. Column (1) and (2) represents loan growth for small banks, Column (3) and (4) are for medium banks and Column (5)-(6) for large banks. Small banks are defined as the ones that lie below the 25th percentile of the $\log(\text{TotalAssets})_{i,t}$, medium banks are between 25th and 50th percentile and large banks are defined as the one that lie above the 75th percentile of the $\log(\text{TotalAssets})_{i,t}$ of the $\log(\text{TotalAssets})_{i,t}$. MonetaryPolicy is the monetary policy indicator that takes the value of 1 during contractionary monetary policy episodes and 0 otherwise. Liquidity is defined as the ratio of liquid assets to total assets. Constant terms included but not reported. Robust standard errors in parentheses. ***, **, * represent significance at the 1%, 5% and 10%, respectively.

Table 10: The impact of monetary policy changes on Time Deposits

	Growth of Time Deposits					
	Small Banks		Medium Banks		Large Banks	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>MonetaryPolicy</i> _t	1.040 (0.729)	2.910** (1.241)	1.082** (0.435)	0.868*** (0.325)	0.334 (0.312)	0.368** (0.158)
<i>Liquidity</i> _{i,t-1}	1.483 (1.081)	-2.462** (0.863)	-0.748*** (0.289)	-0.586** (0.261)	-0.561 (0.401)	-1.094*** (0.246)
<i>MonetaryPolicy</i> × <i>Liquidity</i> _{i,t-1}	1.395* (0.752)	5.269** (2.160)	0.819* (0.439)	0.606* (0.345)	0.013 (0.229)	0.281* (0.141)
GDP growth	0.018 (0.025)	0.005 (0.033)	-0.002 (0.012)	0.004 (0.009)	0.008 (0.005)	-0.003 (0.005)
Equity Ratio		0.229 (1.597)		-2.444*** (0.422)		-4.291* (2.235)
Net Interest Income		-0.213 (0.470)		-0.176*** (0.051)		-0.217*** (0.055)
Net Interest Margin		0.070 (0.136)		0.125*** (0.033)		0.088** (0.036)
Cost of Funds		0.073 (0.043)		0.043** (0.018)		0.029 (0.057)
Observations	77	53	398	451	230	230
R-squared	0.335	0.267	0.045	0.307	0.179	0.438
Number of Banks	18	15	55	61	28	28
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

The dependent variable in Column (1)- (6) is the annual growth rate of time deposits. Column (1) and (2) represents loan growth for small banks, Column (3) and (4) are for medium banks and Column (5)-(6) for large banks. Small banks are defined as the ones that lie below the 25th percentile of the $\log(TotalAssets)_{i,t}$, medium banks are between 25th and 50th percentile and large banks are defined as the one that lie above the 75th percentile of the $\log(TotalAssets)_{i,t}$ of the $\log(TotalAssets)_{i,t}$. *MonetaryPolicy* is the monetary policy indicator that takes the value of 1 during contractionary monetary policy episodes and 0 otherwise. *Liquidity* is defined as the ratio of liquid assets to total assets. Constant terms included but not reported. Robust standard errors in parentheses. ***, **, * represent significance at the 1%, 5% and 10%, respectively.

Table 11: The impact of monetary policy changes on loan supply: Capital Ratios

	Growth of Total Loans					
	Small Banks		Medium Banks		Large Banks	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>MonetaryPolicy_t</i>	-0.247*	-0.308**	-0.001	-0.030	0.094**	0.064
	(0.138)	(0.139)	(0.069)	(0.067)	(0.047)	(0.046)
<i>CapitalRatio_{i,t-1}</i>	0.002	0.002	-0.002	-0.003	-0.002	0.002
	(0.001)	(0.002)	(0.006)	(0.006)	(0.005)	(0.005)
<i>MonetaryPolicy</i> × <i>CapitalRatio_{i,t-1}</i>	0.006***	0.006***	0.012**	0.012**	-0.005	-0.004
	(0.002)	(0.002)	(0.006)	(0.005)	(0.005)	(0.005)
GDP growth	-0.054**	-0.058**	0.018*	0.014*	0.004	-0.001
	(0.026)	(0.025)	(0.009)	(0.008)	(0.004)	(0.003)
Equity Ratio		-1.278**		-0.615		-1.311
		(0.635)		(1.467)		(1.463)
Net Interest Income		-0.211		-0.145		-0.118***
		(0.163)		(0.093)		(0.024)
Net Interest Margin		0.094*		0.109		0.051***
		(0.056)		(0.066)		(0.019)
Cost of Funds		-0.019		0.061		-0.017*
		(0.039)		(0.046)		(0.009)
Observations	198	191	453	452	246	246
R-squared	0.181	0.228	0.131	0.227	0.480	0.557
Number of Banks	32	32	61	61	28	28
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

The dependent variable in Column (1)- (6) is the annual growth rate of total loans. Column (1) and (2) represents loan growth for small banks, Column (3) and (4) are for medium banks and Column (5)-(6) for large banks. Small banks are defined as the ones that lie below the 25th percentile of the $\log(\text{TotalAssets})_{i,t}$, medium banks are between 25th and 50th percentile and large banks are defined as the one that lie above the 75th percentile of the $\log(\text{TotalAssets})_{i,t}$ of the $\log(\text{TotalAssets})_{i,t}$. *MonetaryPolicy* is the monetary policy indicator that takes the value of 1 during contractionary monetary policy episodes and 0 otherwise. *CapitalRatio* is defined as the Tier 1 Capital Adequacy Ratio. Constant terms included but not reported. Robust standard errors in parentheses. ***, **, * represent significance at the 1%, 5% and 10%, respectively.

Table 12: The impact of monetary policy changes on Time Deposits

	Growth of Time Deposits					
	Small Banks		Medium Banks		Large Banks	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>MonetaryPolicy_t</i>	-0.438** (0.184)	-0.706** (0.301)	-0.050 (0.054)	-0.016 (0.048)	0.089 (0.072)	0.018 (0.055)
<i>CapitalRatio_{i,t-1}</i>	0.000 (0.002)	-0.000 (0.001)	-0.005* (0.003)	0.000 (0.003)	-0.002 (0.007)	0.011 (0.009)
<i>MonetaryPolicy</i> × <i>CapitalRatio_{i,t-1}</i>	0.011*** (0.003)	0.013** (0.006)	0.008*** (0.003)	0.007*** (0.003)	-0.002 (0.007)	0.002 (0.005)
GDP growth	-0.002 (0.034)	0.027 (0.046)	0.020** (0.010)	0.003 (0.009)	0.016*** (0.005)	0.007* (0.004)
Equity Ratio		-1.171 (0.714)		-3.309*** (0.409)		-2.829* (1.411)
Net Interest Income		-0.204 (0.272)		-0.260*** (0.050)		-0.263*** (0.059)
Net Interest Margin		0.048 (0.111)		0.169*** (0.031)		0.134*** (0.021)
Cost of Funds		-0.018 (0.044)		0.070*** (0.017)		0.016 (0.025)
Observations	77	74	453	453	246	246
R-squared	0.348	0.429	0.075	0.235	0.166	0.388
Number of Banks	18	18	61	61	28	28
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

The dependent variable in Column (1)- (6) is the annual growth of time deposits. Column (1) and (2) represents loan growth for small banks, Column (3) and (4) are for medium banks and Column (5)-(6) for large banks. Small banks are defined as the ones that lie below the 25th percentile of the $\log(TotalAssets)_{i,t}$, medium banks are between 25th and 50th percentile and large banks are defined as the one that lie above the 75th percentile of the $\log(TotalAssets)_{i,t}$ of the $\log(TotalAssets)_{i,t}$. *MonetaryPolicy* is the monetary policy indicator that takes the value of 1 during contractionary monetary policy episodes and 0 otherwise. *CapitalRatio* is defined as the Tier 1 Capital Adequacy Ratio. Constant terms included but not reported. Robust standard errors in parentheses. ***, **, * represent significance at the 1%, 5% and 10%, respectively.

C Robustness Results 2

Table 13: The impact of monetary policy changes on loan supply: Alternate measure of Liquidity

	Growth of Total Loans							
	Panel A				Panel B			
	Small Banks		Large Banks		Small Banks		Large Banks	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$MonetaryPolicy_t$	0.129 (0.223)	-0.287* (0.150)	0.060*** (0.013)	0.030** (0.014)	0.086 (0.203)	-0.347*** (0.105)	0.045*** (0.010)	0.026** (0.011)
$\left(\frac{Securities}{Assets}\right)_{i,t-1}$	-0.408 (0.829)	-2.679*** (0.760)	-0.018*** (0.006)	-0.014*** (0.005)	-0.462 (0.779)	-2.669*** (0.412)	-0.012*** (0.003)	-0.015*** (0.004)
$MonetaryPolicy_t \times \left(\frac{Securities}{Assets}\right)_{i,t-1}$	0.440 (0.878)	1.880*** (0.645)	0.025 (0.017)	0.018* (0.011)	0.445 (0.842)	2.005*** (0.430)	0.030* (0.016)	0.027* (0.015)
GDP growth	-0.011 (0.013)	-0.010 (0.018)	0.011*** (0.002)	-0.001 (0.002)	-0.001 (0.009)	-0.001 (0.009)	0.003 (0.004)	-0.001 (0.003)
Equity Ratio		-0.303 (0.821)		-2.106*** (0.566)		-0.489 (0.356)		-2.610* (1.285)
Net Interest Income		0.071 (0.128)		-0.064** (0.026)		0.030 (0.051)		-0.183*** (0.039)
Net Interest Margin		0.057 (0.051)		0.031 (0.020)		0.081*** (0.028)		0.124*** (0.021)
$\left(\frac{TimeDeposits}{Assets}\right)_i$		-0.315 (0.557)		-0.003 (0.112)		0.165 (0.269)		0.670*** (0.161)
Cost of Funds		0.053 (0.045)		-0.028*** (0.007)		0.027 (0.018)		-0.018 (0.011)
Observations	380	322	428	427	589	532	203	219
R-squared	0.086	0.359	0.370	0.502	0.073	0.286	0.396	0.555
Number of Banks	56	50	50	49	81	76	28	28
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The dependent variable in Column (1)- (6) is the annual growth rate of total loans. Panel A defines banks based on 50th percentile. Small banks are defined as the ones that lie below the 50th percentile of the $\log(TotalAssets)_{i,t}$ Column (1) and (2) and large banks are defined as the one that lie in top 50th percentile of the $\log(TotalAssets)_{i,t}$ Column (3) and (4). Panel B defines banks based on 75th percentile. Small banks are defined as the ones that lie below the 75th percentile of the $\log(TotalAssets)_{i,t}$ Column (5) and (6), large banks are defined as the one that lie in top 75th percentile of the $\log(TotalAssets)_{i,t}$. $Size_i$ is a categorical variable that takes the value 0 for small banks and 1 for large banks. $MonetaryPolicy$ is the monetary policy indicator that takes the value of 1 during contractionary monetary policy episodes and 0 otherwise. $Liquidity$ is defined as the ratio of securities to total assets. Constant terms included but not reported. Robust standard errors in parentheses. ***, **, * represent significance at the 1%, 5% and 10%, respectively.

Table 14: The impact of monetary policy changes on Time Deposits: Alternate measure of Liquidity

	Growth of Time Deposits							
	Panel A				Panel B			
	Small Banks		Large Banks		Small Banks		Large Banks	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$MonetaryPolicy_t$	-0.171 (0.177)	-0.215 (0.180)	0.021 (0.014)	-0.000 (0.014)	-0.182 (0.136)	-0.228** (0.112)	0.044*** (0.013)	-0.019 (0.015)
$(\frac{Securities}{Assets})_{i,t-1}$	-1.592** (0.641)	-1.295* (0.668)	-0.023*** (0.006)	-0.017*** (0.004)	-1.484*** (0.490)	-0.870** (0.369)	-0.020*** (0.004)	-0.016*** (0.004)
$MonetaryPolicy_t \times (\frac{Securities}{Assets})_{i,t-1}$	1.527** (0.741)	1.518** (0.756)	0.048*** (0.018)	0.049** (0.019)	1.434** (0.573)	1.199** (0.469)	0.039** (0.017)	0.053*** (0.017)
GDP growth	0.012 (0.021)	0.006 (0.022)	-0.005 (0.004)	-0.005 (0.004)	0.011 (0.013)	-0.004 (0.012)	0.001 (0.006)	0.008 (0.006)
Equity Ratio		-0.272 (0.700)		-3.980*** (1.185)		-1.850*** (0.368)		-3.229*** (0.964)
Net Interest Income		-0.205* (0.112)		-0.124** (0.057)		-0.097* (0.056)		-0.143** (0.054)
Net Interest Margin		0.180*** (0.057)		0.117*** (0.021)		0.105*** (0.032)		0.089*** (0.023)
Cost of Funds		0.012 (0.041)		0.049 (0.050)		0.058*** (0.019)		0.034 (0.050)
Observations	414	410	430	430	642	550	230	430
R-squared	0.033	0.071	0.081	0.200	0.032	0.123	0.178	0.210
Number of Banks	59	59	51	51	86	78	28	51
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The dependent variable in Column (1)- (6) is the annual growth rate of time deposits. Panel A defines banks based on 50th percentile. Small banks are defined as the ones that lie below the 50th percentile of the $\log(TotalAssets)_{i,t}$ Column (1) and (2) and large banks are defined as the one that lie in top 50th percentile of the $\log(TotalAssets)_{i,t}$ Column (3) and (4). Panel B defines banks based on 75th percentile. Small banks are defined as the ones that lie below the 75th percentile of the $\log(TotalAssets)_{i,t}$ Column (5) and (6), large banks are defined as the one that lie in top 75th percentile of the $\log(TotalAssets)_{i,t}$. $Size_i$ is a categorical variable that takes the value 0 for small banks and 1 for large banks. $MonetaryPolicy$ is the monetary policy indicator that takes the value of 1 during contractionary monetary policy episodes and 0 otherwise. $Liquidity$ is defined as the ratio of securities to total assets. Constant terms included but not reported. Robust standard errors in parentheses. ***, **, * represent significance at the 1%, 5% and 10%, respectively.

Table 15: The impact of monetary policy changes on loan supply: Alternate measure of Capital Ratio

	Growth of Total Loans							
	Panel A				Panel B			
	Small Banks		Large Banks		Small Banks		Large Banks	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$MonetaryPolicy_t$	0.060 (0.072)	0.076 (0.074)	0.046*** (0.009)	0.047*** (0.012)	0.077* (0.042)	0.095** (0.043)	0.081*** (0.012)	0.013 (0.008)
$\left(\frac{Equity}{Assets}\right)_{i,t-1}$	1.584*** (0.326)	2.051*** (0.379)	1.234 (1.017)	-2.067*** (0.717)	1.637*** (0.264)	1.903*** (0.303)	4.407 (3.064)	3.354** (1.280)
$MonetaryPolicy_t \times \left(\frac{Equity}{Assets}\right)_{i,t-1}$	0.474** (0.239)	0.429* (0.255)	1.260** (0.598)	1.639*** (0.515)	0.440** (0.174)	0.353* (0.185)	1.091 (1.001)	1.656** (0.647)
GDP growth	-0.018 (0.015)	-0.010 (0.015)	0.003 (0.003)	0.003 (0.003)	-0.006 (0.010)	-0.001 (0.010)	0.009*** (0.003)	-0.001 (0.003)
Net Interest Income		0.107 (0.072)		-0.143*** (0.023)		0.070 (0.050)		-0.119*** (0.028)
Net Interest Margin		-0.071* (0.037)		0.090*** (0.016)		-0.037 (0.028)		0.033 (0.025)
Cost of Funds		0.028 (0.024)		-0.017** (0.008)		0.015 (0.018)		-0.032* (0.017)
Observations	423	416	430	474	651	644	246	246
R-squared	0.162	0.187	0.199	0.313	0.160	0.171	0.235	0.625
Number of Banks	60	60	51	53	87	87	28	28
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The dependent variable in Column (1)- (6) is the annual growth rate of total loans. Panel A defines banks based on 50th percentile. Small banks are defined as the ones that lie below the 50th percentile of the $\log(TotalAssets)_{i,t}$ Column (1) and (2) and large banks are defined as the one that lie in top 50th percentile of the $\log(TotalAssets)_{i,t}$ Column (3) and (4). Panel B defines banks based on 75th percentile. Small banks are defined as the ones that lie below the 75th percentile of the $\log(TotalAssets)_{i,t}$ Column (5) and (6), large banks are defined as the one that lie in top 75th percentile of the $\log(TotalAssets)_{i,t}$. $Size_i$ is a categorical variable that takes the value 0 for small banks and 1 for large banks. $MonetaryPolicy$ is the monetary policy indicator that takes the value of 1 during contractionary monetary policy episodes and 0 otherwise. $CapitalRatio$ is defined as the ratio of equity to total assets. Constant terms included but not reported. Robust standard errors in parentheses. ***, **, * represent significance at the 1%, 5% and 10%, respectively.

Table 16: The impact of monetary policy changes on time deposits: Alternate measure of Capital Ratio

	Growth of Time Deposits							
	Panel A				Panel B			
	Small Banks		Large Banks		Small Banks		Large Banks	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$MonetaryPolicy_t$	-0.118 (0.098)	-0.117** (0.053)	0.085*** (0.013)	0.002 (0.012)	0.009 (0.031)	-0.068 (0.057)	0.029* (0.015)	0.008 (0.015)
$\left(\frac{Equity}{Assets}\right)_{i,t-1}$	2.783*** (0.443)	2.267** (0.890)	-0.422 (1.455)	-3.919* (2.267)	1.601*** (0.379)	3.925*** (0.417)	2.048 (1.660)	5.406** (2.538)
$MonetaryPolicy_t \times \left(\frac{Equity}{Assets}\right)_{i,t-1}$	0.357 (0.332)	0.975** (0.441)	-0.033 (0.661)	0.211 (0.488)	0.713*** (0.227)	0.418* (0.235)	3.046** (1.404)	2.464** (0.994)
GDP growth	0.020 (0.021)	-0.016 (0.012)	0.009*** (0.003)	0.004 (0.003)	-0.004 (0.007)	0.019 (0.013)	0.004 (0.004)	0.003 (0.004)
Equity Ratio		-1.896** (0.899)		0.801 (1.806)		-1.958*** (0.490)		-7.329*** (1.803)
Net Interest Income		-0.151 (0.111)		-0.147*** (0.042)		-0.030 (0.065)		-0.192*** (0.064)
Net Interest Margin		0.038 (0.049)		0.066*** (0.021)		0.004 (0.037)		0.067 (0.045)
Cost of Funds		-0.029 (0.048)		-0.032** (0.015)		-0.031 (0.024)		-0.009 (0.043)
Observations	414	201	474	471	434	639	246	246
R-squared	0.199	0.533	0.093	0.303	0.297	0.278	0.315	0.441
Number of Banks	59	43	53	51	70	86	28	28
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The dependent variable in Column (1)- (6) is the annual growth rate of time deposits. Panel A defines banks based on 50th percentile. Small banks are defined as the ones that lie below the 50th percentile of the $\log(TotalAssets)_{i,t}$ Column (1) and (2) and large banks are defined as the one that lie in top 50th percentile of the $\log(TotalAssets)_{i,t}$ Column (3) and (4). Panel B defines banks based on 75th percentile. Small banks are defined as the ones that lie below the 75th percentile of the $\log(TotalAssets)_{i,t}$ Column (5) and (6), large banks are defined as the one that lie in top 75th percentile of the $\log(TotalAssets)_{i,t}$. $Size_i$ is a categorical variable that takes the value 0 for small banks and 1 for large banks. $MonetaryPolicy$ is the monetary policy indicator that takes the value of 1 during contractionary monetary policy episodes and 0 otherwise. $CapitalRatio$ is defined as the ratio of equity to total assets. Constant terms included but not reported. Robust standard errors in parentheses. ***, **, * represent significance at the 1%, 5% and 10%, respectively.

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Table 17: The impact of monetary policy changes on loan supply: Liquidity

	Growth of Total Loans									
	Panel A		Panel B				Panel C			
	Full Sample		Small Banks		Large Banks		Small Banks		Large Banks	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\Delta \log(Loans)_{i,t-1}$	0.131 (0.123)	0.126 (0.118)	0.117** (0.050)	0.095* (0.050)	0.302*** (0.050)	0.239*** (0.063)	0.127 (0.128)	0.116 (0.121)	0.367*** (0.084)	-0.080 (0.059)
$\Delta Reperate_t$	-0.422* (0.253)	-0.418 (0.259)	-0.028 (0.394)	-0.157 (0.381)	-0.486** (0.230)	-0.675** (0.298)	-0.306 (0.286)	-0.224 (0.299)	-0.037 (0.192)	-0.421** (0.209)
$Liquidity_{i,t-1}$	1.149*** (0.427)	1.323*** (0.358)	1.189*** (0.247)	1.670*** (0.251)	0.716*** (0.143)	0.649*** (0.212)	1.140** (0.456)	1.371*** (0.379)	0.618*** (0.187)	0.516*** (0.176)
$\Delta Reperate_t \times Liquidity_{i,t-1}$	2.168*** (0.751)	2.267*** (0.760)	1.605* (0.842)	1.836** (0.796)	2.128*** (0.742)	2.498*** (0.877)	2.053** (0.797)	2.041** (0.800)	0.776 (0.615)	1.350** (0.664)
GDP growth	0.008 (0.009)	0.004 (0.009)	0.004 (0.018)	-0.002 (0.019)	0.006 (0.004)	0.000 (0.004)	0.004 (0.010)	0.008 (0.012)	0.009** (0.004)	-0.010** (0.004)
Equity Ratio		-1.154 (0.847)		-1.466*** (0.394)		-2.310*** (0.544)		-1.065 (0.804)		-3.148** (1.291)
Net Interest Income		0.062 (0.060)		0.167** (0.070)		-0.089** (0.038)		0.096 (0.073)		-0.179*** (0.030)
Net Interest Margin		0.059 (0.037)		0.047 (0.039)		0.092*** (0.021)		0.054 (0.038)		0.079*** (0.019)
Cost of Funds		0.006 (0.024)		0.077*** (0.027)		-0.014 (0.010)		0.005 (0.026)		-0.033 (0.038)
$\left(\frac{TimeDeposits}{Assets}\right)_i$		0.539* (0.274)				0.329* (0.182)		0.675** (0.324)		1.289*** (0.325)
Observations	792	784	362	349	430	430	562	554	230	230
R-squared	0.144	0.200	0.144	0.289	0.216	0.297	0.142	0.208	0.283	0.634
Number of Banks	95	95	53	51	51	51	78	78	28	28
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The dependent variable in Column (1)- (10) is the annual growth rate of total loans. Column (1) and (2) represents loan growth for the full sample. Panel B defines banks based on 50th percentile. Small banks are defined as the ones that lie below the 50th percentile of the $\log(TotalAssets)_{i,t}$ Column (3) and (4) and large banks are defined as the one that lie in top 50th percentile of the $\log(TotalAssets)_{i,t}$ Column (5) and (6). Panel C defines banks based on 75th percentile. Small banks are defined as the ones that lie below the 75th percentile of the $\log(TotalAssets)_{i,t}$ Column (7) and (8), large banks are defined as the one that lie in top 75th percentile of the $\log(TotalAssets)_{i,t}$. $Size_i$ is a categorical variable that takes the value 0 for small banks and 1 for large banks. $Reperate$ is the change in monetary policy instrument defined as the rate at which central bank lends to commercial banks. $Liquidity$ is defined as the ratio of liquid assets to total assets. Constant terms included but not reported. Robust standard errors in parentheses. ***, **, * represent significance at the 1%, 5% and 10%, respectively.

Table 18: The impact of monetary policy changes on time deposits: Liquidity

	Growth of Time Deposits									
	Panel A		Panel B				Panel C			
	Full Sample		Small Banks		Large Banks		Small Banks		Large Banks	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\Delta Reperate_t$	-0.259 (0.314)	-0.697*** (0.261)	-0.729* (0.407)	-0.920* (0.514)	-0.032 (0.359)	-0.470* (0.262)	-0.526* (0.299)	-0.768*** (0.288)	0.171 (0.206)	0.216 (0.199)
$Liquidity_{i,t-1}$	0.941*** (0.215)	-0.238 (0.183)	-0.105 (0.490)	-0.284 (0.364)	0.346 (0.312)	-0.124 (0.172)	-0.514 (0.410)	0.195 (0.401)	-0.385 (0.301)	-0.366 (0.314)
$\Delta Reperate_t \times Liquidity_{i,t-1}$	1.208 (0.817)	1.956*** (0.748)	1.133 (0.902)	2.259* (1.273)	0.286 (1.094)	1.500* (0.831)	1.151 (0.860)	2.147*** (0.784)	0.046 (0.646)	-0.673 (0.665)
GDP growth	0.004 (0.010)	-0.010 (0.009)	-0.029 (0.024)	-0.017 (0.022)	-0.007 (0.005)	-0.004 (0.004)	-0.020 (0.015)	-0.023*** (0.007)	0.005 (0.007)	-0.009 (0.007)
Equity Ratio		-2.730*** (0.312)		-2.848*** (0.745)		-2.311** (0.940)		0.493 (1.002)		-2.723 (3.585)
Net Interest Income		-0.145*** (0.038)		-0.167** (0.082)		-0.101*** (0.029)		-0.035 (0.047)		-0.219*** (0.070)
Net Interest Margin		0.150*** (0.024)		0.176*** (0.057)		0.069*** (0.021)		0.035 (0.038)		0.083** (0.034)
Cost of Funds		0.045*** (0.014)		0.062*** (0.023)		-0.008 (0.011)		0.057*** (0.020)		-0.003 (0.019)
Cost of Borrowings		0.000 (0.000)		0.000 (0.000)		0.000 (0.001)				0.000 (0.002)
Return On Assets		0.037** (0.018)		0.049 (0.051)		0.103*** (0.030)		0.026 (0.040)		-0.021 (0.028)
Return On Equity		0.000 (0.002)		-0.005 (0.009)		-0.005** (0.002)		0.002 (0.003)		0.001 (0.001)
Reserves		-3.505*** (0.617)		-3.638** (1.525)		-3.780*** (0.668)		-1.530** (0.715)		-3.006** (1.258)
Observations	888	731	354	301	430	471	554	378	230	230
R-squared	0.031	0.189	0.077	0.200	0.055	0.325	0.027	0.400	0.131	0.479
Number of Banks	102	90	53	48	51	51	78	63	28	28
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The dependent variable in Column (1)- (10) is the annual growth rate of time deposits. Column (1) and (2) represents loan growth for the full sample. Panel B defines banks based on 50th percentile. Small banks are defined as the ones that lie below the 50th percentile of the $\log(TotalAssets)_{i,t}$ Column (3) and (4) and large banks are defined as the one that lie in top 50th percentile of the $\log(TotalAssets)_{i,t}$ Column (5) and (6). Panel C defines banks based on 75th percentile. Small banks are defined as the ones that lie below the 75th percentile of the $\log(TotalAssets)_{i,t}$ Column (7) and (8), large banks are defined as the one that lie in top 75th percentile of the $\log(TotalAssets)_{i,t}$. $Size_i$ is a categorical variable that takes the value 0 for small banks and 1 for large banks. $Reperate$ is the change in monetary policy instrument defined as the rate at which central bank lends to commercial banks. $Liquidity$ is defined as the ratio of liquid assets to total assets. Constant terms included but not reported. Robust standard errors in parentheses. ***, **, * represent significance at the 1%, 5% and 10%, respectively.

Table 19: The impact of monetary policy changes on loan supply: Capital Ratio

	Growth of Total Loans									
	Panel A		Panel B				Panel C			
	Full Sample		Small Banks	Large Banks		Small Banks	Large Banks			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\Delta Reperate_t$	0.120 (0.105)	0.132 (0.144)	0.258 (0.234)	0.320 (0.271)	0.145 (0.128)	0.191* (0.098)	0.216 (0.146)	0.217 (0.189)	0.034 (0.157)	-0.013 (0.136)
$CapitalRatio_{i,t-1}$	0.002** (0.001)	0.004** (0.002)	0.004*** (0.001)	0.004*** (0.001)	-0.001 (0.005)	-0.005* (0.003)	0.004*** (0.001)	0.004** (0.002)	0.003 (0.005)	0.001 (0.004)
$\Delta Reperate_t \times CapitalRatio_{i,t-1}$	0.012*** (0.003)	0.018*** (0.006)	0.014*** (0.004)	0.016*** (0.005)	0.002 (0.014)	-0.007 (0.009)	0.014*** (0.003)	0.017** (0.007)	0.018 (0.016)	0.007 (0.013)
GDP growth	-0.001 (0.009)	0.006 (0.011)	-0.001 (0.017)	0.001 (0.018)	0.005 (0.003)	0.003 (0.003)	0.007 (0.011)	0.006 (0.014)	0.009** (0.005)	0.000 (0.004)
Net Interest Income		-0.060 (0.124)		-0.043 (0.069)		-0.062*** (0.016)		-0.058 (0.155)		-0.132*** (0.024)
Net Interest Margin		0.053 (0.042)		0.043 (0.034)				0.055 (0.045)		0.035* (0.018)
Cost of Funds		0.047 (0.036)		0.066** (0.027)		-0.032*** (0.007)		0.055 (0.040)		-0.032** (0.013)
Return On Assets		-0.007 (0.054)		-0.010 (0.028)		-0.014 (0.021)		-0.009 (0.056)		-0.046** (0.023)
Return On Equity		0.007* (0.004)		0.008 (0.006)		0.004*** (0.001)		0.007* (0.004)		0.006*** (0.002)
Observations	792	890	423	416	430	471	651	644	230	246
R-squared	0.085	0.160	0.130	0.153	0.156	0.492	0.124	0.155	0.252	0.608
Number of Banks	95	103	60	60	51	51	87	87	28	28
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The dependent variable in Column (1)- (10) is the annual growth rate of total loans. Column (1) and (2) represents loan growth for the full sample. Panel B defines banks based on 50th percentile. Small banks are defined as the ones that lie below the 50th percentile of the $\log(TotalAssets)_{i,t}$ Column (3) and (4) and large banks are defined as the one that lie in top 50th percentile of the $\log(TotalAssets)_{i,t}$ Column (5) and (6). Panel C defines banks based on 75th percentile. Small banks are defined as the ones that lie below the 75th percentile of the $\log(TotalAssets)_{i,t}$ Column (7) and (8), large banks are defined as the one that lie in top 75th percentile of the $\log(TotalAssets)_{i,t}$. $Size_i$ is a categorical variable that takes the value 0 for small banks and 1 for large banks. $Reperate$ is the change in monetary policy instrument defined as the rate at which central bank lends to commercial banks. $CapitalRatio$ is defined as the Tier 1 capital adequacy ratio. Constant terms included but not reported. Robust standard errors in parentheses. ***, **, * represent significance at the 1%, 5% and 10%, respectively.

Table 20: The impact of monetary policy changes on time deposits: Capital Ratio

	Growth of Time Deposits									
	Panel A		Panel B				Panel C			
	Full Sample		Small Banks		Large Banks		Small Banks		Large Banks	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\Delta Reperate_t$	-0.097 (0.157)	-0.297*** (0.113)	-0.424 (0.306)	-0.752** (0.345)	0.050 (0.175)	-0.030 (0.131)	-0.167 (0.185)	-0.470*** (0.166)	0.207 (0.220)	-0.558** (0.217)
$CapitalRatio_{i,t-1}$	0.004 (0.003)	0.005*** (0.001)	0.004 (0.003)	0.006*** (0.001)	0.000 (0.008)	0.001 (0.007)	0.004 (0.003)	0.006*** (0.001)	-0.009 (0.007)	0.009 (0.007)
$\Delta Reperate_t \times CapitalRatio_{i,t-1}$	0.008 (0.013)	0.015** (0.007)	0.013 (0.016)	0.027** (0.013)	0.000 (0.018)	-0.006 (0.013)	0.009 (0.013)	0.020** (0.008)	0.006 (0.023)	0.045** (0.020)
GDP growth	-0.007 (0.006)	-0.005 (0.006)	-0.033* (0.019)	-0.017 (0.019)	-0.007 (0.004)	0.001 (0.004)	-0.012 (0.008)	-0.005 (0.009)	0.015*** (0.006)	-0.020*** (0.007)
Net Interest Income		-0.067** (0.027)		-0.092 (0.077)		-0.140*** (0.047)		-0.047 (0.040)		
Net Interest Margin		0.024 (0.020)		0.005 (0.048)		0.057** (0.026)		0.005 (0.027)		0.054** (0.027)
Cost of Funds		-0.009 (0.014)		-0.005 (0.031)		-0.044** (0.020)		-0.027 (0.019)		-0.041** (0.017)
Cost of Borrowings		0.000 (0.000)		0.000 (0.000)				0.000 (0.000)		0.004* (0.002)
Return On Assets		0.005 (0.018)		0.000 (0.037)				0.008 (0.023)		-0.059* (0.035)
Return On Equity		0.001 (0.002)		0.005 (0.005)				0.002 (0.002)		0.006** (0.002)
Observations	680	656	209	185	430	471	434	410	246	230
R-squared	0.246	0.331	0.276	0.428	0.047	0.290	0.246	0.371	0.092	0.374
Number of Banks	86	83	43	40	51	51	70	67	28	28
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The dependent variable in Column (1)- (10) is the annual growth rate of time deposits. Column (1) and (2) represents loan growth for the full sample. Panel B defines banks based on 50th percentile. Small banks are defined as the ones that lie below the 50th percentile of the $\log(TotalAssets)_{i,t}$ Column (3) and (4) and large banks are defined as the one that lie in top 50th percentile of the $\log(TotalAssets)_{i,t}$ Column (5) and (6). Panel C defines banks based on 75th percentile. Small banks are defined as the ones that lie below the 75th percentile of the $\log(TotalAssets)_{i,t}$ Column (7) and (8), large banks are defined as the one that lie in top 75th percentile of the $\log(TotalAssets)_{i,t}$. $Size_i$ is a categorical variable that takes the value 0 for small banks and 1 for large banks. $Reperate$ is the change in monetary policy instrument defined as the rate at which central bank lends to commercial banks. $CapitalRatio$ is defined as the Tier 1 capital adequacy ratio. Constant terms included but not reported. Robust standard errors in parentheses. ***, **, * represent significance at the 1%, 5% and 10%, respectively.

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Table 21: The impact of monetary policy changes on loan supply: Domestic versus Foreign Banks

	Growth of Total Loans			
	Domestic Banks (1)	Domestic Banks (2)	Foreign Banks (3)	Foreign Banks (4)
L.g.Loans	0.331*** (0.039)	0.202*** (0.038)	0.122 (0.128)	0.163*** (0.055)
<i>MonetaryPolicy</i> _t	-0.155** (0.064)	-0.139** (0.058)	-0.039 (0.083)	-0.082 (0.146)
<i>Liquidity</i> _{i,t-1}	1.191*** (0.178)	0.390** (0.173)	0.943* (0.520)	0.657** (0.299)
<i>MonetaryPolicy</i> × <i>Liquidity</i> _{i,t-1}	0.634*** (0.215)	0.515*** (0.195)	0.500** (0.234)	0.763** (0.356)
GDP growth	0.004 (0.003)	-0.002 (0.003)	-0.019 (0.015)	-0.002 (0.018)
Equity Ratio		-3.072*** (1.091)		-0.649 (0.448)
Net Interest Income		-0.061*** (0.018)		0.144* (0.078)
Net Interest Margin		0.003 (0.014)		0.020 (0.040)
Cost of Funds		-0.036*** (0.007)		0.010 (0.024)
Cost of Borrowings		0.000*** (0.000)		0.003 (0.003)
Return On Assets		0.068*** (0.008)		0.021 (0.020)
$\left(\frac{TimeDeposits}{Assets}\right)_i$		0.192* (0.112)		1.052*** (0.373)
Observations	470	466	322	269
R-squared	0.407	0.553	0.138	0.309
Number of Banks	52	51	43	40
Bank Fixed Effects	Yes	Yes	Yes	Yes

The dependent variable in Column (1)- (6) is the annual growth rate of total loans. Column (1) and (2) represents loan growth for domestic banks and, Column (3) and (4) are for foreign banks. *MonetaryPolicy* is the monetary policy indicator that takes the value of 1 during contractionary monetary policy episodes and 0 otherwise. *Liquidity* is defined as the ratio of liquid assets to total assets. Constant terms included but not reported. Robust standard errors in parentheses. ***, **, * represent significance at the 1%, 5% and 10%, respectively.

Table 22: The impact of monetary policy changes on time deposits: Domestic versus Foreign Banks

	Growth of Total Loans			
	Domestic Banks (1)	Domestic Banks (2)	Foreign Banks (3)	Foreign Banks (4)
<i>MonetaryPolicy_t</i>	-0.132 (0.095)	-0.213** (0.088)	-0.112 (0.211)	-0.427* (0.246)
<i>Liquidity_{i,t-1}</i>	-0.713*** (0.259)	-1.770*** (0.248)	0.693* (0.418)	0.133 (0.542)
<i>MonetaryPolicy</i> × <i>Liquidity_{i,t-1}</i>	0.705** (0.307)	0.791*** (0.287)	0.638 (0.463)	1.428** (0.693)
GDP growth	0.009** (0.004)	0.001 (0.004)	0.007 (0.024)	0.030 (0.024)
Equity Ratio		-0.123 (1.316)		2.285** (0.953)
Net Interest Income		-0.116*** (0.028)		-0.038 (0.125)
Net Interest Margin		0.062*** (0.022)		-0.026 (0.065)
Cost of Funds		0.086* (0.047)		-0.020 (0.039)
Cost of Deposits		-0.112** (0.046)		
Return On Assets		0.093*** (0.013)		-0.031 (0.055)
Observations	527	527	361	146
R-squared	0.078	0.332	0.049	0.458
Number of Banks	57	57	45	27
Bank Fixed Effects	Yes	Yes	Yes	Yes

The dependent variable in Column (1)- (6) is the annual growth rate of time deposits. Column (1) and (2) represents loan growth for domestic banks and, Column (3) and (4) are for foreign banks. *MonetaryPolicy* is the monetary policy indicator that takes the value of 1 during contractionary monetary policy episodes and 0 otherwise. *Liquidity* is defined as the ratio of liquid assets to total assets. Constant terms included but not reported. Robust standard errors in parentheses. ***, **, * represent significance at the 1%, 5% and 10%, respectively.

Table 23: The impact of monetary policy changes on loan supply: Domestic versus Foreign Banks

	Growth of Total Loans			
	Domestic Banks (1)	Domestic Banks (2)	Foreign Banks (3)	Foreign Banks (4)
<i>MonetaryPolicy</i> _t	0.146*** (0.043)	0.013 (0.024)	0.066 (0.083)	0.053 (0.110)
<i>CapitalRatio</i> _{i,t-1}	0.009*** (0.001)	0.013*** (0.001)	0.003*** (0.001)	0.002 (0.002)
<i>MonetaryPolicy</i> × <i>CapitalRatio</i> _{i,t-1}	-0.005 (0.005)	0.003 (0.002)	0.004*** (0.001)	0.006** (0.003)
GDP growth	0.010*** (0.003)	-0.000 (0.003)	-0.019 (0.018)	-0.004 (0.019)
Equity Ratio		0.823 (1.140)		-0.201 (1.047)
Net Interest Income		-0.020 (0.019)		-0.120 (0.208)
Net Interest Margin		-0.002 (0.015)		0.062 (0.061)
Cost of Funds		0.024 (0.032)		0.039 (0.032)
$\left(\frac{TimeDeposits}{Assets}\right)_i$		0.335*** (0.115)		0.983 (0.604)
Observations	527	526	370	311
R-squared	0.258	0.529	0.140	0.275
Number of Banks	57	56	46	42
Bank Fixed Effects	Yes	Yes	Yes	Yes

The dependent variable in Column (1)- (6) is the annual growth rate of total loans. Column (1) and (2) represents loan growth for domestic banks and, Column (3) and (4) are for foreign banks. *MonetaryPolicy* is the monetary policy indicator that takes the value of 1 during contractionary monetary policy episodes and 0 otherwise. *CapitalRatio* is defined as the Tier 1 Capital Adequacy Ratio. Constant terms included but not reported. Robust standard errors in parentheses. ***, **, * represent significance at the 1%, 5% and 10%, respectively.

Table 24: The impact of monetary policy changes on time deposits: Domestic versus Foreign Banks

	Growth of Total Loans			
	Domestic Banks	Domestic Banks	Foreign Banks	Foreign Banks
	(1)	(2)	(3)	(4)
<i>MonetaryPolicy_t</i>	0.039 (0.034)	0.042 (0.032)	0.045 (0.097)	-0.005 (0.104)
<i>CapitalRatio_{i,t-1}</i>	0.004** (0.002)	0.017*** (0.001)	0.009*** (0.002)	0.004** (0.002)
<i>MonetaryPolicy</i> × <i>CapitalRatio_{i,t-1}</i>	-0.000 (0.003)	-0.001 (0.003)	0.001 (0.002)	0.005* (0.003)
GDP growth	-0.006* (0.004)	-0.004 (0.003)	0.003 (0.021)	-0.006 (0.020)
Equity Ratio		-3.008** (1.487)		-2.010*** (0.530)
Net Interest Income		-0.074*** (0.025)		-0.135 (0.089)
Net Interest Margin		0.034* (0.020)		0.137*** (0.042)
Cost of Funds		0.066 (0.042)		0.056** (0.027)
Observations	470	526	361	269
R-squared	0.135	0.463	0.239	0.235
Number of Banks	52	56	45	40
Bank Fixed Effects	Yes	Yes	Yes	Yes

The dependent variable in Column (1)- (6) is the annual growth rate of time deposits. Column (1) and (2) represents loan growth for domestic banks and, Column (3) and (4) are for foreign banks. *MonetaryPolicy* is the monetary policy indicator that takes the value of 1 during contractionary monetary policy episodes and 0 otherwise. *CapitalRatio* is defined as the Tier 1 Capital Adequacy Ratio. Constant terms included but not reported. Robust standard errors in parentheses. ***, **, * represent significance at the 1%, 5% and 10%, respectively.