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Relationship Banking and Monetary Policy Transmission : Evidence from India

Relationship Banking And Monetary Policy Transmission: Evidence from India *

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Abstract

Though the monetary policy transmission and financial intermediation literature have highlighted the role of the "bank credit channel" and relationship banking respectively, the effect of relationship banking on the transmission of monetary policy has not been investigated. In this paper, we study the impact of relationship banking on the transmission of monetary policy. Theoretically, relationship banking could ameliorate or exacerbate the effects of monetary policy shocks. Using *unique and comprehensive* data on bank-borrower relationships in India, we find that firms that enjoy an exclusive banking relationship are less susceptible to monetary policy shocks than firms that bank with multiple banks.

Key Words: banks, monetary policy, central banks and their policies
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I Introduction

In this paper, we examine how relationship banking affects the transmission of monetary policy. Specifically, we study whether borrowers with unique banking relationships are more or less susceptible to monetary policy shocks when compared to borrowers banking with multiple banks.

The motivation for our study is compelling. First, the transmission of monetary policy is one of the most studied areas in monetary economics (Bernanke and Blinder (1992)). In particular, the "firm balance sheet channel" for transmission of monetary policy has been an area of intense scrutiny since the seminal work of Bernanke et al. (1988) and Bernanke et al. (1996). Second, the financial intermediation literature has independently argued that banks are special because *inter alia* they undertake relationship-based lending.[1] Yet, the literature is silent about the impact of relationship banking on the transmission of monetary policy. Our study attempts to fill this void.

Theoretically, relationship banking could ameliorate or exacerbate the effects of monetary policy shocks. Relationship banking could exacerbate the effect of monetary policy shocks for the following reasons. First, under the "firm balance sheet channel" hypothesis, a monetary policy shock significantly impacts a firm's balance sheet.[2] The tightening of monetary policy may reduce the net worth of borrowers due to an increase in the discount rate and a decrease in expected cash flows. Given information asymmetry between borrowers and lenders, a negative shock to net worth aggravates agency problems. The credit premium increases as a result, which in turn reduces the demand for credit. An increase in agency problems may also reduce the supply of financing because the lender may find it prohibitively costly to lend in the presence of greater agency problems. Small

[1] See Rajan (1992); Boot (2000); Diamond and Rajan (2001); Ongena and Smith (2001); Berger and Udell (2002); Berger et al. (2005).

[2] See Bernanke et al. (1999); Bernanke and Blinder (1992); Ciccarelli et al. (2014); Peek and Rosengren (2010); Oliner and Rudebusch (1996); Ashcraft and Campello (2007); Aysun and Hepp (2013).

and opaque firms are more likely to utilize relationship banking because they suffer from significant information asymmetry.[3] Therefore, a tightening of monetary policy may reduce disproportionately the supply of (and demand for) financing for firms relying on relationship banking (hereafter R-firms) when compared to firms banking with multiple banks, i.e., firms undertaking transactional banking (hereafter T-firms).

Second, through the "bank balance sheet channel", monetary policy shocks affect the real economy because banks' cannot substitute deposits with other sources of funding (Stein and Kashyap (1993); Becker and Ivashina (2014)). Such inelastic substitution is likely to impact small banks more than large banks (Kashyap and Stein (1994)). Since R-firms are more likely to borrow from small banks, even the bank lending channel is likely to impact R-firms relatively more than T-firms.

Arguments based on the relationship banking literature, however, provide the opposite prediction (Boot (2000); Bolton et al. (2016)). First, relationship bankers are likely to invest in learning about the firm and its business (Diamond and Rajan (2001); Rajan (1992)). Such investments are likely to reduce considerably the information asymmetry between the bank and the borrower (Ongena and Smith (2001)). However, R-firms are small and opaque and are more likely to engage in relationship banking (Berger and Udell (2002); Berger et al. (2005)). Because relationship banking reduces the information asymmetry, the increase in the credit premium due to a monetary policy shock may be lower for R-firms than for T-firms. So, R-firms may be less susceptible to monetary policy shocks than T-firms.

The above theoretical tension sets up the agenda for our empirical analysis. India offers an ideal economic setting to examine these issues since (i) the banking sector is concentrated [4] and relationship-driven (Bhue et al. (2015); Sarkar et al. (2019)); and (ii)

[3] See Berger and Udell (2002); Berger et al. (2005).

[4] There are only 44 large and small scheduled commercial banks in India as opposed to 6800 in the U.S. This equates to 24 banks per trillion dollars of GDP for India when compared to more than 400 banks per trillion dollars of GDP for the U.S.

credit markets suffer from significant frictions (Banerjee and Duflo (2014); Raghavan and Sarwono (2012); De and Singh (2011)).

We use *unique and comprehensive* data on bank-borrower matches in India to quantify banking relationships using measures commonly used in the relationship banking literature (Santos et al. (2002); Gopalan et al. (2011)). Following Das et al. (2015), we measure monetary policy using the Cash Reserve Ratio (CRR). [5] The outcome of interest in our baseline specification is the ratio of bank credit to total credit (following Stein and Kashyap (1993)). As we detail later, using the fraction of bank debt (instead of the level) helps us to control for the monetary policy sensitivity of aggregate demand, which is known as the demand channel[6] of monetary policy transmission. Specifically, we do not use the level of bank credit because it would change in response to the aggregate money supply in the economy, and this demand channel is not directly related to the financial intermediation sector of the economy. However, we do use the volume of loans as the outcome variable in our robustness tests. In our baseline specification, we use a difference-in-difference methodology to test how a firm's exclusive relationship with its bank affects the sensitivity of bank credit to monetary policy. Even though banking relationships are stable and long-lasting, the differential sensitivity can arise due to observed and unobserved omitted variables. We run a battery of robustness tests to address the above concern.

Our main finding is that relationship banking ameliorates the impact of monetary policy shocks. We find that, in general, higher CRR is associated with a lower proportion of bank credit to total credit. A 1% increase in the CRR associates with a 1.8% decrease

[5] CRR is the main policy tool used by the Reserve Bank of India (RBI). However, all our results are robust to using alternative monetary policy rates.

[6] The traditional literature viewed monetary policy transmission through the "aggregate demand" channel (Friedman and Schwartz (1963)). This view, which is labeled the "text book" view by Bernanke and Gertler (1995), posits that a change in short-term nominal interest rates caused by monetary policy influences real rates due to short-term stickiness of factor prices. This (potentially) influences demand, which then leads to real effects on production.

in the ratio of bank credit to total credit. This result is in line with the extant literature, which shows that monetary policy affects bank credit availed by firms (Stein and Kashyap (1993)). Crucially, we find that firms engaged in relationship banking are affected less by the change in CRR when compared to those engaged in transactional banking. In fact, the overall impact of CRR is 1.1% lower for R-firms when compared to T-firms. Thus, the impact of monetary policy shocks is 61% lower for R-firms than for T-firms.

As described above, we use a ratio measure as our primary outcome variable because we want to control for the change in aggregate demand in response to monetary policy changes. However, an increase in the ratio can represent an increase in bank debt (the numerator) or a decrease in the total debt (the denominator). It is essential to decompose these two effects because R-firms and T-firms might have differential access to non-bank sources, which can affect their total debt. To investigate this, we study how the level of bank and nonbank credit change for R-firms and T-firms in response to a monetary policy shock. We find that following a positive monetary policy shock, the decline in the absolute level of bank credit is lower for R-firms than T-firms. Thus, the relative increase in bank credit to the total credit ratio of R-firms is not mechanically caused by the relative inability of R-firms to replace bank credit with non-bank credit.

Since bank debt and total debt are autocorrelated (due to the presence of legacy loans), these tests can mask the actual economic impact of CRR changes. We address this issue by directly focusing on net issuances and estimating our baseline specification using the change in bank debt as the dependent variable. We find that (i) net new bank debt issuance increases (decreases) by 9% over its mean when CRR decreases (increase) by 1%; (ii) the impact on R -firms is lower by about 80%; (iii) highly levered firms that are more likely to be impacted by the firm balance sheet channel (due to an increase in the risk-shifting incentives of the entrepreneurs) show a higher sensitivity to CRR (11.5% for net new issuance of bank debt) and also higher off-setting differential impact on R-firms

when compared to T firms; (iv) the results using levels of bank debt are also directionally similar and economically meaningful.

Since monetary policy changes are never random, it is challenging to obtain a natural experiment to study the hypothesized effects. So, we examine the various threats to identification in our setting. In general, we note that for identification, the monetary policy changes must be uncorrelated with unobserved determinants of the *difference in the ratio* of bank credit to total credit between R-firms and T-firms, i.e., unobserved determinants of a proxy that resembles a *second-order derivative* of credit. Compared to the usual assumptions required for identification, it is easier to satisfy this identifying assumption.

Nevertheless, we consider specific concerns regarding identification. The main concern is that firms and their banks are likely to be matched endogenously. Since our dependent variables are all defined at the firm level, identification may get spoiled by the unobserved firm characteristics that lead to the match. We address this concern in several ways. First, our coefficient of interest is not materially dependent on whether or not we include firm fixed effects. Thus, any time-invariant firm characteristics that lead to the match between firms and banks do not seem to influence our results.

Second, is it possible that the endogenous match is affected by time-varying firm characteristics. This could occur if just before monetary policy changes firms that are less likely to be impacted by monetary policy shocks match with banks that are keen to develop a banking relationship with the firm. We address this concern in two ways. First, we re-define relationship banking as a continuous spell of engagement. We test several spells ranging from 2 to 5 *consecutive* years and find that our results remain robust. Since a firm is unlikely to anticipate monetary policy shocks five years in advance, our results are unlikely to be driven by time-varying firm characteristics affecting the firm-bank match. Second, we find no correlation between monetary policy shocks and the change

by a firm from R-banking to T-banking or vice versa. Overall, these results suggest that our results are unlikely to be driven by time-varying firm characteristics affecting the firm-bank match.

Third, we appeal to the existing findings (Bernanke et al. (1988, 1996)) to further buttress the argument that endogenous matching does not drive our results. A robust finding of this literature is that small firms, which lack access to non-bank finance, are more likely to be impacted by monetary policy shocks when compared to large firms that can obtain such access. Also, small firms are more likely to engage in relationship banking (Rajan (1992); Boot (2000)). We verify that this phenomenon is obtained in our setting as well. Thus, if small firms self-select into relationship banking, such endogenous matching should lead to R-firms being more impacted by monetary policy shocks than T-firms. This is not what we find in our analysis. Thus, we again conclude that our results are unlikely to be driven by the endogenous match between banks and firms. Finally, we rule out the possibility that the relatively lesser sensitivity of R-firms to monetary policy shocks is a result of the risk-shifting channel of monetary policy transmission (Jiménez et al. (2014)).

Another concern pertains to possible reverse causality. Note that for our results to be a manifestation of a reverse-causal relationship, *expected differences* between R-firms and T-firms in the *ratio* of bank credit to total credit should affect the monetary policy changes. By carefully reading each of the monetary policy statements issued by RBI during our sample period, we conclude that such a phenomenon is unlikely. Nevertheless, we examine the correlation between our monetary policy proxy and *lags* of the ratio of bank credit to total credit. We do not find any significant association. Thus, we remain confident that reverse causality is not driving our results.

The heterogeneity in the sensitivity to monetary policy brought about by relationship banking informs our understanding of the aggregate effect of the firm balance sheet

channel. This is because, according to this channel, an increase in nominal interest rates reduces the net worth of the borrowing firm. The risk-shifting incentives generated by an increase in effective leverage raises the external finance premium. In firms that are monitored by their relationship banker, the increased verifiability of effort reduces the risk-shifting incentives conditional on the decline in net worth. Consequently, the increase in finance premium is moderated, and credit rationing for such firms is lower when monetary policy tightens. In aggregate, relationship banking delivers a transmission of monetary policy that is heterogeneous across different types of informational environments and the type of banking model (relationship or transactional) that firms and banks engage in an economy.

This paper contributes to the monetary policy transmission literature as well as the banking literature. The extant literature on monetary policy transmission has shown that bank-dependent borrowers are more susceptible to monetary policy shocks. We contribute to this literature by showing that relationship banking plays an important role in absorbing the shocks created by changes in monetary policy (Stein and Kashyap (1993); Stein (2012); Kashyap and Stein (2000); Acharya and Naqvi (2012); Kashyap et al. (1997); Gertler and Gilchrist (1994); Agarwal et al. (2017, 2019)). Related literature on business cycles studies the determinants of banking relationships using survey data and geographical proximity of borrowers and lenders (Bolton et al. (2016); Beck et al. (2014). In contrast to these studies, we use precise data on the bank-borrower relationship and focus on how relationship banking affects monetary policy transmission. We also contribute to the broad relationship banking literature by showing one more instance of the differential impact of relationship banking (Santos and Winton (2008); Boot and Thakor (2000); Boot (2000); Bolton et al. (2016)).

II Institutional background

A The Indian banking sector

Large banks in India belong to one of the following four categories: Government-owned banks or public sector banks account for more than two-thirds of overall lending in India. All these banks are listed in the stock exchanges and their Government ownership ranges from 55% to 80%. Private sector banks cater to the rest of the market. Within the large private sector banks, the ownership is widely dispersed with substantial stakes held by institutional investors. Foreign institutions own more than 50% of stake in most of these banks.[7] Additionally, there are some small private-sector banks that have concentrated ownership, and these banks mainly cater to small geographical areas. Finally, foreign banks have a minimal presence in India. The above distinctions between the various categories of banks are important for our study, as it has been shown in the Indian context that different types of banks engage with systematically different types of borrowers (Berger et al. (2008); Bhaumik et al. (2011); Bhue et al. (2015)). Figure 1 depicts important debt financing sources for Indian firms.

B Reserve Bank of India

The Indian central bank (called the Reserve Bank of India) is in charge of monetary policy in India. The RBI has been very active in the management of the monetary policy. During the period of our study (1998 - 2013), policy rates changed 50 times, and reserve requirements changed 46 times.

[7]Source: www.rbi.org.in

C Monetary policy instruments

Selecting the appropriate monetary policy benchmark is key to our empirical analysis. Monetary policy tools used by the RBI can be broadly classified into quantitative tools and rate changes. Quantitative tools include Cash Reserve Ratio (CRR) and Statutory Liquidity Ratio (SLR), whereas rates include Repo, Reverse Repo, and bank rate. CRR, which is the proportion of bank liabilities that have to be deposited with the RBI, is an important policy lever and the focus of our analysis. We provide a brief description of CRR and its suitability for our analysis below. We delegate the description of the alternative policy instruments to the online appendix. Figure 2 shows the trend of all policy instruments used by RBI during our sample period (1998-2013).

C.1 Cash reserve ratio

Cash Reserve Ratio (CRR) is a quantitative tool used by RBI. Section 42(1A) of the RBI Act of 1934 empowers RBI to require banks to set aside a certain portion of their demand and time liabilities. Banks need to maintain these balances with RBI. RBI does not pay any interest on these balances. Currently, CRR is set equal to 3%. CRR directly impacts a bank's ability to create deposits, and if the bank is unable to replace reservable deposits with other sources, a change in CRR may impact bank lending. Given the non-interest bearing nature of CRR, banks do not maintain excess CRR. Second, RBI audits banks every fortnight to ensure that appropriate CRR is maintained; any violation invites heavy penalties. Finally, CRR, as a monetary policy instrument, has been frequently used by the RBI. During our sample period, which spans a 15-year period between 1998 and 2013, the CRR rate was changed 46 times. Twenty-two of them represented an increase, whereas the rest represented a decrease. A change in CRR directly impacts deposit-taking and lending activity (Das et al. (2015)).

III Data and variable definitions

A Data

We use three board categories of data: (i) data relating to Cash Reserve Ratio and Policy Rates; (ii) data relating to bankers to a firm in a year; and (iii) data relating to various types of borrowing by firms and other firm-year level financial details.

Our data spans a period of 15 years between 1998 and 2013. We start the data from the year 1998 because the coverage of bank-firm association by the Prowess database starts from that year. Table A.1 defines the key variables used.

A.1 Data on policy instruments

We obtain data relating to RBI monetary policy instruments from the RBI website. The monetary policy section of the RBI website lists the current as well as historical policy rates. Data on CRR is available from the year 1992. Since the firm-level data are sourced from annual financial reports, we use average CRR, which equals the "time-weighted value" of CRR rate in the current year as our primary explanatory variable. For example, if CRR equals 6% for nine months and 7% for three months, then the time-weighted CRR equals 6.25%.[8]

A.2 Data on bank-firm association

We obtain data for the bank-firm pair in a year from the Prowess database maintained by Center For Monitoring Indian Economy (CMIE). Many important papers that use the Indian setting use this database (Bertrand et al. (2002); Vig (2013); Gopalan et al. (2007a)). The Prowess database provides information about bankers to firms listed in

[8]We use the repo rate as an alternative policy instrument and report corresponding results in the online appendix. As the repo rate data starts from 2001 and the bank rate was the main policy rate before 2001, we replace the repo rate with the bank rate for years 1998 to 2000.

the database. The information about the bankers of a firm is available in the "Associates and Subsidiary Company Name" sub-section in the "Query by Ownership Structure and Governance Indicators" section. This data are sourced from the annual reports of the borrowing firms. For a random sample of 50 firms, we cross-verify this information and find that Prowess records the data accurately.

Following Santos et al. (2002); Gopalan et al. (2011), we code firm-years where a firm banks exclusively with one bank as R-firms and firm-years where a firm deals with multiple banks simultaneously as T-firms. As a robustness measure, in different specifications, we redefine relationship banking as a continuous spell of a firm dealing with a single bank for 2, 3, 4 and 5 consecutive years.

A.3 Data pertaining to firm financials

Prowess also provides information about financial and cash flow statements of firms on an annual basis. We obtain information relating to different sources of funding availed by a firm. In particular, we collect data relating to the total amount of bank and non-bank credit availed by a firm in any given year. Sources of non-bank credit include non-banking financial institutions, inter-corporate borrowing, trade credit, borrowings from development financial institutions, insurance companies, corporate bonds, public deposits, etc. Prowess, however, does not provide information on the amount of credit borrowed by a firm from each bank or financial institution. We also collect firm-level information on total assets, the market capitalization of equity, profitability, and other relevant variables from the Prowess database.

B Summary statistics

We present the summary statistics for our sample in Table 1.

As seen in Panel A, a typical firm in our sample undertakes relationship banking

in 43% of the firm years. If we narrow our definition of relationship banking as an exclusive relationship with a bank for two consecutive years, we find that a typical firm in our sample undertakes relationship banking in 35% of the firm-years. As expected, the proportion declines as we increase the threshold spell of association between a firm and a bank. Our sample consists of all the Scheduled Commercial Banks in India (44 in number) and 8,400 distinct public and private firms.

We note in Panel B that the average (median) bank borrowing to total borrowing ratio is 54% (58%). The bank dependency ratio is thus comparable to that in countries often seen as bank dependent (King and Levine (1993); La Porta et al. (1998)). The near absence of non-banking sources and high bank dependence makes the Indian setting apt for this study. Figure 1 plots the dependency of firms on various sources of external finance at a year level. It is clear from the figure that banks in India supply an overwhelming part of external finance.

More than 95% of the loans in our sample are secured. Although most loans are collateralized, banking relationships play an important role as enforcing collateral is a significant challenge in India, given the slow judicial system and political interference in a government-dominated banking system. When a majority of loans are collateralized, the balance sheet channel for transmission of the monetary policy assumes greater importance than the demand channel (Bernanke et al. (1996)). This is quite pertinent in our context because our analysis focusses primarily on the balance sheet channel for transmission of monetary policy. In panel C, we report firm-level characteristics that we use as additional explanatory variables in our regression specifications. In panel D, we report bank-level characteristics like the size of the loan book, ratio of non-performing assets to advances, and capital adequacy ratio (Bank's CAR). Finally, we report summary statistics relating to the monetary policy instruments in panel E. The CRR (Repo) averages 6.19% (7.16%) and has a standard deviation of 1.77% (1.01%). Figure 2 plots the movement of various

monetary policy instruments with time. It appears that the central bank has actively varied monetary policy instruments.

In Table 2, we perform a uni-variate comparison between R-firms and T-firms. Crucially, the average bank dependency ratio is the same for both groups. In terms of overall borrowing from non-banking sources, there is no significant difference between the two groups of borrowers either. With respect to size and profitability, R-firms seem different from T-firms. R-firms are smaller both in terms of assets as well as in terms of the absolute amount of borrowing from different sources. In accordance with the size difference, R-firms also have a lower net issuance of the bank, non-bank, and overall debt. They are also relatively less profitable and have lower market-to-book ratios when compared to other borrowers. The current ratio is higher for R-firms when compared to T-firms. However, when it comes to leverage, there is hardly any meaningful economic difference between the two groups.

IV Empirical strategy and results

We examine the main hypothesis of whether relationship banking reduces or enhances the impact of monetary policy changes.

A Identifying Relationship Banking

There is no standard way of identifying relationship banking (Boot and Thakor (2000)). In the extant literature, relationship banking has been identified using characteristics such as exclusive dealing between a firm and a bank (Ongena and Smith (2001)), length of association (Bhue et al. (2015)), specialized knowledge about the firm or the industry (Rajan (1992)), among others. It is generally accepted in the relationship banking literature that small firms and small banks are more likely to engage in rela-

tionship banking (Boot (2000); Gopalan et al. (2007b)). We first check whether this is true in our data. We report the results in Tables 3 and Table 4. In line with the extant evidence documented in the literature, we find that larger firms tend to bank with more number of banks and show a lower probability of engaging in exclusive dealing with a bank (coefficient of 0.6 and -0.49, respectively). Similarly, in Table 4, we show that Rs. 1 trillion increase in bank assets is linked with a 2.1% reduction in the ratio of relationship borrowers to total borrowers and 8.8% decrease in the probability of engaging in exclusive banking relationship with a borrower.

We use exclusive association and the length of association as a measure of relationship banking. This is because our thesis is that a relationship banker, owing to its superior information about the borrower or expertise in understanding the borrower's business, is able to overcome the frictions that arise during times of monetary policy shock. This will require a significant amount of investment of resources on the part of the banker. As shown by Petersen and Rajan (1995), a banker may not be able to recover all the investments made immediately due to plausible borrower moral hazard. Therefore, for this kind of relationship banking to exist, it is necessary that a bank has some power over the borrower in the sense of Rajan (1992). We use an exclusive banking association as a proxy for such power, which enables the banker to learn about the borrower. Further, we add a second dimension, i.e., the length of the exclusive banking association between a firm and a bank. This is not to say that other ways of identifying relationship banking are not important. However, given the requirements of this paper, the exclusive banking association seems to be appropriate.

It is important to note that studies such as Bharath et al. (2009) and Dahiya et al. (2003) define relationship banking at a loan facility level using the Dealscan database for the US. However, due to the unavailability of loan-level data with a firm-bank match in the Indian context, we can only define our relationship at a firm level and not at the loan

level.

B Focus on firms that have access to bank finance

To distinguish the impact of monetary policy shocks between R-firms and T-firms first, we need to compare among firms that have access to bank finance. Including firms that do not have access to bank finance in a particular year, for instance, would introduce variation that confounds the hypothesis we intend to test. In particular, firms that do not have access to bank finance in a particular year may differ from firms that have access to bank finance not only with respect to the nature of the banking relationship but also in terms of their ability to access bank finance. The latter source of variation may not be related to the nature of the banking relationship. Therefore, our empirical strategy restricts the analysis to firms that have access to a bank loan in each of the years in our sample period. We acknowledge that the above sample selection process leaves out firms that lose banking association for reasons such as liquidation, merger, or any other corporate action. To address this concern, we (i) estimate within-firm variation by including firm fixed effects; and (ii) estimate our results using a sub-sample of firms that have information for all 15 years of our sample period. We also show our results with and without firm fixed effects. In fact, Khwaja and Mian (2008) use the lack of significant difference in outcomes with and without fixed effects to show that firm-level factors do not influence the results. Finally, it is also important to note that finding the relationship effect is harder among successful firms, and hence, our estimates could be conservative.

C Focus on the credit channel of monetary policy

Second, we need to account for the direct "demand channel" of monetary policy. As discussed in the Introduction, the demand channel is likely to impact the overall borrowing of a firm due to a change in demand. Therefore, using absolute levels of borrowing, it

is not possible to disentangle the credit channel from the demand channel. Therefore, in our main tests, we follow Stein and Kashyap (1993) and examine the composition of borrowing. Specifically, we use the ratio of total bank borrowing of a firm in a year to total borrowing by the firm in that year. Because the demand channel is unlikely to influence the composition of firm borrowing, using the ratio of bank credit to total credit enables us to avoid any confounding effects of the demand channel.

D Baseline specification

We estimate the following regression:

$$Y_{it} = \alpha + \nu_i + (\beta_1 * \text{Avg CRR}_t + \beta_2) * \text{Relationship Bank}_{it} + \beta_3 * X_{it} + \epsilon_{it} \quad (1)$$

The data are organized at the firm-year level. The dependent variable (Y_{it}) is the ratio of bank credit to total credit borrowed by a firm i in year t (i.e. $Y_{it} = \frac{\text{Bank Loan}}{\text{Total Loans}_{it}}$). The explanatory variable Avg CRR_t represents time-weighted value of monetary policy instrument (CRR) for year t. Relationship Bank_{it} is a dummy variable that takes the value of 1 if firm i in a year t banks with only one bank and 0 otherwise. Firms level controls X_{it} include: (i) size represented by log of total assets, (ii) profitability represented by the ratio of EBIT to assets, and (iii) growth potential represented by Tobin's Q. ν_i denotes firm fixed effects. The errors ϵ_{it} are clustered at the firm level and adjusted for heteroscedasticity.

The main coefficient of interest is the interaction between Relationship Bank_{it} and Avg CRR_t. The coefficient β_1 captures the differential impact of monetary policy shocks on R-firms when compared to T-firms:

$$\beta_1 = \left.\frac{\partial Y_{it}}{\partial \text{Avg CRR}_t}\right|_{\text{R-firms}} - \left.\frac{\partial Y_{it}}{\partial \text{Avg CRR}_t}\right|_{\text{T-firms}} \quad (2)$$

The results reported in Table 5 are both with (column 3 and 4) and without (column 1 and 2) firm-fixed effects. Columns 2 and 4 add size, profitability, and Tobin's Q as control variables. As expected, the coefficient on Avg CRR is negative and statistically significant. We focus on column 3 for our discussion. A 1% increase in Avg CRR is associated with a 1.8% decrease in the ratio of bank borrowing to total borrowing. This result is in line with Stein and Kashyap (1993), who show that the bank lending channel matters for transmission of monetary policy.

Our main independent variable of interest—the interaction between relationship banking dummy and monetary policy shock—shows interesting results. We find that in a bank dependent environment, borrowers who maintain a relationship with a single bank are relatively less sensitive to monetary policy shocks. The interaction term indicates that the ratio of bank credit to total credit declines by 1.1% less for single bank dependent firms. Note that given an overall decline of 1.8% for the entire sample, the above result implies that the ratio of bank credit to total credit declines by only 0.7% for a single bank dependent firms.[9] Note that the results are not a result of the bank lending channel pointed out by Stein and Kashyap (1993). The impact of the bank lending channel is likely to reflect in the overall 1.8% decline in the bank credit ratio. Therefore the above result implies that the impact of the "firm balance sheet channel" is likely to be muted for R-firms due to the absence of information asymmetry.

Notice the negative co-efficient of the relationship bank dummy. As discussed above, the result implies that the fraction of loans borrowed from banks is lower for firms having

[9]Result with repo rate is presented in Table A.2 in the online appendix. In Table A.3, we reproduce the main result with year fixed effects. Expectedly, the coefficient relating to Avg CRR gets omitted as it varies at an annual level. Our main result goes through even with year fixed effects. In Table A.4, we restrict the sample to firms whose information is available for all the years. Again, the results go through. Finally, in Table A.5, we test whether the incremental impact of relationship banking on monetary policy transmission is any different for unlisted firms. We do not find any such significant difference. It is important to note that the Prowess database is likely to cover only large unlisted firms and hence our sample of unlisted firms is unlikely to be representative of the unlisted firm universe in India.

an association with a single bank when compared to firms dealing with multiple banks. The fact that R-firms have lower bank borrowing ratio does not imply that their banks support them less. In fact, given that typically small and opaque firms engage in banking relationships, in the absence of relationship banking, such firms would have received even lesser credit. It is difficult to construct such a counter-factual given our data. However, since our focus is on the relative impact of monetary policy, we focus more on the interaction term. The co-efficient of the relationship banking dummy does not reflect the impact of monetary policy. It only shows that R firms have a lower proportion of bank borrowing when compared to T firms. The result is in line with the finding in the relationship banking literature that firms that have difficulty in obtaining credit in debt markets due to reasons such as opacity, size, etc. engage in relationship banking (Berger and Udell (1995); Berger et al. (1999)). It is also crucial to note that given that we measure changes in monetary policy variables at an annual level, we cannot measure the instantaneous reaction of firms to monetary policy variations.

E Identification challenges

Since monetary policy changes are never random, it is very difficult to obtain a natural experiment to study the hypothesized effects. So, we examine the various threats to identification in our setting.

For clean identification, monetary policy changes must be uncorrelated with unobserved determinants of the *difference* between R-firms and T-firms in the *ratio* of bank credit to total credit, i.e., unobserved determinants of a proxy that resembles a *second-order derivative* of credit. Thus, even if the monetary policy shocks are correlated with the the ratio of bank credit to total credit for all firms, the identifying assumption would be satisfied. This is because the monetary policy shocks may not correlate with the unobserved determinants of the *difference* between R-firms and T-firms in the ratio of bank

credit to total credit. Similarly, even if the monetary policy shocks are correlated with the the difference in bank credit between R-firms and T-firms or the difference in total credit between R-firms and T-firms, the identifying assumption is likely to be satisfied.

E.1 Endogenous Matching

The key challenge to identification stems from endogenous matching between banks and firms. The literature on relationship banking highlights that R-firms are likely to be small and opaque (Rajan (1992); Boot (2000); Berger and Udell (2002); Berger et al. (2005)). Thus, firm characteristics—observed and unobserved—are likely to impact a firm's choice of relationship banking versus transactional banking. Additionally, it is also possible that certain bank characteristics (like capitalization) are correlated with banks' incentives to engage in the relationship banking model. Such self-selection is especially problematic if it is affected by time-varying firm characteristics. This could occur if just before monetary policy changes firms that are less likely to be impacted by monetary policy shocks match with banks that are keen to develop a banking relationship with the firm. We address this concern in two ways.

Multi-year relationships We re-define relationship banking as a continuous spell of engagement. We test several spells ranging from 2 to 5 *consecutive* years. A firm is unlikely to anticipate monetary policy shocks five years in advance. So, if our results remain robust even when relationship banking is defined as a continuous spell of engagement for 2 to 5 *consecutive* years, we can conclude that our results are unlikely to be driven by time-varying firm characteristics that affect the firm-bank match. We report these results in Table 6 and find results to be quite similar to those reported in Table 5.

The coefficient of Avg CRR is stable at around 1% across different definitions of relationship banking. The interaction between Avg CRR and relationship banking continues to positive and significant and has a magnitude of 0.5% to 0.9%. However, as the

definition of relationship banking becomes strict, more and more R-firms are classified as T-firms, the statistical significance falls from 1% to 5%, and the relative strength of relationship bank channel (measured as the ratio of interaction coefficient to Avg CRR coefficient) decreases from 81% to 56%. In row 11 of the Table, we present the derivative with respect to relationship banking. The nominal values of the coefficients do not show a declining trend as the definition becomes tighter. Therefore, it is reasonable to conclude that, in general, this table shows that our results are robust to varying the depth of the relationship.

Switch between R-banking and T-banking We examine the correlation between monetary policy shocks and the switch by a firm from R-banking to T-banking or vice versa. As noted before, we present the summary information about the proportion of firms switching from one type of banking to other in Table A.6 of the online appendix. We do not find any significant unusual patterns here. The proportion remains largely stable with time. If this correlation is insignificant, we can then conclude that our results are unlikely to be driven by time-varying firm characteristics affecting the firm-bank match. We estimate the following conditional logit specification:

$$logit(Y_{it}) = \alpha + \nu_i + \beta_1 * \text{Avg CRR}_{t-1} + \beta_2 * \Delta X_{it,t-1} + \epsilon_{it} \tag{3}$$

Here, the dependent variable denotes a change in a firm's bank relationship status. The explanatory variable of interest, Avg CRR_{t-1} is the lagged value of average annual CRR. In essence, we examine if monetary policy shocks themselves are associated with the type of banking a firm indulges in. The results are reported in Table 7. In columns 1 and 4, the dependent variable is a dummy variable that takes the value of 1 if a firm shift from R-banking to T-banking during the year and zero otherwise. In columns 2 and 5, the dependent variable is a dummy variable that takes the value of 1 if a firm shifts

from T-banking to R-banking during the year and zero otherwise. In columns 3 and 6, the dependent variable is a dummy variable that takes the value of 1 if a firm changes its relationship status and zero otherwise. The data are organized at a firm-year level. We include firm fixed effects in all columns.

Additionally, in columns 4, 5, and 6, we include various firm characteristics that are likely to influence the way a bank deals with a firm. We rely on the extant literature (Farinha and Santos (2002); Detragiache et al. (2000); Gopalan et al. (2011)) on determinants of relationship banking in selecting control variables. Based on the results presented in Table 7, it is reasonable to infer that the way a firm deals with its bankers is not significantly influenced by monetary policy shocks. This finding helps us rule out the possibility of an unobserved correlated factor influencing both monetary policy shocks as well as relationship banking formation.

Risk-Shifting Channel At Work We examine whether banks with weaker balance sheets chose to engage in relationship banking model. This can affect our results because as outlined by Jiménez et al. (2014), undercapitalized banks tend to assume more risk during dovish monetary policy regimes. Prima facie, the risk channel, which is pro-cyclical, is likely to operate in the opposite direction and hence should lead to an understatement of our results. However, in an unlikely scenario of T-firms being more risky, the risk channel could operate in the same direction as relationship banking. To address this concern, we conduct two tests. First, we explicitly control for the risk channel by estimating the following regression specification:

$$\begin{aligned} Y_{it} = \quad & \alpha + \nu_i + (\beta_1 * \text{Avg CRR}_t + \beta_2) * \text{Relationship Bank}_{it} \\ & + (\beta_4 * \text{Avg CRR}_t + \beta_5) * \text{Bank CAR}_{it} + \beta_3 * X_{it} + \epsilon_{it} \end{aligned} \tag{4}$$

Here the interaction between capital adequacy ratio of banks and monetary policy

accounts for the risk channel. If R-firms see a lower decline in bank borrowing not because of their relationship, but because they are paired with undercapitalized banks, then we would expect β_4 to subsume the effect of β_1. Instead, as evident from Table A.7 in the appendix, β_4 is positive, and more importantly, the main coefficient of interest (β_1) remains positive and strongly significant. Second, we test whether our main results are robust to bank heterogeneity. We divide firms into subcategories based on the average value of bank fundamentals (non-performing assets (Gross NPA/Advances), loan book size, and capital adequacy ratio (Bank CAR)) for all the firm's bankers in year t. We estimate the baseline regression equation (1) separately for the different subsample of firms. We report the results in Table A.8. Our results continue to hold across all categories of banks. We do note that our relationship banking channel is more potent for firms that (on average) borrow from banks with smaller size and lower CAR. Given these results, we conclude that the relationship banking channel is significant even after accounting for the risk channel of monetary policy transmission.

E.2 Reverse causality

Another identification concern pertains to possible reverse causality. Note that for our results to be a manifestation of a reverse-causal relationship, *expected differences* between R-firms and T-firms in the *ratio* of bank credit to total credit should affect the monetary policy changes. To investigate this concern, we carefully examine the pronouncements made by Central Bank Governors while announcing monetary policy changes. We do not find a mention of differential bank credit between R-firms and others as a cause for change in the monetary policy stance.

To further rule out reverse causality, we estimate the impact of CRR change on lending in the same year as the year of change, subsequent years, and the previous years. We estimate the same for both types of firms under study. If the differential bank borrowing

between R-firms and T-firms drives the variation in CRR, then the said differences are likely to manifest before the policy change. In other words, if our results are impacted by reverse causality, then the relative advantage of R-firms, in terms of bank borrowing, should precede CRR.

We estimate regression (1) using the bank borrowing from year -2 to year +2 as the dependent variable. We plot the coefficient in figure 3. The panel on the left plots the coefficients for transaction banking, whereas the panel on the right plots the same for R-firms. As shown in the figure, none of the lagged values of bank borrowing is statistically significant for either type of firm. This significantly ameliorates concerns regarding reverse causality. Interestingly, the coefficient is negative and significant for transaction banking firms in the year of change and the subsequent years. This shows that the monetary policy shocks impact transaction banking firms negatively. Crucially, the R-firms do not experience any significant decline in bank borrowing even after the monetary policy change. Thus relationship banking seems to insulate firms from monetary policy shocks as in (Bolton et al. (2016)). As an additional test, we also regress average annual CRR on the lagged values of bank debt share separately for R-firms and T-firms. As reported in Table A.9 in the online appendix, we find that a model with three lags of bank borrowing ratio is not able to predict CRR. Overall, these results offer evidence that our results are not driven by reverse causality.

F Channels

We now examine the channel through which relationship banking affects the sensitivity of bank debt share of firms to monetary policy.

F.1 Substitution between bank credit and non-bank credit

The main outcome variable that we consider is the ratio of bank debt to total debt. A ratio could change either because of a change in the numerator or in denominator. An example will make this point clear. Assume that a T-firm, which obtains financing from multiple banks, and an R-firm, which depends on a single bank, have INR 1 of bank debt, and INR 1 of non-bank debt and a monetary policy tightening follows. Now suppose if both the above firms lose INR 0.25 of bank funding because of the bank lending channel, [10] and the bank dependent small borrower fails to replace this lost credit from other sources (whereas the large borrower succeeds), then the ratio of bank credit to total credit would be 0.75/1.75 for the R-firm and 0.75/2 for the T-firm borrower. Thus mechanically, the ratio is relatively "higher" for the R-firm but the result is just an artifact of working of the bank lending channel and R-firm's higher credit constraints with respect to non-bank credit.

To address the above concern, we examine what exactly happens to the amount of credit instead of the ratio of bank credit. The results are reported in Table 8. First, we estimate the regression equation (1) using the natural logarithm of the level of total borrowing as the dependent variable and report the results in column 1. If the above objection is correct, then one expects to see that level of total borrowing to be more sensitive for R-firms. In other words, based on the mechanical change story explained above, a tightening of monetary policy is expected to lead to a higher reduction in total borrowing for R-firms when compared to T-firms.[11] However, while we find that the direct effect of Avg CRR on the volume of total debt is negative and significant (-3.4%),

[10] As we have clarified above, as per extant literature, the small firm is expected to lose more as it banks with small banks. However, such a possibility only strengthens our case, and biases result in our favor.

[11] In these tests, we do not include endogenous firm-level variables such as assets because, as Angrist and Pischke (2008) highlight, the inclusion of endogenous variables in a regression affects the coefficient magnitude and the interpretation of the exogenous variables as well. However, we do include firm-fixed effects, since we are mainly interested in within-firm variation.

the interaction term between Avg CRR and relationship banking dummy is statistically insignificant. This shows that there is no differential impact on firms dependent on banking relationships.[12] Thus our results are not driven by the relative inability of small firms to substitute lost bank credit. The negative relationship between CRR and total credit could be driven by either the aggregate demand channel or the supply side bank balance sheet channel.

We burrow a layer further by dividing the total credit into bank and non-bank credit and study the impact on them separately. The results are reported in columns 2 and 3 in Table 8. In column 2, the dependent variable is the natural logarithm of the level of bank credit. The interaction term between Avg CRR and relationship banking dummy is positive and statistically significant (3.1%). In other words, while the reduction in bank credit is 5.7% for T-firms, it is only 2.6% (5.7%-3.1%) for R-firms. Column 3 tells a different story altogether. Here the dependent variable is the logarithm of non-bank credit. The result presented shows that nonbank borrowing of firms that are dependent on a single bank is more sensitive to monetary policy changes when compared to other firms. For the sake of exposition, we take the case of monetary policy tightening. The results indicate that R-firms experience an increase of only 1.6% in nonbank credit as compared to 4% for T-firms. This clearly shows that R-firms suffer from information asymmetry caused by agency issues when it comes to dealing with arms-length lenders as they are not able to substitute bank credit with non-bank credit as much as T-firms do. However, this effect disappears when dealing with relationship bankers.

Next, we rerun the above specifications using annual changes (instead of log levels) in the outcome variables. To address the concern that total credit, bank credit, and non-bank credit are all strongly autocorrelated, this specification uses annual changes in debt or new debt issuance. Column (4), (5), and (6) show that our results go through. Column

[12]Results with year fixed-effects are presented in Table A.10 of the Online appendix. The results are stable across specifications.

5 shows that for a 1% increase in Avg CRR, the issuance of bank debt by T-firms falls by Rupees 9.7mn. Since the average bank debt issuance is Rupees 103 mn (as reported in summary statistics), this represents a change of around 9%. The interaction term of 7.828 implies that the sensitivity of bank debt issuance to Avg CRR for R-firms is only around 1.8%. Note the this shows that both the direct effect of CRR and the differential effect due to relationship banking on new bank issuances are economically significant.[13] These results lead to the following broad conclusions:

1. In general, bank (nonbank) credit for all firms is decreasing (increasing) in CRR (due to the substitution effect).

2. R-firms' bank borrowing is relatively less sensitive to CRR, whereas their non-bank borrowing is relatively more sensitive.

3. On an overall basis, R-firms can offset the relative loss of non-bank credit with relative gains in bank credit. Hence, relationship banking neutralizes the impact of the firm balance sheet channel.

F.2 Bank lending channel

It is well known that small borrowers usually borrow from small banks, and large borrowers prefer large banks (Berger et al. (2014)). It is also well known that the small bank-small firm combination is more amenable to relationship banking (Berger et al. (2005). As mentioned before, we find this association in our data as well. Therefore, any differential effect of monetary policy shocks on small versus large banks can impact the transmission of monetary policy to the relationship banking channel. In other words, the concern could be that the results shown in table 5 are likely to be a manifestation of the bank balance sheet channel at work. However, this is unlikely to be the case

[13] Analogous results for repo rate are reported in Table A.11 in the Online Appendix. As with previous results, the results are not clear with the repo rate as the policy variable.

here. Small banks are impacted more by monetary policy than large banks because, unlike large banks, small banks cannot seamlessly replace their lost deposits (Kashyap and Stein (1994)). So the R-firms, which are more likely to bank with small firms, are expected to be more sensitive to monetary policy shocks if our results manifested due to the bank lending channel.

On the contrary, in table 5, we find that R-firms are less sensitive to monetary policy shocks. Thus, the differential impact due to the bank lending channel is likely to counter the effect of relationship banking on monetary policy transmission that we find. In other words, the effect of the bank balance sheet channel is likely to understate the real impact of the relationship banking channel on monetary policy transmission.

To isolate the relationship banking channel from the bank balance sheet channel, we perform a test based on the idea developed by (Ashcraft and Campello (2007)). The identification in Ashcraft and Campello (2007) is based on the idea that all banks belonging to bank holding companies face similar supply-side constraints at the margin. Hence, any disparate treatment of borrowers of such banks is likely to be the result of the borrower balance sheet channel being at work. Based on a similar logic, we analyze the sensitivity to monetary policy shocks for a sub-sample of borrowers who borrow exclusively from government-owned banks. All government-owned banks are majority-owned by a single owner and that too a sovereign. Also, in the Indian context, all government banks are homogenous and are subject to similar operating rules (Cole (2009)). So, it is reasonable to assume that supply-side effects on the margin are likely to be similar for all government-owned banks.

We, therefore, estimate the regression equation (1) on such a sub-sample. Effectively we compare borrowers who have a banking relationship with one public sector bank vis-a-vis those that deal with many public sector banks. Given the arguments made above, these banks are likely to experience similar supply-side shocks but differ with respect

to the level of information they possess about each borrower. Thus it is reasonable to attribute any difference in the borrower level impact to borrower balance sheet factors.

The results are shown in Table 9. The arrangement of the tables mimics the arrangement of Table 5. As shown in column 3, we find that while the decline in bank debt ratio is 1.8% for T-firms, it is only 0.8% for R-firms. Our main independent variable, the interaction between relationship banking dummy and Avg CRR, remains positive and significant. This implies that even within a sample of borrowers that borrow exclusively from government-owned banks and hence are likely to face the same supply shocks, R-firms are less susceptible to monetary policy shocks when compared to T-firms. This further strengthens our hypothesis that our results are driven by reduced information asymmetry that reduces the impact of monetary policy through the firm balance sheet channel.[14]

G Monetary tightening vs. loosening

Note that for expositional ease, we base most of our examples on a tightening scenario. Our next set of tests seek to examine if the R-firms' response to monetary policy is symmetrical across tightening as well as loosening. We have discussed the plausible impact of monetary policy tightening in the presence of relationship banking. However, what is likely to happen after a reduction in CRR is not very clear. When faced with higher liquidity, does the relationship lender chose to increase lending differentially to R-firms who are likely to be credit constrained or to T-firms who have access to other lenders as well? To address this question, we define monetary tightening (loosening) as an increase (decrease) in Avg CRR in a year t over the year $t-1$. Using the above

[14]Table A.12 in the online appendix presents the results for the repo rate. The results are directionally similar.

definition, we estimate the following regression equation:

$$\begin{aligned} Y_{it} &= \alpha + \nu_i + (\beta_1 * \text{Relationship Bank}_{it} + \beta_2) * \text{Avg CRR}_t \times \mathbb{1}\{\Delta\text{Avg CRR}_{t,t-1} \geq 0\} \\ &\quad + (\beta_3 * \text{Relationship Bank}_{it} + \beta_4) * \text{Avg CRR}_t \times \mathbb{1}\{\Delta\text{Avg CRR}_{t,t-1} < 0\} \\ &\quad + \beta_5 * \text{Relationship Bank}_{it} + \beta_6 * X_{it} + \varepsilon_{it} \end{aligned} \tag{5}$$

The results are reported in Table 10. Columns 3 and 4 employ firm-fixed effects, whereas columns 1 and 2 do not. The results illustrate that the effects are quite symmetric. Focusing on column 3, we see that a 1% increase in Avg CRR decreases the bank debt share of T-firms by 1.7%, whereas an equal decline in Avg CRR raises it by 2.1%. The corresponding changes for R-firms are 0.7% and 0.9%, respectively. It shows that while banking relationships are beneficial to the firms when monetary policy tightens, holdup problems restrain them during times of monetary expansions. Thus, our results are also consistent with Rajan (1992) who shows that relationship lenders extract monopoly rents from their borrowers. Our results show that this extraction is concentrated in times when monetary policy is loosened.[15]

V Discussion On Economic Significance

Our baseline result with firm-fixed effects in Table 5 (column (3)) shows that a 1% increase in Avg CRR leads to a 1.8% decline in the ratio of bank debt to total debt for T-firms. For R-firms, the decline is less by 1.1%. However, summary statistics presented in Table 1 show that the average bank borrowing ratio is 54%. Given the above data, there could be concerns about (i) the overall effectiveness of CRR itself in economic terms; and (ii) the economic significance of the relatively lower sensitivity of R-firms when compared to T firms to monetary policy shocks.

[15] In Table A.13, we repeat the above specification using the repo rate. The results are similar.

In our main tests, as described before, we use the bank borrowing ratio as the dependent variable for measuring the impact of monetary policy in general and its differential impact on R-firms. We do this to control for the impact of the demand channel (Kashyap and Stein (2000)). The symmetric or asymmetric impact of the demand channel on R-firms, when compared to T-firms, is not the question we investigate. Our focus is on the plausible differential treatment made by the banks. However, while the ratio measure is useful in isolating the demand channel, it is not ideally suited to assess the economic significance of the results (Frank and Goyal (2015)). This is because the measure is based on total bank loans and total loans from all sources. Both variables contain legacy loans and extremely long term loans that are not affected much by monetary policy changes.

To address this issue, in columns 4, 5, and 6 of Table 8, we examine the impact of monetary policy on the net issuance of new debt by firms. The summary statistics presented in Table 1 show that the average net new issuance of bank debt is close to Rupees 103 million. To assess the economic impact of CRR in general, consider the co-efficient of Avg CRR in column 5, where the net new issuance of bank debt is the dependent variable. We find that the net issuance of bank debt changes by close to Rupees 9.715 million when Avg CRR changes by one percentage point, and the direction of association is negative. The result also implies that a one standard deviation change in Avg CRR leads to Rupees 17.2 million (-9.7Mn * 1.77) change in the net issuance of bank debt in the opposite direction. The change translates to 16.8% of the average net new bank debt issuance of firms in a year and therefore appears economically meaningful.

Now consider the differential impact of CRR on R-firms and T-firms. Here, we find that a one standard deviation change in Avg CRR leads to a drop in issuance of Rupees 3.4Mn for R-firms (1.9Mn * 1.77).[16] Thus, the relative strength of relationship banking channel can be quantified as 13.5% (over the mean bank debt issuance), which is

[16]Note that due to firm-fixed effects, this difference is not contaminated by the fact that on-average, net bank debt issuance by T-firm is also higher that that of R-firms (as shown in Table 2)

economically sizable. In other words, close to 80%[17] of the overall effect of CRR gets reversed.

Second, we then slice the data on median leverage and study the economic impact of CRR on R firms when compared to T firms using net new issuance of bank debt as the dependent variable in both the subsamples separately. The idea is to provide suggestive evidence relating to the working of the firm balance sheet channel of monetary policy and also assess the economic meaningfulness of our results. The firm balance sheet channel works through the erosion of net-worth, which distorts the incentives of equity holders. This tendency gets aggravated by the asymmetry of information. It is well known that the call-option-like behavior of equity increases in leverage (Toft and Prucyk (1997)), and, hence, we expect the impact of CRR to be higher for highly levered firms.

In the results presented in columns 5 and 6 of Table 11, we find that for highly levered firms, the net issuance of bank debt changes by close to Rupees 11.87 million when Avg CRR changes by one percentage point and the direction of association is negative. The result also implies that a one standard deviation change in Avg CRR leads to Rupees 21 million (11.87*1.77) change in net issuance of bank debt in the opposite direction. The change translates to 20.3% of the average net new bank debt issuance of firms in a year and therefore appears economically meaningful. We then measure the differential impact of CRR on R and T firms using the same dependent variable. Here we find that 82% of the overall effect of CRR gets reversed. We find similar results with the ratio and the level measures in columns 1 to 4. The significant incremental impact of CRR on highly levered firms and its reversal for R-firms support the thesis that our results are driven by the working of the firm balance sheet channel and R-firms' relative resistance to it.

Third, an alternative way to assess the importance of relationship banking is to compare it with commonly studied factors known to affect interest rate sensitivity of firms in

[17](13.5/17.2)

developing markets. These factors are group affiliation[18] (Braggion et al. (2009); Borensztein and Lee (2002)), profitability (Bougheas et al. (2006)) and growth opportunities (a proxy for capital demand). The results are presented in Table 12. We run a difference-in-difference model where the dependent variable is the level of bank borrowing and net issuance of bank loans.[19] The independent variables are the factors mentioned above (relationship banking, group affiliation, profitability, and Tobin's Q) along with their respective interactions with the Avg CRR. In other words, we run a horse-race model where we compare these factors against relationship banking in terms of the differential response they generate for the interest rate sensitivity of firms. We do not use firm fixed-effects since we want to get the direct effect of group affiliation (which is time-invariant), and we also do not use year fixed-effects to see the effect of CRR. However, we include industry fixed-effects to control for the cross-sectional variation to some degree.

In terms of the level of bank borrowing (column 1 to 4), we find that firms with more growth opportunities have a 3.5% higher sensitivity to interest rates, whereas, group affiliation and profitability has no significant effect. In contrast, firms with relationship banking are entirely insensitive to interest rate changes, whereas those without relationships have a sensitivity of -6.7%. In terms of issuances (column 5 to 8), we find that while T-firms reduce their issuance by Rupees 13.8 Mn for a 1% increase in Avg CRR, the corresponding decrease for R-firms is only Rupees 2.2 Mn. Thus, the difference in sensitivity attributable to relationship banking is 11% [20] The corresponding value for group affiliation, profitability, and Tobin's Q is 10%, 30%, and 5.8%, respectively. Overall, this shows that in the context of developing markets, the relationship banking channel is one of the most important sources of firm heterogeneity in terms of economic significance.

[18]Business groups are equivalent to chaebols in the Indian context.

[19]Corresponding results with bank borrowing ratio as the dependent variable are present in Table A.14 of the Online Appendix. We present the ratio measure as robustness because it is not well suited to assess the economic significance when both the numerator and the denominator could be moving (Frank and Goyal (2015)).

[20]Since The average net issuance in the sample if Rupees 103 Mn.

Finally, in Table A.15, we find that the within-firm variation of the bank borrowing ratio is 30% lower than the overall variation. Therefore, the economic significance of the main effect appears higher when viewed in the light of within-firm variation. This shows that, in general, one standard deviation change in Avg CRR reduces bank debt share by 3.2% (representing 15% of the total dispersion). All the above results together show that the overall effect shown in this study is economically meaningful.

VI Conclusion

Recent literature on monetary policy transmission has focused on capital market frictions that affect the transmission of monetary policy to the real economy. We contribute to this literature by showing that firms that engage in relationship banking, i.e., those that deal exclusively with one bank, are less sensitive to monetary policy shocks. Thus, we highlight another angle through which relationship banking enables small, growing firms to alleviate the effects of credit market frictions. Broadly, our study highlights the role of the *nature of engagement* between a bank and its borrowers in the way monetary policy shocks impact a firm. Because the relationship banking literature has highlighted the role of competition in affecting the intensity of relationship banking, our study suggests that policymakers may want to consider the structure of the banking market in analyzing the impact of monetary policy on the real economy.

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Figure 1: Fraction of borrowing from different sources

This figure tracks the movement in composition of total borrowing of a typical firm during the sample period.

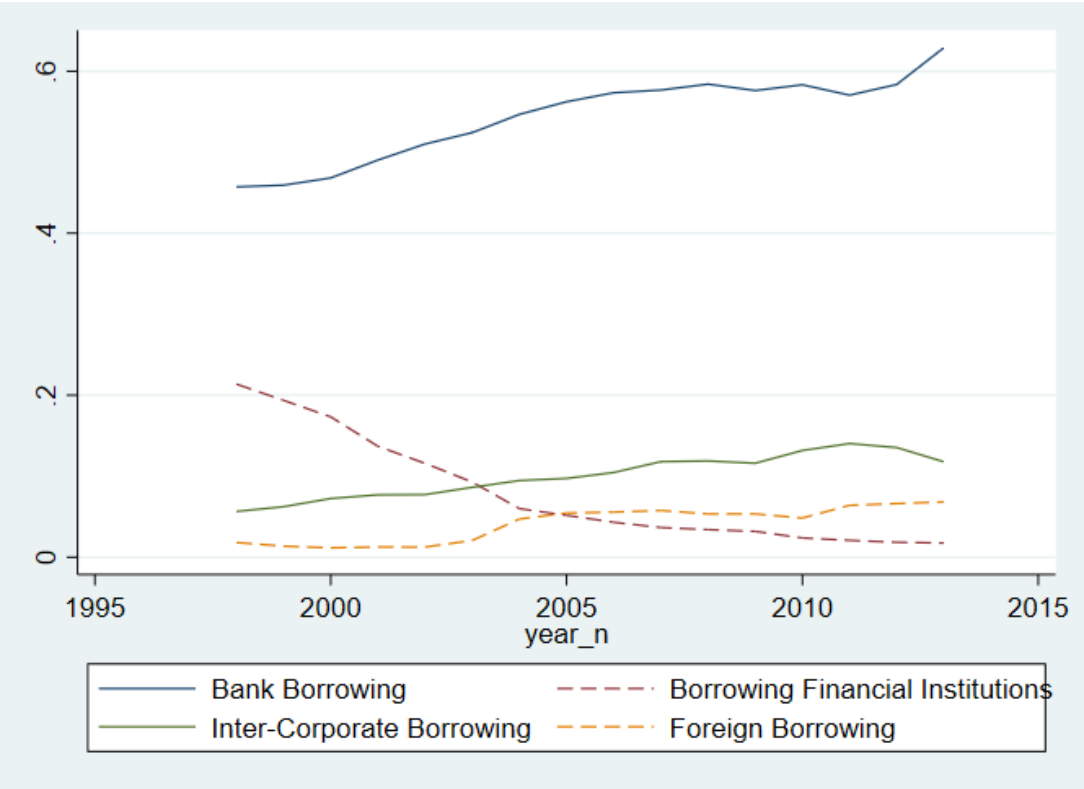

Figure 2: RBI Monetary Policy Tools (1998-2013)

This figure depicts movement in various monetary policy tools employed by the RBI.

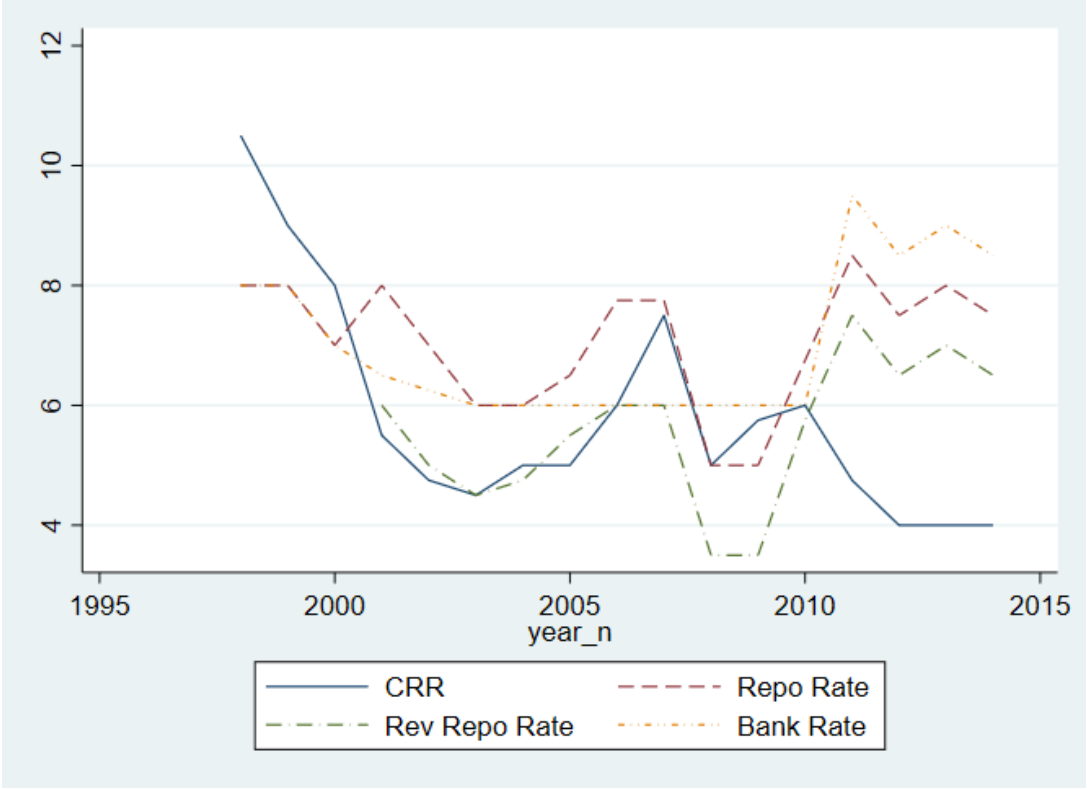

Figure 3: Sensitivity To CRR

This figure depicts the association between bank borrowing and Avg CRR. The left panel depicts the association for R-banking firms whereas the right panel shows the same for T-banking firms.

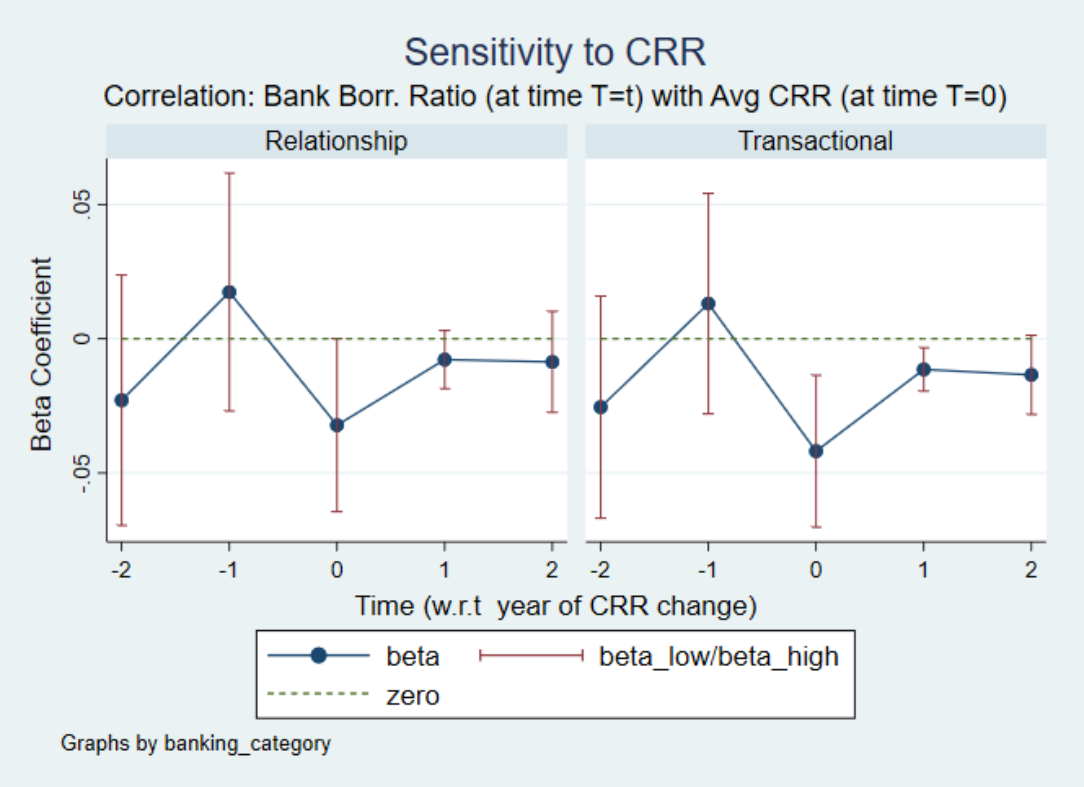

Table 1: Summary Statistics

In this table we present the summary statistics for all the variables used in the study.

	Obs	Mean	Median	Std Dev.
Panel A				
Relationship Bank (1 yr)	78,640	43%	0%	50%
Relationship Bank (2 yr)	78,640	35%	0%	48%
Relationship Bank (3 yr)	78,640	28%	0%	45%
Relationship Bank (4 yr)	78,640	22%	0%	42%
Relationship Bank (5 yr)	78,640	18%	0%	38%
Panel B				
Bank borr. ratio	51,093	54%	58%	35%
Borr. from non-bank sources (ratio)	51,093	46%	43%	35%
Financial institutions borr. ratio	51,093	8%	0%	18%
Government borr. ratio	51,093	2%	0%	9%
Capital market borr. ratio	51,093	3%	0%	10%
Inter-corporate borr. ratio	51,093	10%	0%	23%
Foreign borr. ratio	51,093	4%	0%	14%
Promoter borr. ratio	51,093	4%	0%	15%
CP borr. ratio	51,093	0%	0%	3%
Other borr. ratio	51,093	16%	3%	25%
Log(Total borrowing amount)	56,106	4.69	4.91	2.58
Log(Bank borrowing amount)	56,106	3.76	4.07	2.66
Log(Non-bank borrowing amount)	56,106	3.50	3.59	2.63
Total Loans (Change in Rupees Mn)	43,317	162.80	0.20	911.79
Bank Loans (Change in Rupees Mn)	43,317	102.96	0	587.38
Non-bank Loans (Change in Rupees Mn)	43,317	48.12	0	515
Secured bank borr. ratio	49,502	95%	100%	17%
Unsecured bank borr. ratio	49,502	5%	0%	17%
Panel C				
Size/Log of Assets (Rupees mn)	62,369	6.24	6.13	2.03
Profitability (%)	62,373	6%	7%	12%
Leverage (%)	56,792	50%	36%	69%
Current Ratio	61,260	3.92	2.17	6.52
Tobin's Q (Ratio)	78,639	1.01	1.00	0.69
Panel D				
Loan Book Size (Rupees mn)	75,454	20,987	10,169	28,966
Gross NPA/Advances	63,407	6%	4%	5%
Bank CAR	73,350	0.12	0.12	0.02
Panel E				
Avg CRR (%)	74,789	6.19%	5.68%	1.77%
Avg Repo (%)	74,789	7.16%	7.58%	1.01%

Table 2: Univariate Results (Relationship and Transactional Banking)

This table reports the summary statistics for firms in relationship banking and those in transactional banking. It also presents the univariate results for the mean difference between these two groups of firms.

	R-firms			T-firms			Univariate Results	
Variable	Observations	Mean	Median	Observations	Mean	Median	Mean Difference	T-Stat
Bank borr. Ratio	21,221	54%	58%	29,872	54%	57%	0.001	0.38
Non-bank borr. ratio	21,221	46%	42%	29,872	46%	43%	-0.001	-0.38
Financial institutions borr. ratio	21,221	8%	0%	29,872	8%	0%	-0.006***	-3.94
Government borr. ratio	21,221	1%	0%	29,872	2%	0%	-0.005***	-6.84
Capital market borr. ratio	21,221	1%	0%	29,872	4%	0%	-0.021***	-22.93
Inter-corporate borr. ratio	21,221	12%	0%	29,872	9%	0%	0.029***	13.69
Foreign borr. ratio	21,221	2%	0%	29,872	5%	0%	-0.026***	-20.74
Promoter borr. ratio	21,221	5%	0%	29,872	3%	0%	0.026***	19.94
Other borr. ratio	21,221	7%	0%	29,872	6%	0%	0.010***	5.97
CP borr. ratio	21,221	0%	0%	29,872	0%	0%	-0.003***	-12.82
Log(Total borrow)	23,619	3.77	4.09	32,487	5.35	5.80	-1.580***	-75.03
Log(Bank borrow)	23,619	2.90	3.21	32,487	4.39	4.93	-1.490***	-68.08
Log(Non-bank borrow)	23,619	2.65	2.69	32,487	4.12	4.43	-1.468***	-67.96
Total Loans (Change in Rupees Mn)	17,165	36.50	0.0	26,152	245.71	1.1	-209.21***	-23.5
Bank Loans (Change in Rupees Mn)	17,165	22.43	0.0	26,152	155.82	0.0	-133.37***	-23.3
Non-bank Loans (Change in Rupees Mn)	17,165	11.45	0.0	26,152	72.19	0.0	-60.74***	-12.0
Size	25,185	5.29	5.31	33,956	6.96	7.03	-1.668***	-106.18
Profitability	25,185	0.06	0.06	33,960	0.07	0.07	-0.015***	-13.72
Leverage	22,400	0.52	0.33	31,288	0.51	0.37	0.014*	2.17
Current Ratio	24,384	4.42	2.30	33,661	3.63	2.05	0.783***	13.55
Tobin's Q	32,279	1.00	1.00	42,509	1.03	1.00	-0.028***	-5.37

Table 3: Firms Level Characteristics And Number Of Bank Associations

In this table, we present the association between firm-level characteristics and the number of banks a firm deals with in a given year. The data are organized at a firm-year level. Column 1 is OLS with the number of banks a firm deals with, in a given year, as the outcome variable. In column 2, the dependent variable is a dummy variable that takes the value of 1 if the firm under consideration exclusively deals with one bank in that year, and the model is conditional logit. Various firm characteristics are used as explanatory variables. OLS regression includes fixed effects at the firm level. Errors are clustered at the firm level for OLS and are bootstrapped for logit, and robust t-statistics are reported in parenthesis. ***, ** and * represents significance at 1%, 5% and 10% respectively.

Dependent Variable	Number of Bankers	Prob[Relationship Bank]
Size	0.605***	-0.496***
	(19.564)	(-96.061)
Profitability	-0.001	0.666***
	(-0.148)	(8.784)
Tobin's Q	0.005***	-0.168***
	(3.361)	(-15.678)
Observations	59,141	59,141
R-squared	0.817	
Firm FE	Yes	-
SE	Clustered	Bootstrapped

Table 4: Bank Size And Relationship Banking

In this table, we present the association between bank size and relationship banking. The dependent variable in column 1 is the proportion of relationship firms to total firms for a bank and the model is OLS. The data are organized at the bank year level. For column 2, the dependent variable is the dummy variable that takes the value of 1 if the firm exclusively deals with a bank. The model is conditional logit, and the data are organized at the bank-firm-year level. We include fixed-effects at the bank level. Errors are clustered at the bank level for OLS and bootstrapped for logit. Robust t-statistics are reported in parenthesis. ***, ** and * represents significance at 1%, 5% and 10% respectively.

Dependent Variable	RB firms to Total firms	Prob[Relationship Bank]
Bank size (in Rs. trillion)	-0.021***	-0.088***
	(-3.556)	(-22.325)
Observations	665	189,152
R-squared	0.546	
Bank FE	Yes	Yes
Adj R-squared	0.514	0.0256

Table 5: Impact of Monetary Policy on the fraction of borrowing from banks

This table reports the results of regression with the dependent variable as the fraction of borrowing from banks. Relationship Bank is a dummy that takes a value of 1 in year t if the firm deals with a single bank in year t (and 0 otherwise). Avg CRR is a time-weighted average value of CRR for the fiscal year t. Data are organized at the firm-year level. Columns (3) and (4) specify the results with firm-fixed effects. In columns (2) and (4), we use additional firm-level controls that proxy for size (assets), profitability (EBIT to assets ratio), and growth opportunities (Tobin'Q). Errors are clustered at the firm level, and robust t-statistics are reported in parenthesis. ***, ** and * represents significance at 1%, 5% and 10% respectively.

Dependent Variable	Bank Loan/Total Loans			
Relationship Bank * Avg CRR	0.014***	0.012***	0.011***	0.009***
	(7.219)	(6.237)	(5.382)	(4.538)
Avg CRR	-0.024***	-0.023***	-0.018***	-0.013***
	(-19.251)	(-18.144)	(-13.755)	(-10.295)
Relationship Bank	-0.085***	-0.043***	-0.096***	-0.056***
	(-5.705)	(-2.917)	(-6.726)	(-3.984)
Size		0.018***		0.060***
		(8.292)		(14.681)
Profitability		0.245***		-0.057***
		(11.087)		(-3.119)
Tobin's Q		-0.070***		-0.007*
		(-18.802)		(-1.709)
Observations	51,093	51,076	51,093	51,076
R-squared	0.010	0.056	0.615	0.625
Firm FE	No	No	Yes	Yes
Adj R-squared	0.0095	0.056	0.549	0.561

Table 6: Relationship banking relationship for consecutive years

This table reports the results of regression with the dependent variable as the fraction of borrowing from banks. Relationship Bank is a dummy that takes a value of 1 in year t if the firm had a single bank in year t to year t-n (and 0 otherwise) and n ranges from zero to four, respectively from columns one to five. Avg CRR is a time-weighted average value of CRR for the fiscal year t, and Relationship Bank * Avg CRR is their interaction. Data are at the firm-year level. Fixed-effects are employed at the firm level. Errors are clustered at the firm level, and robust t-statistics are reported in parenthesis. ***, ** and * represents significance at 1%, 5% and 10% respectively.

Dependent Variable	Bank Loan/Total Loans				
Relationship Bank (1 yr) * Avg CRR	0.009***				
	(4.538)				
Relationship Bank (1 yr)	-0.056***				
	(-3.984)				
Relationship Bank (2 yr) * Avg CRR		0.008***			
		(4.162)			
Relationship Bank (2 yr)		-0.053***			
		(-3.999)			
Relationship Bank (3 yr) * Avg CRR			0.006***		
			(2.958)		
Relationship Bank (3 yr)			-0.040***		
			(-2.923)		
Relationship Bank (4 yr) * Avg CRR				0.005**	
				(2.285)	
Relationship Bank (4 yr)				-0.037**	
				(-2.508)	
Relationship Bank (5 yr) * Avg CRR					0.005**
					(2.281)
Relationship Bank (5 yr)					-0.037**
					(-2.332)
$\beta_1+\beta_2$*$\mathbb{E}$[Avg CRR]	-0.001	-0.002	-0.002	-0.006	-0.004
	(-0.098)	(-0.360)	(-0.380)	(-0.846)	(-0.538)
Avg CRR	-0.013***	-0.012***	-0.011***	-0.011***	-0.010***
	(-10.295)	(-10.182)	(-9.567)	(-9.341)	(-9.412)
Size	0.060***	0.060***	0.060***	0.060***	0.060***
	(14.681)	(14.901)	(14.950)	(14.940)	(14.975)
Profitability	-0.057***	-0.057***	-0.057***	-0.057***	-0.057***
	(-3.119)	(-3.114)	(-3.113)	(-3.112)	(-3.123)
Tobin's Q	-0.007*	-0.007*	-0.007*	-0.007*	-0.007*
	(-1.709)	(-1.681)	(-1.675)	(-1.681)	(-1.674)
Observations	51,076	51,076	51,076	51,076	51,076
R-squared	0.625	0.625	0.625	0.625	0.625
Firm FE	Yes	Yes	Yes	Yes	Yes
Adj R-squared	0.561	0.561	0.561	0.561	0.561

Table 7: Impact of Monetary Policy on Relationship Banking

In this table, we present the association between the change in the relationship status of a firm and the lagged values of monetary policy variables. In columns 1 and 4, the dependent variable is a dummy variable that takes the value of 1 if a firm shift from R-banking to T-banking during the year t, and zero otherwise. In columns 2 and 5, the dependent variable is a dummy variable that takes the value of 1 if a firm shift from T-banking to R-banking during the year t, and zero otherwise. In columns 3 and 6, the dependent variable is a dummy variable that takes the value of 1 if a firm changes its relationship status (in either direction) and zero otherwise. The data are organized at the firm-year level. We run a conditional logit model with firm fixed effects in all columns. Additionally, in columns 4, 5, and 6, we include various firm characteristics that are likely to influence the way a bank deals with a firm. Standard errors are bootstrapped, and Z-scores are reported in parenthesis. ***, ** and * represents significance at 1%, 5% and 10% respectively.

Dependent Variable	RB to TB	TB to RB	Two-way shift	RB to TB	TB to RB	Two-way shift
Avg CRR (Lag)	-0.004	-0.024	-0.014	-0.000	-0.029	-0.013
	(-0.300)	(-1.461)	(-1.054)	(-0.003)	(-1.208)	(-0.790)
Avg Repo (Lag)	-0.029	0.026	-0.006	-0.037	0.023	-0.014
	(-1.371)	(0.928)	(-0.309)	(-1.373)	(0.504)	(-0.604)
Change in Size				0.676***	0.037	0.501***
				(6.733)	(0.390)	(5.399)
Change in Sales				0.116***	0.072	0.108**
				(2.796)	(1.441)	(2.524)
Change in Profit				-0.603*	-0.027	-0.327
				(-1.933)	(-0.081)	(-1.382)
Change in Tobin's Q'				0.087*	-0.105*	0.014
				(1.714)	(-1.734)	(0.332)
Change in Current Ratio				0.004	-0.001	0.002
				(0.550)	(-0.121)	(0.412)
Change in Borrowing				-0.048	0.067	0.006
				(-1.043)	(1.061)	(0.142)
Change in Bank Borrowing				0.056*	0.030	0.048*
				(1.844)	(0.825)	(1.902)
Change in Leverage				-0.043	-0.175	-0.129
				(-0.217)	(-1.074)	(-0.914)
Observations	20,603	16,245	26,297	12,011	8,372	14,892
Number of companies	2,242	1,791	2,972	1,294	920	1,666
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
SE	Bootstrapped	Bootstrapped	Bootstrapped	Bootstrapped	Bootstrapped	Bootstrapped

Table 8: Level of Borrowing (Total, Banks and Non-banks)

This table reports the results of regression where the amount of borrowing is the dependent variable. Avg CRR is a time-weighted average value of CRR for the fiscal year t. Total borrowing from all sources is the dependent variable in columns 1 and 4, the amount of borrowing from banks is the dependent variable in columns 2 and 5, and the amount of nonbank borrowing is the dependent variable in columns 3 and 6. Log-level (in mn Rupees) is used in columns 1 to 3, whereas the annual change in levels is used in columns 4 to 6. Data are at a firm-year level. Relationship Bank is a dummy that takes a value of 1 in year t if the firm had a single bank in year t (and 0 otherwise). Fixed effects are employed at the firm level. Errors are clustered at the firm level, and robust t-statistics are reported in parenthesis. ***, ** and * represents significance at 1%, 5% and 10% respectively.

	Log			Change		
Dependent Variable	Total Loans	Bank Loans	Non-bank Loans	Total Loans	Bank Loans	Non-bank Loans
Relationship Bank * Avg CRR	0.011	0.031***	-0.024**	3.162	7.828**	-8.466**
	(1.195)	(2.968)	(-2.356)	(0.561)	(2.106)	(-2.490)
Avg CRR	-0.034***	-0.057***	0.040***	-7.886	-9.715***	5.891**
	(-5.239)	(-7.449)	(5.413)	(-1.588)	(-2.885)	(1.986)
Relationship Bank	-0.565***	-0.740***	-0.201***	-74.903**	-85.614***	36.549*
	(-8.157)	(-9.693)	(-2.612)	(-2.159)	(-3.778)	(1.719)
Observations	56,106	56,106	56,106	43,317	43,317	43,317
R-squared	0.827	0.777	0.772	0.393	0.328	0.220
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj R-squared	0.799	0.741	0.735	0.292	0.216	0.0887

Table 9: Firms dealing with Government-Owned Banks

In this table, firms that deal exclusively with public banks (either single or multiple) are considered. The dependent variable is the fraction of borrowing from banks. Relationship Bank is a dummy that takes a value of 1 in year t if the firm had a single public bank in year t (and 0 if the firm dealt with multiple public banks in year t). Avg CRR is a time-weighted average value of CRR for the fiscal year t. Columns (3) and (4) report the results with firm-fixed effects. In columns (2) and (4), we use additional firm-level controls that proxy for size (assets), profitability (EBIT to assets ratio), and growth opportunities (Tobin'Q). Data are at the firm-year level. Fixed effects are employed at the firm level. Errors are clustered at the firm level, and robust t-statistics are reported in parenthesis. ***, ** and * represents significance at 1%, 5% and 10% respectively.

Dependent Variable	Bank Loan/Total Loans			
Relationship Bank * Avg CRR	0.014***	0.013***	0.010***	0.010***
	(6.124)	(5.781)	(4.399)	(4.436)
Avg CRR	-0.026***	-0.024***	-0.018***	-0.015***
	(-15.136)	(-14.295)	(-10.534)	(-8.769)
Relationship Bank	-0.068***	-0.029	-0.094***	-0.068***
	(-3.659)	(-1.576)	(-5.055)	(-3.752)
Size		0.027***		0.077***
		(9.117)		(13.197)
Profitability		-0.000		-0.004
		(-0.106)		(-1.540)
Tobin's Q		-0.001*		0.000
		(-1.801)		(1.019)
Observations	31,666	31,653	31,666	31,653
R-squared	0.013	0.031	0.672	0.684
Firm FE	No	No	Yes	Yes
Adj R-squared	0.0130	0.0305	0.598	0.613

Table 10: Impact of CRR Rise and CRR Fall on bank borrowing

This table reports the results of regression with the dependent variable as the fraction of borrowing from banks. Relationship Bank is a dummy that takes a value of 1 in year t if the firm had a single bank in year t (and 0 otherwise). $\mathbb{1}\{\Delta\text{Avg CRR}_{t,t-1} \geq 0\}$ is a dummy that takes a value of one if Avg CRR in year t is greater than (or equal to) that in year t-1, and zero otherwise. $\mathbb{1}\{\Delta\text{Avg CRR}_{t,t-1} < 0\}$ is a dummy that takes a value of one if Avg CRR in year t is less than that in year t-1, and zero otherwise. In columns 2 and 4, we use firm-level controls, and in columns 3 and 4, we employ firm fixed-effects. Data are at a firm-year level. Errors are clustered at the firm level, and robust t-statistics are reported in parenthesis. ***, ** and * represents significance at 1%, 5% and 10% respectively.

Dependent Variable	Bank Loan/Total Loans			
Relationship Bank * Avg CRR * $\mathbb{1}\{\Delta\text{Avg CRR}_{t,t-1} \geq 0\}$	0.014***	0.012***	0.010***	0.009***
	(7.182)	(6.096)	(5.788)	(4.828)
Avg CRR * $\mathbb{1}\{\Delta\text{Avg CRR}_{t,t-1} \geq 0\}$	-0.023***	-0.022***	-0.017***	-0.013***
	(-19.274)	(-17.779)	(-14.714)	(-10.879)
Relationship Bank * Avg CRR * $\mathbb{1}\{\Delta\text{Avg CRR}_{t,t-1} < 0\}$	0.016***	0.014***	0.012***	0.011***
	(6.936)	(6.344)	(5.694)	(5.063)
Avg CRR * $\mathbb{1}\{\Delta\text{Avg CRR}_{t,t-1} < 0\}$	-0.026***	-0.026***	-0.021***	-0.017***
	(-17.938)	(-17.968)	(-15.005)	(-12.183)
Relationship Bank	-0.089***	-0.048***	-0.100***	-0.061***
	(-5.810)	(-3.170)	(-7.341)	(-4.524)
Size		0.018***		0.060***
		(8.422)		(15.876)
Profitability		0.241***		-0.063***
		(10.854)		(-3.725)
Tobin's Q		-0.071***		-0.010**
		(-18.982)		(-2.523)
Observations	51,093	51,076	49,896	49,884
R-squared	0.010	0.057	0.604	0.615
Firm FE	No	No	Yes	Yes
Adj R-squared	0.00966	0.0570	0.547	0.560

Table 11: Effect of Leverage

This table reports the results of regression with the fraction of borrowing from banks (columns 1 and 2), level of bank borrowing (columns 3 and 4), and annual change in bank borrowing (columns 5 and 6) as the dependent variable. Relationship Bank is a dummy that takes a value of 1 in year t if the firm had a single bank in year t (and 0 otherwise). Avg CRR is a time-weighted average value of CRR for the fiscal year t. Leverage is calculated as debt-to-assets, and firms are divided on the basis of the average value of their leverage from 1998-2013. Data are at the firm-year level, and firm fixed-effects are employed in all columns. Errors are clustered at the firm level, and robust t-statistics are reported in parenthesis. ***, ** and * represents significance at 1%, 5% and 10% respectively.

Dependent Variable	Bank Loan/Total Loans		Bank Loan (Log)		Bank Loan (Change)	
	Low Leverage	High Leverage	Low Leverage	High Leverage	Low Leverage	High Leverage
Relationship Bank * Avg CRR	0.009***	0.012***	0.019	0.044***	5.912	9.727*
	(2.837)	(4.734)	(1.143)	(3.211)	(1.220)	(1.728)
Avg CRR	-0.015***	-0.020***	-0.045***	-0.068***	-7.499*	-11.869**
	(-7.093)	(-12.678)	(-3.655)	(-7.259)	(-1.692)	(-2.359)
Relationship Bank	-0.068***	-0.122***	-0.465***	-1.078***	-56.241*	-120.022***
	(-3.042)	(-6.637)	(-4.068)	(-10.260)	(-1.914)	(-3.425)
Observations	24,328	26,757	27,453	27,406	21,675	20,957
R-squared	0.579	0.649	0.724	0.769	0.254	0.370
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj R-squared	0.507	0.588	0.683	0.731	0.138	0.261

Table 12: Comparison with other firm-specific factors: Borrowing Levels

This table reports the results of regression where the dependent variable is the level (columns 1 to 4) and annual change (columns 5 to 8) in bank borrowing. Avg CRR is a time-weighted average value of CRR for the fiscal year t. Profitability is EBIT/Assets and Group Affiliation is a dummy variable that is one if the firm is part of a business group, and 0 otherwise. Tobin's Q is the sum of market capitalization, R&D expense and total borrowing divided by total assets. Data are at a firm-year level. Relationship Bank is a dummy that takes a value of 1 in year t if the firm had a single bank in year t (and 0 otherwise). Fixed effects are employed at the industry level. Errors are clustered at the firm-level, and robust t-statistics are reported in parenthesis. ***, ** and * represents significance at 1%, 5% and 10% respectively.

Dependent Variable	Bank Loan (Log)				Bank Loan (Change)			
Relationship Bank * Avg CRR	0.069***				11.741***			
	(5.995)				(3.843)			
Relationship Bank	-1.877***				-194.966***			
	(-19.592)				(-8.819)			
Group Affiliation * Avg CRR		-0.005				-10.225**		
		(-0.456)				(-2.182)		
Group Affiliation		0.810***				96.404***		
		(7.599)				(2.926)		
Profitability * Avg CRR			-0.012				30.502***	
			(-0.223)				(3.388)	
Profitability			0.626				-204.114***	
			(1.534)				(-3.402)	
Tobin's Q * Avg CRR				0.035***				5.979***
				(3.922)				(3.153)
Tobin's Q				-0.329***				-40.576***
				(-4.844)				(-3.333)
Avg CRR	-0.067***	-0.053***	-0.048***	-0.086***	-13.903***	-7.420***	-12.768***	-16.762***
	(-8.163)	(-7.852)	(-7.341)	(-8.679)	(-4.876)	(-3.224)	(-7.100)	(-6.332)
Observations	56,106	56,106	56,082	56,106	43,317	43,317	43,304	43,317
R-squared	0.186	0.140	0.115	0.116	0.026	0.016	0.015	0.015
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj R-squared	0.186	0.139	0.115	0.116	0.0256	0.0159	0.0147	0.0148

Online Appendix For Relationship Banking and Monetary Policy Transmission: Evidence from India

Table A.1: Variable Definition

In this table we present the description and source of important the variables used in the study.

Variables	Description
Relationship Bank	Dummy variable that takes a value of 1 when firm borrows from only 1 bank in the current year and 0 otherwise
Relationship Bank (n yrs)	Dummy variable that takes a value of 1 when firm borrows from only 1 bank consecutively for n years and 0 otherwise
Cash Reserve Ratio	The proportion of bank liabilities that needs to be maintained in cash with the Reserve Bank of India (RBI)
Bank Rate	The rate at which the central bank (RBI) lends money to other banks or financial institutions
Repo Rate	The rate at which the RBI lends short-term funds to the banks against securities.
Reverse Repo Rate	The rate at which banks park their short-term excess liquidity with the RBI
Bank borr. ratio	Amount of borrowings from banks divided by total borrowings (fraction)
Non-bank borr. ratio	Amount of borrowings from sources other than banks divided by total borrowings (fraction)
Unsecured Bank borrowing ratio	Amount of unsecured borrowings from banks divided by total bank borrowings (fraction)
Log(Total borrow)	Log of value of total borrowings in Million Rs.
Log(Bank borrow)	Log of value of total borrowings from banks in Million Rs.
Log(Non-bank borrow)	Log of value of total borrowings from sources other than banks in Million Rs.
Size	Log of total assets in Million Rs.
Profitability	Ratio of EBIT to total assets (fraction)
Leverage	Debt-to-Equity ratio
Tobin's Q	Sum of market capitalization, R&D expense and total borrowing divided by total assets (fraction)
Capital Adequacy Ratio	Ratio of Tier 1 capital and risk-weighted assets

Table A.2: Impact of Monetary Policy on the fraction of borrowing from banks

This table reports the results of regression with the dependent variable as the fraction of borrowing from banks. Relationship Bank is a dummy that takes a value of 1 in year t if the firm deals with a single bank in year t (and 0 otherwise). Avg Repo is the time-weighted average value of the Repo rate for the fiscal year t. Data are organized at the firm-year level. Columns (3) and (4) specify the results with firm-fixed effects, and in columns (2) and (4), we use additional firm-level controls that proxy for size (assets), profitability (EBIT to assets ratio) and growth opportunities (Tobin'Q). Errors are clustered at the firm-level, and robust t-statistics are reported in parenthesis. ***, ** and * represents significance at 1%, 5% and 10% respectively.

Dependent Variable	Bank Loan/Total Loans			
Relationship Bank * Avg Repo	0.011***	0.011***	0.006*	0.007**
	(3.290)	(3.450)	(1.952)	(2.355)
Avg Repo	-0.024***	-0.026***	-0.017***	-0.015***
	(-12.463)	(-13.572)	(-9.922)	(-8.978)
Relationship Bank	-0.076***	-0.046*	-0.073***	-0.049**
	(-3.010)	(-1.883)	(-3.419)	(-2.320)
Size		0.019***		0.064***
		(8.945)		(15.813)
Profitability		0.242***		-0.064***
		(10.972)		(-3.502)
Tobin's Q		-0.069***		-0.006
		(-18.701)		(-1.509)
Observations	51,093	51,076	51,093	51,076
R-squared	0.003	0.051	0.612	0.624
Firm FE	No	No	Yes	Yes
Adj R-squared	0.003	0.051	0.546	0.560

Table A.3: Impact of Monetary Policy on the fraction of borrowing from banks - With Year Fixed-Effects

This table reports the results of regression with the dependent variable as the fraction of borrowing from banks. Relationship Bank is a dummy that takes a value of 1 in year t if the firm deals with a single bank in year t (and 0 otherwise). Avg CRR is a time-weighted average value of CRR for the fiscal year t. In column (2), we use additional firm-level controls that proxy for size (assets), profitability (EBIT to assets ratio), and growth opportunities (Tobin'Q). Fixed effects are employed at firm and year level. Errors are clustered at the firm-level, and robust t-statistics are reported in parenthesis. ***, ** and * represents significance at 1%, 5% and 10% respectively.

Dependent Variable	Bank Loan/Total Loans	
Relationship Bank * Avg CRR	0.011***	0.010***
	(5.843)	(5.479)
Relationship Bank	-0.089***	-0.063***
	(-6.733)	(-4.838)
Size		0.059***
		(13.109)
Profitability		-0.076***
		(-4.464)
Tobin's Q		-0.013***
		(-3.197)
Observations	49,896	49,884
R-squared	0.608	0.617
Firm FE	Yes	Yes
Year FE	Yes	Yes
Adj R-squared	0.552	0.562

Table A.4: Impact of Monetary Policy on the fraction of borrowing from banks [survivors only]

This table reports the results of the baseline regression but only for firms that are present in all 15 years of the sample period. The dependent variable is the fraction of borrowing from banks. Relationship Bank is a dummy that takes a value of 1 in year t if the firm deals with a single bank in year t (and 0 otherwise). Avg CRR is a time-weighted average value of CRR for the fiscal year t. Data are organized at the firm-year level. Columns (3) and (4) specify the results with firm-fixed effects, and in columns (2) and (4), we use additional firm-level controls that proxy for size (assets), profitability (EBIT to assets ratio), and growth opportunities (Tobin'Q). Errors are clustered at the firm-level, and robust t-statistics are reported in parenthesis. ***, ** and * represents significance at 1%, 5% and 10% respectively.

Depedent Variable	Bank Loan/Total Loans			
Relationship Bank * Avg CRR	0.015***	0.014***	0.014***	0.012***
	(3.871)	(3.803)	(3.828)	(3.373)
Avg CRR	-0.031***	-0.032***	-0.029***	-0.021***
	(-13.685)	(-13.885)	(-13.171)	(-9.860)
Relationship Bank	-0.065**	-0.057*	-0.118***	-0.071***
	(-2.090)	(-1.856)	(-4.239)	(-2.599)
Size		0.005		0.072***
		(0.965)		(10.631)
Profitability		0.223***		-0.005
		(3.840)		(-0.123)
Tobin's Q		-0.072***		-0.009
		(-7.197)		(-1.137)
Observations	12,318	12,316	12,317	12,315
R-squared	0.023	0.052	0.498	0.516
Firm FE	Yes	Yes	Yes	Yes
Adj R-squared	0.0228	0.0513	0.460	0.479

Table A.5: Impact of Monetary Policy on the fraction of borrowing from banks - Unlisted Firms

This table reports the results of triple-difference regression with the dependent variable as the fraction of borrowing from banks. Relationship Bank is a dummy that takes a value of 1 in year t if the firm deals with a single bank in year t (and 0 otherwise). Avg CRR is a time-weighted average value of CRR for the fiscal year t. Unlisted is a dummy variable that takes the value of one for unlisted firms and zero otherwise. Fixed effects are employed at the firm-level. Errors are clustered at the firm-level, and robust t-statistics are reported in parenthesis. ***, ** and * represents significance at 1%, 5% and 10% respectively.

Dependent Variable	Bank Loan/Total Loans		
Relationship Bank * Avg CRR * Unlisted			-0.003
			(-1.000)
Avg CRR * Unlisted			0.011***
			(4.618)
Relationship Bank * Unlisted			0.026
			(1.139)
Relationship Bank * Avg CRR		0.011***	0.011***
		(8.181)	(7.478)
Relationship Bank		-0.096***	-0.098***
		(-10.490)	(-9.508)
Avg CRR	-0.013***	-0.018***	-0.019***
	(-21.284)	(-21.137)	(-21.224)
Observations	49,896	49,896	49,896
R-squared	0.602	0.603	0.604
Firm FE	Yes	Yes	Yes
Adj R-squared	0.545	0.546	0.547

Table A.6: Proportion Of Firms Switching Between Relationship And Transaction Banking

In this table we present the details regarding the number of firms that are switching between relationship and transaction banking. We report the results year-wise for the period considered between 1998 to 2013.

Year	Total no. of firms	RB-to-TB firms	TB-to-RB firms	Two-way shift firms	Proportion of RB-to-TB firms	Proportion of TB-to-RB firms	Proportion of Two-way shift firms
1998	3679	85	117	202	2.31	3.18	5.49
1999	4531	96	90	186	2.12	1.99	4.11
2000	4857	137	113	250	2.82	2.33	5.15
2001	5272	138	130	268	2.62	2.47	5.08
2002	5329	151	140	291	2.83	2.63	5.46
2003	5520	184	175	359	3.33	3.17	6.50
2004	5323	181	139	320	3.40	2.61	6.01
2005	5079	225	161	386	4.43	3.17	7.60
2006	5390	226	191	417	4.19	3.54	7.74
2007	5483	267	193	460	4.87	3.52	8.39
2008	5077	253	176	429	4.98	3.47	8.45
2009	4904	217	168	385	4.42	3.43	7.85
2010	4581	185	157	342	4.04	3.43	7.47
2011	3916	180	120	300	4.60	3.06	7.66
2012	3646	124	92	216	3.40	2.52	5.92
2013	2201	58	51	109	2.64	2.32	4.95

Table A.7: Risk Channel

In this table, the effect of the banks' risk-shifting channel on debt composition is compared with the relationship banking channel. The dependent variable is the fraction of borrowing from banks. Relationship Bank is a dummy that takes a value of 1 in year t if the firm had a single bank in year t (and 0 otherwise). Avg CRR is the time-weighted average value of CRR for the fiscal year t. Bank CAR is the average capital adequacy ratio of all the bankers to the firm in year t. Data are organized at the firm-year level. Column (3) and (4) report results with firm fixed-effects, and in columns (2) and (4), we use additional firm-level controls that proxy for size (assets), profitability (EBIT to assets ratio) and growth opportunities (Tobin'Q). Data are at the firm-year level. Errors are clustered at the firm-level, and robust t-statistics are reported in parenthesis. ***, ** and * represents significance at 1%, 5% and 10% respectively.

Dependent Variable	Bank Loan/Total Loans			
Relationship Bank * Avg CRR	0.013***	0.011***	0.011***	0.008***
	(6.547)	(5.589)	(5.281)	(4.143)
Avg CRR	-0.023***	-0.027***	-0.017***	-0.016***
	(-11.076)	(-12.914)	(-8.846)	(-8.230)
Relationship Bank	-0.069***	-0.031**	-0.094***	-0.048***
	(-4.553)	(-2.037)	(-6.359)	(-3.296)
Bank CAR * Avg CRR	-0.004	0.041**	-0.010	0.026*
	(-0.266)	(2.571)	(-0.717)	(1.821)
Lender's CAR	0.578***	0.208	0.255	-0.049
	(3.033)	(1.128)	(1.589)	(-0.314)
Size		0.017***		0.062***
		(7.574)		(15.197)
Profitability		0.229***		-0.070***
		(10.137)		(-3.738)
Tobin's Q		-0.070***		-0.007*
		(-18.517)		(-1.732)
Observations	48,639	48,626	48,639	48,626
R-squared	0.012	0.055	0.619	0.630
Firm FE	No	No	Yes	Yes
Adj R-squared	0.0115	0.0553	0.552	0.565

Table A.8: Bank Heterogeneity

This table reports the results of the baseline regression in subsamples divided by bank heterogeneity. The dependent variable is the fraction of borrowing from banks. Relationship Bank is a dummy that takes a value of 1 in year t if the firm had a single bank in year t (and 0 otherwise). Avg CRR is the time-weighted average value of CRR for the fiscal year t. Gross NPA/Advances, Loan Book Size, and Bank CAR for a firm in year t is defined as their average values across all the banks dealing with the firm that year. Subsamples are defined on the basis of their above-median and below-median values across the sample from 1998-2013. Data are at a firm-year level, and firm fixed-effects are used in all columns. Errors are clustered at the firm level, and robust t-statistics are reported in parenthesis. ***, ** and * represents significance at 1%, 5% and 10% respectively.

Dependent Variable	Bank Loan/Total Loans					
Subsamples	Gross NPA/Advances		Loan Book Size		Bank CAR	
	Low	High	Small	Big	Low	High
Relationship Bank * Avg CRR	0.012***	0.009***	0.010***	0.010***	0.013***	0.009***
	(3.734)	(3.533)	(3.570)	(3.700)	(4.519)	(3.332)
Avg CRR	-0.021***	-0.015***	-0.011***	-0.023***	-0.016***	-0.020***
	(-10.971)	(-8.787)	(-5.726)	(-13.327)	(-9.043)	(-10.578)
Relationship Bank	-0.101***	-0.088***	-0.082***	-0.098***	-0.104***	-0.092***
	(-4.647)	(-4.476)	(-3.827)	(-5.140)	(-4.897)	(-4.744)
Observations	24,966	25,415	22,679	28,095	24,398	26,347
R-squared	0.598	0.618	0.645	0.576	0.612	0.609
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj R-squared	0.536	0.552	0.570	0.518	0.548	0.542

Table A.9: Reverse Causality

In this table we present the association between Avg CRR and the lagged values of bank debt share for R-firms (column 1-3) and T-firms (column 4-6). Column 2 and 5 add lags of total debt and column 3 and 6 add lags of bank debt. Column 1 and 4 report the results without firm level controls. Data are at a firm-year level and firm fixed-effects are used. Errors are clustered at firm level and robust t-statistics are reported in parenthesis. ***, ** and * represents significance at 1%, 5% and 10% respectively.

	T-Firms			R-Firms		
Dependent Variable	Avg CRR					
Bank borr. ratio (Lag 1)	0.018	0.020	0.025	0.022	0.016	0.026
	(0.493)	(0.540)	(0.630)	(0.462)	(0.337)	(0.508)
Bank borr. ratio (Lag 2)	0.022	0.022	0.022	0.046	0.038	0.039
	(0.485)	(0.472)	(0.479)	(0.774)	(0.644)	(0.655)
Bank borr. ratio (Lag 3)	-0.021	-0.020	-0.020	-0.037	-0.033	-0.032
	(-0.560)	(-0.536)	(-0.533)	(-0.777)	(-0.671)	(-0.666)
Log(Total borrowing amount) (Lag 1)		-0.007			-0.007	
		(-1.187)			(-0.835)	
Log(Bank borrowing amount) (Lag 1)			-0.002			-0.004
			(-0.351)			(-0.485)
Size		-0.001	-0.006		0.000	-0.002
		(-0.096)	(-0.986)		(0.043)	(-0.280)
Profitability		0.127*	0.141**		0.207**	0.213***
		(1.820)	(2.030)		(2.567)	(2.645)
Tobin's Q		0.000	-0.000		-0.001	-0.003
		(0.056)	(-0.033)		(-0.088)	(-0.236)
Observations	16,510	16,447	16,447	9,362	9,289	9,289
R-squared	0.000	0.001	0.001	0.000	0.001	0.001
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

Table A.10: Level of Borrowing (Total, Banks and Non-banks) with Firm and Year FE

This table reports the results of regression where the amount of borrowing (in log) is the dependent variable. Total borrowing from all sources is the dependent variable is columns 1 and 4, the amount of borrowing from banks is the dependent variable in columns 2 and 5, and the amount of non-bank borrowing is the dependent variable in columns 3 and 6. Relationship Bank is a dummy that takes the value of 1 in year t if the firm had a single bank in year t (and 0 otherwise). Avg CRR is the monetary policy measure used in columns 1 to 3. In columns 4 to 6, Avg repo rate is used as the monetary policy measure. Data are at a firm-year level. Fixed effects are employed at firm and year level. Errors are clustered at firm level and robust t-statistics are reported in parenthesis. ***, ** and * represents significance at 1%, 5% and 10% respectively.

Dependent Variable	Total Loans	Bank Loans	Non-bank Loans	Total Loans	Bank Loans	Non-bank Loans
Relationship Bank * Avg CRR	0.002	0.023**	-0.030***			
	(0.270)	(2.426)	(-3.198)			
Relationship Bank * Avg Repo				-0.006	0.011	-0.037***
				(-0.482)	(0.774)	(-2.759)
Relationship Bank	-0.443***	-0.624***	-0.147**	-0.388***	-0.554***	-0.073
	(-7.088)	(-8.970)	(-2.089)	(-4.322)	(-5.451)	(-0.719)
Observations	54,899	54,899	54,899	54,899	54,899	54,899
R-squared	0.827	0.776	0.769	0.827	0.776	0.769
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj R-squared	0.803	0.745	0.737	0.803	0.745	0.737

Table A.11: Level of Borrowing (Total, Banks and Non-banks-Repo Rate)

This table reports the results of regression where the amount of borrowing is the dependent variable. Avg Repo is the time-weighted average value of the Repo rate for the fiscal year t. Total borrowing from all sources is the dependent variable in columns 1 and 4, the amount of borrowing from banks is the dependent variable in columns 2 and 5, and the amount of nonbank borrowing is the dependent variable in columns 3 and 6. Log-level (in mn Rupees) is used in columns 1 to 3, whereas the annual change in levels is used in columns 4 to 6. Data are at the firm-year level. Relationship Bank is a dummy that takes a value of 1 in year t if the firm had a single bank in year t (and 0 otherwise). Fixed effects are employed at the firm-level. Errors are clustered at the firm-level, and robust t-statistics are reported in parenthesis. ***, ** and * represents significance at 1%, 5% and 10% respectively.

	Log			Change		
Dependent Variable	Total Loans	Bank Loans	Non-bank Loans	Total Loans	Bank Loans	Non-bank Loans
Relationship Bank * Avg Repo	0.011	0.039**	-0.033*	-21.007***	-12.987**	-0.322
	(0.581)	(1.989)	(-1.678)	(-2.643)	(-2.294)	(-0.065)
Avg Repo	0.052***	0.014	0.147***	17.439**	10.012**	-0.311
	(4.288)	(1.073)	(11.560)	(2.498)	(2.020)	(-0.070)
Relationship Bank	-1.660***	-1.768***	-1.235***	91.137	51.318	-10.783
	(-10.855)	(-11.222)	(-8.118)	(1.611)	(1.271)	(-0.302)
Observations	56,106	56,106	56,106	43,317	43,317	43,317
R-squared	0.092	0.076	0.079	0.394	0.328	0.219
Firm FE	No	No	No	Yes	Yes	Yes
Adj R-squared	0.0916	0.0764	0.0787	0.292	0.216	0.0885

Table A.12: Firms dealing with Government-Owned Banks

In this table, firms that deal exclusively with public banks (either single or multiple) are considered. The dependent variable is the fraction of borrowing from banks. Relationship Bank is a dummy that takes a value of 1 in year t if the firm dealt with a single public bank in year t (and 0 if the firm dealt with multiple public banks). Avg Repo is the time-weighted average value of the Repo rate for the fiscal year t. Columns (3) and (4) report the results with firm fixed effects. In columns (2) and (4), we use additional firm-level controls that proxy for size (assets), profitability (EBIT to assets ratio), and growth opportunities (Tobin'Q). Data are at the firm-year level. Fixed effects are employed at the firm-level. Errors are clustered at the firm-level, and robust t-statistics are reported in parenthesis. ***, ** and * represents significance at 1%, 5% and 10% respectively.

Dependent Variable	Bank Loan/Total Loans			
Relationship Bank * Avg Repo	0.014***	0.015***	0.006	0.007*
	(3.312)	(3.539)	(1.627)	(1.933)
Avg Repo Rate	-0.032***	-0.035***	-0.020***	-0.018***
	(-10.222)	(-11.183)	(-6.980)	(-6.437)
Relationship Bank	-0.077**	-0.060*	-0.072**	-0.053*
	(-2.326)	(-1.864)	(-2.511)	(-1.854)
Size		0.020***		0.080***
		(6.623)		(13.261)
Profitability		0.232***		-0.070***
		(8.947)		(-3.172)
Tobin's Q		-0.074***		-0.009
		(-15.190)		(-1.566)
Observations	31,666	31,653	31,666	31,653
R-squared	0.006	0.058	0.670	0.683
Firm FE	No	No	Yes	Yes
Year FE	No	No	No	No
Adj R-squared	0.00635	0.0580	0.595	0.612

Table A.13: Impact of Repo Rise and Repo Fall on bank borrowing

This table reports the results of regression with the dependent variable as the fraction of borrowing from banks. Relationship Bank is a dummy that takes a value of 1 in year t if the firm had a single bank in year t (and 0 otherwise). $\mathbb{1}\{\Delta\text{Avg Repo}_{t,t-1} \geq 0\}$ is a dummy that takes a value of one if Avg Repo in year t is greater than (or equal to) that in year t-1, and zero otherwise. $\mathbb{1}\{\Delta\text{Avg Repo}_{t,t-1} < 0\}$ a dummy that takes a value of one if Avg Repo in year t is less than that in year t-1, and zero otherwise. In columns 3 and 4, we employ firm fixed-effects. Data are at a firm-year level. Errors are clustered at the firm level, and robust t-statistics are reported in parenthesis. ***, ** and * represents significance at 1%, 5% and 10% respectively.

Dependent Variable	Bank Loan/Total Loans			
Relationship Bank * Avg Repo * $\mathbb{1}\{\Delta\text{Avg Repo}_{t,t-1} \geq 0\}$	0.011***	0.012***	0.006**	0.007**
	(3.346)	(3.527)	(2.032)	(2.510)
Avg Repo * $\mathbb{1}\{\Delta\text{Avg Repo}_{t,t-1} \geq 0\}$	-0.024***	-0.026***	-0.018***	-0.016***
	(-12.196)	(-13.495)	(-10.700)	(-9.820)
Relationship Bank * Avg Repo * $\mathbb{1}\{\Delta\text{Avg Repo}_{t,t-1} < 0\}$	0.013***	0.014***	0.006**	0.008**
	(3.394)	(3.696)	(2.007)	(2.535)
Avg Repo * $\mathbb{1}\{\Delta\text{Avg Repo}_{t,t-1} < 0\}$	-0.025***	-0.029***	-0.020***	-0.018***
	(-11.120)	(-12.944)	(-10.352)	(-9.694)
Relationship Bank	-0.084***	-0.057**	-0.075***	-0.054**
	(-3.149)	(-2.191)	(-3.514)	(-2.540)
Size		0.019***		0.064***
		(9.000)		(17.071)
Profitability		0.240***		-0.067***
		(10.863)		(-3.959)
Tobin's Q		-0.070***		-0.007*
		(-18.748)		(-1.960)
Observations	51,093	51,076	49,896	49,884
R-squared	0.003	0.052	0.601	0.613
Firm FE	No	No	Yes	Yes
Adj R-squared	0.00315	0.0514	0.543	0.558

Table A.14: Comparison with other firm-specific factors: Borrowing Ratio

This table reports the results of a regression where the dependent variable is the ratio of borrowing from banks. Profitability is EBIT/assets, and Group Affiliation is a dummy variable that is one if the firm is part of a business group, and 0 if it is a standalone firm. Tobin's Q is the sum of market capitalization, R&D expense and total borrowing divided by total assets. Avg CRR is the time-weighted average value of CRR for the fiscal year t. Data are at the firm-year level. Relationship Bank is a dummy that takes a value of 1 in year t if the firm had a single bank in year t (and 0 otherwise). Fixed effects are employed at the industry-level. Errors are clustered at the firm-level, and robust t-statistics are reported in parenthesis. ***, ** and * represents significance at 1%, 5% and 10% respectively.

Dependent Variable	Bank Loan/Total Loans			
Relationship Bank * Avg CRR	0.014***			
	(7.287)			
Relationship Bank	-0.088***			
	(-6.003)			
Group Affiliation * Avg CRR		-0.006***		
		(-3.739)		
Group Affiliation		0.036**		
		(2.576)		
Profitability * Avg CRR			-0.019**	
			(-2.174)	
Profitability			0.433***	
			(6.983)	
Tobin's Q * Avg CRR				0.007***
				(4.726)
Tobin's Q				-0.113***
				(-11.412)
Avg CRR	-0.025***	-0.016***	-0.016***	-0.027***
	(-19.899)	(-14.031)	(-15.439)	(-16.706)
Observations	51,093	51,093	51,080	51,093
R-squared	0.030	0.029	0.040	0.057
Industry FE	Yes	Yes	Yes	Yes
Adj R-squared	0.0297	0.0288	0.0395	0.0564

Table A.15: Variance Decomposition

In this table, we present the dispersion of the Bank Loan/Total Loans variable. Dispersion is expressed in terms of standard deviation, and we report the results for the entire sample as well as the subsample of low and high leverage firms. Leverage is calculated as the ratio of debt to assets, and firms are divided based on their average leverage from the years 1998 to 2013.

	All firms	Low Leverage	High Leverage
Between Firms	31.85%	33.65%	29.61%
Within Firm	22.12%	24.46%	19.75%
Overall	35.41%	37.55%	32.95%

Description of alternative policy instruments

Repo and reverse repo rate

The second set of instruments that RBI uses for monetary policy actions are related to change in interest rates. Unlike the fed funds rate, there is no single tractable benchmark short-term rate in India. There is a plethora of rates such as the bank rate (used by RBI for lending to banks), the repo rate (rate at which banks sell and buy back securities from RBI) and the reverse repo rate (rate at which banks buy and sell securities to RBI), among others. Repo rate is the rate at which the RBI lends overnight funds to banks. A bank can sell government securities to the central bank and agree to repurchase it at a later date at a pre-specified price. The difference between the buy and the sell price reflects the repo rate. Thus, repo operations represent short-term secured lending by RBI to banks. An increase in this rate signals monetary tightening and vice-versa. The reverse repo rate is the rate that RBI provides on bank deposits. RBI only announces Repo Rate. The Reverse Repo Rate is 100 basis points (1%) below the repo rate.

None of these instruments are likely to have the kind of bite the CRR is expected to have because banks borrow only 5% of their funds from the RBI. Thus a change in either the repo or the bank rate does not make much difference to the cost of funds of a bank. Similar arguments can be made with regards to the reverse repo and the bank rate. Given the above institutional details, we focus on CRR as our main monetary policy variable and study the impact of change in CRR on relationship lending. Note that Das et al. (2015), who study the transmission of monetary policy within banks in India, use the CRR as the principal monetary policy instrument in India. However, for completeness, we test our results using changes in the repo rate as well.

Bank rate

Over and above their normal repo operations, banks have an option to tap into RBI in case of fund shortfall for meeting regulatory requirements. The rate at which the RBI lends such funds is known as the bank rate. These loans have a longer-term than the repo and do not involve buying and selling of securities. Given the unsecured nature of the loans, the bank rate is always higher than the repo rate.

Statutory liquidity ratio

As per provisions of the Reserve Bank of India Act (Section 24), RBI has the power to mandate the banks to maintain a specific portion of their assets in interest-bearing liquid securities. This proportion corresponds to the Statutory Liquidity Ratio (SLR). Even though the stated purpose of SLR is to protect depositors' interest, in reality, it acts as a tax on borrowers and an indirect way of funding government deficits.