International Financial Flows, Credit Allocation and Productivity

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Abstract

This paper examines how international financial liberalization shapes domestic credit allocation and real economic outcomes using detailed bank-firm matched data. Exploiting a 2004 reform that raised foreign shareholding limits in Indian banks, I identify differences in credit allocation patterns across banks with varying exposure to foreign capital inflows. More exposed banks received larger inflows, which relaxed their funding constraints and expanded their overall lending. This increase in bank lending was disproportionately directed towards more productive firms, raising their investment and reducing the overall dispersion of marginal revenue product of capital (MRPK). Quantifying the aggregate impact and accounting for general equilibrium effects, I find that the reallocation gains from liberalization led to significant improvements in total factor productivity (TFP).

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1. Introduction

International capital flows play an important role in shaping economic activity, especially in emerging market economies. These inflows, whether in the form of equity, such as foreign direct investment (FDI) and foreign institutional investment (FII), or debt, such as external borrowing, are a key source of external finance for domestic firms and banks. They can ease funding constraints, improve credit allocation and spur investment, productivity and economic growth. However, at the same time, surges in inflows are often associated with domestic credit booms that weaken lending standards, distort credit allocation and increase financial fragility. This raises a central question: how do capital inflows influence the allocation of credit in an economy and what are the implications for firm performance and aggregate productivity.

Early studies on capital inflows (Chari and Henry (2003), Henry (2000a), Henry (2000b)) primarily examined financial liberalization episodes in emerging markets during the 1990s, often relying on cross-country analyses and aggregate macroeconomic data. More recent work (Gopinath et al. (2017), Varela (2018), Bau and Matray (2023)) has shifted to country specific studies that explore how liberalization and subsequent capital inflows affect misallocation and productivity. Most of this literature, however, focuses on direct capital inflows to firms and their influence on firm investment and productivity. However, in many emerging markets, financial intermediaries, especially banks, play a central role in channeling foreign capital to domestic borrowers. While existing studies have examined how inflows affect bank balance sheets and aggregate lending (Baskaya et al. (2017), Di Giovanni et al. (2017)), much less is known about how these changes in bank lending shape credit allocation across firms, and, in turn, real economic outcomes. This paper addresses this gap by examining the "bank-lending channel" of capital inflows, tracing how capital inflows to banks affect their balance sheets, their lending to firms, firm outcomes and ultimately allocative efficiency and productivity.

A unique natural experiment in India provides the empirical setting to examine this channel. In March 2004, the ceiling on foreign shareholding in Indian private banks was raised from 49 percent to 74 percent of equity, substantially expanding banks' access to foreign capital and easing capital market frictions. This exogeneous variation in banks' ability to access foreign capital influences aggregate productivity through two channels. First, by increasing the overall amount of capital available, it can relax banks' funding constraints, allowing them to lend more. Second, lower funding constraints and presence of foreign capital can impact the credit allocation decisions of banks, potentially reshaping how credit is distributed across firms with implications for overall efficiency and productivity. To study these effects, I combine detailed data on bank-firm credit relationships with balance sheet information for both banks and firms. This setting allows me to causally identify how increased access to foreign capital shapes the allocation of credit, and, in turn,

firm performance and aggregate productivity.

I find that banks more exposed to liberalization experience a rise in market valuations, which strengthens their balance sheets and enhances their ability to raise funds on more favorable terms. These banks reduce their reliance on traditional deposit financing and increase their borrowings, both domestically and from abroad. The resulting expansion in funding capacity translates into higher lending. While lending increases for all firms the increase is disproportionately larger for more productive firms, leading to an improvement in the overall allocation of credit. Firms that receive more credit following liberalization significantly expand investment and employment, generating positive real effects. Moreover, the dispersion in the marginal revenue product of capital (MRPK) across firms declines, indicating a reduction in misallocation and a gain in aggregate productivity. These improvements in credit allocation stem from better lending decisions by banks, supported by improved screening of loans and greater investments in their human capital. At the aggregate level, the reallocation gains from liberalization result in measurable productivity improvements for the economy.

To measure a bank's exposure to liberalization, I follow the existing literature on bank funding shocks (Paravisini et al. (2015), Mian and Sufi (2022), Cingano and Hassan (2022)) and use a bank's ex-ante level of foreign shareholding as the exposure measure. The intuition is that banks with higher foreign ownership prior to liberalization are more visible to foreign investors, have stronger international connections, and are therefore more likely to attract capital inflows once restrictions are lifted. I then examine how liberalization affects aggregate bank-level outcomes. Using bank balance sheet data, I implement a difference-in-differences (D-i-D) approach that interacts the continuous exposure measure with an indicator for the post-liberalization period. I find that liberalization significantly increases foreign shareholding, alters the funding mix and raises overall lending by more exposed banks. Specifically, a 10 percentage point increase in bank exposure leads to a 5 percent rise in foreign shareholding in the post-liberalization period. In parallel, the share of deposits falls by 2 percent. Banks increase their total borrowings by 47 percent, with a substantial portion coming from abroad. Finally, they expand their overall lending by 40 percent following liberalization.

This expansion in aggregate bank lending in the post-liberalization period reflects a combination of both credit demand and credit supply effects. To isolate the impact of liberalization on bank credit supply to firms, I use loan-level data between banks and firms and employ the Khwaja and Mian (2008) within-firm estimator, including firm-bank fixed effects to account for time-invariant bank characteristics and factors such as relationship lending. I then estimate how a bank's exposure to liberalization affects its credit supply to firms along both the intensive margin (increasing credit to existing borrowers) and the extensive margin (initiating or ending a lending relationship). At the intensive margin,

I find that in response to a 10 percentage point increase in bank exposure, credit supply increases by 11 percent. At the extensive margin, banks with greater exposure are more likely to start new credit relationships and less likely to terminate existing ones.

To examine how the increase in bank credit supply affects different types of firms, I classify firms based on their ex-ante productivity, collateral, as well as a combination of both. These characteristics are central to how banks make lending decisions. I find that while credit supply increases across the board, more productive firms receive significantly more credit. At the intensive margin, a 10 percentage point increase in bank exposure leads to a 17 percent increase in credit to more productive firms, compared to a 10 percent increase for less productive firms. This effect is strongest for firms that are both highly productive and well-collateralized. At the extensive margin, more exposed banks are less likely to end relationships with productive, well-collateralized firms and more likely to terminate relationships with firms that are both less productive and poorly collateralized. These banks are also more likely to initiate new relationships with productive, well-collateralized firms. However, conditional on starting a new relationship, they issue smaller initial loans, particularly to less productive firms. Over time, as bank-firm relationships deepen, lending increases- a phenomenon consistent with improved screening by banks.

I next examine how the increase in bank credit supply affects firm-level outcomes. A firm's exposure to liberalization is measured as a weighted average of the exposure of all the banks it borrows from. I find that more productive firms benefit significantly: a 10 percentage point increase in exposure leads to a 10 percent rise in fixed asset investment in the post-liberalization period along with an increase in employment. These effects stem from greater access to bank credit, enabling productive firms to invest and grow. In contrast, less productive firms experience a decline in investment, likely due to reduced access to funding. Overall, liberalization reduces capital misallocation by lowering the dispersion of marginal revenue product of capital (MRPK) across firms.

To understand the mechanisms behind these findings, I examine how liberalization affects bank behavior. More exposed banks see large improvements in market valuation and net worth, which strengthen their balance sheets and expand access to funding. A 10 percentage point increase in bank exposure raises market valuation by 21 percent and foreign borrowings by 57 percent in the post-liberalization period. These banks also make better lending decisions: loans issued by more exposed banks are significantly less likely to be restructured in the future. In addition, they invest more in their human capital, which could help explain the improvements in loan screening and credit allocation.

Lastly, I quantify the overall productivity gains of this bank liberalization episode using the approach developed by Sraer and Thesmar (2023). Their method accounts for general equilibrium effects and estimates how total factor productivity (TFP) would have changed if this liberalization had been the only change in the economy. Applying their framework, I

find that the reallocation of credit following liberalization increases aggregate TFP by 0.8 percent in the post-liberalization period.

Related Literature. This paper relates most closely to Cingano and Hassan (2022), who use loan-level data from Italy to study how global capital inflows shape bank credit allocation and productivity. Like them, I link international financial flows to allocative efficiency using granular credit data. However, my setting differs in several important respects. First, I study an emerging market context, where financial frictions are more severe and access to credit is limited, whereas their analysis focuses on an advanced economy. Second, I exploit a policy-driven, bank-specific equity liberalization episode, which provides cleaner causal identification compared to the general surge in capital inflows that they study. Third, while their analysis emphasizes debt flows, my work centers on equity inflows into the banking sector. Lastly, I go beyond documenting aggregate patterns by tracing the mechanisms through which liberalization improves credit allocation, such as better governance, enhanced screening and greater investment in human capital.

Beyond this, the paper contributes to several strands of literature. It complements work on international capital flows and credit channels in emerging markets such as Baskaya et al. (2017), who show that Turkish banks expand lending in response to higher capital inflows. While their analysis focuses primarily on loan volumes of banks, I go further to examine how bank lending is allocated across firms. My results demonstrate not only that lending expands when banks' equity constraints are relaxed, but also that it becomes more efficiently directed toward firms with higher productivity and investment opportunities.

Financial sector liberalization can take multiple forms, yet research on emerging economies has primarily examined one channel: foreign bank entry. Existing studies (Gormley (2010), Detragiache et al. (2008), Chakraborty and Mitra (2024)) find that when foreign banks enter, they tend to direct credit disproportionately toward larger, well-established firms, a pattern often described as cherry-picking. In contrast, my paper investigates a different form of financial sector liberalization: foreign equity inflows into incumbent domestic banks, which has received little attention to date. I show that this type of liberalization not only expands overall lending but also improves its allocation toward more productive firms, even as lending to larger firms also increases, consistent with earlier findings. Because domestic banks already maintain stronger relationships with their borrowers, informational frictions are likely less severe, which may help explain why equity inflows enhance rather than distort lending patterns. More broadly, the results highlight that the form and channel of liberalization matter, as different types of financial liberalization can have distinct implications for credit allocation and policy design.

This paper also complements related work on India. Bau and Matray (2023) study the

removal of foreign ownership restrictions across industrial sectors, showing that greater access to foreign equity reduced misallocation and raised productivity. While their focus is on how firms benefit directly from foreign investment, my paper examines a related but distinct liberalization in the banking sector. I show that equity inflows into domestic banks strengthened their funding capacity and management, enabling them to allocate credit more efficiently. In this way, my study complements their findings by analyzing a similar type of reform through a different channel- credit intermediation, linking capital inflows not just to aggregate productivity but to the mechanisms of credit allocation.

In addition, this paper contributes to the literature on FII and governance. Bena et al. (2017) and Stulz (2009) show that FII inflows improve governance and managerial practices at the firm level, enhancing investment efficiency. I extend this line of work by shifting the focus from firms to banks, showing that FII inflows also strengthen governance within banks. By relaxing funding constraints and improving screening capacity, FIIs enhance banks' ability to intermediate funds and allocate credit more effectively across firms. Finally, this work extends the literature on stock market liberalizations (Henry (2000a), Henry (2000b), Chari and Henry (2003)), which documents how liberalization lowers the cost of capital and fosters economic growth. I go a step further by focusing on equity liberalization targeted specifically at banks and tracing how these inflows propagate through the financial system.

Taken together, the paper's findings demonstrate that liberalization of the banking sector can relax funding constraints, improve governance and screening, reduce credit misallocation and raise aggregate productivity. By tracing the effects of liberalization from bank balance sheets to credit allocation, firm performance and macroeconomic outcomes, this paper provides micro-founded evidence on the channel through which financial liberalization affects real economic activity.

The rest of the paper is organized as follows. Section 2 provides the institutional background and describes the policy reform in detail. Section 3 describes the main data sources and explains the construction of the firm-bank matched panel used in the main analysis. Section 4 presents the conceptual framework, develops the theoretical model that formalizes the mechanisms and outlines the main empirical strategy. Section 5 presents the core results. Section 6 discusses robustness tests and Section 7 examines the mechanisms behind the key findings. Section 8 links the micro-level estimates to aggregate productivity effects and Section 9 concludes.

2. Institutional Context and Policy Change

India operated as a closed socialist economy until the 1980s. A severe balance of payments crisis in 1991 paved the way for liberalization reforms which led to the removal of several

trade and licensing restrictions (Topalova and Khandelwal (2011)). Over time, there was also a gradual relaxation of foreign investment restrictions across various sectors, including banking.

Until the early 1990s, India's banking sector was predominantly state-owned. In 1993-94, the government allowed new private banks to be set up. However, both public (state-owned) and private banks remained subject to strict foreign shareholding limits of 20%. In 2001, the cap on Foreign Direct Investment (FDI) in private banks was raised to 49% [1]. Despite this policy shift, the response of capital inflows was underwhelming. This was largely due to regulatory ambiguity around whether the 49% limit applied only to FDI or to total foreign shareholding (which includes FII's, Foreign Portfolio Investments (FPI's) etc.). The lack of coordination among the Ministry of Finance, the Reserve Bank of India and the Ministry of Commerce resulted in mixed messaging and policy uncertainty.[2] Consequently, this reform had little impact on foreign shareholding in Indian banks as seen in Figure 1A. This confusion, along with the 49% cap preventing foreign entities from obtaining a majority shareholding, likely dampened investor interest.

In March 2004, the policy governing foreign shareholding in Indian banks was overhauled. The ceiling on total foreign shareholding in private banks was increased to 74% of a banks' equity.[3] However, foreign shareholding in public banks remained capped at 20%.[4] This policy change was clearly communicated and effectively implemented, leading to an increase in foreign capital inflows into Indian private banks (Figure 1B). Interestingly, although the reform targeted private banks, public banks- which had negligible foreign shareholdings at the time- also experienced a surge in foreign capital inflows, within the 20% regulatory limit (Figure 1C). Figure 1 illustrates the evolution of foreign shareholding in India's banking sector.

The influx of capital took several forms, with Foreign Institutional Investors (FIIs) being the primary source of investment. In addition, several banks attracted investments from institutions such as the International Finance Corporation, Government of Singapore (via GIC) and major international banks such as HSBC, Rabobank and Citicorp. Many banks also issued American Depository Receipts (ADRs) and Global Depository Receipts (GDRs) on international stock exchanges.

The 2004 liberalization of the banking sector proved to be effective, paving the way for significant foreign capital inflows into Indian banks and enabling international entities to

[1] DIPP, Press Note 4, 2001

[2] Excerpt from The Economic Times (Feb 17, 2002): "The Government, in May 2001, had announced FDI up to 49 per cent 'from all sources' in private sector banks. However, in the absence of any clarifications on whether this would include or exclude investments of FIIs, and no follow-up guidelines from the RBI, the old norms which capped FDI at 20 per cent, continued."

[3] DIPP, Press Note 2, 2004

[4] Further,the maximum voting rights per shareholder was capped at 10% of the total voting rights of the bank.

obtain board representation in several of these banks.

3. Data

My main analysis relies on loan-level data between banks and firms, matched with firm and bank balance sheet data. The primary source is the Ministry of Corporate Affairs (MCA) database, which has been widely used in recent papers on financial sector and bankruptcy reforms in India (Chari et al. (2021), Chopra et al. (2021), Kulkarni (2020)). I download this data for all firms for which I also have balance sheet information from CMIE Prowessdx.

The MCA data provides information on the loan amount, the date on which the loan was issued, the dates of modification and repayment, the names of the borrower and lender, and the address of the lending institution. Lenders include banks, non-banks, development financial institutions, state governments and, in some cases, individuals. I restrict the sample to loans disbursed between 1998 and 2008. Since the dataset records both the origination and repayment dates, I am able to construct outstanding credit for each firm-bank pair during the period of analysis. Details on the construction of the panel are provided in Appendix B.1.

I match the loan-level data from the MCA with firm characteristics using firm balance sheet data from CMIE Prowessdx. I also merge the loan-level data with bank balance sheet information and other bank-level variables obtained from Prowessdx and the RBI. This results in a panel of firm-bank matched data that forms the basis of my main analysis.
In addition, I collect detailed data on foreign shareholding in banks by compiling information from archived webpages of the Bombay Stock Exchange (BSE).[5] This includes data on the total level of foreign shareholding, the categories of foreign investors and the identities of foreign entities holding more than 1% of equity in a bank.

Data on sectoral FDI/FII flows are available for India only from 2012 onwards, which falls outside my period of study. To create a series of FII inflows for the relevant period, I use FII equity trades data from the National Securities Depository Limited (NSDL) for the banks in my sample. From this, I construct a time series of FII flows to each bank . Details of this data construction are provided in Appendix B.2.

Table 1 presents summary statistics for the banks and firms in my sample. I restrict the analysis to listed banks, as they are the institutions directly affected by the foreign shareholding policy change. My final dataset therefore includes 31 banks that were already listed before the liberalization episode. I limit the analysis to the period 1998-2008 to exclude the effects of the global financial crisis. On average, the sample contains about 15,000 firms, though the exact number varies depending on the level of analysis (e.g. intensive versus extensive margins).

[5]The Prowess database provides information on foreign shareholding only from 2001 onwards.

4. Conceptual Framework and Empirical Strategy

4.1 Conceptual Framework

Equity liberalization can benefit banks by easing their funding constraints through several reinforcing channels. When restrictions on foreign ownership are relaxed, domestic banks are integrated into global equity markets, allowing international investors to diversify away country-specific risks. This improved risk sharing lowers the risk premium embedded in local equity prices and, in turn, reduces the cost of capital (Chari and Henry (2003), Henry (2000b)). A lower required return increases the market value of both newly issued equity and shares already in circulation. For banks, higher valuations strengthen balance sheets, expanding their capacity to raise funds on favorable terms and reduce their reliance on more expensive forms of financing. At the same time, liberalization enlarges the investor base, generating additional demand for bank equity and further boosting valuations. Together, these channels imply that banks exposed to liberalization face lower funding costs and greater access to capital thereby enabling them to expand their lending.

Beyond relaxing constraints, lower funding costs themselves can improve the quality of banks' lending decisions. With cheaper and more stable access to capital, banks may face less pressure to engage in short-term or opportunistic lending and can allocate more resources toward monitoring and screening borrowers. Liberalization also strengthens governance through foreign participation: global investors demand stricter disclosure, higher monitoring standards and encourage managerial accountability (Stulz (2009)). These changes reduce agency problems and reinforce more efficient credit allocation. Moreover, by becoming better known and more credible in international markets, liberalized banks may also gain access to direct foreign borrowing. This additional channel of external finance further relaxes constraints and diversifies funding sources. Altogether, these mechanisms suggest that equity liberalization not only expands banks' lending capacity but also enhances the efficiency of their lending decisions with implications for misallocation and productivity at both the firm and aggregate levels.

However, whether credit allocation improves in practice is ultimately an empirical question. If lending expands uniformly, credit may also flow to less productive firms. Banks may favor large or well-connected borrowers over more productive ones, even when governance improves. Moreover, integration with foreign capital markets can amplify procyclical lending, especially when screening is limited. Thus, the consequences of liberalization depend on how increased funding and improved governance interact with banks' screening decisions and the heterogeneity of firms' creditworthiness.

Motivated by these channels, this section builds a model that formalizes these channels and yields predictions about how equity-market liberalization affects bank balance sheets, total lending, screening behavior and the allocation of credit across heterogeneous firms.

Model Setup

The economy consists of competitive banks that lend to heterogeneous firms. Time is indexed by $t = 0, 1, 2$. At $t = 0$, equity-market liberalization is announced. At $t = 1$, banks adjust balance sheets, choose lending and screen borrowers. At $t = 2$, firms' projects pay off, loans are repaid and banks earn profits and distribute dividends.

At $t = 0$, banks are endowed with initial equity holdings and observe the announcement of the equity-market liberalization. The liberalization reform updates investors' expectations about banks' future profitability and governance. Let $\lambda \in [0, 1]$ denote a bank's exposure to the equity-market liberalization. More exposed banks receive greater foreign capital inflows and have a higher level of foreign shareholding in the post-liberalization period. Governance quality is denoted by $g(\lambda)$, with $g'(\lambda) > 0$, capturing improvements in monitoring, disclosure, and professional management associated with foreign ownership.

At $t = 1$, banks' total equity resources are

$$N(\lambda) = P(\lambda, g)\, S + I(\lambda),$$

where $S > 0$ is pre-existing equity, $I(\lambda) \geq 0$ is net new issuance, and $P(\lambda, g)$ is the equity price which is determined by the present-value of the expected future dividends:

$$P(\lambda, g) = \frac{E(D)}{1 + r(\lambda, g)}$$

where $r(\lambda, g)$ is the required return which is decreasing in the exposure to liberalization and governance i.e. $r_\lambda < 0, r_g < 0$. Thus, liberalization increases bank valuations and strengthens balance sheets.

Total lending is

$$L(\lambda) = \bar{L} + B(\lambda),$$

where $\bar{L}$ includes deposits plus bank capital and $B(\lambda)$ is banks' external borrowing. External borrowing is constrained by pledgeability:

$$B(\lambda) \leq \phi(N(\lambda), g(\lambda))\, N(\lambda),$$

where $\phi(N, g) \geq 0$ is an effective multiplier that is increasing in N and g i.e. $\phi_N \geq 0,\ \phi_g > 0$. In equilibrium, the constraint binds:

$$L(\lambda) = \bar{L} + \phi(N(\lambda), g(\lambda))\, N(\lambda).$$

Banks can lend to two types of firms, $High$ (high-productivity) and Low (low-productivity).

Firm types are not directly observable; banks may invest resources in screening to improve the probability of correctly identifying borrower type.

Let $p \in (0,1)$ denote the baseline share of lending that would go to $High$ types without screening. Banks' expected profit margins from lending to $High$ and Low types are:

$$m_H(\rho) = R_H - \rho - EL_H, \qquad m_L(\rho) = R_L - \rho - EL_L,$$

where $\rho = \rho(N, g)$ is the cost of funds ($\rho_N < 0, \rho_g < 0$), and $m_H > m_L$. Without screening, the expected profit margin of a bank is:

$$\bar{m} = p\, m_H + (1-p)\, m_L.$$

Banks may screen borrowers at intensity $s \in [0,1]$. Successful screening identifies type; otherwise loans are allocated based on the baseline shares p and $1-p$. Thus the probability of lending to a $High$ type is $p + s(1-p)$ and to a Low type is $(1-s)(1-p)$. Loan size is normalized to 1, so that L represents the total volume of bank lending and Q_H and Q_L denotes the total credit allocated to each firm type. [6] The total bank lending to each type is given by:

$$Q_H(\lambda) = L(\lambda)\,[p + s(\lambda)(1-p)], \qquad Q_L(\lambda) = L(\lambda)\,[(1-s(\lambda))(1-p)].$$

Screening cost is

$$c(s)\,\kappa(g)\,L,$$

where $c'(s) > 0$, and $\kappa'(g) < 0$ i.e., the cost of screening increases with screening effort and decreases with better governance. Banks may allocate only a fraction $\theta \in (0,1)$ of loanable funds to screening:

$$c(s) \le \theta L \quad \Rightarrow \quad s_{\max}(L) = c^{-1}(\theta L).$$

where $s_{\max}$ is the feasible maximum screening level and $s'_{\max}(L) > 0$.

Model Propositions

The model yields four propositions that connect liberalization to lending, screening, and credit allocation.

Proposition 1. Liberalization increases banks' equity resources, thereby, relaxing the funding constraints of banks:

$$\frac{dN}{d\lambda} > 0.$$

[6] Allowing loan sizes to vary would not alter the qualitative results.

Proof is given in Appendix A. The key intuition here is that foreign participation and improved governance lower the required return, raising equity valuations and enabling issuance. This, in turn, strengthens banks' balance sheets.

Proposition 2. Lending increases with liberalization:

$$\frac{dL}{d\lambda} > 0.$$

Proof is given in Appendix A. The intuition here is that higher equity resources relax pledgeability constraints, increasing borrowing capacity and total bank lending.

Proposition 3. Liberalization increases optimal screening:

$$\frac{ds^*}{d\lambda} > 0.$$

Proof is given in Appendix A. The reduction in funding costs as a result of liberalization increases margins and lending capacity, allowing greater screening effort. Improved governance due toliberalization further reduces screening cost.

Proposition 4. Lending increases disproportionately toward high-productivity firms.

While lending rises for both types ($dQ_H/d\lambda > 0,\ dQ_L/d\lambda > 0$), the share of lending to high-productivity firms increases:

$$\frac{d}{d\lambda}\left(\frac{Q_H}{Q_H + Q_L}\right) > 0, \qquad \frac{d}{d\lambda}\left(\frac{Q_L}{Q_H + Q_L}\right) < 0.$$

Proof is given in Appendix A. The model therefore predicts that liberalization expands total credit and improves capital allocation toward more productive firms by enhancing banks' screening capacity and governance.

These predictions guide the empirical analysis that follows, which documents how banks differentially exposed to liberalization experience reductions in funding costs, expand lending and reallocate credit toward more productive firms, ultimately contributing to reductions in misallocation and gains in aggregate productivity.

4.2 Emprical Strategy

For my main empirical analysis, I begin by constructing a measure of bank-level exposure to the equity liberalization reform. I then examine how the reform affected banks' balance sheets and aggregate lending. Building on this, I use loan-level data to study lending behavior at both the intensive and extensive margins. Finally, I turn to firm-level outcomes to assess the broader real effects of the reform.

4.2.1 Bank Exposure Measure

To study how financial liberalization affects bank balance sheets and credit allocation, I first construct a measure of a bank's exposure to equity liberalization. Following the literature on bank liquidity shocks, I define a bank's exposure as its pre-liberalization level of FII. Specifically, I use the share of FII in each bank as of December 2003 as a proxy for exposure to equity liberalization.[7]

The intuition behind this measure is that banks with higher pre-liberalization foreign shareholding are more likely to receive foreign capital inflows after liberalization. These banks are typically better known in international capital markets and have stronger foreign connections, making them more attractive to foreign investors.

To test the validity of this exposure measure, I examine whether banks with higher pre-liberalization FII shares indeed receive greater equity inflows in the post-liberalization period. Figure 2 shows the correlation between the exposure measure and each bank's share of post-liberalization FII inflows to the banking sector, both unconditionally (Panel 2A) and conditional on ex-ante bank characteristics (Panel 2B). The relationship is clearly positive: banks with higher pre-liberalization FII levels receive a larger share of equity inflows after liberalization. This validates the exposure measure and confirms that it predicts post-liberalization equity flows well.

4.2.2 Bank Level Regressions

Armed with the exposure measure described above, I begin by analyzing the impact of liberalization on key bank balance sheet variables using a D-i-D estimation strategy. Specifically, I estimate the following regression:

$$Y_{b,t} = \beta_1 Exposure_b \times Post_t + X_b'\theta \times Post_t + \alpha_b + \gamma_t + \epsilon_{b,t} \tag{1}$$

The dependent variable $Y_{b,t}$ represents various bank-level outcomes, including total foreign shareholding, deposit funding share, ln(total borrowings), share of foreign borrowings and ln(total advances).

The key independent variable, $Exposure_b$, is the continuous measure of bank exposure to equity liberalization defined earlier. $Post_t$ is a dummy variable equal to one for the post-liberalization period. X_b' is a vector of ex-ante bank characteristics, such as bank size and liquidity, that could influence bank-level outcomes. I use the ex-ante values of these characteristics to avoid endogeneity concerns, as the liberalization episode could itself affect these variables. The specification includes bank fixed effects α_b to control for time-invariant bank-specific characteristics and time fixed effects γ_t to account for unobserved,

[7] I use December 2003 FII levels rather than pre-period averages because several banks were listed only in 2001, which would bias the averages. I also focus on FII rather than total foreign shareholding, as most foreign equity inflows to banks occur through this channel.

economy-wide, time-varying shocks. Standard errors are clustered at the bank level.

This regression framework examines whether banks were affected by the liberalization. First, using foreign shareholding as the dependent variable tests whether banks more exposed to liberalization experienced a larger increase in their foreign equity share compared to less-exposed banks. Next, I test whether more-exposed banks gained better access to external funding sources by examining changes in total borrowings and foreign borrowings post-liberalization. Finally, I use bank lending (ln(total advances)) as the dependent variable to test the paper's central hypothesis: banks more exposed to liberalization increased their lending in the post-liberalization period relative to less-exposed banks. [8]

4.2.3 Loan Level Regressions

Intensive Margin. The bank-level regressions testing whether more exposed banks increase their lending post-liberalization do not isolate credit supply effects from credit demand effects. This is because the observed lending levels of banks reflect a combination of both. To separate the credit supply and credit demand effects, I use loan-level data and adopt the within-firm estimation strategy proposed by Khwaja and Mian (2008). This approach focuses on firms borrowing from multiple banks and tests whether credit supply to a firm changes differentially depending on a bank's exposure to liberalization, while controlling for firm credit demand. Specifically, I estimate the following loan-level regression using a D-i-D framework:

$$ln(1+OutstandingCredit)_{f,b,t} = \beta_1 Exposure_b \times Post_t + X_b'\theta \times Post_t + \alpha_{f,t} + \gamma_{f,b} + \epsilon_{f,b,t} \quad (2)$$

Here, the dependent variable is the log of the outstanding credit between bank b and firm f in year t. $Exposure_b$ is the continuous measure of a bank's exposure to equity liberalization described earlier and $Post_t$ is a dummy variable equal to one in the post-liberalization period. I control for ex-ante bank-level characteristics, such as bank size and liquidity, that may influence credit supply. The specification includes firm-time fixed effects $\alpha_{f,t}$ to control for credit demand, ensuring that the estimation focuses on within-firm variation in borrowing. I also include firm-bank fixed effects $\gamma_{f,b}$ to account for persistent aspects of a bank–firm relationship, such as relationship lending, that could affect credit allocation. Standard errors are clustered at the bank level.

I estimate this regression for firms that maintain outstanding credit relationships with multiple banks at the time of liberalization, thereby capturing the intensive margin of credit supply. The coefficient of interest, β_1, measures the marginal effect of bank exposure on credit supply to firms in the post-liberalization period.

[8] I also estimate a dynamic D-i-D model for overall bank lending to ensure that the assumptions underlying the D-i-D specification hold. Figure 3 shows the relevant graph for the same.

To ensure that the assumptions underlying the D-i-D specification hold, I estimate the following dynamic D-i-D model:

$$ln(1+OutstandingCredit)_{f,b,t} = \sum_{q=1998}^{2008} \beta_q Exposure_b \times \mathbb{I}_{t=q} + \sum_{q=1998}^{2008} X_b' \theta \times \mathbb{I}_{t=q} + \alpha_{f,t} + \gamma_{f,b} + \epsilon_{f,b,t} \quad (3)$$

Here, the coefficients of interest are β_q, which capture the year-by-year effect of a bank's exposure on credit supply to firms. This specification allows me to examine the dynamics of credit supply and test for the presence of pre-trends.

The regressions above capture the credit supply effects of bank exposure to equity liberalization for the average firm in the economy.

I next investigate the heterogeneous effects of the bank lending channel. Following Cingano and Hassan (2022), I examine how bank credit supply responds to firm characteristics, focusing on firm productivity and firm size. Analyzing heterogeneity by productivity allows me to study the effects of liberalization on credit misallocation-whether banks direct increased credit toward more or less productive firms. Bank lending decisions also often depend on collateral, so I investigate heterogeneity by firm size, proxied by the value of fixed assets.[9] In reality, both productivity and collateral constraints are likely to influence lending decisions. To account for this, I also analyze heterogeneity in credit supply based on the interaction of firm productivity and firm size. My empirical specification for analyzing heterogeneous effects follows Cingano and Hassan (2022) and Federico et al. (2025). Specifically, I estimate the following regression:

$$ln(1+OutstandingCredit)_{f,b,t} = \sum_{d} \beta_d D_i^d (Exposure_b \times Post_t) + X_b' \theta \times Post_t + \alpha_{f,t} + \gamma_{f,b} + \epsilon_{f,b,t} \quad (4)$$

Here D_i^d is an indicator variable for each category of firms with 1) d= High MRPK and Low MRPK , 2) d= High FA and Low FA and 3) d= High MRPK and High FA (H,H), High MRPK and Low FA (H,L), Low MRPK and High FA (L,H) and Low MRPK and Low FA (L,L).

Here, the coefficients of interest are β_d. Comparing β_d across groups allows me to infer patterns of credit allocation. For instance, if $\beta_{High-MRPK} > \beta_{Low-MRPK}$, banks allocate relatively more credit to more productive firms. Similarly, if $\beta_{High-FA} > \beta_{Low-FA}$, banks lend disproportionately to larger firms or firms that can provide more collateral. Finally, comparing $\beta_{H,H}, \beta_{H,L}, \beta_{L,H}, \beta_{L,L}$ reveals how bank lending differs when considering the joint distribution of productivity and size.

In all the above regressions, I control for firm-level credit demand using firm-time fixed effects. However, this approach restricts the sample to firms borrowing from multiple banks, which reduces the number of firms included in the analysis. To incorporate firms

[9] Firms are divided into high and low productivity or high and low size based on their ex-ante marginal revenue product of capital (MRPK) and fixed assets (FA), respectively. I use the within-industry median to classify firms into the high and low categories.

borrowing from a single bank, I follow Degryse et al. (2019) and replace firm-time fixed effects with region-sector-time fixed effects. The identifying assumption here is that firms in the same region and sector within a given year face similar credit demand shocks. I therefore re-estimate all regressions using region-sector-time fixed effects to include the full sample.

Together, this set of regressions provides a comprehensive assessment of both the overall credit supply effects of banking sector liberalization and the heterogeneous allocation of credit by banks to firms along the intensive margin.

Extensive Margin. The previous regressions analyze how banks adjust their credit supply to firms with which they already have an established credit relationship, i.e. the intensive margin. I now turn to the extensive margin of credit supply by examining the probability of a bank initiating a new credit relationship (Entry) or terminating an existing one (Exit).[10] To study these dynamics, I estimate the following regression:

$$Entry_{f,b,\tau}(Exit_{f,b,\tau}) = \beta_1 Exposure_b \times Post_\tau + X_b'\theta \times Post_\tau + \alpha_{f,\tau} + \gamma_b + \epsilon_{f,b,\tau} \quad (5)$$

Here, the dependent variable is Entry or Exit. Exit is a dummy equal to one if a bank and a firm end an existing credit relationship in the post-liberalization period and zero if the bank continues lending to the firm. Entry is constructed by first identifying all potential firm-bank pairs in the sample. It equals one if a firm and a bank initiate a new credit relationship post-liberalization and zero otherwise.[11]

I estimate this regression using a two-period panel, where $\tau = 1, 2$ denotes the periods before and after liberalization. As in the previous regressions, I control for ex-ante bank characteristics, firm-time fixed effects and bank fixed effects. Standard errors are clustered at the bank level.

As with the intensive margin analysis, I also examine heterogeneity in the probability of starting or ending a credit relationship along the extensive margin. Specifically, I estimate the regression above separately for firms that differ in their productivity, collateral constraints, or a combination of both:

$$Entry_{f,b,\tau}(Exit_{f,b,\tau}) = \sum_d \beta_d D_d^i Exposure_b \times Post_\tau + X_b'\theta \times Post_\tau + \alpha_{f,\tau} + \gamma_b + \epsilon_{f,b,\tau} \quad (6)$$

where D_i^d is an indicator for firm categories d as defined above.

[10] An Exit occurs when no new loans are made between a bank and a firm in the post-liberalization period. The bank and firm may still have an ongoing relationship in the sense that the firm continues repaying earlier loans.

[11] In the pre-liberalization period, if a firm and a bank did not have a lending relationship, the Entry dummy is set to zero for that period.

The coefficients of interest, β_d, capture whether the effects of liberalization on forming new credit relationships (Entry) or ending existing ones (Exit) vary systematically by firm productivity, collateral constraints or both. As with the intensive margin, I also estimate all these regressions using region-sector-time fixed effects to include firms that borrow from a single bank in my analysis.

4.3 Firm Level Regressions

The previous regression specifications analyze the bank lending channel of capital flows at both the intensive and extensive margins using detailed loan-level data. I now turn to examining the real effects of liberalization-specifically, how firms' balance sheet variables are affected when they gain increased access to bank credit following the policy change. To analyze these effects, I first construct a measure of a firm's exposure to banking sector liberalization. Following standard practice in the literature, I define a firm's exposure as the weighted average of the exposure of all the banks with which the firm has an outstanding credit relationship at the time of liberalization. The weights are given by the share of a firm's outstanding credit held by each bank relative to the firm's total outstanding credit across all banks. Formally, the firm exposure measure is calculated as:

$$\textit{Firm Exposure}_f = \sum_b \textit{Exposure}_b \frac{\textit{Outstanding Credit}_{f,b}}{\textit{Total Outstanding Credit}_f} \tag{7}$$

This construction ensures that a firm is considered more exposed to liberalization if it borrows more heavily from more exposed banks.

I then use this firm exposure measure to analyze how firm-level outcomes evolve over time. Specifically, I estimate the following regression at the firm level:

$$ln(Y_{f,t}) = \beta_1 \textit{Firm Exposure}_f \times Post_t + X_f'\theta \times Post_t + \alpha_{r,s,t} + \gamma_f + \epsilon_{f,t} \tag{8}$$

Here, the dependent variable denotes several firm level characteristics: total and secured bank borrowings [12], total assets and fixed assets (to measure firm investment), total wage bill (to measure firm employment) and firm level MRPK (to measure firm productivity).

The key explanatory variable $\textit{Firm Exposure}_f$, is the firm-level exposure measure described above. X_f is a weighted average of bank characteristics, where the weights are calculated using the same method as for the firm exposure measure (based on the share of outstanding credit from each bank). I control for credit demand shocks using region-sector-time fixed effects $\alpha_{r,s,t}$ and for unobserved time-invariant firm characteristics using firm fixed effects γ_f. Standard errors are clustered at the industry level to account for correlated

[12] Data on total and secured bank borrowings come from firm balance sheet data and therefore do not match the loan-level data exactly, as the two come from different sources. Analyzing bank borrowings using firm balance sheet data thus serves as a robustness check on the loan-level analysis.

shocks across firms within the same industry.

I also estimate heterogeneous effects as done earlier for the loan-level regressions. Specifically, I divide firms into high vs. low productivity and high vs. low size groups using their ex-ante median values within each industry. I then estimate the following regression:

$$ln(Y_{f,t}) = \sum_{d} \beta_d D_i^d \textit{Firm Exposure}_f \times Post_t + X_f'\theta \times Post_t + \alpha_{r,s,t} + \gamma_f + \epsilon_{f,t} \quad (9)$$

where D_i^d is an indicator for firm categories d as described earlier.

The firm-level regressions allow me to examine how firms' bank borrowing, investment, employment and productivity evolve in the post-liberalization period depending on their differential exposure to the policy.

Taken together, the regression analysis provides a comprehensive view of the effects of banking sector liberalization. It demonstrates how liberalization influences banks' funding structures and overall lending behavior, how these changes in bank funding translate into shifts in the supply of credit to firms and finally, how firm-level outcomes, such as borrowing, investment, employment and productivity evolve in response to increased access to credit.

5. Results

Bank Level Effects. I begin by confirming that the equity liberalization episode significantly affected bank balance sheet variables. Table 2 reports the results from estimating equation (1). For the average bank, a 10 percentage point increase in exposure translates into a 5% rise in foreign shareholdings in the post-liberalization period. This shift is accompanied by a 2% decline in the share of deposit funding, reflecting reduced reliance on core liabilities. At the same time, exposed banks expand their borrowings by 47%, with a substantial portion sourced from abroad, and increase their overall lending by 40%.

Overall, these results indicate that the equity liberalization episode increased foreign equity ownership in banks and enabled them to access non-traditional funding sources which, in turn, facilitated an expansion of their overall lending capacity.

Intensive Margin:Aggregate Credit Supply. The results based on bank balance sheet data suggest that the liberalization episode led to an overall increase in bank lending. To isolate the credit supply effects from credit demand, I estimate equation (2) using loan-level data, controlling for credit demand with either firm-time fixed effects or region-sector-time fixed effects. Table 3 reports the results.

I find that a 10 percentage point increase in a bank's exposure to liberalization leads to an 11.1% increase in bank lending to firms at the intensive margin in the post-liberalization

period. When controlling for credit demand using region-sector-time fixed effects, the estimated effect is even larger: a 10 percentage point increase in bank exposure is associated with a 15.7% increase in bank credit supply to firms at the intensive margin.

Intensive Margin:Heterogeneous Credit Supply. I next examine how liberalization affects bank credit supply to firms according to different firm characteristics. Specifically, I analyze the results from estimating equation (4), presented in Table 4.

Columns 1 and 2 examine heterogeneity in credit supply based on firms' ex-ante productivity (MRPK). I find that banks increase their lending to both high-MRPK and low-MRPK firms following liberalization. However, the effect is significantly stronger for more productive firms: a 10 percentage point increase in bank exposure leads to a 17% increase in credit supply to high-MRPK firms, compared to a 10% increase for low-MRPK firms.

Columns 3 and 4 investigate heterogeneity based on firm collateral, proxied by ex-ante fixed assets (FA). The results show that banks increase their credit supply only to firms with high collateral. Specifically, a 10 percentage point increase in bank exposure results in a 15% increase in lending to high-FA firms in the post-liberalization period with no significant effect for low-FA firms.

Finally, Columns 5 and 6 explore how credit supply varies jointly by productivity and collateral. The results indicate that banks increase credit supply the most to firms with high MRPK and high FA. Credit supply also rises significantly for low MRPK firms with high FA, suggesting that collateral still plays an important role. Credit supply to high-MRPK but low-FA firms increases modestly but is not statistically significant. For low-MRPK and low-FA firms, credit supply declines slightly, though the effect is insignificant.

Overall, these results show that along the intensive margin, banks increased their overall credit supply to firms following liberalization with the increase being greater for more productive firms compared to less productive ones. Importantly, the preferential increase in credit to more productive firms is not independent of firm collateral, as banks favor productive firms with sufficient collateral. Taken together, these findings suggest that banking sector liberalization reduced credit misallocation by directing more credit toward productive firms in the post-liberalization period.

Dynamic Effects. To ensure that the results from the D-i-D regressions are interpreted causally, I estimate a dynamic D-i-D specification to test for the presence of pre-trends. Specifically, I estimate equation (3) and plot the coefficients β_q, which capture the year-by-year marginal effects of a bank's exposure to liberalization on firm credit supply. I present these dynamics for overall credit supply as well as separately for high-MRPK and low-MRPK firms.

Figure 4 presents the dynamic D-i-D results. Panel 4A shows the dynamics for overall

credit supply, Panel 4B for high-MRPK firms and Panel 4C for low-MRPK firms. The absence of significant pre-trends in the pre-liberalization period supports the validity of the D-i-D design and strengthens the causal interpretation of the results.
Moreover, the figure illustrates that credit supply increases overall in the post-liberalization period with a more pronounced and statistically significant increase for high-MRPK firms compared to low-MRPK firms.

Extensive Margin (Overall Effects): Exit. I next examine how liberalization affects banks' likelihood of ending an existing credit relationship with a firm. Table 5 presents the results from estimating equation (5). The findings indicate that more-exposed banks are significantly less likely to terminate existing lending relationships following liberalization. Specifically, a 10 percentage point increase in bank exposure leads to a 2 percentage point decline in the probability of a bank ending an existing credit relationship with a firm.

Extensive Margin (Heterogeneous Effects): Exit. To examine whether a bank's likelihood of ending a credit relationship with a firm varies according to the firm's characteristics, I estimate equation (6) with the exit dummy as the dependent variable. The results, presented in Table 6, indicate that banks are less likely to terminate credit relationships with more productive and better-collateralized firms. Specifically, the probability of ending a credit relationship with a high-MRPK firm is lower than that for a low-MRPK firm ($\beta_{High-MRPK} < \beta_{Low-MRPK}$). Similarly, banks are much less likely to terminate lending relationships with firms that have higher collateral ($\beta_{High-FA} < \beta_{Low-FA}$).

Finally, I examine heterogeneity along the joint distribution of productivity and collateral. The results show that banks are least likely to end relationships with firms that are both high MRPK and high FA as well as firms that are low MRPK but high FA. In contrast, for firms that are low MRPK and low FA, more-exposed banks actually exhibit an increased probability of ending the relationship (β_{LL} >0).

Overall, the results on exit - i.e., the likelihood of ending a credit relationship at the extensive margin - are consistent with the findings at the intensive margin. They also point to a reduction in credit misallocation in the post-liberalization period. Banks are less likely to terminate lending relationships with firms that are more productive and have greater collateral (FA), while they exhibit a higher likelihood of ending relationships with less productive firms that also have low collateral.

Extensive Margin (Overall Effects): Entry. I now examine how liberalization affects the likelihood of a bank initiating a new lending relationship with a firm. To do this, I estimate equation (5) with Entry as the dependent variable. The results, presented in Table 7, indicate that overall, a 10 percentage point increase in bank exposure leads to a 0.6 percentage point increase in the probability of a bank starting a new credit relationship with a firm.

Extensive Margin (Heterogeneous Effects): Entry. I further examine how the probability of entering into a new credit relationship varies according to firm characteristics by estimating equation (6) with Entry as the dependent variable. The results, presented in Table 8, reveal notable heterogeneity.

Columns 1 and 2 analyze the likelihood of forming a new lending relationship based on firms' ex-ante productivity (MRPK). Banks with higher exposure are significantly more likely to start credit relationships with high-MRPK firms whereas the effect for low-MRPK firms is small and statistically insignificant.

Columns 3 and 4 examine heterogeneity by firm collateral, proxied by fixed assets (FA). Banks with greater exposure are more likely to initiate lending relationships with high-FA firms, whereas the effect for low-FA firms is again small and statistically insignificant.

Finally, Columns 5 and 6 consider both productivity and collateral jointly. The results show that more-exposed banks have the highest probability of starting credit relationships with high-MRPK, high-FA firms, followed by high-MRPK, low-FA firms. In contrast, the probability of forming new relationships with low-MRPK, low-FA firms declines, although the coefficient is not statistically significant.

These findings are consistent with the earlier results: banks more exposed to liberalization are more likely to initiate relationships with productive and well-collateralized firms, suggesting a decline in credit misallocation following the policy change.

Taken together, the loan-level results at both the intensive and extensive margins indicate that the equity liberalization of India's banking sector reduced credit misallocation in the post-liberalization period by channeling credit towards more productive firms, particularly those with sufficient collateral.

Firm Level Results. I now turn to firm balance sheet data to examine how the liberalization of the banking sector affected firm credit and other firm-level outcomes, allowing me to analyze the real effects of banking liberalization. I begin by estimating equation (8) which evaluates the overall impact of firm exposure to liberalization on various firm characteristics. The results are presented in Table 9.

The results show that firms with greater exposure to banking sector liberalization experience a significant increase in their total bank borrowings as well as secured bank borrowings. This finding is consistent with the results from the loan-level analysis. Specifically, a 10 percentage point increase in firm exposure leads to an 8.4% increase in total bank borrowings and a 10.2% increase in secured bank borrowings.

Higher firm exposure is also associated with an increase in investment, as reflected in the growth of firms' total assets. In contrast, the estimated effects on fixed assets, employment and MRPK are positive but statistically insignificant for the average firm. These

aggregate effects may be masking important heterogeneity across firms. I therefore next examine whether the evolution of firm outcomes varies systematically with firms' ex-ante productivity (MRPK) and collateral (FA).

Firm Level Results:Heterogeneous Effects. To examine heterogeneous effects, I estimate equation (9). The results are presented in Table 10.

I find that both total bank borrowings and secured bank borrowings increase significantly for high-MRPK firms while the coefficients for low-MRPK firms are negative but statistically insignificant. Furthermore, when analyzing heterogeneity jointly along the MRPK and FA dimensions, I find that bank borrowing and secured borrowing increase most for firms with high MRPK and high FA as well as for firms with high MRPK and low FA. These results indicate that it is primarily high-MRPK firms, regardless of their collateral position, that experience increased access to bank credit in the post-liberalization period.

I next examine the real effects of liberalization at the firm level by analyzing how firm assets (total assets and fixed assets) and employment evolve over time according to firm characteristics. The results show that exposure to liberalization primarily benefits high-MRPK firms. Firms with high MRPK experience a significant increase in both their total assets and fixed assets over time, suggesting that these firms expand their investments in the post-liberalization period. In contrast, low-MRPK firms experience a decline in their total and fixed assets, indicating a contraction in investment, most likely because these firms receive less credit from banks and are therefore more credit constrained.

These patterns persist when examining heterogeneity jointly along MRPK and FA. Specifically, firms with high MRPK and high FA and those with high MRPK and low FA see an increase in their total and fixed assets, whereas firms with low MRPK and high FA and low MRPK and low FA experience a decline in these outcomes in the post-liberalization period. Similarly, high-MRPK firms increase their spending on labor inputs, suggesting that they are able to hire more workers because liberalization relaxes their credit constraints.

Finally, I examine the evolution of MRPK across firms with different characteristics. The results indicate that liberalization, through the bank lending channel, led to a decline in the dispersion of MRPK. This pattern arises because high-MRPK firms exposed to liberalization experience a decline in MRPK (likely due to diminishing returns), whereas low-MRPK firms exhibit an increase in MRPK over time. These results hold when analyzing heterogeneity jointly by ex-ante MRPK and FA. A lower dispersion of MRPK implies a reduction in misallocation in the economy, which is consistent with the earlier findings of declining credit misallocation based on the loan-level evidence.

6. Robustness

6.1 Extensive Margin: Volume of Credit

Previously, I estimated the probability of a bank starting a new lending relationship with a firm in the post-liberalization period. I now extend this analysis to examine patterns in the volume of credit allocation by banks to firms after liberalization. Specifically, I focus on the amount of the first loan that a bank grants to a firm when initiating a new relationship in the post-liberalization period. To analyze this, I estimate the following regression:

$$ln(Credit)_{f,b,\tau} = \beta_1 Exposure_b \times Post_\tau + X_b'\theta \times Post_\tau + \alpha_{f,\tau} + \gamma_b + \epsilon_{f,b,\tau} \tag{10}$$

Here, Credit is the value of the first loan that a bank grants to a firm after initiating a new credit relationship in the post-liberalization period. For the pre-liberalization period, Credit is set to zero because the firm–bank pair did not have an existing lending relationship. The variable τ takes values 1 and 2 for the pre and post-liberalization periods, respectively.

In addition, I estimate this regression to examine heterogeneous effects based on firm characteristics, following the same approach used in the earlier analyses.

The results are presented in Tables C1 and C2. They indicate that while more exposed banks had a higher likelihood of starting a new credit relationship with a firm in the post-liberalization period (as shown earlier), conditional on initiating a new relationship, the size of the first loans extended is smaller compared to those granted by less exposed banks. Specifically, a 1 percentage point increase in a bank's exposure is associated with a 3.6% smaller initial loan amount on average once the credit relationship begins.

When examining heterogeneous effects by ex-ante firm characteristics, I find that more exposed banks extend smaller first-time loans to less productive firms and to firms with low collateral (FA). Moreover, the smallest initial loans are granted to firms that are both less productive and have low FA.

The results on the volume of credit at the extensive margin suggest that banks with greater exposure to liberalization are more willing to expand lending relationships but do so more cautiously by extending smaller initial loans. This pattern is consistent with the interpretation that banks may be using these first-time loans as screening devices to learn about new borrowers' creditworthiness and thereby mitigate the risk of default.

To examine how the volume of credit extended to firms with which a new lending relationship was formed in the post-liberalization period evolves over time, I estimate the

following regression:

$$\ln(\text{Outstanding Credit})_{f,b,t} = \beta_1 \text{ Age of Relationship}_{f,b} + \beta_2 \text{ Exposure}_b + \beta_3 \text{ Age of Relationship}_{f,b} \times \text{Exposure}_b + \alpha_{f,t} + \gamma_{f,b} + \epsilon_{f,b,t} \tag{11}$$

Here Age of Relationship$_{f,b}$ is a discrete variable indicating the number of years since the bank–firm relationship began. The coefficient of interest is β_3, which captures the marginal effect of a bank's exposure on credit supply to a firm at a given point in the relationship, specifically, in year 1, year 2 and year 3.

The results of this regression are presented in Table C3. The estimates show that β_3 is positive and increases over time, implying that more exposed banks gradually expand their lending to firms with whom they formed new relationships in the post-liberalization period.

Overall, the results on the volume of credit at the extensive margin indicate that more exposed banks adopt a cautious approach when initiating new lending relationships, extending smaller initial loan sizes. However, over time, they scale up their lending more rapidly than less-exposed banks, suggesting a strategy consistent with screening new borrowers initially and expanding credit as information about creditworthiness improves.

6.2 The Foreign Borrowing Channel

The liberalization of the Indian banking sector was an equity based liberalization. So far, I have examined how exposure to foreign equity inflows affected banks' credit supply and influenced firm-level outcomes and productivity through the bank lending channel.

While equity inflows are the direct consequence of the policy change, it is also possible that the liberalization indirectly affected foreign debt flows to banks, providing an additional channel through which bank credit supply could be influenced. Equity liberalization can facilitate the entry of foreign investors and shareholders, who may help banks establish connections with global lenders, thereby expanding their access to international borrowing opportunities. Moreover, stronger bank balance sheets and improved creditworthiness resulting from higher foreign equity participation can further enable banks to borrow more easily from international markets.

In Section 6, I showed that liberalization led to an increase in the share of foreign borrowings for banks that were more exposed. Building on this result, I now explore the foreign borrowings channel by using banks' ex-ante foreign liability share (averaged over 1998–2003) as a measure of their exposure to foreign debt flows in the post-liberalization period.

I re-estimate all the main regressions to examine whether direct debt flows to banks

play an important role in shaping bank credit supply to firms following liberalization. The results are broadly consistent with the earlier findings based on the foreign equity channel although the effects are slightly less statistically significant. These findings suggest that the equity liberalization of the banking sector influenced bank lending not only directly, through increased foreign shareholding, but also indirectly, by facilitating a rise in foreign borrowings by banks.

7. Mechanisms

7.1 Increase in Funding Sources

Bank Funding Constraints. In this section, I examine the channels through which the liberalization of foreign shareholding in banks affects their lending behavior. Liberalizing foreign shareholding can influence a bank's net worth and market valuation, which in turn shape its ability to access funding and extend credit.

An increase in foreign equity participation raises the demand for bank equity, pushing up stock prices and leading to a higher market valuation of a bank's stock. In addition, capital inflows improve a bank's net worth by providing additional capital, enhancing efficiency and increasing profitability. A higher market valuation and stronger net worth enhance a bank's credibility and financial strength, thereby enabling it to access external funding more easily and reduce borrowing costs. This mechanism explains how the liberalization of foreign shareholding alleviates bank funding constraints and, in turn, impacts bank lending.[13] I test whether this mechanism operates as described by estimating the following regression:

$$Y_{b,t} = \beta_1 Exposure_b \times Post_t + X_b'\theta \times Post_t + \alpha_b + \gamma_t + \epsilon_{b,t} \tag{12}$$

Here $Y_{b,t}$ represents one of three bank-level outcomes:ln(Market Value of Equity), ln(Net Worth) or the Net Interest Margin (NIM) of bank b and $Exposure_b$ denotes the bank's exposure to equity liberalization, as defined earlier.

The hypothesis is that banks with greater exposure to liberalization should experience a larger increase in their market value of equity and net worth relative to less exposed banks. This improvement in financial strength should, in turn, lead to a decline in funding costs, which would be reflected in higher NIMs for more exposed banks compared to less exposed ones.

The results of this regression are presented in Table 12. Banks with greater exposure to liberalization experience a significant increase in their market value of equity, net worth and net interest margins compared to less exposed banks. Specifically, a 1 percentage point

[13] Equity liberalization could also enable banks to borrow more from abroad, a mechanism I examine separately in the robustness section.

higher exposure is associated with an additional 2.1% increase in the market value of equity, a 2.6% increase in net worth and a 2.8% higher net interest margin.

Taken together (along with the earlier results showing that liberalization also increased foreign borrowings), these findings confirm that the policy strengthened banks' balance sheets, improved their market valuation and relaxed funding constraints, thereby enabling banks to expand their lending capacity in the post-liberalization period.

7.2 Better Governance

Bank Exposure to Liberalization and Loan Restructuring. The empirical analysis shows that banks not only increased their credit supply following liberalization but also made better credit allocation decisions, lending more to more productive firms and thereby reducing credit misallocation in the economy. Furthermore, the analysis of real effects revealed that liberalization contributed to a decline in overall misallocation and an improvement in aggregate productivity.

To understand why these improvements occur, I examine whether liberalization led to better management and governance practices within banks, thereby enabling them to make more efficient credit allocation decisions. Specifically, I focus on two key aspects: the quality of banks' loan portfolios and their investments in human capital.

Liberalization reduces funding constraints for banks, which allows them to allocate more time and resources to screening loans and making better informed lending decisions. It can also improve corporate governance and management practices, either by requiring banks to adhere to international standards or through the transfer of technical and managerial know-how from foreign investors. Additionally, a reduction in funding constraints may enable banks to invest more in training their employees and ensure that they follow international best practices which can, in turn, support better lending decisions. To explore this further, I estimate the following regression:

$$Y_{b,t} = \beta_1 Exposure_b \times Post_t + X_b'\theta \times Post_t + \alpha_b + \gamma_t + \epsilon_{b,t} \tag{13}$$

Here $Y_{b,t}$ is either the ratio of staff expenses to total income or the log of total employee compensation for bank b in year t.

The results are presented in Table 13. I find that banks with greater exposure to liberalization spend more on their employees, as reflected in higher staff expenses and total employee compensation. This pattern is consistent with greater investments in human capital and staff training by these banks.

To examine whether more exposed banks make better loan allocation decisions, I use

my loan-level data[14] which records whether a particular loan was restructured or modified- an indicator of loan quality and estimate the following regression:

$$LoanRestructured_{f,b,t} = \beta_1 Exposure_b \times Post_t + X_b'\theta \times Post_t + \alpha_{f,t} + \gamma_{f,b} + \epsilon_{f,b,t} \quad (14)$$

Here, the dependent variable is a dummy indicator that equals one if the loan between firm f and bank b was restructured at any point in time and zero otherwise. The results are presented in Table 14. They show that banks with greater exposure to liberalization have a lower likelihood of loans issued by them being restructured in the post-liberalization period compared to less exposed banks. Specifically, a 10 percentage point increase in bank exposure is associated with a 5 percentage point decrease in the probability of a loan being restructured. This suggests that banks more exposed to liberalization make higher quality lending decisions, which may, in part, reflect improved corporate governance and better management practices.

To summarize, the evidence indicates that liberalization reduced funding constraints for banks, enabling them to increase their overall lending capacity. In addition, it was associated with improvements in governance and greater investments in human capital, which allowed banks to make more informed lending decisions. Together, these effects contributed to a decline in credit misallocation and an improvement in aggregate productivity in the economy.

8. Aggregate Productivity Effects

My empirical analysis using loan-level data and firm balance sheet data shows that capital inflows led to a decline in credit misallocation by banks and an improvement in the dispersion of MRPK across firms. I now turn to quantifying the aggregate impact of the bank lending channel of capital inflows on allocative efficiency. To do this, I follow the methodology outlined in Sraer and Thesmar (2023).

Traditionally, equilibrium misallocation has been measured by estimating the cross-sectional dispersion of marginal products across firms (Hsieh and Klenow (2009), Restuccia and Rogerson (2008)). However, this approach has several limitations: productivity dispersion can arise even in the absence of resource misallocation, for instance, due to measurement errors in inputs, adjustment costs or other firm-specific frictions.

Sraer and Thesmar (2023) propose a methodology to estimate the impact of a policy reform on allocative efficiency using quasi-experimental evidence. Under the assumption that ln(MRPK) is normally distributed before the treatment, they show that the aggregate

[14] I do not use aggregate non-performing loan (NPL) data for banks due to concerns about reporting biases. It has been documented that several Indian banks under-reported their NPLs during the 2000s in order to make their balance sheets appear stronger and more profitable than they actually were.

change in total factor productivity (TFP) depends on the effect of the policy reform on three components: the mean and variance of ln(MRPK) as well as the covariance between ln(MRPK) and ln(sales) within each industry.

Following their methodology, I first calculate the effect of the liberalization on var(ln(MRPK)), mean(ln(MRPK)) and cov(ln(MRPK),ln(Sales)). Specifically, I estimate the following D-i-D regression:

$$M_{s,t} = \delta_t + \eta_s + \beta_M Exposure_s \times Post_t + \mu_s \times t + \epsilon_{s,t} \tag{15}$$

Here $M_{s,t}$ is either var(ln(MRPK)), mean(ln(MRPK)) or cov(ln(MRPK),ln(Sales)) for industry *s* in year *t*. $Exposure_s$ denotes the sector-level exposure to banking liberalization, calculated as the average exposure measure of all firms within sector *s*. $Post_t$ is a dummy variable equal to one for the post-liberalization period. The regression includes sector fixed effects η_s, time fixed effects δ_t and sector specific trends $\mu_s \times t$. Standard errors are clustered at the sector level.

The coefficients of interest are the β_M estimates for each of the three moments. I then use these estimated coefficients in the formula prescribed by Sraer and Thesmar (2023) to compute the effect of liberalization on aggregate TFP. The formula is as follows:

$$\begin{aligned}\Delta \log(\text{TFP}) = &-\frac{\alpha}{2}\left[1 + \frac{\alpha\theta}{1-\theta}\right]\sum_{s=1}^{S} \kappa_s \widehat{\Delta\Delta\sigma^2(s)} \\ &-\frac{\alpha}{2}\left[1 + \frac{\alpha\theta}{1-\theta}\right]\sum_{s=1}^{S}(\phi_s - \kappa_s)\left(\widehat{\Delta\Delta\mu(s)} + \widehat{\Delta\Delta\sigma_{\text{MRPK,py}}(s)} + \frac{1}{2}\frac{\alpha\theta}{1-\theta}\widehat{\Delta\Delta\sigma^2(s)}\right)\end{aligned} \tag{16}$$

Specifically, $\widehat{\Delta\Delta\sigma^2(s)}$ is the D-i-D estimate for var(ln(MRPK)), $\widehat{\Delta\Delta\mu(s)}$ is the D-i-D estimate for mean(ln(MRPK)) and $\widehat{\Delta\Delta\sigma_{MRPK,py}(s)}$ is the D-i-D estimate for cov(ln(MRPK),ln(Sales)). Further, κ_s is the capital share of industry s and ϕ_s is the sales share of industry s before the shock, α is the share of capital in firms' production functions and θ denotes the elasticity of substitution across varieties. α and θ are calibrated using standard values in the literature- $\alpha = 0.33$ and $\theta = 0.83$.

I perform this estimation for all firms in the manufacturing sector at the two-digit industry level. [15] I first verify that the assumption of normally distributed ln(MRPK) holds. Figure 5 plots the cumulative distribution function (c.d.f.) of ln(MRPK) for the manufacturing sector, which broadly follows a normal distribution (although minor deviations appear in the tails).

I then estimate equation (10), and the results are presented in Table 11. I find that exposure to liberalization has a negative and significant effect on var(ln(MRPK)) : a 10 percentage

[15] I restrict the analysis to manufacturing firms due to data limitations on price deflators.

point increase in sectoral exposure leads to a 2.1% decline in the dispersion of ln(MRPK) in the post-liberalization period. While exposure to liberalization has a positive but statistically insignificant effect on mean(ln(MRPK)), it leads to a decline in cov(ln(MRPK),ln(Sales)) over the same period.

I use the coefficients from these D-i-D estimations and substitute them into the formula described above to calculate the aggregate change in TFP. The results indicate that the improvement in allocative efficiency brought about by banking sector liberalization led to an overall increase in aggregate TFP of 0.8% in the post-liberalization period.

9. Conclusion

This paper examines the link between foreign capital liberalization and aggregate productivity through the bank-lending channel. Using detailed loan-level and firm-bank matched data for India, I show that liberalization reduces credit misallocation and enhances aggregate productivity. When banks gain access to foreign equity inflows, their funding constraints ease, leading to an expansion in overall lending. Importantly, this expansion is directed disproportionately toward high-MRPK firms, which increases investment and reduces the dispersion of MRPK. At the aggregate level, these improvements in the allocation of credit translate into significant TFP gains.

The findings demonstrate that the benefits of international financial integration extend beyond capital inflows themselves, depending critically on the intermediation role of domestic banks. By documenting how foreign equity inflows alter the distribution of credit and firm-level outcomes, this paper highlights the potential for financial liberalization to foster growth, while also underscoring the importance of strong institutional channels to ensure that these gains are realized.

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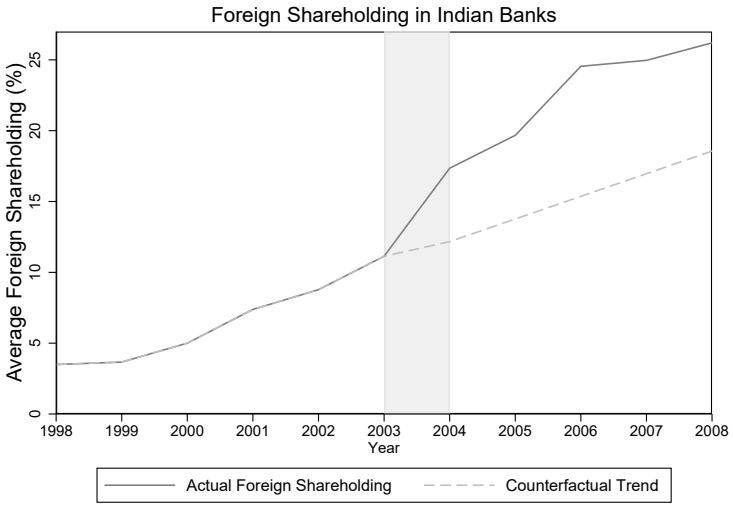
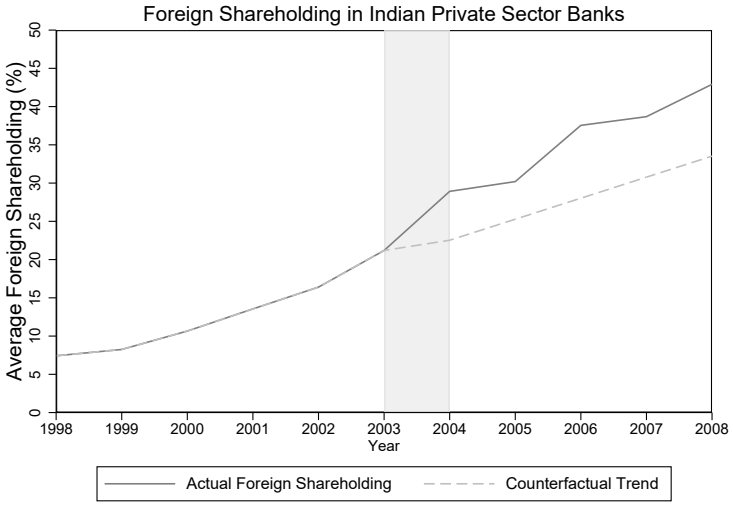
FIGURES AND TABLES

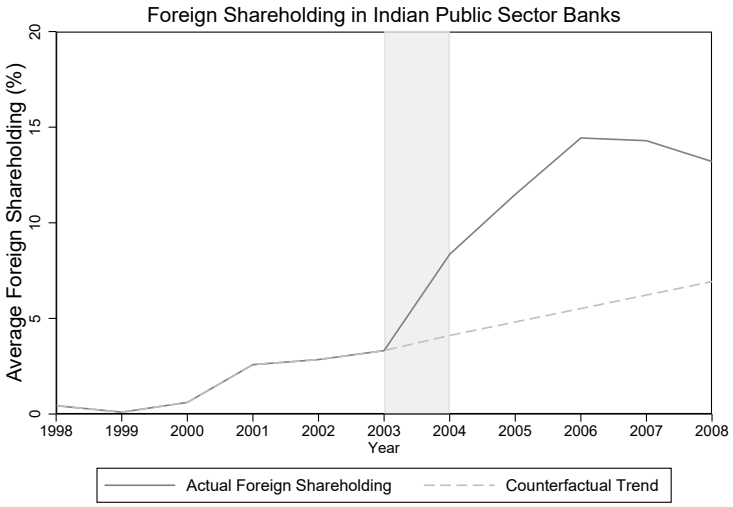
Figures



(A) All Banks

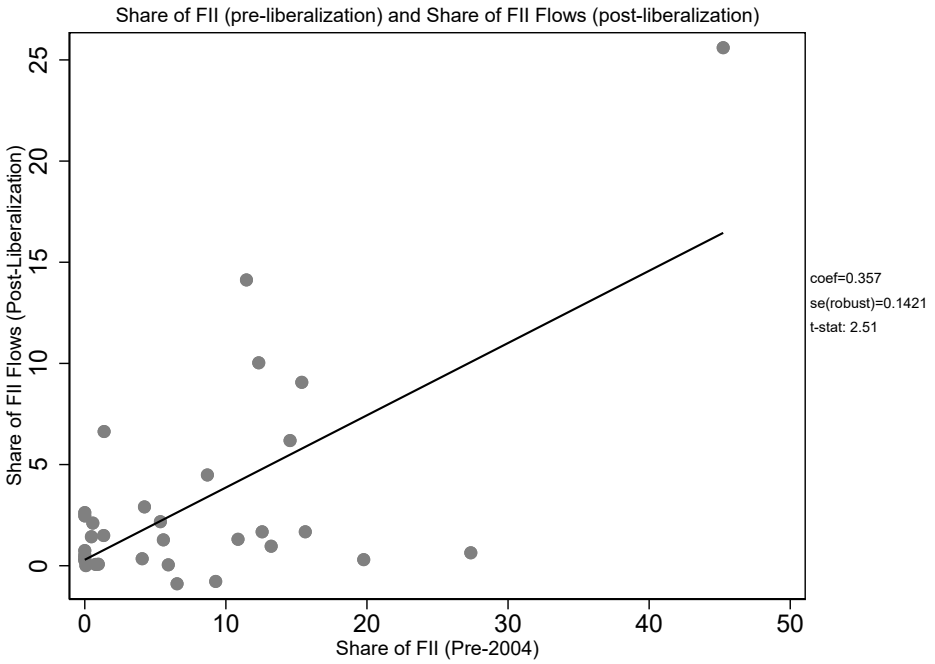


(B) Private Banks

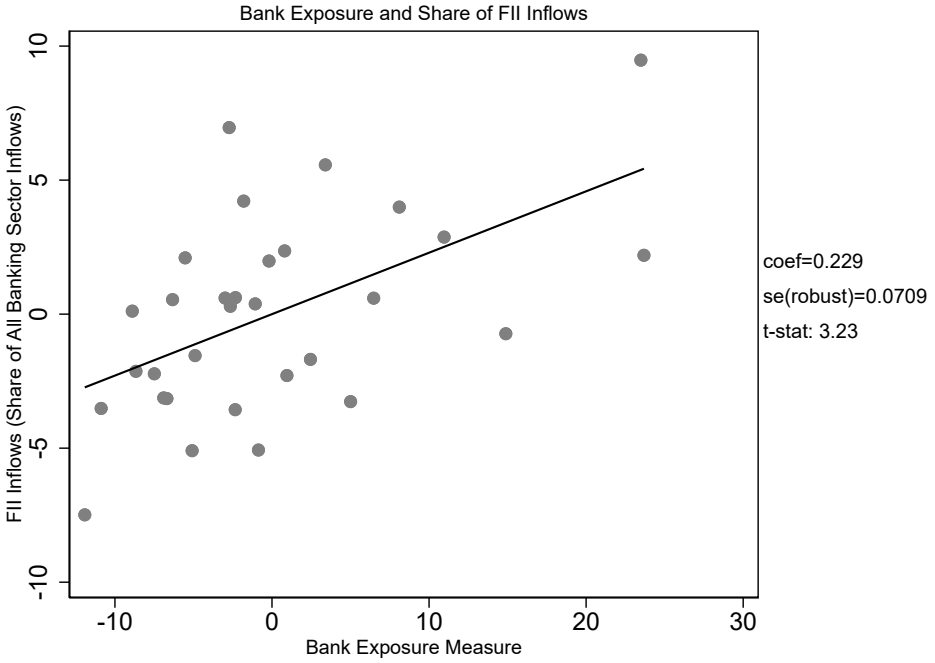


(C) Public Banks

FIGURE 1. Foreign shareholding in India's Banking Sector



(A) Unconditional Correlation



(B) Conditional Correlation: Controlling for Bank Characteristics

FIGURE 2. Bank Exposure (Pre-Liberalization) and Share of FII Inflows (Post-Liberalization)

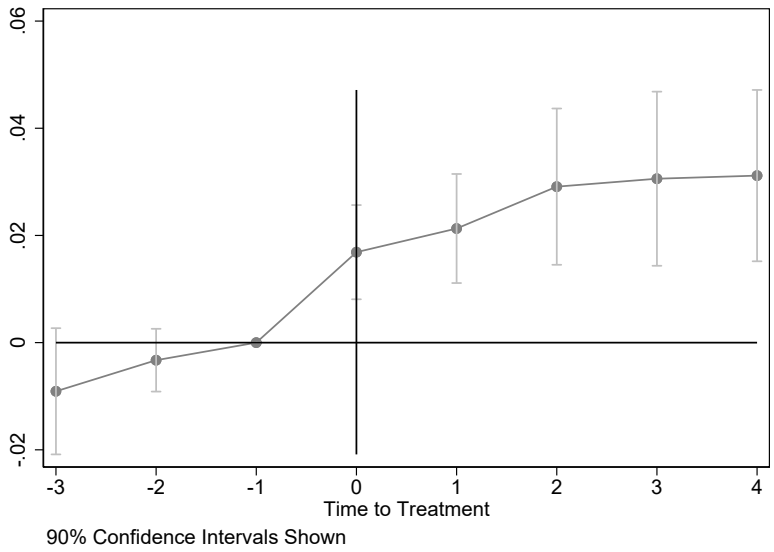
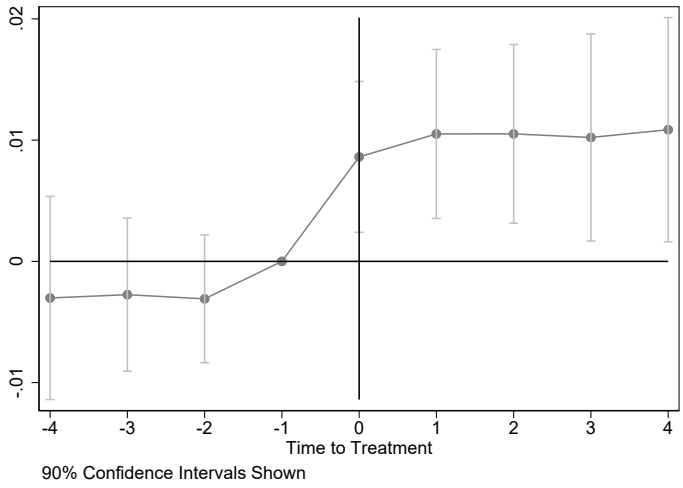
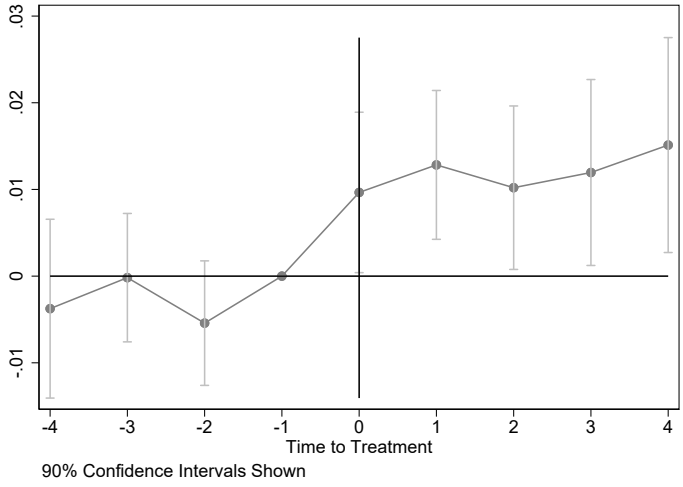


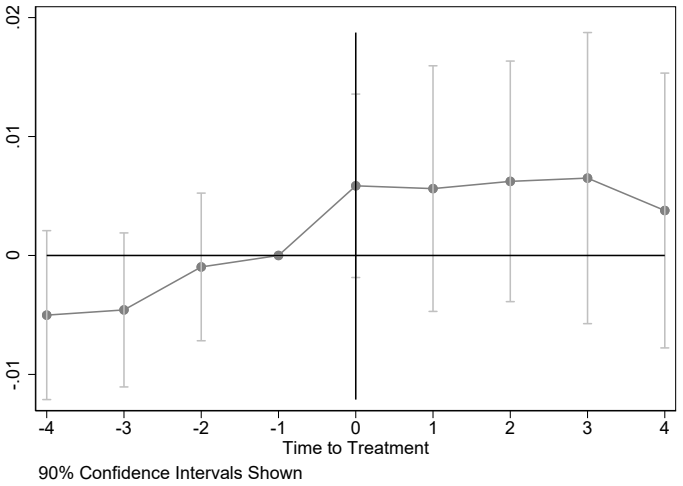
FIGURE 3. Dynamic Differences-in-Differences for Overall Bank Lending



(A) All Firms



(B) High-MRPK Firms



(C) Low-MRPK Firms

FIGURE 4. Dynamic Difference-in-Differences

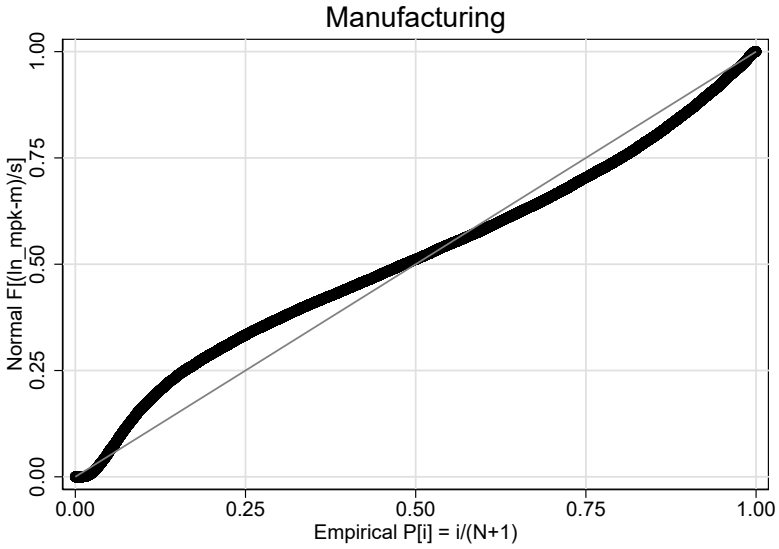


FIGURE 5. Log-Normality of MRPK for Manufacturing Sector

Tables

TABLE 1. Summary Statistics

Variable Name	Units	Mean	Median	SD
Panel A: Bank Characteristics				
Total Assets	INR Billions	495.41	233.46	827.86
Total Advances	INR Billions	250.47	106.48	435.25
Total Deposits	% Liabilities	83.13	85.45	8.78
Total Borrowings	% Liabilities	4.04	2.01	6.86
Total Foreign Borrowings	% Borrowings	35.7	24.02	33.26
Total Foreign Shareholding	%	14.23	6.11	18.5
Panel B: Firm Characteristics				
Total Assets	INR Millions	2757.07	271.3	20256.43
Total Sales	INR Millions	2435.13	298.3	26258.79
Total Bank Borrowings	INR Millions	466.08	62.9	2975.85
No. of Banking Relations	No.	3.16	2	3.04

Note: This table reports summary statistics (1998-2008 averages) for firms and banks used in the analysis. Bank balance-sheet data is from the Reserve Bank of India and the firm balance-sheet data is from CMIE Prowessdx. I calculate the number of banking relationships for each firm using the MCA loan-level data.

TABLE 2. Impact of Liberalization on Bank Variables

Dependent variable:	Foreign Shareholding	Deposit Share	Total Borrowing	Foreign Borrowing Share	Total Advances
	(1)	(2)	(3)	(4)	(5)
Exposure × Post	0.509***	-0.209**	0.0471**	0.806***	0.0406***
	(0.174)	(0.0960)	(0.0175)	(0.260)	(0.00886)
Bank Chars. x Post	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Observations	341	341	341	288	341
Adj. R-squared	0.797	0.732	0.727	0.587	0.947

Note: The table reports the coefficients of equation 1. It shows the impact of bank exposure to liberalization on bank balance sheet variables. Foreign Shareholding is the proportion of total equity held by foreigners (in percentages), Deposit Share is bank deposits as a proportion of total bank liabilities(in percentages), Total Borrowing is in logarithms, Foreign Borrowing Share is bank borrowing from abroad as a proportion of total bank borrowing (in percentages), and Total Advances is in logarithms. Standard errors are clustered at the bank level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE 3. Liberalization and Bank Credit Supply to Firms

Dependent variable: $\ln(1 + \text{Outstanding Credit})$		
	(1)	(2)
Exposure × Post	0.0111**	0.0157**
	(0.00509)	(0.00676)
Bank Chars. x Post	Yes	Yes
Firm-Time FE	Yes	No
Region-Sector-Time FE	No	Yes
Firm-Bank FE	Yes	Yes
Observations	91,938	145,222
Adj. R-squared	0.721	0.682

Note: The table reports the coefficients of equation 2. It shows the impact of bank exposure to liberalization on credit supply to firms along the intensive margin. Column 1 shows the within-firm estimation results by using firm-time fixed effects to control for credit demand. Column 2 controls for credit demand by using region-sector(NIC 2 digit)-time fixed effects. Standard errors are clustered at the bank level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE 4. Liberalization and Bank Credit Supply by Firm Characteristics

Dependent variable: $\log(1 + \text{Outstanding Credit})$						
	(1) MRPK	(2) MRPK	(3) FA	(4) FA	(5) MRPK & FA	(6) MRPK & FA
Exposure × Post x High MRPK	0.017**	0.022**				
	(0.007)	(0.009)				
Exposure × Post x Low MRPK	0.010*	0.016*				
	(0.006)	(0.009)				
Exposure × Post x High FA			0.015**	0.023**		
			(0.006)	(0.009)		
Exposure × Post x Low FA			-0.000	0.002		
			(0.007)	(0.010)		
Exposure × Post x HighMRPK-HighFA					0.020***	0.026***
					(0.007)	(0.009)
Exposure × Post x HighMRPK-LowFA					0.001	0.010
					(0.009)	(0.010)
Exposure × Post x LowMRPK-HighFA					0.011*	0.020**
					(0.006)	(0.009)
Exposure × Post x LowMRPK-LowFA					-0.002	-0.017
					(0.006)	(0.011)
Bank Chars. x Post	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Time FE	Yes	No	Yes	No	Yes	No
Region-Sector-Time FE	No	Yes	No	Yes	No	Yes
Firm-Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	56,323	65,425	57,474	67,086	56,297	65,394
Adj. R-squared	0.710	0.687	0.712	0.689	0.710	0.688

Note: The table reports the coefficients of equation 4. It shows the impact of bank exposure to liberalization on credit supply to firms along the intensive margin according to the type of firm. Column 1 and Column 2 examine how credit supply to firms differs according to their productivity levels. Column 3 and Column 4 examine how credit supply to firms differs according to their size or collateral. Column 5 and Column 6 examine differences in credit supply using a combination of both firm productivity and firm size. Columns 1,3,5 use firm-time fixed effects whereas Columns 2,4,6 use region-sector(NIC 2 Digit)-time fixed effects to control for firm credit demand. Standard errors are clustered at the bank level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE 5. Liberalization and Likelihood of Exit

Dependent variable: Exit Dummy		
	(1)	(2)
Exposure × Post	-0.002*	-0.003*
	(0.001)	(0.002)
Bank Chars. x Post	Yes	Yes
Firm-Time FE	Yes	No
Region-Sector-Time FE	No	Yes
Bank FE	Yes	Yes
Observations	18,230	27,606
Adj. R-squared	0.584	0.476

Note: The table reports the coefficients of equation 5. It shows the impact of bank exposure to liberalization on the likelihood of a bank ending an existing credit relationship with a firm. Column 1 shows the within-firm estimation results by using firm-time fixed effects to control for credit demand. Column 2 controls for credit demand by using region-sector(NIC 2 digit)-time fixed effects. Standard errors are clustered at the bank level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE 6. Liberalization and Likelihood of Exit by Firm Characteristics

Dependent variable: Exit Dummy						
	(1) MRPK	(2) MRPK	(3) FA	(4) FA	(5) MRPK & FA	(6) MRPK & FA
Exposure × Post x High MRPK	-0.002	-0.005**				
	(0.001)	(0.002)				
Exposure × Post x Low MRPK	-0.002*	-0.002				
	(0.001)	(0.002)				
Exposure × Post x High FA			-0.003*	-0.004**		
			(0.001)	(0.002)		
Exposure × Post x Low FA			-0.000	-0.000		
			(0.002)	(0.002)		
Exposure × Post x HighMRPK-HighFA					-0.002	-0.005***
					(0.001)	(0.002)
Exposure × Post x HighMRPK-LowFA					-0.002	-0.004
					(0.002)	(0.002)
Exposure × Post x LowMRPK-HighFA					-0.003**	-0.003*
					(0.001)	(0.002)
Exposure × Post x LowMRPK-LowFA					0.004	0.008***
					(0.003)	(0.002)
Bank Chars. x Post	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Time FE	Yes	No	Yes	No	Yes	No
Region-Sector-Time FE	No	Yes	No	Yes	No	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12,200	14,324	12,466	14,746	12,192	14,316
Adj. R-squared	0.572	0.467	0.577	0.474	0.572	0.471

Note: The table reports the coefficients of equation 6. It shows the impact of bank exposure to liberalization on the likelihood of a bank ending an exisitng credit relationship with a firm according to the type of firm. Column 1 and Column 2 examine how the probability of ending a credit relationship with a firm differs according to firm productivity levels. Column 3 and Column 4 examine how the probability of ending a credit relationship with a firm differs according to firm size or collateral. Column 5 and Column 6 examine the probability of ending a credit relationship with a firm according to both firm productivity and firm size. Columns 1,3,5 use firm-time fixed effects whereas Columns 2,4,6 use region-sector(NIC 2 Digit)-time fixed effects to control for firm credit demand. Standard errors are clustered at the bank level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE 7. Liberalization and Likelihood of Entry

Dependent variable: Entry Dummy		
	(1)	(2)
Exposure × Post	0.0006**	0.0006**
	(0.0002)	(0.0002)
Bank Chars. x Post	Yes	Yes
Firm-Time FE	Yes	No
Region-Sector-Time FE	No	Yes
Bank FE	Yes	Yes
Observations	1,477,636	1,258,660
Adj. R-squared	0.056	0.029

Note: The table reports the coefficients of equation 5. It shows the impact of bank exposure to liberalization on the likelihood of a bank starting a credit relationship with a firm. Column 1 shows the within-firm estimation results by using firm-time fixed effects to control for credit demand. Column 2 controls for credit demand by using region-sector(NIC 2 digit)-time fixed effects. Standard errors are clustered at the bank level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE 8. Liberalization and Likelihood of Entry by Firm Characteristics

Dependent variable: Entry Dummy						
	(1) MRPK	(2) MRPK	(3) FA	(4) FA	(5) MRPK & FA	(6) MRPK & FA
Exposure × Post x High MRPK	0.0011**	0.0011**				
	(0.0005)	(0.0004)				
Exposure × Post x Low MRPK	0.0004	0.0003				
	(0.0004)	(0.0004)				
Exposure × Post x High FA			0.0010**	0.0011**		
			(0.0005)	(0.0004)		
Exposure × Post x Low FA			0.0005	0.0004		
			(0.0004)	(0.0004)		
Exposure × Post x HighMRPK-HighFA					0.0014**	0.0015***
					(0.0005)	(0.0005)
Exposure × Post x HighMRPK-LowFA					0.0009**	0.0008*
					(0.0004)	(0.0004)
Exposure × Post x LowMRPK-HighFA					0.0006	0.0008*
					(0.0004)	(0.0004)
Exposure × Post x LowMRPK-LowFA					-0.0000	-0.0003
					(0.0003)	(0.0004)
Bank Chars. x Post	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Time FE	Yes	No	Yes	No	Yes	No
Region-Sector-Time FE	No	Yes	No	Yes	No	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	396,030	319,358	417,278	335,580	395,665	319,114
Adj. R-squared	0.085	0.057	0.083	0.055	0.085	0.058

Note: The table reports the coefficients of equation 6. It shows the impact of bank exposure to liberalization on the likelihood of a bank starting a credit relationship with a firm according to the type of firm. Column 1 and Column 2 examine how the probability of starting a credit relationship with a firm differs according to firm productivity levels. Column 3 and Column 4 examine how the probability of starting a credit relationship with a firm differs according to firm size or collateral. Column 5 and Column 6 examine the probability of starting a credit relationship with a firm according to both firm productivity and firm size. Columns 1,3,5 use firm-time fixed effects whereas Columns 2,4,6 use region-sector(NIC 2 Digit)-time fixed effects to control for firm credit demand. Standard errors are clustered at the bank level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE 9. Liberalization and Firm level Effects

Dependent variable						
	(1) Total Bank Borrowing	(2) Secured Bank Borrowing	(3) Total Assets	(4) Fixed Assets	(5) Employment	(6) MRPK
Exposure × Post	0.0084**	0.0102***	0.0040*	0.0011	0.0018	0.0009
	(0.0040)	(0.0036)	(0.0021)	(0.0025)	(0.0023)	(0.0028)
Bank Chars. x Post	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Region-Sector-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	34,904	34,500	41,262	40,438	38,392	37,676
Adj. R-squared	0.791	0.790	0.904	0.918	0.903	0.778

Note: The table reports the coefficients of equation 8. It shows how liberalization impacts firm-level credit, firm investment (proxied by Total Assets and Fixed Assets), firm employment (proxied by the Wage Bill) and firm MRPK. Column 1 and Column 2,respectively, look at Total and Secured Bank Borrowings of firms. Columns 3 and 4 look at Total Assets and Gross Fixed Assets of firms respectively.Column 5 looks at the Wage Bill of firms and Column 6 looks at the MRPK. All variables are in natural logarithms. Standard errors are clustered at the industry (NIC 2 digit) levels. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent variable:	Total Bank Borrowing		Secured Bank Borrowing		Total Assets		Fixed Assets		Wage Bill		MRPK	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Exposure × Post x High MRPK	0.019***		0.020***		0.014***		0.010***		0.006**		-0.008***	
	(0.005)		(0.004)		(0.002)		(0.003)		(0.002)		(0.003)	
Exposure × Post x Low MRPK	-0.003		-0.001		-0.010***		-0.011***		-0.003		0.012***	
	(0.005)		(0.004)		(0.002)		(0.003)		(0.003)		(0.004)	
Exposure × Post x HighMRPK-HighFA		0.014**		0.015***		0.012***		0.004		0.002		-0.005*
		(0.006)		(0.005)		(0.003)		(0.004)		(0.002)		(0.003)
Exposure × Post x HighMRPK-LowFA		0.026***		0.028***		0.017***		0.017***		0.011***		-0.010**
		(0.005)		(0.004)		(0.002)		(0.003)		(0.003)		(0.005)
Exposure × Post x LowMRPK-HighFA		-0.004		-0.001		-0.008***		-0.010***		-0.003		0.010**
		(0.005)		(0.004)		(0.003)		(0.003)		(0.003)		(0.004)
Exposure × Post x LowMRPK-LowFA		-0.001		0.002		-0.016***		-0.010**		-0.003		0.020**
		(0.009)		(0.009)		(0.004)		(0.005)		(0.005)		(0.009)
Bank Chars. x Post	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region-Sector-Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	29,834	29,811	29,494	29,471	34,326	34,303	33,988	33,965	32,803	32,777	32,463	32,439
Adj. R-squared	0.785	0.785	0.784	0.784	0.903	0.903	0.917	0.917	0.899	0.899	0.766	0.766

Note: The table reports the coefficients of equation 9. It shows how liberalization impacts firm-level variables according to the type of firm. Columns 1,3,5,7,9,11 analyze the impact on firm level variables according to firm productivity. Columns 2,4,6,8,10,12 analyze the impact on firm level variables according to both firm productivity and firm size. All variables are in natural logarithms. Standard errors are clustered at the industry (NIC 2 digit) levels. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE 10. Liberalization and Firm-Level Effects by Firm Characteristics

TABLE 11. Sector Exposure to Bank Liberalization and Moments of ln(MRPK) distribution

	Dependent variable:		
	(1) Var(ln(MRPK))	(2) Mean(ln(MRPK))	(3) Cov(ln(MRPK),ln(Sales))
Exposure × Post	-0.2156**	0.0037	-0.2475*
	(0.0998)	(0.0427)	(0.1379)
Sector FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Sector Trend	Yes	Yes	Yes
Observations	237	241	237
Adj. R-squared	0.780	0.903	0.697

Note: The table reports the coefficients of equation 10. Standard errors are clustered at the sector (NIC-2-Digit) level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE 12. Mechanisms: Decline in Bank Funding Constraints

Dependent variable:	Market Value of Equity	Net Worth	Net Interest Margin
	(1)	(2)	(3)
Exposure × Post	0.021**	0.026***	0.028***
	(0.008)	(0.009)	(0.009)
Bank Chars. x Post	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Observations	287	340	214
Adj. R-squared	0.940	0.913	0.670

Note: The table reports the coefficients of equation 14. It shows the impact of bank exposure to liberalization on bank funding constraints. Market Value of Equity and Net Worth of banks is expressed in logarithms. Net Interest Margin is expressed in percentages. Standard errors are clustered at the bank level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE 13. Bank Exposure to Liberalization and Investments in Human Capital

Dependent variable:	Staff Expenses to Total Income	Number of Employees
	(1)	(2)
Exposure × Post	0.122**	0.0542***
	(0.0542)	(0.0122)
Bank Chars. x Post	Yes	Yes
Bank FE	Yes	Yes
Time FE	Yes	Yes
Observations	213	320
Adj. R-squared	0.853	0.924

Note: The table reports the coefficients of equation 15. It shows the impact of bank exposure to liberalization on bank investments in human capital. Staff Expenses are measured as a percentage of Total Income and Number of Employees is measured in logarithms. Standard errors are clustered at the bank level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE 14. Bank Exposure to Liberalization and Loan Restructuring

Dependent variable: Loan Restructured Dummy	
	(1)
Exposure × Post	-0.005*
	(0.003)
Bank Chars. x Post	Yes
Firm-Time FE	Yes
Firm-Bank FE	Yes
Observations	3,872
Adj. R-squared	-0.162

Note: The table reports the coefficients of equation 16.It shows how the bank exposure to liberalization affects the likelihood of a loan being restructured. Standard errors are clustered at the bank level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Appendix A. Proofs of Model Propositions

Proof of Proposition 1.

Since $r_\lambda < 0, r_g < 0$,

$$P_\lambda = \frac{-E(D)\,[\,r_\lambda + r_g g_\lambda\,]}{(1+r(\lambda,g))^2} > 0 \qquad P_g = \frac{-E(D)\,r_g}{(1+r(\lambda,g))^2} > 0$$

Differentiating $N(\lambda)$ with respect to λ:

$$\frac{dN}{d\lambda} \;=\; S(P_\lambda + P_g\, g_\lambda) \;+\; I_\lambda \;>\; 0$$

□

Proof of Proposition 2.

$$L(\lambda) = \bar{L} + \phi(N,g)N.$$

Differentiating,

$$\frac{dL}{d\lambda} = [\phi + \phi_N N]\,\frac{dN}{d\lambda} + \phi_g N\,\frac{dg}{d\lambda}.$$

Since $\frac{dN}{d\lambda} > 0$, $g'(\lambda) > 0$, $\phi_N \geq 0, \phi_g > 0$, we obtain $\frac{dL}{d\lambda} > 0$. □

Proof of Proposition 3.

Given the borrower types, banks' screening levels, funding and screening constraints, the bank solves:

$$\begin{aligned} \max_s\ & \pi(L,s) = L\big[s\,m_H + (1-s)\,\bar{m}\big] \\ \text{s.t. } & 0 \leq L \leq \bar{L} + \phi(N,g)N, \\ & 0 \leq s \leq s_{\max}(L). \end{aligned}$$

For an interior solution, the first–order condition w.r.t. s is:

$$\frac{\partial \pi}{\partial s} = L(m_H - \bar{m}) - c'(s)\,\kappa(g)\,L = 0$$

which implies

$$c'(s) = \frac{m_H - \bar{m}}{\kappa(g)}.$$

Hence,

$$s = (c')^{-1}\left(\frac{m_H - \bar{m}}{\kappa(g)}\right).$$

The optimal screening is therefore given by:

$$s^*(N,g) = \min\left\{(c')^{-1}\left(\frac{m_H - \bar{m}}{\kappa(g)}\right),\ c^{-1}(\theta L)\right\} \in [0,1].$$

That is, banks screen until the marginal benefit of screening equals the marginal cost, or until they reach their resource cap $s_{\max}$, whichever is lower.

A reduction in funding constraints (an increase in N) lowers $\rho(N,g)$, and since $m'_H(\rho) < 0$ and $m'_L(\rho) < 0$, both m_H and $\bar{m}$ increase. Further, since $L = \bar{L} + \phi(N,g)N$, an increase in N raises L, increasing the feasible $s_{\max}$. Similarly, an improvement in governance (g) decreases $\kappa(g)$, which increases $(c')^{-1}\big((m_H - \bar{m})/\kappa(g)\big)$ and also increases L through $\phi(N,g)$.

Therefore, both a reduction in funding constraints (higher N) and better governance (higher g) increase the optimal screening level and relax the maximum feasible level, resulting in higher optimal screening $s^*(N,g)$. □

Proof of Proposition 4.

$$Q_H(\lambda) = L^*(\lambda)[p + s^*(\lambda)(1-p)], \qquad Q_L(\lambda) = L^*(\lambda)[(1 - s^*(\lambda))(1-p)].$$

Differentiating,

$$\frac{dQ_H}{d\lambda} = [p + s^*(1-p)]\,\frac{dL^*}{d\lambda} + L^*(1-p)\frac{ds^*}{d\lambda} > 0,$$

$$\frac{dQ_L}{d\lambda} = [(1-s^*)(1-p)]\,\frac{dL^*}{d\lambda} - L^*(1-p)\frac{ds^*}{d\lambda}.$$

Thus,

$$\frac{dQ_L}{d\lambda} > 0 \iff \frac{L^{*'}(\lambda)}{L^*(\lambda)} > \frac{s^{*'}(\lambda)}{1 - s^*(\lambda)}.$$

Shares:

$$\frac{Q_H}{Q_H + Q_L} = p + s^*(1-p), \qquad \frac{Q_L}{Q_H + Q_L} = 1 - s^*(1-p).$$

Differentiating:

$$\frac{d}{d\lambda}\Big(\frac{Q_H}{Q_H + Q_L}\Big) = (1-p)\frac{ds^*}{d\lambda} > 0,$$

$$\frac{d}{d\lambda}\Big(\frac{Q_L}{Q_H + Q_L}\Big) = -(1-p)\frac{ds^*}{d\lambda} < 0.$$

Thus, lending rises for both types, but the share and level rise more for $High$ types. □

Appendix B. Data Description

B.1 Data construction:Loan-level data

I follow the existing literature that uses loan-level data (formally referred to as "Index of Charges") from the MCA to construct a loan-level panel matched with firm and bank level characteristics (Kulkarni (2020)). The MCA maintains records of all secured loans on which a charge has been registered by the lender under the Companies Act, 2013. Under this Act, lenders may register a charge on secured loans. If a loan is not registered, then in the event of bankruptcy or liquidation, it is treated on par with an unsecured loan. Given these material consequences, most lenders do register their charges with the MCA (Chopra et al. (2021)).

To construct my dataset, I begin with Company Identification Numbers (CINs) for all firms (46,069 firms) in the ProwessDx database and collect data on charges for each of these firms from the MCA website. Not all firms in ProwessDx have a corresponding entry in the MCA database. I am able to obtain charge data for 30,586 firms (last downloaded in May 2023). Each loan record between a bank and a firm in the MCA database is associated with a unique identifier (Charge ID). The database provides details on the lending institution, the firm name and ID, the loan amount , the date on which the loan was issued, the dates of modification and the date of satisfaction or repayment of the loan.

I winsorize the data to address extreme outliers and remove duplicate loan entries. Since the dataset records both loan origination and repayment dates, I can compute the outstanding credit between each bank-firm pair. I then construct a balanced panel of outstanding credit at the bank-firm-year level. This loan-level panel is matched with firm and bank level characteristics which forms the basis of my main analysis.

B.2 Data construction:FII flows at the bank level

I construct a dataset on FII inflows to each bank using FII equity trade data from NSDL. I use this flow data to demonstrate that my exposure measure serves as a valid instrument for predicting equity inflows after liberalization. NSDL provides data on equity trades starting from 2003. The lack of data before 2003 is not a concern, as I require flow data only for the post-liberalization years.

I download the FII equity trade data from NSDL for the period 2003–2008 and filter it to include only the banks in my sample. Using this data, I construct series on FII inflows, FII outflows, and net FII inflows. To calculate FII inflows, I aggregate the values of secondary market purchases, primary market purchases, rights issue purchases, and preferential allotments. FII outflows are calculated using the values of secondary market sales for each bank. Finally, net FII inflows are computed as the difference between total FII inflows and total FII outflows.

B.3 Data construction:MRPK

To construct firm level MRPK's, I follow the method used by Bau and Matray (2023) and use the deflator data that they provide. Assume that firms follow a Cobb-Douglas revenue production function:

$$Revenue_{ijt} = TFPR_{ijt} K_{ijt}^{\alpha_j^k} L_{ijt}^{\alpha_j^l} M_{ijt}^{\alpha_j^m} \tag{B1}$$

where i denotes a firm, j denotes an industry and t denotes a year. $Revenue_{ijt}, K_{ijt}, L_{ijt}, M_{ijt}$ are measures of sales, capital, the wage bill and materials and $TFPR_{ijt}$ is the firm-specific unobserved revenue productivity.
In this scenario, $MRPK = \frac{\partial Revenue_{i,t}}{\partial K_{i,t}} = \alpha_j^k \frac{\partial Revenue_{i,t}}{\partial K_{i,t}}$. Thus, $\frac{Revenue_{i,t}}{K_{i,t}}$ provides a within-industry measure of MRPK, under the assumption that all firms in an industry share the same α_j^k. I therefore calculate MRPK as the ratio of $\frac{Sales}{GrossFixedAssets}$ for each firm. I deflate sales using the GDP deflator and Gross Fixed Assets using the Capital Deflator.

Appendix C. Robustness

C.1 Credit Supply at the Extensive Margin

TABLE C1. Liberalization and Bank Credit Supply to Firms:Extensive Margin

Dependent variable: $\ln(\text{Credit})$		
	(1)	(2)
Exposure × Post	-0.036***	-0.032***
	(0.008)	(0.007)
Bank Chars. x Post	Yes	Yes
Firm-Time FE	Yes	No
Region-Sector-Time FE	No	Yes
Bank FE	Yes	Yes
Observations	11,376	18,911
Adj. R-squared	0.855	0.765

Note: The table reports the coefficients of equation 12. It shows the impact of bank exposure to liberalization on the volume of credit to firms at the extensive margin (i.e. a new lending relationship started post liberalization). Column 1 shows the within-firm estimation results by using firm-time fixed effects to control for credit demand. Column 2 controls for credit demand by using region-sector(NIC 2 digit)-time fixed effects. Standard errors are clustered at the bank level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE C2. Liberalization and Bank Credit Supply by Firm Characteristics:Extensive Margin

Dependent variable: $\ln(\text{Credit})$						
	(1) MRPK	(2) MRPK	(3) FA	(4) FA	(5) MRPK & FA	(6) MRPK & FA
Exposure × Post x High MRPK	-0.029***	-0.030***				
	(0.009)	(0.007)				
Exposure × Post x Low MRPK	-0.038***	-0.031***				
	(0.009)	(0.007)				
Exposure × Post x High FA			-0.029***	-0.022**		
			(0.009)	(0.008)		
Exposure × Post x Low FA			-0.040***	-0.047***		
			(0.011)	(0.007)		
Exposure × Post x HighMRPK-HighFA					-0.024**	-0.021**
					(0.009)	(0.009)
Exposure × Post x HighMRPK-LowFA					-0.038***	-0.041***
					(0.011)	(0.007)
Exposure × Post x LowMRPK-HighFA					-0.037***	-0.021**
					(0.009)	(0.008)
Exposure × Post x LowMRPK-LowFA					-0.050**	-0.075***
					(0.019)	(0.013)
Bank Chars. x Post	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Time FE	Yes	No	Yes	No	Yes	No
Region-Sector-Time FE	No	Yes	No	Yes	No	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,718	5,829	4,856	6,045	4,714	5,819
Adj. R-squared	0.877	0.808	0.878	0.809	0.877	0.812

Note: The table reports the coefficients of equation 12 (by firm characteristics). It shows the impact of bank exposure to liberalization on the volume of credit to firms at the extensive margin (i.e. a new lending relationship started post liberalization) according to firm type. Column 1 and Column 2 examine whether the volume of new credit given to a firm differs according to firm productivity levels. Column 3 and Column 4 examine whether the volume of new credit given to a firm differs according to firm size or collateral. Column 5 and Column 6 examine whether the volume of new credit given to a firm differs according to both firm productivity and firm size. Columns 1,3,5 use firm-time fixed effects whereas Columns 2,4,6 use region-sector(NIC 2 Digit)-time fixed effects to control for firm credit demand. Standard errors are clustered at the bank level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE C3. Evolution of Credit Over Time: Extensive Margin

Dependent variable: $\ln$(Outstanding Credit)	
	(1)
Year 1 after Entry $\times$Exposure	0.003**
	(0.001)
Year 2 after Entry $\times$Exposure	0.005***
	(0.001)
Year 3 after Entry $\times$Exposure	0.006**
	(0.002)
Bank Chars. x Post	Yes
Firm-Time FE	Yes
Firm-Bank FE	Yes
Observations	9,846
Adj. R-squared	0.933

Note: The table reports the coefficients of equation 13.It shows how the volume of credit given out at the extensive margin by banks to firms evolves over time according to bank exposure in the post liberalization period. Standard errors are clustered at the bank level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

C.2 The Foreign Borrowings Channel

TABLE C4. Liberalization and Bank Credit Supply to Firms: Foreign Borrowing Channel

Dependent variable: $\ln(1 + \text{Outstanding Credit})$		
	(1)	(2)
Exposure × Post	0.0806	0.136**
	(0.0694)	(0.0656)
Bank Chars. x Post	Yes	Yes
Firm-Time FE	Yes	No
Region-Sector-Time FE	No	Yes
Firm-Bank FE	Yes	Yes
Observations	91,938	145,222
Adj. R-squared	0.721	0.682

Note: The table examines the foreign borrowing channel. It shows the impact of bank exposure to liberalization (exposure to foreign borrowings) on credit supply to firms along the intensive margin. Column 1 shows the within-firm estimation results by using firm-time fixed effects to control for credit demand. Column 2 controls for credit demand by using region-sector(NIC 2 digit)-time fixed effects. Standard errors are clustered at the bank level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE C5. Liberalization and Bank Credit Supply by Firm Characteristics:Foreign Borrowing Channel

Dependent variable: $\log(1 + \text{Outstanding Credit})$						
	(1) MRPK	(2) MRPK	(3) FA	(4) FA	(5) MRPK & FA	(6) MRPK & FA
Exposure × Post x High MRPK	0.122	0.174**				
	(0.075)	(0.083)				
Exposure × Post x Low MRPK	0.023	0.072				
	(0.079)	(0.085)				
Exposure × Post x High FA			0.064	0.148*		
			(0.079)	(0.083)		
Exposure × Post x Low FA			0.096	0.064		
			(0.069)	(0.078)		
Exposure × Post x HighMRPK-HighFA					0.124	0.202**
					(0.082)	(0.084)
Exposure × Post x HighMRPK-LowFA					0.114*	0.124
					(0.067)	(0.082)
Exposure × Post x LowMRPK-HighFA					0.020	0.102
					(0.080)	(0.086)
Exposure × Post x LowMRPK-LowFA					0.059	-0.060
					(0.102)	(0.087)
Bank Chars. x Post	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Time FE	Yes	No	Yes	No	Yes	No
Region-Sector-Time FE	No	Yes	No	Yes	No	Yes
Firm-Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	56,323	65,425	57,474	67,086	56,297	65,394
Adj. R-squared	0.709	0.687	0.711	0.688	0.709	0.687

Note: The table examines the foreign borrowing channel. It shows the impact of bank exposure to liberalization on credit supply to firms along the intensive margin according to the type of firm. Column 1 and Column 2 examine how credit supply to firms differs according to their productivity levels. Column 3 and Column 4 examine how credit supply to firms differs according to their size or collateral. Column 5 and Column 6 examine differences in credit supply using a combination of both firm productivity and firm size. Columns 1,3,5 use firm-time fixed effects whereas Columns 2,4,6 use region-sector(NIC 2 Digit)-time fixed effects to control for firm credit demand. Standard errors are clustered at the bank level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE C6. Liberalization and Likelihood of Exit:Foreign Borrowing Channel

Dependent variable: Exit Dummy		
	(1)	(2)
Exposure × Post	-0.031**	-0.007
	(0.013)	(0.010)
Bank Chars. x Post	Yes	Yes
Firm-Time FE	Yes	No
Region-Sector-Time FE	No	Yes
Bank FE	Yes	Yes
Observations	18,230	27,606
Adj. R-squared	0.585	0.475

Note: The table examines the foreign borrowing channel. It shows the impact of bank exposure to liberalization on the likelihood of a bank ending an existing credit relationship with a firm. Column 1 shows the within-firm estimation results by using firm-time fixed effects to control for credit demand. Column 2 controls for credit demand by using region-sector(NIC 2 digit)-time fixed effects. Standard errors are clustered at the bank level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE C7. Liberalization and Likelihood of Exit by Firm Characteristics:Foreign Borrowing Channel

Dependent variable: Exit Dummy						
	(1) MRPK	(2) MRPK	(3) FA	(4) FA	(5) MRPK & FA	(6) MRPK & FA
Exposure × Post x High MRPK	-0.031**	-0.021*				
	(0.013)	(0.012)				
Exposure × Post x Low MRPK	-0.038**	0.006				
	(0.015)	(0.011)				
Exposure × Post x High FA			-0.039**	-0.024**		
			(0.014)	(0.010)		
Exposure × Post x Low FA			-0.001	0.024**		
			(0.013)	(0.010)		
Exposure × Post x HighMRPK-HighFA					-0.037**	-0.037***
					(0.014)	(0.011)
Exposure × Post x HighMRPK-LowFA					-0.012	0.004
					(0.015)	(0.012)
Exposure × Post x LowMRPK-HighFA					-0.044***	-0.011
					(0.016)	(0.011)
Exposure × Post x LowMRPK-LowFA					0.018	0.066***
					(0.020)	(0.016)
Bank Chars. x Post	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Time FE	Yes	No	Yes	No	Yes	No
Region-Sector-Time FE	No	Yes	No	Yes	No	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12,200	14,324	12,466	14,746	12,192	14,316
Adj. R-squared	0.572	0.466	0.578	0.475	0.572	0.470

Note: The table examines the foreign borrowing channel. It shows the impact of bank exposure to liberalization on the likelihood of a bank ending an exisitng credit relationship with a firm according to the type of firm. Column 1 and Column 2 examine how the probability of ending a credit relationship with a firm differs according to firm productivity levels. Column 3 and Column 4 examine how the probability of ending a credit relationship with a firm differs according to firm size or collateral. Column 5 and Column 6 examine the probability of ending a credit relationship with a firm according to both firm productivity and firm size. Columns 1,3,5 use firm-time fixed effects whereas Columns 2,4,6 use region-sector(NIC 2 Digit)-time fixed effects to control for firm credit demand. Standard errors are clustered at the bank level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE C8. Liberalization and Likelihood of Entry:Foreign Borrowing Channel

Dependent variable: Entry Dummy		
	(1)	(2)
Exposure × Post	0.0015	0.0013
	(0.0067)	(0.0065)
Bank Chars. x Post	Yes	Yes
Firm-Time FE	Yes	No
Region-Sector-Time FE	No	Yes
Bank FE	Yes	Yes
Observations	1,477,636	1,258,660
Adj. R-squared	0.055	0.029

Note: The table examines the foreign borrowing channel. It shows the impact of bank exposure to liberalization on the likelihood of a bank starting a credit relationship with a firm. Column 1 shows the within-firm estimation results by using firm-time fixed effects to control for credit demand. Column 2 controls for credit demand by using region-sector(NIC 2 digit)-time fixed effects. Standard errors are clustered at the bank level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE C9. Liberalization and Likelihood of Entry by Firm Characteristics:Foreign Borrowing Channel

Dependent variable: Entry Dummy						
	(1) MRPK	(2) MRPK	(3) FA	(4) FA	(5) MRPK & FA	(6) MRPK & FA
Exposure × Post x High MRPK	0.0001	0.0000				
	(0.0142)	(0.0140)				
Exposure × Post x Low MRPK	-0.0109	-0.0127				
	(0.0147)	(0.0147)				
Exposure × Post x High FA			-0.0008	0.0001		
			(0.0129)	(0.0128)		
Exposure × Post x Low FA			-0.0075	-0.0100		
			(0.0145)	(0.0146)		
Exposure × Post x HighMRPK-HighFA					0.0055	0.0080
					(0.0121)	(0.0115)
Exposure × Post x HighMRPK-LowFA					-0.0038	-0.0053
					(0.0156)	(0.0156)
Exposure × Post x LowMRPK-HighFA					-0.0078	-0.0076
					(0.0145)	(0.0145)
Exposure × Post x LowMRPK-LowFA					-0.0153	-0.0197
					(0.0149)	(0.0147)
Bank Chars. x Post	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Time FE	Yes	No	Yes	No	Yes	No
Region-Sector-Time FE	No	Yes	No	Yes	No	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	396,030	319,358	417,278	335,580	395,665	319,114
Adj. R-squared	0.084	0.057	0.083	0.055	0.084	0.057

Note: The table examines the foreign borrowing channel. It shows the impact of bank exposure to liberalization on the likelihood of a bank starting a credit relationship with a firm according to the type of firm. Column 1 and Column 2 examine how the probability of starting a credit relationship with a firm differs according to firm productivity levels. Column 3 and Column 4 examine how the probability of starting a credit relationship with a firm differs according to firm size or collateral. Column 5 and Column 6 examine the probability of starting a credit relationship with a firm according to both firm productivity and firm size. Columns 1,3,5 use firm-time fixed effects whereas Columns 2,4,6 use region-sector(NIC 2 Digit)-time fixed effects to control for firm credit demand. Standard errors are clustered at the bank level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE C10. Liberalization and Firm level Effects:Foreign Borrowing Channel

Dependent variable						
	(1) Total Bank Borrowing	(2) Secured Bank Borrowing	(3) Total Assets	(4) Fixed Assets	(5) Employment	(6) MRPK
Exposure × Post	-0.0340	-0.0246	0.0123	-0.0008	0.0137	-0.0102
	(0.0302)	(0.0300)	(0.0147)	(0.0163)	(0.0149)	(0.0210)
Bank Chars. x Post	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Region-Sector-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	39,867	39,313	47,509	46,500	44,069	43,186
Adj. R-squared	0.789	0.788	0.903	0.917	0.902	0.780

Note: The table examines the foreign borrowing channel. It shows how liberalization impacts firm-level credit, firm investment (proxied by Total Assets and Fixed Assets), firm employment (proxied by the Wage Bill) and firm MRPK. Column 1 and Column 2,respectively, look at Total and Secured Bank Borrowings of firms. Columns 3 and 4 look at Total Assets and Gross Fixed Assets of firms respectively.Column 5 looks at the Wage Bill of firms and Column 6 looks at the MRPK. All variables are in natural logarithms. Standard errors are clustered at the industry (NIC 2 digit) levels. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent variable:	Total Bank Borrowing		Secured Bank Borrowing		Total Assets		Fixed Assets		Wage Bill		MRPK	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Exposure × Post x High MRPK	0.038		0.040		0.075***		0.059***		0.041**		-0.068**	
	(0.031)		(0.034)		(0.018)		(0.016)		(0.017)		(0.030)	
Exposure × Post x Low MRPK	-0.128***		-0.113***		-0.068***		-0.082***		-0.019		0.067***	
	(0.038)		(0.035)		(0.018)		(0.024)		(0.026)		(0.024)	
Exposure × Post x HighMRPK-HighFA		0.024		0.029		0.069***		0.041***		0.037***		-0.063*
		(0.032)		(0.033)		(0.021)		(0.014)		(0.012)		(0.035)
Exposure × Post x HighMRPK-LowFA		0.052		0.052		0.082***		0.080***		0.047*		-0.073**
		(0.044)		(0.047)		(0.024)		(0.026)		(0.028)		(0.033)
Exposure × Post x LowMRPK-HighFA		-0.128***		-0.107***		-0.068***		-0.094***		-0.025		0.053*
		(0.043)		(0.040)		(0.018)		(0.022)		(0.027)		(0.028)
Exposure × Post x LowMRPK-LowFA		-0.130***		-0.129***		-0.067**		-0.057*		-0.005		0.098**
		(0.046)		(0.047)		(0.031)		(0.033)		(0.040)		(0.042)
Bank Chars. x Post	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region-Sector-Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	33,926	33,904	33,473	33,450	39,340	39,316	38,952	38,928	37,537	37,510	37,160	37,135
Adj. R-squared	0.782	0.782	0.781	0.781	0.901	0.901	0.916	0.916	0.897	0.897	0.767	0.767

Note: The table examines the foreign borrowing channel. It shows how liberalization impacts firm-level variables according to the type of firm. Columns 1,3,5,7,9,11 analyze the impact on firm level variables according to firm productivity. Columns 2,4,6,8,10,12 analyze the impact on firm level variables according to both firm productivity and firm size. All variables are in natural logarithms. Standard errors are clustered at the industry (NIC 2 digit) levels. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE C11. Liberalization and Firm-Level Effects by Firm Characteristics:Foreign Borrowing Channel