Bank Ownership and Firm Performance*

Pavel Chakraborty†

ABSTRACT

Does a bank's ownership matter for a firm's performance (to which it is connected)? Especially, in the event of a crisis? I study this question through the effect of 2008–09 crisis on Indian manufacturing firms to provide evidence on a new channel that can matter significantly for a firm's performance – bank ownership. I find that firms connected to private (domestic and foreign) banks earn around 10% and 25% less from sales and exports, respectively during the crisis as compared to firms' having banking relationships with public-sector banks. This happened as private banks were differentially affected in terms of credit supply from the Central Bank and withdrawal of deposits. Firms connected to private banks also laid-off more workers, and imported less capital goods. Lastly, these effects are significant across the size distribution of the firms (except the smallest firms), for firms producing intermediates, and about 40% less for firms who belongs to a business group.

Keywords: Bank Ownership, 2008–09 Financial Crisis, Private Banks, Public-sector Banks, Firm Performance, Exports.

JEL Codes: F41, F14, G01, G21

*This paper has been previously circulated as "Bank Ownership, Monetary Policy and Exports: Evidence from a Matched Firm-Bank Dataset". India's Central Bank is popularly known as the Reserve Bank of India or RBI. I have used India's Central Bank and RBI interchangeably through the paper; both the names refer to the same institution. I have also used banking and credit relationships interchangeably in the paper; both mean the same – credit relationships of firms with banks. I would like to thank the Editor, Maitreesh Ghatak, and two other anonymous referees for their comments on the paper which has helped in improving the paper substantially. This paper has also benefited from discussions with Richard Baldwin, Shantanu Banerjee, Sebastian Franco Bedoya, Raoul Minetti, Vasso Ioannidau, Nirupama Kulkarni, Magdalena Rola-Janicka, Maurizio Zanardi, Yuan Zi as well as conference participants at Ljubljana Empirical Trade Conference (LETC) 2018; Midwest Macro Meetings, Fall 2018; Workshop on Regional Vulnerabilities on South Asia, Central Bank of Sri Lanka, Colombo; Arnoldshain Seminar XVI, Bournemouth University; Research Conference on 'Financial Distress, Bankruptcy and Corporate Finance', Indian Institute of Management, Ahmedabad; 50th Money-Macro-Finance Conference, LSE, 2019; ETSG 2019, University of Bern; Midwest Trade Meetings, Fall 2019; 7th Bordeaux Workshop in International Economics and Finance; CAFRAL-World Bank Conference on State Intervention in the Financial Sector, and seminar participants at Hebrew University of Jerusalem, University of Nottingham, and Lancaster University. All errors are my own.

†Department of Economics, Management School, Lancaster University, LA1 4YX, UK; Email: p.chakraborty1@lancaster.ac.uk

1 Introduction

Does a bank's ownership matter for a firm's performance (to which it is connected)? Especially, in the event of a crisis? The role of banks on economic activities has long been investigated by policymakers and academics (Friedman and Schwarz (1963); Bernanke (1983)). And, there is now a sizeable body of evidence suggesting that bank health/credit/funding significantly affects several firm level indicators, such as exports (Amiti and Weinstein (2011); Manova (2013); Paravisini et al. (2014); Buono and Formai (2018); Caballero et al. (2018)), investment (Amiti and Weinstein, 2018), financial performance (Iyer et al. (2014); Ongena et al. (2015)), etc. Another set of literature studies how differential exposure to international financial shocks of different types of banks can act as a propagation mechanism during global financial crisis (Peek and Rosengren (1997, 2000); Cetorelli and Goldberg (2012); Schnabl (2012); Acharya et al. (2013); Ivashina et al. (2015); Ongena et al. (2015)). However, the effect on firm performance due to variation in banks' ownership pattern, especially during a crisis, has not been studied in detail and the underlying mechanisms behind this effect are still not well understood.

In this article, I show evidence of a new channel which can matter significantly for a firm's overall performance, especially exports, in the event of a crisis – bank ownership. Indian manufacturing firms connected to private (major) or foreign banks earn around 10% and 25% less in terms of their overall sales and export earnings, respectively during the 2008–09 crisis as compared to firms' having banking/credit relationships with public-sector banks.

This happened due to two reasons: (a) public-sector banks were given more preference than the private banks in terms of lending by India's Central Bank (popularly known as *Reserve Bank of India* or RBI, hereafter) during the crisis of 2008–09; and (b) since public-sector banks are perceived to be more resilient to a crisis (due to the explicit and implicit guarantees provided by the Govt.), a significant amount of deposits were transferred from private to these banks.[3] These significantly impacted the credit flow from the private banks to the firms associated with them which led to a negative performance of firms. To the best of my knowledge, this is one of the first paper to show how firms got differentially affected (in terms of their sales, exports, domestic sales, factors of production, imports, etc.) due to the ownership pattern of the banks that they are connected to as the identification strategy.[4] This is my primary contribution.

A key question arises immediately: how does being client to a private bank as opposed to a public-sector bank affects a firm's performance negatively during the crisis? Existing set of research highlights two possible reasons: (a) credit-lending by the public-sector or Govt.-owned banks tend to be less responsive to macroeconomic shocks than private banks (Micco and Panizza (2006); Bertray et al. (2012); Cull and Martinez-Peria (2013); Acharya and Kulkarni (2019)). **Panel A** of **Figure 1** reveals similar situation in case of India. For public-sector banks, credit expanded during

[3] In case of India, both of these could happen due to a specific clause in the Indian Banking Act of 1969. More on this later.

[4] The results also portray that credit shocks have a negative effect on firm performance, especially exports, which is however not new in the literature (Chor and Manova (2012); Buono and Formai (2018)). But, my findings show that these negative credit shocks depend on the ownership of the banks with which the firms are connected.

the crisis of 2008–09 by 20.4% as compared to 22.5% in 2007–08, a mere drop of 2 percentage points only. On the other hand, for private banks and foreign banks the numbers are 10.9% and 4%, respectively (compared to 19.9% and 28.5% in 2007–08, respectively).

Relatedly, Ivashina and Scharfstein (2010) point out that one of the reasons why public-sector banks cut their credit less is that they may have better access to deposit financing. **Panel B** of **Figure 1** plots the growth in deposits in case of Indian public-sector, private and foreign banks. An average public-sector bank saw an increase in deposits, whereas for the other two types, it declined sharply. Deposits in the public-sector bank increased to 26.9% in 2008–09 as compared to 23.1% in the previous year.[5] On the other hand, private banks' deposit growth decreased from 22.3% to a meagre 9.1% for the same period. This highlights another important point: the growth in deposits for public-sector and private banks were identical before the crisis, i.e., there was no susceptible differences in trends between the growth of deposits across these two kinds of banks.[6]

Acharya et al. (2019) utilizing branch level data from Indian banks show there has been a reallocation of credit from private to public-sector banks. They argue that this is a result of a 'panic' channel – a depositors run on local branches although the banks that held the deposits had no exposure to the fundamental crisis.[7]

(b) due to political pressure. Using plant level data for Brazilian manufacturing firms, Carvalho (2014) provides evidence of political influence over the real decisions of firms. Firms connected with government banks expand employment in politically attractive regions before elections.[8] However, political influences may not be of much relevance in this case as the shock was sudden and external to India.

A third reason, which may play a role and helps to causally identify the effect of bank ownership on firm performance is the presence of the Indian Bank Nationalization Act 1969. The Act provides an explicit guarantee that all obligations of the public-sector banks will be fulfilled by the Indian Govt. in the event of a crisis. This Bank Nationalization Act was adopted when 14 of Indian commercial banks were nationalized in 1969. Acharya and Kulkarni (2019) shows that it is the explicit and implicit government guarantees for the public-sector banks that helped them to tackle the financial crisis better than other banks.[9] The presence of this Act, although circumstantial but provide some

[5]The Govt. of India also issued a directive to public-sector enterprises (firms, not banks) to deposit their surplus funds in public-sector banks (Economic Times, 2008). Following the fall of Lehman Brothers and subsequent credit crisis, many depositors shifted capital out of private and foreign banks and moved to public-sector banks. Infosys, a software MNC, transferred nearly INR 10 billion of deposits from ICICI (the biggest private bank in India) to SBI just after Lehman's collapse in the 3rd quarter of 2008 (Economic Times, 2009).

[6]I have also checked for a longer time trend by plotting the normalized value of deposits across private and public-sector banks for the years 2004 to 2010. The trend in deposits across these two types of banks is quite similar before 2008, but significantly different afterwards.

[7]The differential performance (between public-sector and other banks) could also be due to the differences in investor confidence. Eichengreen and Gupta (2013) by analyzing change in bank deposits in India during the crisis of 2008–09 shows that it is the expectation for an implicit and/or explicit guarantee for the public-sector banks that resulted in a significant growth in deposits during the crisis. Acharya and Kulkarni (2019) also came to the same conclusion by comparing the credit default swap (CDS) spreads for India's largest public-sector bank (State Bank of India, SBI) and largest private bank (ICICI). Both the spreads were within the same range in 2007–08, but the difference increased in SBI's favour during 2008–09 indicating that the market possibly views a public-sector bank to be more resilient to a crisis than a private bank.

[8]Similar evidences have been found by Dinc (2005) for cross-country, Cole (2009) in case of India, Khwaja and Mian (2006) for Pakistan, and Sapienza (2004) for Italy.

[9]They also highlight that this is the theme worldwide. For example, the growth of the government-sponsored enterprises (Fannie Mae and Freddie Mac) and commercial banks in the US (both set of institutions with explicit government support and ready access to central bank emergency lending). These institutions expanded their holdings of mortgage-backed securities while investment banks and hedge-funds de-leveraged and sold

background on why the public-sector banks in India enjoys explicit and implicit guarantees in the event of a crisis, like that of 2008–09.

Figure 2 plots the normalized average real borrowings (short-term) by a public-sector and private bank from the RBI in a given year from 2004 to 2010. The plot clearly shows that pattern of borrowing from the RBI is very similar before the crisis, but significantly different afterwards (similar to what I found for deposits in **Figure 1**). The flow of money from the RBI increases almost exclusively for the public-sector banks.[10]

Given this as the background, I use the context of financial crisis of 2008–09 to investigate the differential effects of bank ownership on Indian manufacturing firms' performance. I presume that the public-sector and other banks (private and foreign) were differentially affected during the crisis due to the implicit and explicit guarantees that comes with public-sector banks and this subsequently got reflected in the performance of the firms, especially the exporters.

I carry out the analysis at the firm-year level by exploiting information on credit relationships of firms with banks and their (banks') balance sheet, specifically borrowing by a bank from the RBI and the deposits received by the banks, to estimate the causal effect of the banks' ownership on firms' performance. Using this matched firm-bank data helps me to tackle the usual identification challenge that a lot of studies face to isolate changes in firm borrowing that are driven solely by credit supply forces instead of credit demand. But, it still does not solve the problem of selection issue – the matching between a firm and a bank is endogenous.

For example, a firm may switch to a public-sector bank from its current banker (which could be a private and/or foreign bank) during the crisis to avoid the anticipated drop in credit supply or it just stops borrowing from private and/or foreign bank(s) and borrow only from public-sector bank(s), etc.[11] Also, the lending pattern of banks may vary according to their ownership. For example, foreign-owned banks may lend to completely different set of firms. These issues can significantly bias my estimated coefficients.

To control for these, I undertake the following steps: (a) use an indicator variable which takes a value 1 if a firm is a client to a private bank in an out of the sample years (which is significantly before the crisis period); (b) interact key firm characteristics with the bank ownership dummy to control for the fact that banking relationships might be correlated with borrower characteristics that might affect their credit demand.

For doing such kind of exercises, I put together information from a well-known dataset on Indian manufacturing firms known as PROWESS (Chakraborty and Raveh, 2018). The dataset is unique in a sense that (a) it reveals information on the name and type of banks that each individual firm is client (because of their credit relationships) along with the information on the balance sheet of the banks, e.g., the amount of borrowing (both short and long term) done by the banks from the RBI, deposits received, total amount of loans and advances by them, etc.; and (b) it

these type of securities (He et al., 2009).

[10] Mihaljek (2010) also provides similar evidence by looking across a range of emerging economies – flow of credit from the Central Banks increased more towards the public-sector banks.

[11] Another problem that may plague my analysis is the problem of multiple banking relationships of a firm. Although, I have matched firm-bank dataset, the variation comes at the firm-year level and at not firm-bank-year level.

contains direct measures on borrowing by firms from different types of sources (but not by each bank), namely total borrowings summed up across all domestic banks (public and private), similarly for foreign banks, etc. The dataset also reports total sales, trade flows (divided into exports and imports), compensation to employees, expenditure on technology, capital employed, ownership category and other important firm and industry characteristics. I use all this information for the time period 2003–10. This enables me to track a firm's banking relationships over time, thereby allowing for a dynamic specification in which changes in credit flows from different kinds of sources may influence firm performance.

I have two sets of results. First, I exploit banking relationships of the firms to show that firms client to the private (major) and foreign banks (especially, the banks of the US origin) receive less credit (15%), earn significantly less from sales (10%), exports (25.3%), domestic sales (6.7%) pay less wages (4%), import less capital goods (6.8%), as compared to firms connected to state-owned or public-sector banks. My benchmark result is robust to all other possible important controls, such as demand shock, differential trends in bank lending, interactions between firm characteristics and bank dummy, multiple banking relationships, substitutability of credit, and matching methods. This negative effect on firm performance (a) is true for firms selling intermediates, across all sizes except the smallest ones; and (b) gets mitigated by 40% for a firm who is part of a business group.

Secondly, I use balance sheet information of the banks (particularly, borrowing from the RBI and deposits received) to show that drop in credit supply from the RBI and deposits for private banks significantly explains the negative performance of firms connected to these banks.

The findings contribute to three different kinds of literature. My primary contribution is to show that bank ownership matter for a firm's performance, especially in the event of a crisis. In other words, the contribution lies in the identification and measurement of credit supply shocks and their real effects using matched firm-bank level data using the ownership of the banks as the source of variation. My study is closely related to Coleman and Feler (2015) on Brazil where they show that following the collapse of Lehman Brothers in September 2008, Brazil's Govt.-owned banks substantially increased lending. Localities in Brazil with a high share of public-sector banks received more loans and experienced better employment outcomes in comparison to localities with a low share of government banks. The results also indicate this lending was politically targeted and inefficiently allocated which reduced productivity growth. My paper complements and extends the study by Coleman and Feler (2015) in terms of utilizing a matched firm-bank dataset and causally estimating the effect of the bank ownership in the context of 2008–09 crisis on firm performance. This paper also complements the study of Amiti and Weinstein (2011) in showing that likewise bank health, bank ownership can also be an important channel for firm trade, especially exports and import of intermediates.

Secondly, the results contribute to the macro effects of global banking (Klein et al. (2002); Chava and Purnanandam (2011); Claessens et al. (2011)). I add to this literature to show that presence of private and/or foreign banks transmit international financial shocks to an economy and public-sector banks can act as counter-cyclical elements. Relatedly,

the paper is also related to the recent literature that uses the bank lending channel as an instrument for credit shocks (Kalemli-Ozcan et al. (2010); Jiménez et al. (2012); Chodorow-Reich (2014)). I find similar evidence, but, my results also show that it may depend on bank ownership patterns.

Lastly, the article also contributes to now a seemingly growing literature on trade and finance; namely, the role of credit supply or shocks on export activities. This paper exploits differences in the availability of credit across different types of banks due to their ownership patterns and measure its effect on firms' performance. The results are closely related to work that analyzes the effects of credit disruptions on trade during the Great Trade Collapse of 2008–09 (Bolton et al. (2011); Chor and Manova (2012); Levchenko et al. (2010); Ahn and M. (2019)) as well as the general literature on credit shocks or banks' health and performance of firms (Amiti and Weinstein (2011); Bronzini and D'Ignazio (2017); Berton et al. (2018)).[12]

The rest of the paper is organized as follows. Section 2 describes what happened in India during the crisis of 2008–09. The dataset is outlined in Section 3. Section 4 estimates the effect of bank ownership on banks' performance, while Section 5 evaluates the direct effect of bank ownership on firm performance. Section 6 concludes.

2 Financial Crisis in India during 2008–09

India, like Brazil and China was relatively immune to the slowdown of the international credit flows.[13] However, it still witnessed a heavy sell-off by Foreign Institutional Investors (FIIs) during the crisis to provide the much-needed liquidity to their parents in the US or Europe – a net expulsion of around USD 13.3 billion in 2008 through equity disinvestment (Joseph (2009); Kumar et al. (2009)). **Table 1** shows a major return flow of capital from India, especially in the second half of the year, with regard to short-term trade finance and bank borrowings to the extent of USD 9.5 billion and USD 11.4 billion, respectively.

Indian banks lost access to funds from abroad, as inter-bank borrowing seized up in the US and Europe. In addition, they had to send funds to their branches abroad in those countries. The drying up of funds in the foreign credit markets led to a virtual cessation of external commercial borrowing for India, including access to short-term trade finance. This led to (a) fall in Bombay Stock Exchange (BSE) Index; (b) rapid depreciation of the Indian rupee vis-a-vis the US dollar; (c) call money rate breaching the upper bound of the informal Liquidity Adjustment Facility (LAF); overnight call money rates rose by nearly 20% in October and early November 2008;[14] and (d) decline in the outstanding amount of certificate of deposit (CD) issued by the commercial banks as the global financial market turmoil intensifies. All

[12] On the other hand, there is also a sizeable amount of studies showing how global financial crisis of 2008-09 have impacted trade flows (due to drop in demand or credit supply or rise in protectionism, etc.): (i) decline in demand (Behrens et al. (2013); Eaton et al. (2016); Chakraborty (2018), (ii) drop in credit supply (Bricongne et al. (2012); Chor and Manova (2012); Paravisini et al. (2014)), and (iii) rise in trade barriers (Kee et al., 2013).

[13] Jayati Ghosh and C. P. Chandrasekhar in an article in The Hindu (Oct 21, 2008) contend that the global financial crisis will certainly have some impact in Indian case, but not of the kind that was experienced in the US due to well-regulated banking system and 'strong fundamentals' of the economy. Rajan (2009) and Joseph (2009) also argue that the 2008–09 global financial crisis initially hit India via the financial channel, but, not through the conventional route – the subprime mortgage assets.

[14] Sengupta (2009) point out that between mid-September to end-October 2008, the daily weighted average call rate and the overnight weighted average money market rate (OWAR) exceeded the upper bound of the LAF corridor twice.

these happened despite (i) majority of the Indian banking system is owned by the public-sector (around 60%), and (ii) Indian banks have limited direct exposure to subprime mortgage assets (Sinha, 2010).[15]

The collapse of the stock market further ruled out the possibility of companies raising funds from the domestic stock market. In addition, banks and corporates that were dependent on global markets for foreign currency suddenly found themselves to be facing a major liquidity crisis as credit dried up (Islam and Rajan, 2011). Thus, while the Indian banking sector remained largely unscathed by the global financial crisis, it still could not escape a liquidity crisis and a credit crunch. Associatedly, the crisis affected the Indian banks differentially.

Acharya and Kulkarni (2019) investigates the impact of ownership structure on bank vulnerability in India and show that private banks performed worse than public-sector banks during the 2008–09 crisis. Private banks experienced deposit withdrawals, whereas state-owned banks saw the opposite. In a similar study, Eichengreen and Gupta (2013) show that Indian private banks experienced a slowdown in their deposit growth during and after the crisis; in contrast, public-sector banks did not experience any such similar situation. Both the studies conclude that one of the main reasons behind this differential effect (in terms of the performance) across the two different types of banks (in terms of ownership) is the explicit and implicit guarantee by the Govt. of India that to the public-sector banks, especially during the crisis. I use this as a pretext to show that firms connected to these banks are differentially affected, in terms of their overall and export performance, using the differential treatment by the RBI or the Govt. of India during the crisis as the identification strategy.

3 Dataset

The sample of firms is drawn from the PROWESS database, constructed by the Centre for Monitoring the Indian Economy (CMIE), a private agency. The database contains information on a large number of publicly listed companies, all within the organized sector, of which almost 9000+ are in the manufacturing sector. I use data for around 5,500+ firms, for which there is consolidated data on banking relationships. I use data for the years 2003 to 2010, hence covering the crisis period (2008-09). Unlike other sources, the PROWESS data is in effect a panel of firms, enabling me to study their behaviour and banking relationships over time.

The dataset is classified according to 5-digit 2008 National Industrial Classification (NIC) level.[16] The dataset spans across 310 (5-digit 2008 NIC) disaggregated manufacturing industries that belong to 22 (2-digit 2008 NIC) larger ones. It presents several features that makes it particularly appealing for the purposes of this study. Below, I outline two of the most important features that are primarily needed for the paper.

(i) information on the banking or credit relationships of each firm. The dataset provides with the names and the types of banks (domestic public-sector, domestic private, foreign) with which each and every firm has a credit relation-

[15] Indian banks are allowed to invest only 5% of their capital on sub-prime mortagage activities.

[16] All monetary-based variables measured in Millions of Indian Rupees (INR), deflated by 2005 industry-specific Wholesale Price Index (WPI).

ship.[17] The dataset provides information on 52 public-sector banks (including state-sponsored financial institutions), 88 private banks (including cooperatives), and 53 foreign banks. For my analysis, I only use the list of major banks (excluding the financial institutions, cooperatives, etc.) as outlined by the RBI. About 36% firms have only links to private banks, 60% of firms have connection with only public-sector banks, and 55% firms have connection to both.

(ii) the dataset also rolls out all the important information from the balance sheet of the banks. In particular, there is information on borrowing done by these respective banks from the RBI, especially the short-term borrowings.[18] These short-term borrowings are part of the open market operations (OMOs) used by the RBI. And, there are two types of OMOs: (a) Outright purchase (PEMO): this is outright buying or selling of government securities and more of permanent in nature and (b) Repurchase agreement (REPO): this is short term, and are subject to repurchase. The short-term borrowings from the RBI indicates the latter. And, this could possibly be a direct result of the explicit and implicit guarantees provided to the public-sector banks.[19] This gives me the unique advantage of utilizing this information and investigate whether this is one of the key mechanisms through which the differential effect of the firms connected to private and public-sector bank materializes.[20]

The information on the balance sheet of the banks also gives out the total amount of deposits received by the banks. I also use this variable to show that the effects are similar. Private banks experienced a significant drop in deposits during the crisis with opposite effects for public-sector banks. This could also have a significant effect on firms' performance connected with them as deposits can be used to cater to the extra credit demand (due to the crisis) by the firms. **Table B1 (Appendix B)** lists summary statistics for some of the key variables at the aggregate and by ownership of the banks. A public-sector bank on average borrows more from the RBI and have more deposits than a private and/or a foreign bank.

(iii) the dataset rolls out information on a vast array of firm level characteristics regarding to the total sales, imports, cost, compensation, production factors employed, other kinds of expenditures, gross value added, assets and other important firm and industry characteristics. Majority of the firms in the dataset are either private Indian firms or affiliated to some private business groups, whereas a small percentage of firms are either government or foreign-owned. The database covers large companies, firms listed on the major stock exchanges and many small enterprises. Data for big companies are worked out from balance sheets while CMIE periodically surveys smaller companies for their data.[21] The variables are measured in Indian Rupees (INR) million, deflated to 2005 using the industry-specific

[17] A listed Indian manufacturing firm on average has credit relationships with 5 banks. A firm above the 75th percentile of size distribution has 4 times more banking relationships with firms below 25th percentile.

[18] Banks borrow money from other banks as well as from the RBI. The RBI acts as a 'lender of last resort' to all Indian banks. Borrowing from the RBI by a bank is the amount of short-term borrowings done by a bank. Banks can borrow from the RBI on the basis of eligible securities or any other arrangement. Also, in times of crisis, they can approach the RBI for any kind of financial help.

[19] **Figure 2** show such is the case; public-sector banks were able to borrow more money as compared to other banks.

[20] Details about the variables used in the paper are outlined in **Appendix A**.

[21] Inspite of all these advantages there are a couple of potential limitations of the dataset (in terms of the banking information) that is worthy of mention: (a) there is no way to understand which bank is the main 'reference bank' for a firm. Therefore, I treat all the banks with equal importance; and (b) the dataset does not give the exact amount of loan that has been received by a firm from a particular bank, i.e., no information on an individual firm receiving loan from a particular bank. However, I believe this is not of such a great concern in this particular case, as I plan

Wholesale Price Index. The dataset accounts for more than 70% of the economic activity in the organized industrial sector, and 75% (95%) of corporate (excise duty) taxes collected by the Indian Government (Chakraborty and Raveh, 2018).[22]

Table 2 compares key firm characteristics (bank borrowing, total sales, exports, domestic sales, capital employed, raw materials, total assets, and value-added) based on balancing tests (Imbens and Wooldridge, 2008) according to their banking relationships – firms' connected to public-sector compared to private banks prior to the crisis. If the absolute value of normalized difference for any characteristic across two different sectors is more than 0.25, then it would suggest an imbalance between the two groups. Columns (1) and (2) presents median and standard deviation of the firm characteristics for firms connected to private banks, whereas columns (3) and (4) does the same for firms connected to public-sector banks. None of the 8 different characteristics have an absolute value of the normalized difference exceeding the threshold of 0.25. This suggests that firm outcomes did not systematically vary based on their banking relationships.[23]

4 Bank Ownership and Banks' Performance

As discussed my main idea is to understand whether bank ownership plays an important role in firm performance or not, especially during the crisis. However, before doing so I first check if the ownership of a bank has any leverage on its own performance in terms of deposits or credit borrowing or lending. In other words, do we see any differential effect by bank type in terms of deposits received or borrowing from the RBI or loans and advances granted? This is highlighted by **Figures 1** and **2**, but those do not control for the possible observables and unobservables that may play a role. For this purpose, I exploit the data from banks' balance sheet and use the following simple diff-in-diff strategy:

$$\log(x_{bt}) = \beta\left(D_{crisis} \times PVT_b\right) \; + \; \delta_b + \alpha^t + \epsilon_{bt} \tag{1}$$

x_{bt} is bank level outcome which takes the form of three different outcome variables – total deposits, RBI borrowing, and loans and advances by bank b at time t. D_{crisis} is an indicator of the financial crisis. It takes value 1 if the year $\geq$ 2008. PVT_b takes a value 1 if a bank (b) is privately owned (domestic and/or foreign). Standard errors are clustered at the bank level.[24] Results are reported in **Table 3**.

My results re-iterate what **Figures 1** and **2** show. Private banks saw a drop of around 17% in their deposits, 15% in credit borrowing from RBI, and 13% in their credit lending as a result of the crisis. Now, one problem with this result

to utilize banks' borrowing from the RBI and total deposits received by a bank in order to test for the mechanism through which ownership affects firm performance.

[22] Around 20% of the firms in the dataset belong to the chemical industries followed by food products and beverages (12.81%), textiles (10.81%) and basic metals (10.46%).

[23] I also compare firms in terms of their industry composition. I do not find any systematic difference between firms connected to public-sector and private banks (results available on request).

[24] I also check my results by double clustering – bank and year level. My results do not change.

is that the private and govt banks could be on completely different trends before the crisis and the 2008 crisis may have just aggravated it. In order to control for such, I regress borrowing from the RBI by the banks and deposits received on the interaction between year fixed effects and PVT_b and plot the yearly coefficients in **Figure 3**. The yearly trends clearly show that for both these outcome variables private and govt banks are not on different trends before the crisis as the difference in the coefficients are not significantly different from zero, but significantly after.[25]

My results are very similar and provide support to Acharya and Kulkarni (2019) and Acharya et al. (2019). The former analyzes the performance of banks in India during 2007–09 crisis to study the impact of government guarantees on bank vulnerability to a crisis. They find that private-sector banks performed worse than state-owned banks in terms of deposit and lending growth. The latter uses branch level data to show that there was a deposit flight from private banks to public-sector banks during the crisis. These results are consistent with greater market discipline on private-sector banks and lack thereof on state-owned banks which can access credit as they have access to stronger government guarantees and forbearance.

5 Bank Ownership and Firms' Performance

5.1 Utilizing Credit Relationships

5.1.1 Empirical Strategy

This section investigates the direct role of bank ownership on firms' performance. Given that the private banks are differentially affected during the crisis, either due to the lending from the RBI or transfer of deposits (as confirmed by **Figures 1**, **2**, and **3**), it is now imperative to check whether the firms connected to those banks are also differentially affected or not. For this purpose, I exploit firm-bank credit relations. I follow Coleman and Feler (2015) and use a simple interaction term between a crisis dummy (D_{crisis}) and a dummy indicating whether a firm is a client to a private bank (be it domestic and/or foreign) or not as my variable of interest. In particular, I use the following simple OLS reduced form equation:

$$\log(x_{fjt}) = \beta \left(D_{crisis} \times PVT_{f,<=2002} \right) \; + \; \delta_f + \alpha_j^t + \epsilon_{fjt} \tag{2}$$

x_{fjt} is a firm level outcome (total sales, exports, domestic sales, imports, wages, capital employed, raw material expenditure) for an Indian manufacturing firm f belonging to industry j at time t. D_{crisis} is an indicator of the financial crisis. It takes value 1 if the year ≥ 2008.

$PVT_{f,<=2002}$ takes a value 1 if a firm (f) is a client to a private (domestic and/or foreign) bank. Now, banking relationships are endogenous. First, firms can switch to a public-sector bank, especially during the crisis to avoid the risk associated with a private and/or foreign bank, especially if they are aware of the government guarantees, which

[25] I do the same for loans and advances in **Figure C1 (Appendix C)** – the plot is akin to RBI borrowing and/or deposits.

is likely to be the case. So, in order to avoid the issue that the crisis might drive some of the firms to switch banks, $PVT_{f,<=2002}$ takes a value from out of the sample period.

For example, $PVT_{f,<=2002}$ assumes a value 1 if a firm is client to a private bank in any year between 2000 and 2002. I check for the robustness of the results by using years before the crisis, say 2003–07, the results turn out to the same.[26] Therefore, the interaction term, $D_{crisis} \times PVT_{f,<=2002}$, measures the impact of bank ownership given that there is a differential effect (on a private bank as opposed to a public-sector bank) during the crisis. My coefficient of interest is β; β, therefore measures the relative difference between firms' performance when it is connected to a private and/or foreign bank vs. a public-sector bank.

In other words, the thought process here is that the government's guarantees provided to the public-sector banks can be thought of as an exogenous difference between private and public-sector banks to identify the causal impact of bank ownership on firm performance. And, these guarantees could be a result of the 1969 Act. A key assumption for my identification strategy to be valid is that the cross-sectional differences in aggregate lending by the RBI (to the banks) are driven by differential guarantee provided due to their ownership patterns, but uncorrelated with unobserved firm characteristics that can affect their credit demand and performance during the same period. Similarly, for deposits. The withdrawal of the deposits is due to the perception that those are not safe with private banks during the crisis. Acharya et al. (2019) presents micro level evidence on the real effects of a large-scale flight to safety by bank depositors. They show that – private banks in India experienced sudden withdrawals of deposits after the 2008 financial crisis in the US, reflecting pure panic of depositors.

I expect $\beta < 0$. Firms having relationship with private bank(s) are expected to be impacted negatively during the crisis (maybe because of the drop in the supply of credit), therefore would have negative effect on their performance than the firms connected with public-sector banks.

Second, it is true that the relationship between a firm and a bank even before the years of the crisis is not random. There are several reasons why a bank(s) choose a firm(s) to provide credit. For example, size of a firm; or RBI lending may be linked to interference by policy makers; or government wants to lend more to vulnerable firms during the crisis; or RBI funding is endogenous to the pool of firms a bank is linked to. In other words, the matching can happen for any other reason(s) than the crisis. In order to control for such range of issues, I interact few key characteristics with $PVT_{f,<=2002}$; my benchmark results remain the same. I explain this in detail later.

Third, relationships can change over time. Therefore, using banking relationships for firms for the 2000–02 period could bias my results in a certain way. In order to check whether there is something specific to the 2000–02 period or there is a significant difference in the banking relationships between the 2000–02 and afterward, I calculate the mean, median, standard deviation for an average firm for all types of banking relationships, and separately for public-sector,

[26] I also ran two other alternate specifications: (a) I regress being a client to a private bank during the crisis years (2008–10) on the relationship to the same bank type before the crisis and plug the predicted value as the instrument in the second stage; and (b) share of the number of private banks over the total number of borrowers. In both the cases, results remain the same.

and private banks in **Table B2**. The numbers, across any type of banking relationship, do not change much over time thereby justifying my choice of using the 2000–02 period.

A related concern is that different types of firms may choose to be linked to different kinds of banks, which is turn could drive these firms are affected by shocks. **Table B3** presents a frequency distribution of linkage by firm types. I divide my sample of firms into the following categories and present the median number of banking relationships for these types of firms over time – by industry (end-use category), by ownership, by age, and by size. While there are some obvious differences in the number of banking relationships by their size – big firms, especially above the median having higher number of relationships than the rest – there is no systematic differences for any other category. I control for firm size in my estimations along with interaction of size with $PVT_{f,<=2002}$ – the results are akin to the baseline specification.[27]

Fourth, is there political interference to whom banks lend to and how much they give out? This is highly unlikely is this case as the shock was external, sudden, and random. As soon as the crisis hit the Indian market (due to the withdrawal of the FIIs), the Governor of the RBI issued the following statement: "Measures to encourage flow of credit to sectors that are coming under pressure include extension of the period of pre-shipment and post-shipment credit for exports, expansion of the refinance facility for exports,.....".[28] Both Acharya et al. (2019) and Eichengreen and Gupta (2013) show that one of the main reasons behind this differential effect across banks is the explicit and implicit guarantee by the Govt. of India, and not any kind of political pressure, that is attached to the public-sector banks. Even if such is the case (maybe for a handful of the firms), the interaction between firm characteristics with $PVT_{f,<=2002}$ will control for such unobservables.

Fifth, the government may also care more about regional problems or employment numbers than government guarantees. And, the firms located in those places just happen to be connected to public-sector firms. While this might be interesting to analyze in itself, it can definitely raise identification challenges. I use postcodes of the firms to interact state or region fixed effects with $PSB_{f,<=2002}$ to possibly control for these types of issues.

Sixth, Khwaja and Mian (2008) highlight that controlling for multiple banking relationships is crucial for a firm-bank matched dataset by clustering at the bank level and using firm fixed effects. In my case I am using a firm-year dataset in wide format, so the multiple banking relationships should not affect my estimations. One way to control for this issue would be to compare firms which have single bank relationships. However, dropping firms with multiple banking relationships from my dataset may lead to violation of external validity theorem as I need to give away around 80–85% of observations. Nevertheless, I cluster my standard errors at the firm-bank level to control for any shocks

[27] Another concern with my choice of the period of banking relationships is that my estimations may automatically restricts the sample to firms that were active in 2002 and survived until the crisis. To see whether this is indeed a concern, I checked for the number of firms which were active during 2000–02 and present afterwards – the number is 98%. Therefore, the firms which were active in the intital period were mostly active till the financial crisis.

[28] See official statement of the Governor of the RBI: https://www.reuters.com/article/idINIndia-37674620090127. In addition, there was no anecdotal evidence to suggest that firms located in states where the Central Govt. was in power had been favourably been treated.

that might transfer from a bank to all the firms connected to that particular bank. For example, say a domestic private bank was affected more than other private banks as it had higher branches/operations in the US, then clustering at the firm-bank level will make sure that the impact of this shock will be transmitted only to those firms which are connected to those banks and not to others.

Lastly, I use interaction of industry fixed effects at the most disaggregated level (5-digit) and year fixed effects, α_j^t, to control for other simultaneous factors that may affect the performance of a firm, such as any fiscal policy considerations, drop in demand for products due to the crisis[29], and industry exposure of banks. For example, some banks can choose to give credit only to certain set of industries. Lastly, before going on to the estimations, let me be clear in terms of the level at which I am running the regressions. Although I have a matched firm-bank dataset but the data still varies at the firm-year level rather than at the firm-bank-year level since I do not observe the credit granted by each bank to an individual firm.[30]

However, one should still be careful in interpreting the basic estimates as conclusive evidence of the causal effect of the bank ownership on performance of firms connected to private banks and not because of the following couple of reasons: (a) omitted variable bias; and (b) differential time trends. I address the former by sequentially adding various observable characteristics and its interaction with the $PVT_{f,<=2002}$ dummy to my baseline specification. As for the latter one, I show that firms connected to private banks were on similar trends in the pre-crisis period as opposed to post-2008 through some checks explicitly in the following section.

5.1.2 Were the Firms with Different Banking Relationships (Private and Public-sector) on Different Pre-Crisis Time Trends?

Before proceeding to the main estimations, one needs to address an important issue which is crucial for understanding the results: whether firms connected to private banks were on similar trends before the crisis as during the crisis? In other words, are there any significant differences in performance patterns for the two sets of firms (according to their banking relationships) which just got amplified as a result of the crisis? I use sales and exports of a firm as the performance measures (results similar for alternative indicators). In order to understand whether such is the case or not, I use pre-crisis data from 2003 to 2007 to estimate differential time trends in performance for firm connected to private banks or not. Results are reported in **Table 4**.

Columns (1) – (3) use sales and columns (4) – (6) use exports by a firm as the dependent variable, respectively. In columns (1) and (4), I estimate a constant linear time trend model while allowing for an interaction of the constant linear trend with the $PVT_{f,<=2002}$ dummy. For columns (2) and (5), I use the following specification:

$$log(x_{fjt}) = \sum_{i=2003}^{2007} \delta_i[(Year = i) \times PVT_{f,<=2002}] + \delta_f + \alpha_j^t + \epsilon_{fjt} \tag{3}$$

[29] I also explicitly control for demand shocks.

[30] Please note that the observations vary across different types of estimations since I add different variables to control for the omitted variable bias.

where I replace the linear time trend with a series of year dummies (for the pre-crisis period) and include in the regression of each of these time dummies with the $PVT_{f,<=2002}$. For columns (3) and (6), I run similar regressions as (2) and (5) but separately identifying for the year fixed effects.[31]

The estimates from these columns suggest that there is a time trend in the performance of a firm, but this trend is either identical for firms connected to private banks or positive (i.e., firms had higher earnings from both sales and exports when connected to private sector bank before the crisis). It should also be noted that some of the interaction terms in columns (2), (3), (5), and (6) are positive and others are negative, thereby lacking any consistent pattern. I, therefore cannot reject the hypothesis that all the interaction terms are jointly equal to zero. I conclude that both groups of firms were on a similar time trend in terms of their overall performance or had a opposite pattern than after the crisis.[32] These pre-crisis trends for firms connected to private banks show that there were no anticipatory effects for firms connected to the private banks in terms of switching to the public-sector banks in order to take advantage of the sovereign guarantees provided to the public-sector banks.

5.1.3 First Order Effects

I start by demonstrating that connection to the private banks also impacted the amount of credit received by the firms having credit relationships with those banks. This will also help me in ruling out the explanation that firms may borrow from other sources to substitute for bank credit, such as intra-business group lending, reliance on trade credit, etc. To check whether such is the case, I use the following empirical specification:

$$\log(C_{ft}) = \beta \left(D_{crisis} \times PVT_{f,<=2002}\right) \; + \; \delta_f + \alpha_j^t + \epsilon_{fjt} \tag{4}$$

To estimate the above equation, I match the banking information of the firms with another unique features of the dataset: information on firm level credit issued from different sources. The dataset gives detailed information on different types of borrowings (from banks and/or private financial institutions) by different sources (domestic or foreign) done by firms, but at the aggregate level.[33] I sum up the total amount of credit received by the firms across these different sources to show that firms connected to private banks have received less credit than firms connected to public-sector banks at the time of the crisis.

My outcome of interest, C_{ft}, is the sum of credit received by a firm f in year t across all the different sources. The main variable of interest is the interaction term, $D_{crisis} \times PVT_{f,<=2002}$. It estimates the difference in the credit

[31] The specification that I use for these two columns is the following: $log(x_{fjt}) = \sum_{i=2003}^{2007} \beta_i (Year = i) + \sum_{i=2003}^{2007} \delta_i [(Year = i) \times PVT_{f<=2002}] + \delta_f + \epsilon_{fjt}$.

[32] I have also used change in sales or exports; the result is the same.

[33] For example, how much a firm has borrowed from all the domestic banks (public-sector and private) combined. Or the amount of loan taken in a currency other than Indian rupees, termed as foreign currency borrowing.

received by a firm connected to a private (domestic private and/or foreign) bank vis-a-vis a public-sector bank. Results are reported in **Panel A** of **Table 5**.

All the columns control for firm fixed effects, industry-year fixed effects at the 5-digit level, and cluster standard errors at the firm-bank level. In addition, column (2) uses firm important controls (age, size, and technology adoption); column (3) controls for different bank level characteristics that may influence the amount of credit lending to firms over time using interaction of bank and year fixed effects; column (4) repeats column (1) but for firms belonging to industries of high financial dependence; and column (5) replaces the absolute value of credit received with first difference as the outcome of interest. All the estimates show that firms connected to private banks received less credit than others during the crisis of 2008-09, especially firms which are highly dependent on external finance.[34] **Figure C2** plots the yearly differences in the amount of credit received by a representative firm connected to a private bank compared to a public-sector bank. The estimates show that where there are no differences before 2008, there is a clear negative effect afterward.

5.1.4 Benchmark Results

Having now established that firms connected to private banks were either on similar trends as other firms or performing better than others in the pre-crisis period and received less credit during the crisis, I now turn to the results of my benchmark estimations. **Panel B**, **Panel C**, and **Panel D** of **Table 5** estimates the effect on total sales, exports, and domestic sales of a firm, respectively.

Overall, my diff-in-diff estimates show that the firms connected to private banks are impacted negatively during the crisis in comparison to firms connected to public-sector banks. A firm connected to a private bank earns around 5–10% less than other firms from their overall sales as a result of the crisis. The result is significant higher for firms which are highly dependent on external finance, 17.5%. The effect on export earnings is 2.5–3 times larger than overall sales, whereas the effect on domestic sales is smaller.

One important issue which needs to be addressed immediately is the fact that the borrowing pattern of different types of firms might be different in the pre-crisis period. In other words, there might be pre-trends which can possibly influence the results. In order to control for such an issue, I interact the year fixed effects with the private bank dummy, $PVT_{f,<=2002}$, and plot the coefficients ($\beta's$) for the years 2005–10 in **Figure 4** for total sales in **Panel A** and exports in **Panel B**.[35]

The plotted coefficients illustrate that the difference between the firms connected to private banks and others in terms of both sales and exports is either not significantly different from zero before the crisis of 2008 or on a positive

[34] I use total borrowing by a firm as an indicator for dependent on external finance. An industrial sector which borrows more than the median borrowing of the entire manufacturing sector is classified as sectors which are highly dependent on external finance.

[35] I have used 2008 as the reference period when plotting the coefficients. The results or the figure is unaltered with the change in the reference period. For example, if I set the coefficient to 0 just before the crisis (in 2007), the result does not change qualitatively.

trend (as also shown in my previous exercises in **Table 3**) and this got completely reversed after the crisis. The performance of firms connected to private banks were significantly less than firms connected to public-sector banks.

Other Outcome Variables of Interest: Given the consistent evidence on overall negative performance for firms connected to private banks, it is also imperative to investigate about what happened to the other key characteristics of firms, namely the production factors and imports. Results are reported in **Table B4**. I start by looking at the amount of capital employed by a firm in column (1). I do not find any significant evidence of lower capital employed by firms connected to the private banks as a result of the crisis, although the sign of the coefficient is negative. Following Chodorow-Reich (2014), I substitute capital by labour compensation in column (2). PROWESS is not suitable to understand the employment effects, as the number of employees data is not consistently reported both across firms and over time. But, the dataset routinely reports data on the total price of labour. Therefore, I concentrate only on the intensive margin of employment effect. My coefficient shows that firms connected to private banks paid about 4% less wages to their employees than firms connected to public-sector banks. This could be due to laying off workers. And, this result is significantly driven by non-managerial rather than managerial compensation (total compensation can be divided into managerial and non-managerial compensation; results available on request).

Next, in column (3) I use another important factor of production, raw material expenditure. I do not find any negative effect on use of raw materials by firms not connected to private banks. Column (4) uses total imports and columns (5) – (8) explore the effects on sub-categories of imports - capital goods, raw materials, stores and spares, and finished goods. I find significant negative effects only in case of capital goods (7%) and finished products (4%).

These results evoke two important implications: (a) banking relationships during the crisis not only matter for overall performance, but also exports, imports and use of productive factors as well; and (b) credit shortage for firms connected to the private banks may explain this negative difference between them and other firms.

Before going ahead to check the robustness of my results, one concern that may affect my findings is the choice of the period of the banking relationships of firms. In order to check whether my period of choice bias my findings in any way, I estimate Equation (2), using only exports as the outcome variable, by defining the banking relationships of firms across five other different time-periods and present it in **Figure 5** along with my benchmark finding. The estimated betas across different periods are all significantly different from zero and show that my benchmark finding is not influenced by my choice of time period of banking relationships. This justifies my choice of using the relationship indicator of firms with banks for out-of-sample period in order to estimate a possibly exogenous effect of banking relationships on firm outcomes.

5.1.5 Robustness Checks

From now on, I will present my results using only exports as the outcome of interest. Three reasons drive my choice: (a) effect on exports is significantly larger than both total sales and domestic sales, especially the latter; (b) linkages

between financial sector and firms' export activities have attracted significant attention in the recent years (Chor and Manova (2012); Amiti and Weinstein (2011); Minetti and Zhu (2011); Bricongne et al. (2012); Paravisini et al. (2014); Bronzini and D'Ignazio (2017)); and (c) during a crisis, the demand for liquidity by the exporters goes up significantly. I present my results only for exports in **Table 6**.[36]

I start by controlling for different firm characteristics in **Panel A** of **Table 6** that may affect the type of banking relationships a firm has and therefore on the outcome variable of interest. Even though I control for firm fixed effects, my estimates could still be affected due to the following problem: foreign banks or private banks that rely on international funding may lend to different types of firms in which case measuring the true impact of the shock on the real economy may require accounting for firm fundamentals. In other words, the variation in credit lending across these three types of banks can be driven by demand. To control for such issues, I interact two key firm characteristics, size (measured through average firm assets between 2000–02) and age with $PVT_{f,<=2002}$ in columns (1) and (2). The coefficient of interest continues to remain negative and significant. Interestingly the magnitude of the coefficient increases when controlling for firm size highlighting that big firms were in need of more credit from the private banks during the crisis. Columns (3) and (4) interacts both the firm characteristics with $PVT_{f,<=2002}$ and D_{crisis} dummies, respectively. The coefficient remains similar to my benchmark finding. In column (5), I first run a probit model for the period 2000–02, obtained the predicted values for those firm characteristics and interacted them with $PVT_{f,<=2002}$ in the main estimation – I do not find any difference in the finding.[37]

Next, it could be possible that the RBI cared more about regional problems or employment numbers than government guarantees. And, the firms that are connected to public-sector banks are located where the regional numbers look relatively worse. In order to control for this situation, I match the postcodes of these firms and use the region or state fixed effects and its interactions with $PVT_{f,<=2002}$ in column (6). My result does not change.[38]

Columns (7) and (8) explore the heterogeneity within the private banks (domestic and foreign) to understand whether firms connected to domestic private or foreign suffered more during the crisis? For example, does a firm's export flows dropped more when a firm is connected to a US based bank (such as, Bank of America) or a EU based bank (such as, Barclays)? or when a firm is connected to a private domestic bank, ICICI. My estimates show that (a) firms connected to domestic private banks suffered around 18% more drop in their export earnings than firms connected to public-sector banks; and (b) firms connected to foreign banks experienced a drop of more than 10% in their export earnings than firms connected to public-sector banks. I also interacted the year fixed effects with the respective domestic private and foreign bank dummies and plot the coefficients ($\beta's$) in **Figure 6**. These plots (a) portray similar results as the overall effect of putting domestic private and foreign banks together and (b) show that

[36] Results for both total sales and domestic sales remain the same.

[37] I have also interacted $PVT_{f,<=2002}$ with an industry level dummy which classifies firms based on their end-use categories – consumer durable, consumer non-durable, basic, intermediate, and capital goods – the results continue to be similar.

[38] The number of observations drop a little as there is no information on the postcodes of around 20% of firms.

firms connected to domestic private banks were on a positive trend before the crisis and this became quite the opposite after.[39]

Digging deeper, I find that firms connected to major domestic private banks (which are 6 of them) suffered more than firms connected to other private banks (results available on request).[40] In case of foreign banks, the negative effect on firms' export flows is due to connection with US based banks than others (results available on request).[41]

Column (9) uses matching methods. I compare firms using their characteristics (industry, size, age) connected to the two different types of banks (private and public-sector) and report the differences in their export earnings. Altering the estimation method does very little to my benchmark estimate; it continues to be negative and significant. However, the point estimate increases significantly.

One more concern that may affect my results is the multiple banking relationships of firms even though I use firm fixed effects and cluster my standard errors at firm-bank level. Specifically, a firm which has, for example, relationship with a public-sector and private bank is part of the control and treated group, respectively. In order to tackle this situation, I estimate a specification in column (10) where I drop all the firms with multiple relationships. I loose about 80-85% of the sample of firms and this may create external validity problems. However, my coefficient continues to be negative at 10% level.

Column (11) extends the dataset to 2014. This would show that the impact was only during the crisis for the lack of funds; once the foreign funds came back, the ownership did not matter. I continue to use $PVT_{f,<=2002} \times D_{Crisis}$ as my coefficient of interest. My estimate shows the hypothesis to be true. Once the time period is extended beyond the crisis period, the negative effect goes away.[42]

Next, I control for important firm level observable which can affect its export performance: financial needs in column (12). I use (a) cash to current liabilities ratio, (b) debt to equity ratio, and (c) net cash flow to total capital ratio as the possible indicators (result only reported for the former). I exploit the initial financial ratio (cash to current liabilities) of a firm and its interaction with $PVT_{f,<=2002}$; I do not find any evidence that controlling for internal finance hampers my benchmark result. The estimate remains robust.

Banking decisions can often be influenced by managerial preferences, especially by the managers who belong to the top management of a firm or who are the decision makers of a firm. Bertrand and Schoar (2003) show that managers are involved in a wide range of corporate decisions such as financial, organizational, etc. practices of firms. Therefore, using managerial fixed effects may help in controlling for such decisions, in our case banking with public-sector banks.

[39] I also include another interaction term $D_{crisis} \times Both_{f,<=2002}$, where $Both_{f,<=2002}$ takes a value 1 when a firm has credit relationships with both a public-sector and private bank (domestic and foreign) to see if there is any differential effect for firms that have links with both types of banks. I do not find any significant differential effect; my benchmark result continues to hold.

[40] The classification is done using the following rule: banks which have a share of more than 5% of all relationships with firms in the sample.

[41] Chakraborty (2018) also show that during the crisis the exports of the Indian manufacturing firms are most affected (as a result of the drop in demand) when their trade destination is the US compared to EU.

[42] One reason for not finding the negative effect of the crisis could be that the inefficient firms may have exited the sample which were mainly affected by the crisis. However, in case of India the exit rates are not a big problem. The exit rates have been measured by Goldberg et al. (2010) and they are quite low - it hovers around only 5-6%.

PROWESS provides detailed information on the names and designations of directors and executive directors of a firm. I use such information to match with my firm-bank credit relationships data and control for managerial fixed effects in my estimation in column (13). My estimate and standard error continues to be similar to previous estimates.[43]

Column (14) controls for export share in the pre-crisis period. Exports might decline because firms may face an increased incentive to sell domestically rather than abroad, not affecting overall firm performance. Therefore, controlling for firm level export share before the crisis could help to control for potentially systematic differences in the extent of reallocation that firms can undergo during a crisis. However, I continue to find similar result.

Lastly, I control for export demand in column (15). It could be possible that firms connected to public-sector banks were less exposed to trade before the crisis than the borrowers of the domestic private and foreign banks. This would mean that the results then will only reflect the differences in the unobservable demand for exports across firms, rather than the causal effect of the differences in bank behaviour. I carry out the analysis for 'demand shock' in case of both the US, EU and putting US and EU together. Demand shock has a negative and significant effect on the export flows of the Indian manufacturing firms. But, the effect on exports due to differences in bank ownership continues to be unaffected. This implies that the firms who are connected to private banks got adversely affected both from the 'demand shock' and supply of finance (due to the ownership pattern of banks to which they were connected).[44]

5.1.6 Firm Characteristics

Table B5 slices the data according to different firm characteristics. Column (1) divides the firms by size (according to their quartiles) based on average assets before the crisis period. For example, a firm is classified in 1st quartile if the average assets of a firm for the years 2003–07 is less than 25th percentile of the assets of the corresponding industry and so on. I find that firms of all sizes, except the smallest, connected to private banks are most affected due to the crisis. Column (2) classify firms according to their ownership: domestic and foreign and interact with $PVT_{f,<=2002} \times D_{Crisis}$. I do not find any differential effect based on the owneship of firms.

In column (3) I check whether firms which are a part of a business group are affected differently given that business groups play an important role in allocating finance across affiliates (Bertrand et al., 2002). I utilize the information on a firm ownership about whether they are a part of a business group or not and interact that dummy with my main variable of interest. Although my double interaction term continues to be negative, my triple interaction turns out to be

[43] Please note that the observations increase significantly as there are multiple managers for an individual firm.

[44] For the demand shock index, I match the data at industry (4–digit)–destination–year level as the firm level dataset does not provide firm-specific trade destinations. The main purpose of matching these two datasets is to create a measure of demand shock, which varies according to industry–time–country. It is defined as the share of exports of an industrial sector or product category directed towards countries affected by the crisis (the US and/or the EU) to the total exports of that sector. This proportion would give us an idea about the extent of demand prevailing for any product categories in a crisis-affected zone. A primary concern with this 'demand shock' index is the potential endogeneity or problem of reverse causality. To avoid that such factors do not play a role in the estimations, I compute an average of the 'demand shock' index using data for the pre-crisis years, 2000-02 to create a potentially more clear and exogenous measure of the 'demand shock'. The demand shock index, $demandshock_j^d$, is interacted with $PVT_{f,<=2002} \times D_{Crisis}$.

positive highlighting the fact that being a part of a business group partially mitigates the negative effect of the crisis. In particular, a firm which belongs to a business group, the negative effect of the crisis drops by around 40%.

Lastly, in column (4) I divide firms according to its end use product: final (consumer durable and non-durable) and intermediate (intermediate, basic, and capital) to check for the compositional effect. The estimates show the overall drop in export earnings is driven by firms exporting intermediate and not final goods. My findings are aligned with Levchenko et al. (2010) and Bems et al. (2010) who find that large changes in demand for intermediates significantly explain the reductions in both imports and exports.

5.2 Testing for the Mechanisms: Utilizing Balance Sheets of Banks

5.2.1 Empirical Strategy

Utilizing banking relationships in a diff-in-diff setup is important to establish a causal effect of the bank ownership on firm performance, but it may not address the following concern: the mechanism/channel through which bank ownership can affect the real economy. In other words, did the crisis affect the key variables in a bank's balance sheet, measured through the amount of borrowings from the RBI, deposits received due to their ownership that led to this difference in performance between these two types of firms (categorized according to their banking relationships)?[45]

As mentioned before, the uniqueness of the dataset allows me to test for the channel by using direct information from the balance sheet of the banks. As **Figures 1**, **2**, and **3** suggests that while there was no differential trend for private and public-sector banks in terms of their borrowing from the RBI (and deposits received before the crisis), this trend became quite different after the crisis. Given this as a background, I will now use information from the balance sheet of the banks to clearly establish that the differential performance of the firms is due to the differential effect on banks' balance sheet. I use the following fixed effects type of OLS estimation to establish a cleaner causal effect of the bank ownership:

$$\begin{aligned} \log(x_{fjt}) \quad &= \quad \beta_1 \left(D_{crisis} \times B_{bf,<=2002}\right) \; + \; \beta_2 \left(D_{crisis} \times B_{bf,<=2002} \times PVT_{f,<=2002}\right) \\ &+ \quad \beta_3 \left(B_{bf,<=2002} \times PVT_{f,<=2002}\right) \; + \; \delta_f + \alpha_j^t + \epsilon_{fjt} \end{aligned} \tag{5}$$

$B_{bf,<=2002}$ is a bank level indicator for bank b connected to a firm f. It assumes either the amount of borrowing (short-term) done by a bank b (connected to firm f) from the RBI or total amount of deposits received as a share of its total liabilities. In case a firm is connected to multiple banks, it would take the balance sheet information of the respective banks connected to a firm.[46] However, balance sheet information during the crisis is endogenous and

[45] As indicated previously, the dataset also provides information on the total amount of loans and advances done by a bank. I also use this for robustness check and results remain the same.

[46] I have also experimented my results using the average values of these indicators. For example, a private bank b will take the value of the average deposits across all private banks; the effect remains the same.

therefore could overestimate the effect of bank ownership on firm performance. In order to potentially subvert this problem, I use average values of a bank for 2000–2002 as a proxy for the years 2008–2010.

My treated group of firms or variable of interest here is the triple interaction term – $D_{Crisis} \times B_{b,<=2002} \times PVT_{f,<=2002}$. This estimates the effect of say, borrowing from the RBI by the private banks (during the crisis) on the firms' performance which have banking relationships with them. If the flow of credit from the last lendor of resort drops (given that there is already a credit crunch), this can severely affect the financial health of the banks and simultaneously flow of credit from them to the firms connected which will then have a negative impact on those firms' performance. This could perhaps be some way of recapitalizing banks but in the form of lending from RBI instead of straightforward capitalizations which would show up as equity. Similarly, for deposits transferred/withdrawal. In other words, it estimates the absolute effect of a bank's ownership during the crisis on a firm's performance when the bank is privately- and not publicly-owned. Therefore, I expect β_2 to be negative and significant.

I have two set of control variables here. First, $D_{crisis} \times B_{b,<=2002}$. It estimates the effect of the 2008–09 crisis on a firm's performance when a firm does not bank with a private bank. Or in other words, when it has banking relationship with public-sector banks. In this case, my coefficient of interest is β_1 and I expect no effect for β_1. This is because the differential treatment by the RBI and positive growth of deposits should increase the amount of credit flows by these banks to the firms connected to them and this should cancel out the negative effects of the crisis.

Second, the other double-interaction term, $B_{b,<=2002} \times PVT_{f,<=2002}$. This estimates the overall effect on the performance of a firm due to banking relationship with a private bank. In effect, this is an interaction between a private bank dummy with its balance sheet variable, say borrowing for the RBI. And, this should have a sign, which is opposite to my variable of interest the triple interaction term, $D_{Crisis} \times B_{b,<=2002} \times PVT_{f,<=2002}$. All the other terms remain the same.

5.2.2 Results

Results are reported in **Table 7**. I start by using exports as the outcome variable of interest in columns (1) – (8). Columns (1) – (4) exploits borrowing from the RBI and columns (5) – (8) total deposits received by a bank as the explanatory mechanism for the negative performance of firms connected to the private banks.

Column (1) starts by using a basic specification – firm and industry-year fixed effects; column (2) adds firm controls (age, size, and technology adoption); column (3) drops firm controls and adds interactions between $PVT_{f,<=2002}$ and firm characteristics to control for heterogeneous firm characteristics which might influence both banking relationships and firm performance; column (4) in addition interacts a time trend with initial bank characteristics. Overall, my results show that decrease in the supply of credit from the RBI to the private banks can significantly explain the negative performance of firms (connected to those banks) during the crisis. And, this effect is absent for (a) firms connected to other (or public-sector) banks and (b) the overall effect of connection to private banks.

Columns (5) – (8) substitute RBI borrowings by deposits. Private banks experienced a significant drop in the growth of deposits during the crisis partly as a result of the transfer of deposits to the public-sector banks due to the explicit and implicit guarantee enjoys by them from the Govt. of India (Acharya and Kulkarni, 2019).[47] I find similar negative effects of the drop in deposits for private banks during the crisis having a dampening effect on firm exports. Other estimates continue to remain the same.[48]

Lastly, I substitute exports by total sales and domestic sales in columns (9) – (10) and (11) – (12) as the outcome variable of interest. I continue to find similar effects. These results show that both drop in deposits and borrowings from the RBI can be cited as significant explanatory mechanisms/channel through which private banks got significantly affected in terms of their financial health and this translated into negative performance of firms who has banking relationships with them.[49]

To sum up, it is the disproportionate transfer from the RBI to the private banks (and drop in deposits), after the crisis hit the Indian capital market, which resulted in adverse effect for firms connected to those private banks (possibly due to higher drop in credit supply). My estimates also suggests that possible international exposure of the domestic private banks may have acted as a propagation mechanism during the global financial crisis (Cetorelli and Goldberg, 2012) and foreign banks transmitted shocks across borders through their local affiliates (Ongena et al., 2015). This exposure to foreign funding interacted with little or no guarantees during the crisis have had a significant negative effect on the performance of firms connected to these type of banks.

6 Conclusion

In this article, I show bank ownership as a new channel which matters significantly for a firm's performance, exports, especially in the event of a crisis. A firm having banking relationship with a private bank during the crisis receives 16% less credit and earns about 10% and 25% less in terms of their overall sales and export flows, respectively than firms connected to a public-sector bank. This negative effect on firm performance is significant across all sizes of firms (except for the smallest ones) who produce intermediate goods. Firms connected to private banks also paid less wages and imported less capital goods. Lastly, this negative effect on firm performance can possibly explained by the drop in the supply of credit to the banks from the Central Bank and withdrawal of deposits. To this end, my results show that ownership of banks appear to be economically important both at the micro level (firm) and aggregate.

My findings provide direct evidence for a new complementary channel which is bank ownership that highlights the role of financial frictions in restricting the availability of credit to firms (Chava and Purnanandam (2011); Coleman

[47] They also argue that state-owned banks can access credit as they have access to stronger government guarantees.

[48] I also control for all other possible issues that may affect my estimates – differential trends of borrowing from the RBI, different banks lending to different types of firms, lending pattern of banks correlated with firm characteristics, bank health characteristics; the estimates remain the same.

[49] Another possible mechanism that could drive my results is the forbearance policy announced by the RBI after the global financial crisis in October 2008 (Chari et al., 2021). However, the variable that would supposedly capture the forbearance policy is essentially a dummy equal to one for the years 2008 and 2009. And, this is highly correlated with the crisis variable which would make it difficult to disentangle the effect of the policy than the crisis.

and Feler (2015)). Overall, my results show that propagation of financial shocks to the real economy can be different due to the ownership of the banks.

Lastly, interpreting the performance of firms, during the crisis, connected to public-sector banks a success could be questionable as the relative stability and efficiency of the public-sector banks relative to private and/or foreign banks appears to be doubtful. This is because the perception that public-sector banks enjoy an implicit guarantee is a moral hazard problem that may limit the incentive to enhance efficiency and encourage excessive risk taking. This points to the desirability of scaling back implicit guarantees to the public-sector banks and in general whether by preventing them from becoming too large and connected to fail or by setting up more effective mechanisms for the orderly resolution of insolvent institutions.

Raghuram Rajan (Rajan, 2013) in his 2013 Annual Andrew Crockett Memorial Lecture in Bank of International Settlements (BIS) points out that the types of policies undertaken by the Central Bankers after the crisis of 2008–09 "has truly been a step in the dark". This is because these type of policies raise more questions than answers. The fundamental hope behind these policies are that as the price of risk is reduced, firms faced with lower cost of capital will have higher incentives to make real investments, thereby creating jobs and enhancing growth. He points out that there are two reasons for which these calculations can possibly go wrong: (a) absence of a well capitalized banking system or policy certainty, and (b) large reduction in the cost of capital for firms such that they prefer labour-saving capital investment to hiring labour. And, in case of India, the former applies aptly.

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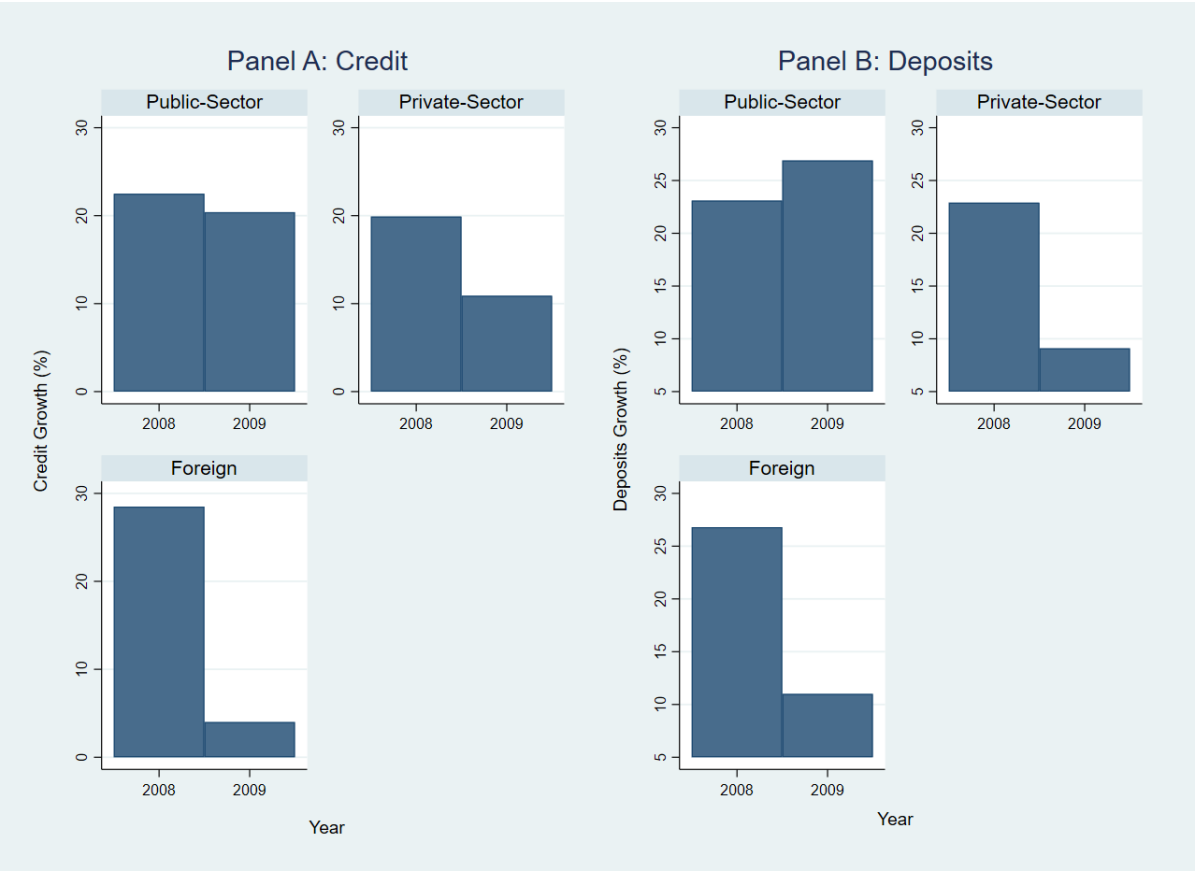

Figure 1 Credit and Deposits Growth in Public-sector, Private, and Foreign Banks in India, 2008 and 2009

Notes: Figure presents the yearly growth rates in different types of banks in India, 2008-2009.

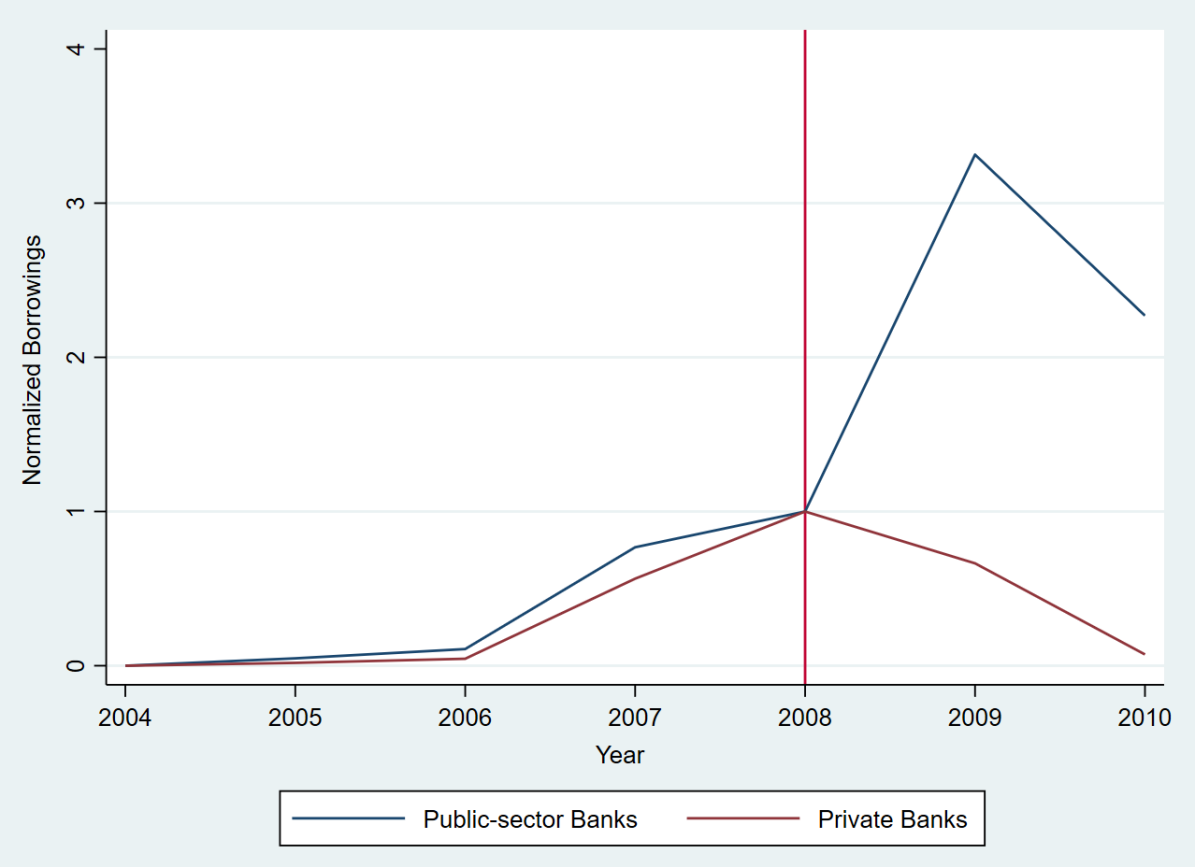

Figure 2 Banks' Borrowing from India's Central Bank, 2004-2010

Notes: Figure represents average real borrowing from India's Central Bank. "Public-sector Banks" include all the state-owned banks. "Private Banks" are domestic private banks and banks of foreign origin. It does not include private NBFCs (Non-banking Financial Corporations) and cooperative banks. All the values are deflated to Indian Rupees of April 2004 and normalized to the value of 1 for all bank types at 2008.

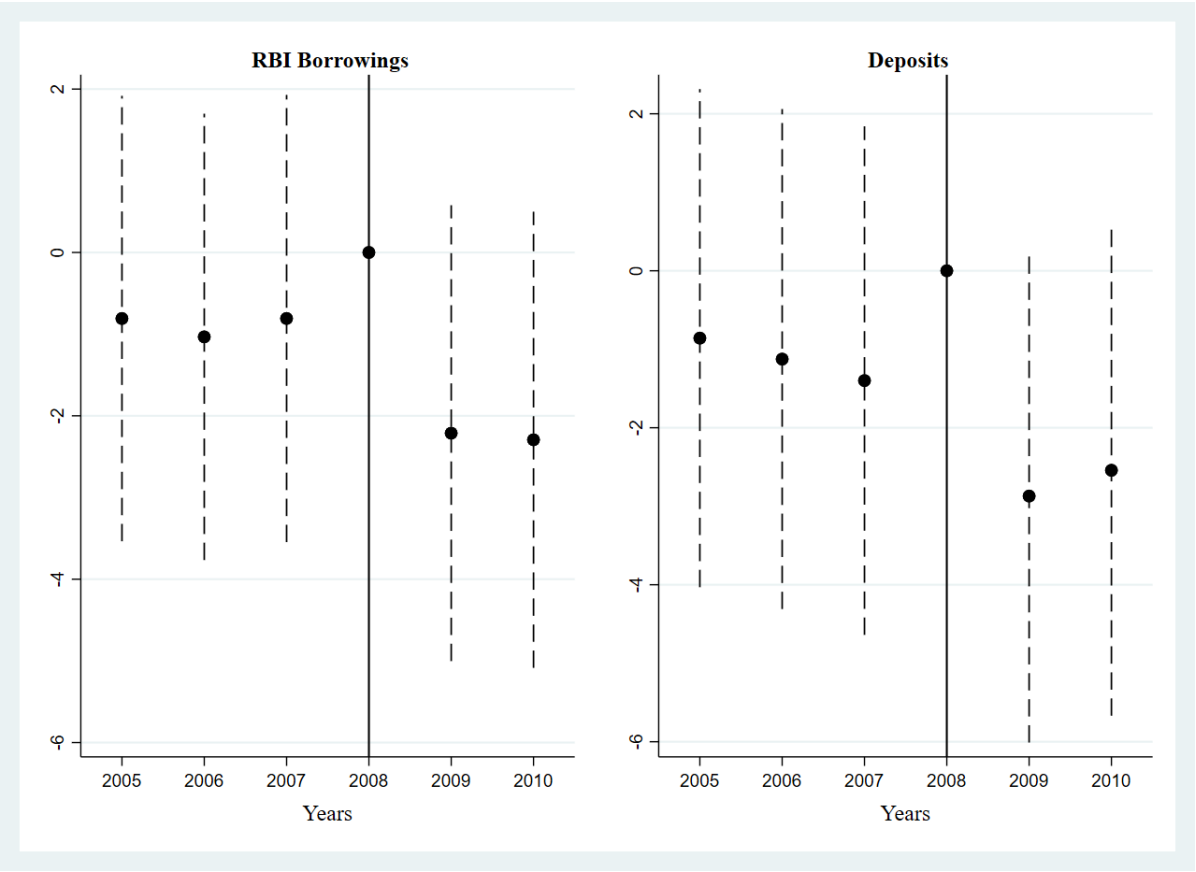

Figure 3 Effect of Bank Ownership on Bank Performance – Borrowings from RBI and Deposits, 2005–2010

Notes: Figure presents the OLS coefficient estimates (and their 95% confidence intervals) of the difference in the borrowings from the RBI and deposits received by private (domestic and foreign) in comparison to public-sector banks for the period 2005–2010.

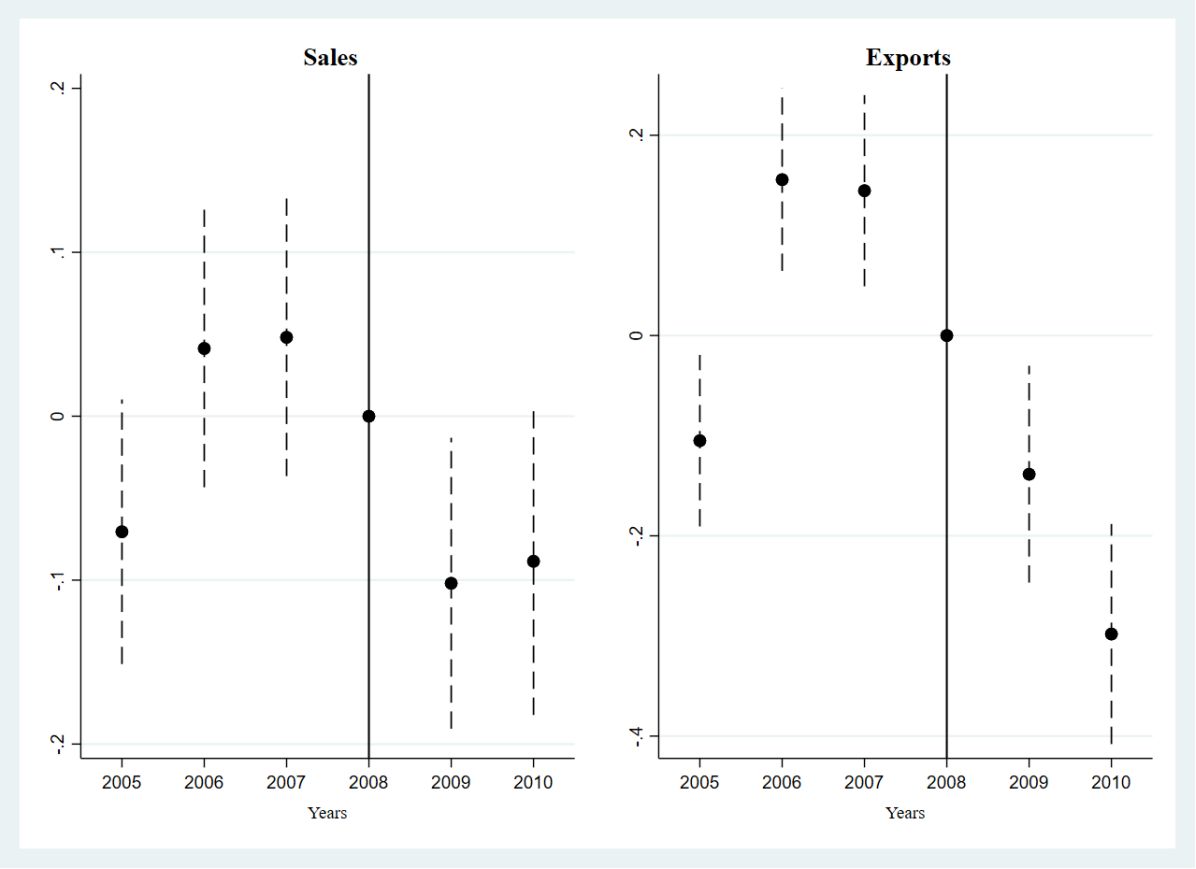

Figure 4 Effect of Bank Ownership on Firm Performance – Sales and Exports, 2005–2010

Notes: Figure presents the OLS coefficient estimates (and their 95% confidence intervals) of the difference in the total sales and export earnings for firms connected to private (domestic and foreign) in comparison to public-sector banks for the period 2005–2010.

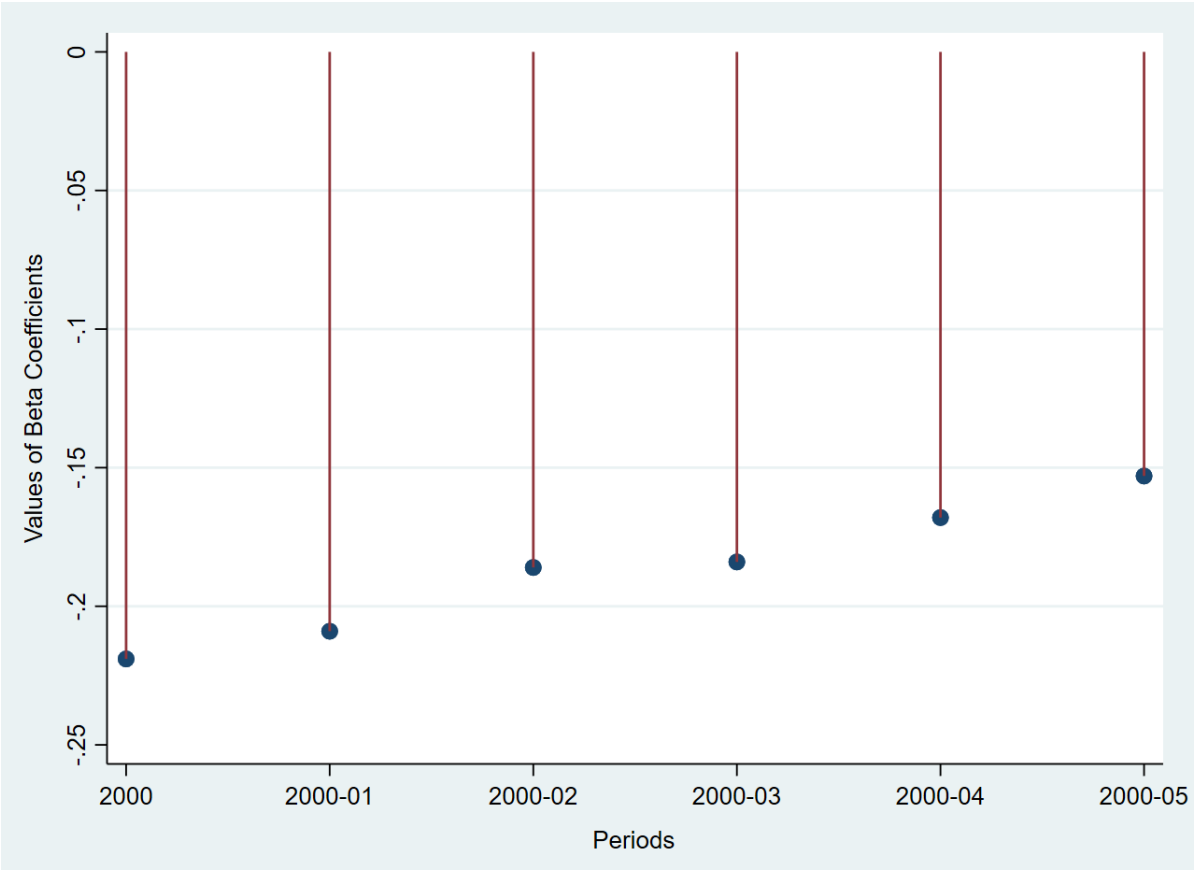

Figure 5 Effect of Bank Ownership on Firm Performance – Beta Coefficients from Using Different Periods of Lending Relationships

Notes: Figure presents the different beta coefficients in terms of the response of the difference in the export earnings for firms connected to private (domestic and foreign) and public-sector banks using different periods of lending relationships.

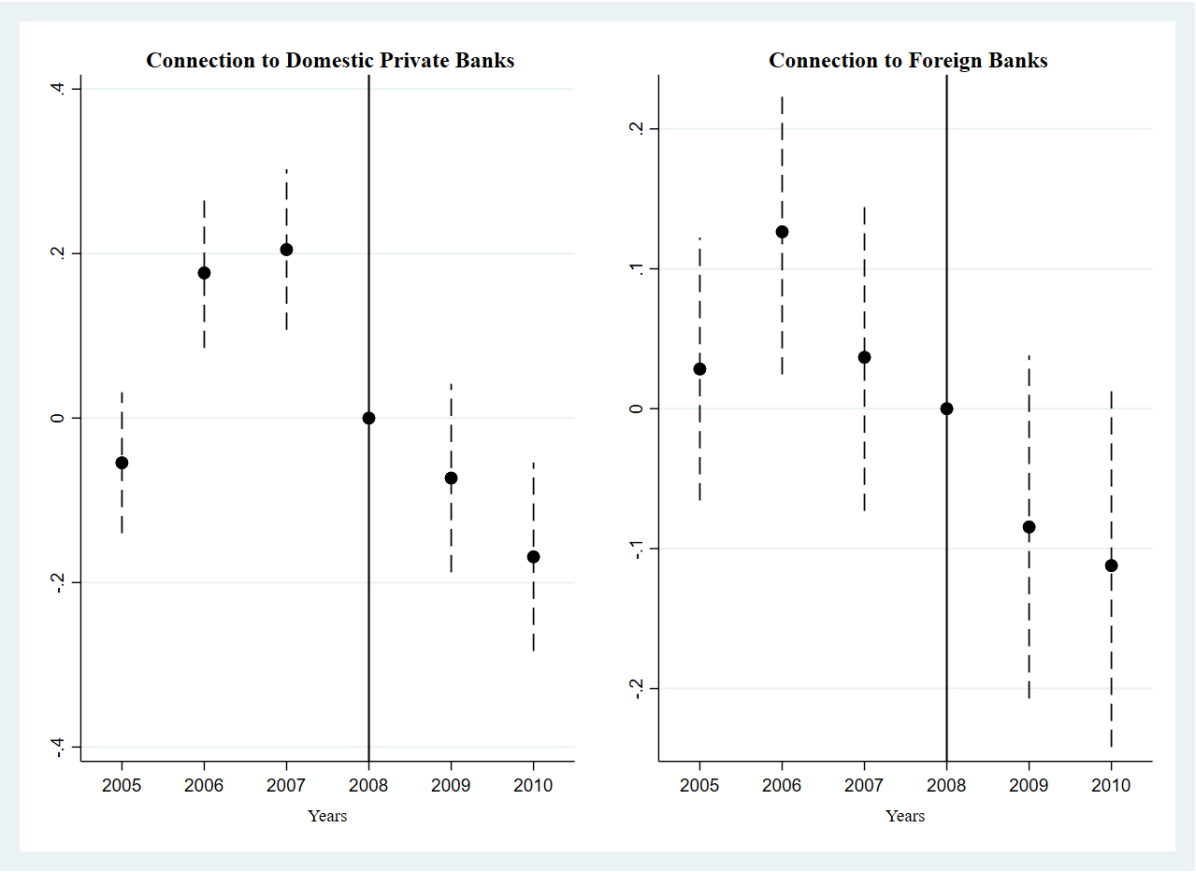

Figure 6 Effect of Bank Ownership on Firm Exports – Divided into Domestic Private and Foreign Banks, 2005–2010

Notes: Figure presents the OLS coefficient estimates (and their 95% confidence intervals) of the difference in the export earnings for firms connected to domestic private banks and foreign banks in comparison to public-sector banks, respectively for the period 2005–2010.

Table 1 India's Capital Account, 2008-2009

	2007-08	2008-09	2008-09 1st Half	2008-09 2nd Half
Foreign Direct Investment	15,401	17,496	13,867	3,629
Portfolio Investment	29,556	–14,034	–5,521	–8,513
External Commercial Borrowings	22,633	8,158	3,157	5,001
Short-term Trade Credit	17,183	–5,795	3,689	–9,484
Other Banking Capital	11,578	–7,687	3,747	–11,434
Other Flows	10,554	4,671	–1,849	6,520

Notes: Figures are in INR million. Source: Reserve Bank of India.

Table 2 Balancing Tests

	Firms Connected to				
	Private Banks		Public-sector Banks		Normalized
	Median	Std. Dev	Median	Std. Dev	Difference
	(1)	(2)	(3)	(4)	(5)
Bank Borrowing	285.1	4,159.44	250	1,418.32	0.22
Total Sales	1,909.3	73,859	1513.5	45,664.16	0.18
Exports	98.2	21,506.67	81.3	1,335.76	0.14
Domestic Sales	1,528	59,914.72	1,252.1	44,745.17	0.17
Capital Employed	1,784	40,664.5	1,308.8	23,906.27	0.17
Raw Materials	957.4	35,864.2	1,031.9	23,898.13	0.17
Total Assets	2,363	65,069.96	1,682.4	22,379.86	0.22
Value-added	1,207.8	52,150.82	1,050.8	39,197.92	0.16

Notes: Table reports median values for 2000–2007. Values are expressed in INR Millions. Column (5) shows the normalized difference between the two groups. Following Imbens and Wooldridge (2008), an absolute value above 0.25 would suggests an imbalance between the two groups.

Table 3 Bank Ownership and Bank Performance

	Total Deposits	RBI Borrowing	Loans & Advances
	(1)	(2)	(3)
$PVT_b \times \mathrm{D}_{crisis}$	–1.691***	–1.459***	–1.323***
	(0.503)	(0.392)	(0.521)
R-Square	0.73	0.70	0.71
N	2,959	2,959	2,959
Bank FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Notes: Columns (1), (2), and (3) uses total deposits received by banks, total credit received from the RBI, and total loans and advances by a bank as the dependent variable. D_{crisis} is an indicator of the 2008-09 crisis. It takes a value 1 for the years $\geq$ 2008.PVT$_b$ is a dummy variable which takes a value 1 for a private sector bank. Numbers in the parenthesis are robust clustered standard errors at the bank level. Intercepts included but not reported. *,**,*** denotes 10%, 5% and 1% level of significance, respectively.

Table 4 Differences in Pre-Crisis Time Trends, 2000–2007: Firms Connected to Private and Public-sector Banks

	Log(Total Sales)			Log(Exports)		
	(1)	(2)	(3)	(4)	(5)	(6)
$PVT_{f,<=2002}$ × Time Trend	0.006			0.018		
	(0.006)			(0.016)		
$Time\ Trend$	30.972			21.381		
	(44.145)			(50.539)		
$PVT_{f,<=2002}$ × Year 2003		0.082*	0.050		0.056	0.037
		(0.049)	(0.036)		(0.036)	(0.035)
$PVT_{f,<=2002}$ × Year 2004		–0.014	–0.043		0.024	0.042
		(0.034)	(0.031)		(0.036)	(0.035)
$PVT_{f,<=2002}$ × Year 2005		–0.027	–0.004		–0.029	0.020
		(0.036)	(0.033)		(0.038)	(0.037)
$PVT_{f,<=2002}$ × Year 2006		0.087	0.098		0.238***	0.247***
		(0.062)	(0.063)		(0.035)	(0.035)
$PVT_{f,<=2002}$ × Year 2007		0.095***	0.102***		0.230***	0.235***
		(0.029)	(0.029)		(0.031)	(0.035)
$Year$ 2003			0.010			0.026
			(0.021)			(0.018)
$Year$ 2004			–0.026			0.062
			(0.020)			(0.042)
$Year$ 2005			0.045			0.296***
			(0.036)			(0.033)
$Year$ 2006			0.320***			0.407***
			(0.033)			(0.035)
$Year$ 2007			0.441***			0.585***
			(0.035)			(0.035)
R-Square	0.89	0.89	0.87	0.90	0.90	0.87
N	80,431	80,431	80,815	80,431	80,431	80,815
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE (5-digit) × Year FE	Yes	Yes	No	Yes	Yes	No

Notes: Columns (1) – (3) use total sales and columns (4) – (6) use exports of a firm as the dependent variable, respectively. $PVT_{f,<=2002}$ is a dummy variable which takes a value 1 if a firm is a client to a private sector bank between 2000 and 2002. $Time\ Trend$ is a linear time trend pre-2008. $Year$ 2003, $Year$ 2004, $Year$ 2005, $Year$ 2006, $Year$ 2007 are year dummies. These dummies equal to 1 for the respective years. Robust standard errors corrected for clustering at the firm-bank level are in the parenthesis. Intercepts included but not reported. *,**,*** denotes 10%, 5% and 1% level of significance, respectively.

Table 5 Bank Ownership and Firm Performance: Benchmark Results

	Ln(Credit Received)				
		Firm Controls	Bank Fixed Effects	High Finance Dependence	First Difference
	(1)	(2)	(3)	(4)	(5)
$PVT_{f,<=2002} \times \mathrm{D}_{crisis}$	–0.160***	–0.072**	–0.149***	–0.194***	–0.111***
	(0.034)	(0.032)	(0.035)	(0.042)	(0.015)
R-Square	0.88	0.89	0.88	0.88	0.05
	Ln(Total Sales)				
$PVT_{f,<=2002} \times \mathrm{D}_{crisis}$	–0.096***	–0.049**	–0.099***	–0.175***	–0.044***
	(0.028)	(0.040)	(0.028)	(0.032)	(0.008)
R-Square	0.89	0.92	0.89	0.89	0.03
	Ln(Exports)				
$PVT_{f,<=2002} \times \mathrm{D}_{crisis}$	–0.249***	–0.186***	–0.253***	–0.278***	–0.227***
	(0.035)	(0.033)	(0.036)	(0.042)	(0.014)
R-Square	0.90	0.92	0.90	0.90	0.04
	Ln(Domestic Sales)				
$PVT_{f,<=2002} \times \mathrm{D}_{crisis}$	–0.065**	–0.068*	–0.067**	–0.142***	–0.018**
	(0.028)	(0.041)	(0.028)	(0.032)	(0.008)
R-Square	0.90	0.92	0.90	0.89	0.05
Firm Controls	No	Yes	No	No	No
N	80,431	70,488	80,109	49,687	56,108
Firm FE	Yes	Yes	Yes	Yes	No
Bank FE × Year FE	No	No	Yes	No	No
Industry FE (5-digit) × Year FE	Yes	Yes	Yes	Yes	No
Industry FE (5-digit)	No	No	No	No	Yes

Notes: Panel A uses natural logarithm of total credit received by a firm; Panel B uses total sales of a firm; Panel C uses total exports by a firm; and Panel D uses domestic sales of a firm as the dependent variable. D_{crisis} is an indicator of the 2008-09 crisis. It takes a value 1 for the years $\geq$ 2008.PVT$_{f,<=2002}$ is a dummy variable which takes a value 1 if a firm is a client to a private sector bank between 2000 and 2002. Firm Controls include age of a firm and its squared term, (Technology Adoption/GVA), and firm size (assets of a firm). Technology Adoption = R&D expenditure + Royalty payments for technical know-how. GVA is the gross value-added of a firm. Both assets and technology adoption are in real terms. Numbers in the parenthesis are robust clustered standard errors at the firm-bank level. Intercepts included but not reported. *,**,*** denotes 10%, 5% and 1% level of significance, respectively.

Table 6 Bank Ownership and Firm Performance: Robustness Checks

	Ln(Exports)				
Panel A	Firm Charac $\times$PVT$_{f,<=2002}$			Firm Charac $\times$D$_{crisis}$	Predicted Values $\times$D$_{crisis}$
	Assets	Age	Both	Both	Both
	(1)	(2)	(3)	(4)	(5)
$PVT_{f,<=2002} \times$ D$_{crisis}$	–0.290***	–0.273***	–0.271***	–0.178***	–0.219***
	(0.033)	(0.038)	(0.036)	(0.037)	(0.039)
R-Square	0.92	0.90	0.92	0.92	0.90
N	76,998	73,588	70,488	70,488	70,488
Panel B	State$\times$ $PVT_{f,<=2002}$	Only Domestic Pvt	Only Foreign	Propensity Score	Only 1 Type of Bank
	(6)	(7)	(8)	(9)	(10)
$PVT_{f,<=2002} \times$ D$_{crisis}$	–0.252***	–0.183***	–0.106**	–0.589***	–0.057*
	(0.039)	(0.039)	(0.043)	(0.066)	(0.030)
R-Square	0.91	0.88	0.89	n/a	0.72
N	65,691	69,463	61,833	70,488	12,924
Panel C	Extending till 2014	Financial Ratio	Managerial Preferences	Export Share	Demand Shock
	(11)	(12)	(13)	(14)	(15)
$PVT_{f,<=2002} \times$ D$_{crisis}$	–0.234	–0.246***	–0.210***	–0.249***	–0.183***
	(0.368)	(0.035)	(0.039)	(0.036)	(0.039)
R-Square	0.89	0.89	0.92	0.92	0.81
N	108,740	80,431	168,635	55,366	61,195
Firm FE	Yes	Yes	Yes	Yes	Yes
Industry FE (5-digit) $\times$ Year FE	Yes	Yes	Yes	Yes	Yes

Notes: Columns (1) – (15) use natural logarithm of exports of a firm as the dependent variable. D_{crisis} is an indicator of the 2008-09 crisis. It takes a value 1 for the years $\geq$ 2008.PVT$_{f,<=2002}$ is a dummy variable which takes a value 1 if a firm is a client to a private sector bank between 2000 and 2002. Robust standard errors corrected for clustering at the firm-bank level are in the parenthesis. Intercepts included but not reported. *,**,*** denotes 10%, 5% and 1% level of significance, respectively.

Table 7 Bank Ownership and Firm Performance: Testing for the Mechanism

	Ln(Exports)								Ln(Total Sales)		Ln(Domestic Sales)	
	Borrowings from RBI				Deposits							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$D_{crisis} \times \text{B}^{RBI}_{b,<=2002}$	0.014	0.014	0.014	0.007					0.022		0.023	
	(0.011)	(0.009)	(0.011)	(0.022)					(0.016)		(0.016)	
$D_{crisis} \times \text{B}^{RBI}_{b,<=2002} \times \text{PVT}_{f,<=2002}$	–0.030***	–0.021**	–0.030***	–0.026***					–0.012***		–0.008**	
	(0.005)	(0.005)	(0.005)	(0.006)					(0.004)		(0.004)	
$B^{RBI}_{b,<=2002} \times \text{PVT}_{f,<=2002}$	0.002	0.005	0.002	0.006					0.010		0.009	
	(0.005)	(0.004)	(0.005)	(0.004)					(0.008)		(0.008)	
$D_{crisis} \times \text{B}^{Deposits}_{b,<=2002}$					0.006	0.012	0.006	0.001		0.003		–0.004
					(0.014)	(0.012)	(0.014)	(0.016)		(0.013)		(0.012)
$D_{crisis} \times \text{B}^{Deposits}_{b,<=2002} \times \text{PVT}_{f,<=2002}$					–0.018***	–0.013***	–0.018***	–0.018***		–0.007**		–0.005*
					(0.003)	(0.003)	(0.003)	(0.003)		(0.003)		(0.003)
$B^{Deposits}_{b,<=2002} \times \text{PVT}_{f,<=2002}$					0.006	0.001	0.006	0.002		0.001		0.002
					(0.006)	(0.005)	(0.006)	(0.010)		(0.008)		(0.007)
Firm Controls	No	Yes	No	No	No	Yes	No	No	No	No	No	No
Firm Characteristics $\times$ $\text{PVT}_{f,<=2002}$	No	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Bank Characteristics $\times$ Time Trend	No	No	No	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes
R-Square	0.90	0.92	0.90	0.90	0.90	0.92	0.90	0.90	0.90	0.89	0.89	0.90
N	70,144	61,607	70,144	50,491	57,173	50,108	57,173	57,173	50,491	57,173	50,408	57,080
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE (5-digit) $\times$ Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Columns (1) – (8) use exports and columns (9) – (10), (11) – (12) use total and domestic sales of a firm as the dependent variable, respectively. D_{crisis} is an indicator of the 2008-09 crisis. It takes a value 1 for the years $\geq$ 2008.$\text{PVT}_{f,<=2002}$ is a dummy variable which takes a value 1 if a firm is a client to a private sector bank between 2000 and 2002. $B^{RBI}_{b,<=2002}$ is the average borrowing by a bank from the RBI for the years 2000-2002. $B^{Deposits}_{b,<=2002}$ is the average deposits received by a bank between 2000 and 2002. 'Firm Controls' includes age, age squared, technology adoption (technology transfer + R&D expenditure), and size of a firm. Both assets and technology adoption are in real terms. Robust standard errors corrected for clustering at the firm-bank level are in the parenthesis. Intercepts included but not reported. *,**,*** denotes 10%, 5% and 1% level of significance, respectively.

APPENDIX

(FOR ONLINE PUBLICATION)

Appendix A: Data

I use an annual panel of 5,500+ Indian manufacturing firms with consolidated information on banking relationships. This is across 108 4-digit industries for the years 2003 to 2010. Data is based on the PROWESS database of the Centre for Monitoring Indian Economy (CMIE). All monetary-based variables measured in Millions of Indian Rupees (INR), deflated by 2005 industry-specific Wholesale Price Index (WPI). I use 2004 National Industrial Classification (NIC).

Variable Definitions

- **Total Deposits (Bank level)**: Total amount of deposits received by a bank.
- **Borrowings from Reserve Bank of India (Bank level)**: Banks borrow money from other banks as well as from India's Central Bank, popularly known as the Reserve Bank of India (or RBI). This is the amount of borrowings done by a bank from the RBI. The RBI acts as a 'lender of last resort' to Indian banks. Therefore, banks can borrow from the RBI on the basis of eligible securities or any other arrangement. Also, in times of crisis, they can approach the RBI for financial help.
- **Loans & Advances (Bank level)**: Total amount of loans and advances disbursed by a bank.
- **Total Credit Received (Firm level)**: Total borrowing (secured) done by a firm from banks (public-sector plus private).
- **Total Sales (Firm level)**: Total sales (exports + domestic sales) of a firm.
- **Exports (Firm level)**: Total exports of a firm.
- **Domestic Sales (Firm level)**: Total Sales – Exports of a firm.
- **Assets (Firm level)**: Total assets of a firm and/or a bank.
- **Capital Employed (Firm level)**: Total amount of capital employed by a firm sourced from different sources.
- **Total Wages (Firm level)**: Total labour compensation of a firm.
- **Domestic Raw Material Expenditure (Firm level)**: Total amount of expenditure incurred by firm on raw materials, stores and spares.
- **Imports (Firm level)**: Total imports = Import of (raw materials + finished goods + stores & spares + capital goods).

- **Technology Adoption (Firm level)**: Research and Development (R&D) Expenditure + Royalty payments for foreign technical knowhow.
- **Age (Firm level)**: Age of a banks and/or a firm.

Appendix B: Tables

Table B1 Summary Statistics: Banks' Characteristics

	Mean	Median
Panel A: Aggregate		
Borrowings from RBI	6,508.55	9,295.16
Deposits	1,389,203	728,433.8
Assets	1,533,651	2,101,786
Panel B: Public-Sector Banks		
Borrowings from RBI	8,156.37	10,106.37
Deposits	1,793,422	969,084.2
Assets	2,008,089	2,401,504
Panel C: Private Banks		
Borrowings from RBI	2,279.10	3,946.33
Deposits	722,258.8	467,477.3
Assets	880,194.9	1,061,077
Panel D: Foreign Banks		
Borrowings from RBI	4,915.3	8,424.03
Deposits	246,917.9	225,222.4
Assets	319,746.9	310,714.7

Notes: Borrowings from RBI is the total amount of borrowings done by a bank from the Reserve Bank of India (RBI). Deposits is the total amount of deposits received by a bank. Assets is the total assets of a bank. All the values are expressed in INR Million.

Table B2 Summary Statistics: Relationships with Banks'

	Mean	Median	Std. Deviation
Panel A: Aggregate			
2000	4.51	4	3.51
2001	4.47	4	3.56
2002	4.41	4	3.44
2003	4.52	4	3.56
2004	4.76	4	3.75
2005	5.00	4	3.98
2006	5.20	4	4.36
2007	5.48	4	4.64
2008	5.80	4	4.89
2009	6.11	5	5.27
2010	6.48	5	5.87
Panel B: Public-Sector Banks			
2000	2.77	2	2.19
2001	2.72	2	2.25
2002	2.73	2	2.26
2003	2.80	2	2.39
2004	2.87	2	2.50
2005	3.05	2	2.71
2006	3.10	2	2.83
2007	3.19	2	2.97
2008	3.25	2	3.03
2009	3.49	2	3.33
2010	3.78	3	3.70
Panel C: Private Banks			
2000	0.79	1	1.06
2001	0.85	1	1.10
2002	0.90	1	1.13
2003	0.98	1	1.17
2004	1.11	1	1.27
2005	1.18	1	1.30
2006	1.30	1	1.45
2007	1.38	1	1.51
2008	1.51	1	1.59
2009	1.62	1	1.77
2010	1.72	1	1.89

Notes: Numbers represent the mean, median, and standard deviation of number of credit relationships of an individual firm across different kinds of banks. All the values expressed are in numbers.

Table B3 Summary Statistics: Relationships with Banks' by Firm Type

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Panel A: By Industry											
Consumer Durable	3	3	3	3	3	4	4	4	4	4	5
Consumer Non-Durable	4	4	4	4	4	4	5	5	5	5	5
Intermediate	4	4	4	4	4	4	4	4	4	5	5
Basic	3	3	3	3	4	4	4	4	4	5	4
Capital	4	4	3	3	4	4	4	4	4	5	5
Panel B: By Ownership											
Domestic Private	3	3	3	3	4	4	4	4	4	5	5
Foreign	5	5	5	5	5	4	4	5	5	5	5
Domestic Govt.-owned	5	5	6	6	6	6	6	6	7	8	8
Panel C: By Age											
$<= 10\ years$	2	2	3	3	3	4	4	4	4	4	5
$> 10\ \&\ <= 25\ years$	3	3	3	3	3	3	4	4	4	4	4
$> 25\ years$	4	4	4	4	4	5	5	5	5	5	5
Panel D: By Size											
$< 25th\ percentile$	2	2	2	2	2	2	2	2	2	2	2
$> 25th\ \&\ <= 50th\ percentile$	3	3	3	3	3	3	3	3	3	3	3
$> 50th\ \&\ <= 75th\ percentile$	5	5	5	5	5	5	5	5	5	5	6
$> 75th\ percentile$	8	8	7	8	8	8	9	9	9	10	10

Notes: Numbers represent the median number of credit relationships of an individual firm across different kinds of banks. Size of a firm is defined according to the total assets of a firm. If a firm's total asset falls below the 25th percentile of the total assets of the corresponding industry to which the firm belongs, then the firm belongs to the 1st quartile. Similarly, if a firm's asset is within 25–50th, 50–75th and over 75th percentile then it would fall into 2nd, 3rd and 4th quartile respectively. All the values expressed are in numbers.

Table B4 Bank Ownership and Firm Performance: Other Indicators

	(1)	(2)	(3)	(4)
	Capital Employed	Total Wages	Domestic Raw Materials	Total Imports
$PVT_{f,<=2002} \times \mathrm{D}_{crisis}$	–0.007	–0.039**	0.032	0.035
	(0.033)	(0.018)	(0.068)	(0.027)
R-Square	0.86	0.92	0.86	0.89
N	79,111	80,431	80,426	80,431
	(5)	(6)	(7)	(8)
	Import of Capital Goods	Import of Raw Materials	Import of Stores & Spares	Import of Finished Goods
$PVT_{f,<=2002} \times \mathrm{D}_{crisis}$	–0.068**	0.032	0.008	–0.037**
	(0.029)	(0.032)	(0.016)	(0.015)
R-Square	0.76	0.85	0.88	0.89
N	80,431	80,431	80,431	80,431
Firm FE	Yes	Yes	Yes	Yes
Industry FE (5-digit) × Year FE	Yes	Yes	Yes	Yes

Notes: D_{crisis} is an indicator of the 2008-09 crisis. It takes a value 1 for the years $\geq$ 2008.PVT$_{f,<=2002}$ is a dummy variable which takes a value 1 if a firm is a client to a private sector bank between 2000 and 2002. Numbers in the parenthesis are robust clustered standard errors at the firm-bank level. Intercepts included but not reported. *,**,*** denotes 10%, 5% and 1% level of significance, respectively.

Table B5 Bank Ownership and Firm Performance: Firm Characteristics

	Ln(Exports)			
	Size	Ownership	Business Group	End-Use
	(1)	(2)	(3)	(4)
$PVT_{f,<=2002} \times \text{D}_{crisis}$	–0.007	–0.112	–0.295***	–0.211***
	(0.074)	(0.133)	(0.045)	(0.043)
$PVT_{f,<=2002} \times \text{D}_{crisis} \times \text{Qr}_2$	–0.490***			
	(0.067)			
$PVT_{f,<=2002} \times \text{D}_{crisis} \times \text{Qr}_3$	–0.505***			
	(0.075)			
$PVT_{f,<=2002} \times \text{D}_{crisis} \times \text{Qr}_4$	–0.581***			
	(0.084)			
$PVT_{f,<=2002} \times \text{D}_{crisis} \times \text{Domestic}_i$		–0.133		
		(0.138)		
$PVT_{f,<=2002} \times \text{D}_{crisis} \times \text{Business Group}_i$			0.135*	
			(0.075)	
$PVT_{f,<=2002} \times \text{D}_{crisis} \times \text{Final}_i$				–0.101
				(0.074)
R-Square	0.90	0.90	0.90	0.90
N	80,431	80,431	80,431	80,431
Firm FE	Yes	Yes	Yes	Yes
Industry FE(5-digit) × Year FE	Yes	Yes	Yes	Yes

Note: Columns (1) – (4) use natural logarithm of exports of a firm as the dependent variable. D_{crisis} is an indicator of the 2008-09 crisis. It takes a value 1 for the years $\geq$ 2008.PVT$_{f,<=2002}$ is a dummy variable which takes a value 1 if a firm is a client to a private sector bank between 2000 and 2002. Quartiles (Qr_i) are defined according to the total assets of a firm. If a firm's total asset falls above the 75th percentile of the total assets of the corresponding industry to which the firm belongs, then the firm belongs to the 4th quartile, and so on. Similarly, if a firm's asset is within 25th-50th and 50th-75th percentile then it would fall into 2nd and 3rd quartile respectively. I used firms belonging to the 1st quartile as the excluded category. $Domestic_i$ is a dummy variable which takes a value 1 if a firm is domestically owned. $Business\ Group_i$ is a dummy variable which takes a value 1 if a firm is a part of the business group between 2000 and 2002. $Final_i$ is a dummy variable which takes a value 1 if a firm belongs to the final goods producing category, such as consumer durables and non-durables. Robust standard errors corrected for clustering at the firm-bank level are in the parenthesis. All the regressions contain the respective double interactions and individual terms. Intercepts included but not reported. *,**,*** denotes 10%, 5% and 1% level of significance, respectively.

Appendix C: Graphs

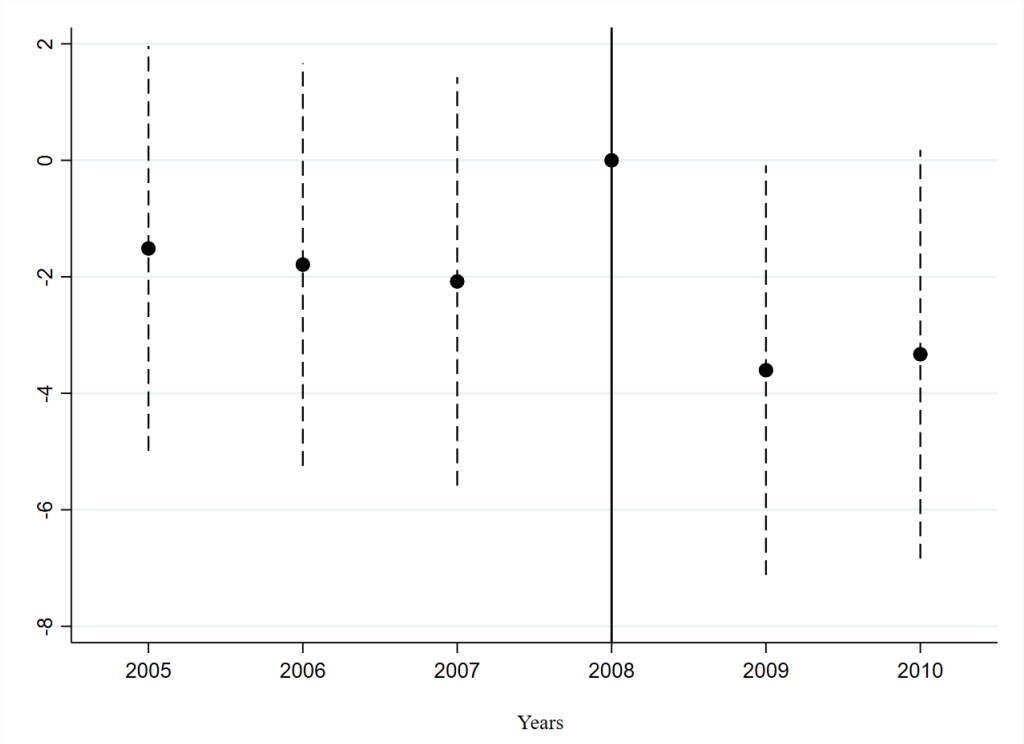

Figure C1 Effect of Bank Ownership on Bank Performance – Loans and Advances, 2005–2010

Notes: Figure presents the OLS coefficient estimates (and their 95% confidence intervals) of the difference in the loans and advances by private (domestic and foreign) in comparison to public-sector banks for the period 2005–2010.

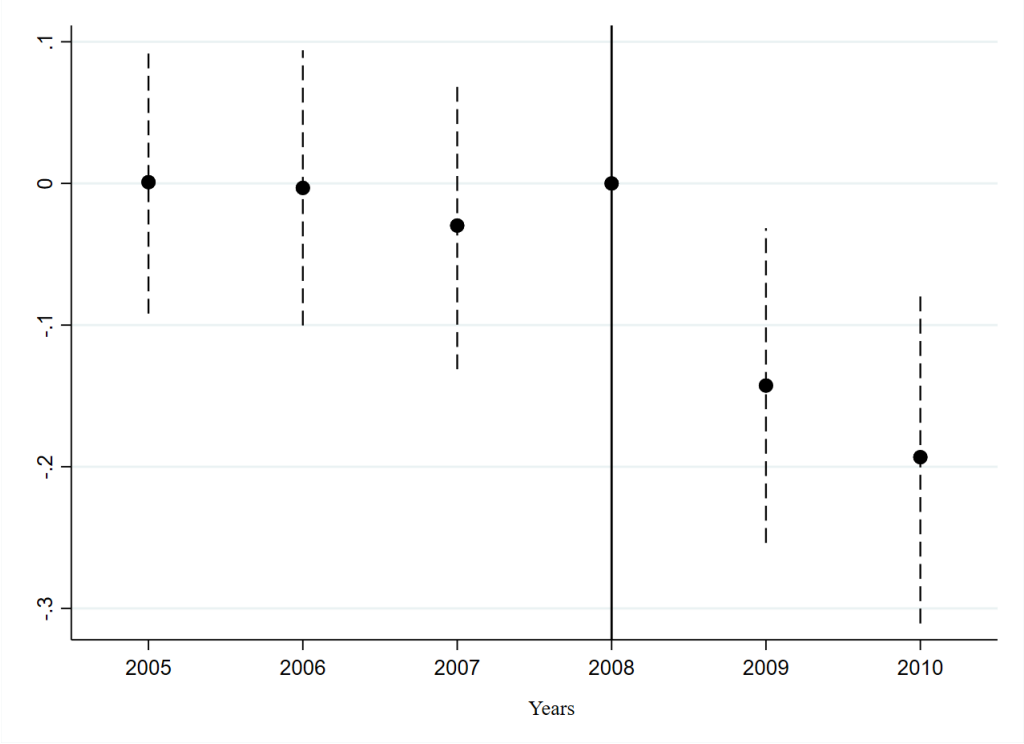

Figure C2 Effect of Bank Ownership on Credit Received by Firms, 2005–2010

Notes: Figure presents the OLS coefficient estimates (and their 95% confidence intervals) of the difference in the credit received by firms from private (domestic and foreign) in comparison to public-sector banks for the period 2005–2010.