

Bank ownership type and banking relationships [☆]

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Abstract

We formulate and test hypotheses about the role of bank ownership type—foreign, state-owned, and private domestic banks—in banking relationships. Our application uses data from India, an important developing nation. The empirical results are consistent with all of our hypotheses with regard to foreign banks. First, these banks tend to establish relationships with relatively transparent firms. Second, firms that have relationships with foreign banks are more likely to enter into multiple banking relationships and to maintain a larger number of such relationships. Finally, firms banking with foreign banks are more likely than others to diversify relationships across bank ownership types. The data are also consistent with the hypotheses that firms with relationships with state-owned banks are relatively unlikely to maintain multiple banking relationships, tend to interact with a smaller number of banks, and less often diversify across ownership types.

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1. Introduction

A number of important policy and research issues concern the relationships of banks with nonfinancial firms. Theory suggests that such relationships may play key roles in resolving information problems and mitigating financial market imperfections more generally, and empirical analysis has shown important benefits from strong banking relationships. Much of the research focus is on the nature of relationships established by different types of banks and on the rationale for multiple banking relationships. To our knowledge, however, existing studies on banking relationships have not directly addressed the potentially important role of bank ownership type—foreign, state-owned, and private domestic banks. In addition, very few of the empirical relationship studies are applied to data on developing nations, where relationships may be particularly important because of financial system inadequacies.

This paper directly addresses these under-researched issues by formulating hypotheses about the effects of bank ownership type on relationships and testing these hypotheses using data from India, one of the largest and most important developing nations. We run three types of tests. First, we test for the types of firms that establish relationships with the different bank ownership types. Second, we investigate the impact of bank ownership type on the likelihood of multiple banking and on the number of banking relationships. Third, we extend the previous literature with an analysis of firms' likelihood to diversify across banks of different ownership types. Almost half of the firms in our sample diversify across bank ownership types, suggesting that diversification may be quite important.

The hypotheses we test are based on the extant theory and knowledge about the effects of bank ownership types on bank–firm relationships. Theory suggests a number of reasons why different types of firms may establish relationships with different ownership types. Information-based theories of banking relationships (e.g., [Stein, 2002](#)) suggest that foreign banks—by virtue of their size and headquarters location in another nation—may be less able to process “soft” information about opaque local firms and/or their local market conditions—and therefore may be more likely to use their advantages in processing “hard” information and enter into relationships with more transparent firms. Alternative explanations of why foreign banks might lend to more transparent firms include their typically urban locations and the comparative advantages of these large institutions in making large loans. In contrast, state-owned banks often have direct mandates to serve certain types of businesses, such as small firms with limited access to private-sector credit, state-owned firms, firms in rural areas, or those in “priority sectors.”

Research on multiple banking relationships suggests that the number of banking relationships might be driven by firms' need to protect themselves from premature withdrawal of services from financially fragile relationship banks (e.g., [Detragiache et al., 2000](#)). We argue that the concept of fragility may be broadened to describe the banking relationship itself. In particular, there are reasons to expect that the fragility of a banking relationship may vary with a bank's ownership type, independent of the bank's financial condition. We hypothesize that relationships with foreign banks may be particularly fragile—even if these institutions are not themselves financially fragile—because foreign banks may have weaker ties to the nation, a greater number of alternative business opportunities overseas, and can exit the market more easily. Thus, a firm with a relationship with a foreign bank may be more likely to maintain multiple relationships or more relationships to protect itself against withdrawal of services, all else equal. Similarly, firms with banking relationships with foreign institutions may be more likely to diversify across ownership types by having at least one other banking relationship with a state-owned or private domestic institution that is less likely to withdraw from the country.

In contrast, relationships with state-owned banks may be particularly sturdy. Fear of withdrawal of services is expected to be least for state-owned banks—even if they are in poor financial condition—because these institutions generally have the most government support to protect them from failing or having to withdraw credits because of poor financial condition. In addition, for some firms that state-owned banks have direct mandates to serve, state-owned banks may be the only institutions willing to provide credit for projects that may have negative net present values, making additional relationships less likely. State-owned banks may also provide subsidies such as below-market interest rates on credit, reducing the probability that the recipients of these subsidies would seek other relationships. Thus, firms with banking relationships with state-owned bank may be less likely to have additional relationships or to diversify into another bank ownership type.

Another potential effect of bank ownership on multiple relationships and diversification is based on differences in monitoring. Prior research illustrates how decisions on multiple relationships may also depend on the costs and benefits of bank monitoring by multiple banks (e.g., Carletti, 2004). State-owned banks often tolerate poor loan repayment performance and have very high proportions of nonperforming loans as a result. This tolerance or relatively low level of monitoring may be interpreted as a net monitoring benefit to a firm from a single relationship with a state-owned bank. Again, this suggests that firms with a relationship with a state-owned bank may be relatively unlikely to have multiple relationships or to diversify across bank ownership types. Based on both sets of arguments, we test the hypotheses that firms with relationships with state-owned banks are the least likely to maintain multiple relationships, to have many relationships, or to diversify relationships across bank ownership types.

Our Indian data set provides an excellent opportunity to test the hypotheses, with information on firms, banks, and their relationships, as well as data on local market conditions. The data set includes information for 3422 nonfinancial firms for the year 2001 from the Centre for Monitoring Indian Economy (CMIE). The firms are either listed on a national exchange or have sales or assets exceeding the equivalent of about US \$4 million. All firms in our sample report audited statements. In addition to firm characteristics, the data include the identities of the banks with which these firms have relationships.

These data are matched to information from the Indian central bank on the size, financial condition, and ownership type of the commercial banks in the country. We identify four bank ownership types—foreign banks, two types of state-owned banks, and private domestic banks. The state-owned banks include the State Bank of India (SBI) and its associates, established in the 1950s with a substantial rural footprint. These are treated separately from the other type of state-owned bank: more recently nationalized large banks that are managed more as corporate entities and retained some prior management, staff, and relationships with large firms. For convenience, we refer to the four ownership types as foreign, SBI, nationalized, and private, respectively.¹

We estimate three models of bank ownership types and firm–bank relationships. These are reduced forms that embody the preferences and needs of the firms, the abilities of the different types of banks to meet these needs/preferences, and local market characteristics. Our first empirical model examines the determinants of the ownership type of the firm's banking relationships. The results are generally consistent with the hypothesis that foreign banks tend to have banking relationships with larger, older, and more transparent firms and are in line with findings in

¹ We exclude regional rural development banks (RRBs)—state-owned development finance vehicles that make microloans to the rural poor—that do not have relationships with the firms in our sample.

Gormley (2006) on the impact of foreign bank entry on access to credit in India. A reason for this may be that foreign banks prefer to use their comparative advantage in processing hard information and enter into relationships with more transparent firms, perhaps because of difficulties in transmitting soft information through the channels of large banking organizations with headquarters in another nation. While soft information may generally play a relatively small role in our data set—since all the firms have audited financial statements—the more transparent firms may better fit the policies and procedures and approval process for foreign banks. Finally, the findings provide only mixed support for the hypothesis that state-owned banks establish relationships with the types of firms they are mandated to serve.

Our second empirical model analyzes the effects of bank ownership type and other variables on whether the firm has multiple banking relationships and the number of these relationships. The results are consistent with the hypothesis that firms with foreign banking relationships are more likely than other firms to have multiple banking relationships and more relationships, and those with state-owned banking relationships are relatively unlikely to have more than one relationship and fewer relationships. Our third empirical model investigates the effects of bank ownership type and other variables on whether firms diversify the ownership type of their banking relationships. The empirical findings are consistent with the hypotheses that firms with foreign banking relationships are the most likely to diversify across ownership types, while firms with state-owned banking relationships are least likely to do so.

The remainder of the paper is organized as follows. Section 2 reviews the literature on banking relationships, multiple relationships, and bank ownership types. Section 3 provides an overview of the Indian banking sector. Section 4 discusses the data set and provides summary statistics. Section 5 presents the empirical methodology. Section 6 presents the empirical results, and Section 7 concludes.

2. Literature review on banking relationships, multiple banking, and bank ownership type

2.1. Banking relationships

Although banking relationships is a general topic, much of the literature focuses on relationship lending to informationally opaque firms. Both theory and empirical evidence point to an advantage for large banks in transactions lending technologies, while small banks tend to excel in lending based on “soft” information. These differences may stem from economies (diseconomies) of scale in the processing and transmission of hard (soft) information (e.g., Stein, 2002), managerial agency problems caused by some of the soft information being proprietary to the loan officer that require a closely-held organizational structure (e.g., Berger and Udell, 2002), and Williamson-type (Williamson, 1988) organizational diseconomies in large banks with using transactions technologies for large businesses along with relationship lending to SMEs. Empirical research supporting these differences includes findings that large banks base lending decisions more on financial ratios than on prior relationships (e.g., Cole et al., 2004) and that large banks tend to have shorter, less exclusive, less personal, and longer-distance associations with SMEs (e.g., Berger et al., 2005a).²

² A significant caveat to this literature is that the lending technology is usually not observed, but is inferred from the loan contract terms or the characteristics of the SME receiving the credit (Berger and Udell, 2006).

Because soft information is generally proprietary to the relationship bank, an exclusive banking relationship for a firm may give rise to a “hold up” problem and the extraction of rents from the firm (e.g., [Sharpe, 1990](#); [Rajan, 1992](#)). Several key issues arise concerning the extent to which borrowers gain from relationships in terms of improved credit availability or contract terms and the actions that firms take to offset some of the potential extraction of rents. Some theories suggest that marginally creditworthy borrowers may have improved credit availability from this exploitation of market power, since it allows the bank to enforce long-term implicit contracts in which the borrower receives a subsidized interest rate in the short term, and then compensates the bank by paying a higher-than-competitive rate in a later period ([Sharpe, 1990](#)). As the market power of the bank increases, firms with progressively lower credit quality may be able to obtain funding ([Petersen and Rajan, 1995](#)). A number of empirical papers test this theory by measuring the association between credit availability and measures of market power, such as banking market concentration or other restrictions on bank competition (e.g., barriers to entry). The empirical results are mixed, with some finding more credit availability (e.g., [Petersen and Rajan, 1995](#); [Cetorelli and Gambera, 2001](#)) and some finding less availability (e.g., [Black and Strahan, 2002](#); [Berger et al., 2004](#)) when measured market power is relatively high.

Some have also examined the issue of whether firms with stronger banking relationships generally have more credit availability or more favorable credit contract terms. Relationship strength is usually measured by its length, breadth, or whether the lending bank is the firm’s main relationship bank (e.g., its “hausbank” in Germany). Some of the theories predict that contract terms such as interest rate and collateral requirements become easier for firms as a relationship matures (e.g., [Boot and Thakor, 1994](#); [Petersen and Rajan, 1995](#)), whereas others predict that terms become tougher over the course of the relationship (e.g., [Greenbaum et al., 1989](#); [Sharpe, 1990](#); [Rajan, 1992](#)).

The empirical literature on the impact of banking relationships on loan conditions is mixed, with some studies finding that loan interest rates are lower when relationships are stronger ([Petersen and Rajan, 1994](#); [Berger and Udell, 1995](#)), while others find no effects on loan rates ([Elsas and Krahnen, 1998](#); [Harhoff and Körting, 1998](#); [Machauer and Weber, 2000](#)) or even an increase in rates ([Degryse and Cayseele, 2000](#)). In general, studies of measures of credit availability and collateral requirements have consistently found that banking relationships facilitate access to financing and relax collateral requirements (e.g., [Petersen and Rajan, 1994, 1995](#); [Berger and Udell, 1995](#); [Cole, 1998](#); [Elsas and Krahnen, 1998](#); [Harhoff and Körting, 1998](#); [Machauer and Weber, 2000](#)).³

2.2. Multiple banking relationships

The existing research refers to at least five major motives for multiple banking relationships. First, multiple relationships may arise when one bank cannot provide all the needs of a firm. This may be expected to occur when the firm is large, complex, and geographically dispersed, requiring more types of services in more locations.⁴ Multiple relationships may arise, for example,

³ Studies of large, traded firms also find that banking relationships add value by showing that the announcement of bank loan agreements has a positive effect on firm stock prices (e.g., [James, 1987](#); [Billet et al., 1995](#)). A related literature also finds that announcements on the health of the main bank have a significant effect on firm stock prices (e.g., [Slovin et al., 1993](#); [Djankov et al., 2005](#)).

⁴ Prior research finds that multiple-bank firms tend to be larger than single-bank firms (e.g., [Houston and James, 1996](#); [Ongena and Smith, 2000](#)).

when the firm's relationship banks are too small to provide enough credit, when the firm needs domestic and international services and the relationship banks have sufficient expertise in only one of these categories; or when the relationship banks do not have offices in all the localities where the firm needs services.

Second, firms may seek multiple banking relationships to mitigate the hold up problem of a single relationship bank discussed above (e.g., Sharpe, 1990; Rajan, 1992; Von Thadden, 1992; Boot, 2000). This incentive may be greater when banking markets are less competitive, offering fewer potential alternatives in the future event that their main bank tightens contract terms dramatically.⁵

Third, firms may engage in a larger number of relationships to insure themselves against a premature withdrawal of credit or other services due to the distress of their relationship banks, rather than any deterioration in their own creditworthiness. Firms are expected to maintain a larger number of banking relationships the more financially fragile are the firm's relationship banks (e.g., Detragiache et al., 2000).⁶ By maintaining more relationships, the firm can increase the likelihood that at least one informed bank would be able to continue providing services, reducing the costs of bankruptcy or financial distress for the firm.

Fourth, multiple banking may arise in response to the "soft-budget constraint" problem—a situation where a relationship bank may refinance unprofitable projects (in the hope of recovering earlier loans), creating an incentive for strategic defaults on the part of the borrower (Dewatripont and Maskin, 1995). By complicating the refinancing process, multiple banking allows banks not to extend further inefficient credit and reduces the borrowers' incentives to default (Bolton and Scharfstein, 1996).

Fifth, multiple banking relationships may be driven by the costs and benefits to the firm from bank monitoring. In one model, the choice between single and multiple banking relationships depends on optimization by firms weighing the costs and benefits in terms of expected profitability and private benefits of the additional monitoring, including the effects on project success and duplication of monitoring costs (Carletti, 2004).⁷

All five motives may create strong incentives for multiple relationships in developing economies where there may be significant market power because bank competition is frequently restricted, where soft-budget constraint problems may be worsened by weak creditor rights and where the costs of monitoring tend to be high due to poor disclosure/accounting standards and other factors. Banks in these nations also often have limited abilities to provide services; the banks are commonly financially fragile and the firms may often be in poor condition and cannot bear the costs of losing access to their main sources of external finance. All of the motives may also be blunted for small, opaque firms because these firms often require the informational benefits of an exclusive relationship and because these firms may not be able to bear the duplicative costs of multiple relationships.

⁵ A related theoretical model finds that it might be optimal for firms to have one main relationship lender plus a multitude of small bank lenders to reduce the hold up problem. This mix may be particularly advantageous for firms with high asset sensitivity or low expected cash flow (Elsas et al., 2004).

⁶ On the other hand, Detragiache et al. (2000) predict that bank fragility will have a positive impact on the likelihood of a single banking relationship due to adverse selection problems (the inability of non-relationship banks to discern whether a relationship was terminated due to problems with the bank or the firm).

⁷ A related study analyzes multiple bank lending from the perspective of banks in a setting where monitoring is essential (Carletti et al., 2004). The model predicts greater use of multiple-bank lending when banks are small relative to investment projects, firms are less profitable, and monitoring costs are high due to poor financial integration, strict regulation, and inefficient judicial systems.

There is a growing empirical literature on the determinants of multiple banking (e.g., Houston and James, 1996; Detragiache et al., 2000; Machauer and Weber, 2000; Ongena and Smith, 2000; Berger et al., 2001, 2005a; Farinha and Santos, 2002). Most of these studies focus on developed nations, such as the US, Italy, and Germany. These studies generally find that the likelihood of multiple banking relationships or the number of these relationships increases with firm size.⁸ This is consistent with the first motive discussed above that a single or few relationship banks cannot fulfill all their needs, given that large firms more often are in many localities, require domestic and international services, are complex, and may require more credit than a single or few relationship banks are able to provide.⁹ This result is also consistent with the possibility noted above that small firms more frequently have exclusive relationships to resolve information problems and/or avoid duplicative costs of multiple relationships.

Regarding the second motive, Farinha and Santos (2002) offer support for the notion that multiple banking arises as a way for firms to mitigate hold up problems by showing that the likelihood of a firm switching from a single relationship to multiple relationships increases with the duration of that relationship. The study also shows that this switch is more likely to occur for firm with more growth opportunities and for those with poor performance, as expected based on the hold up hypothesis.¹⁰ On the other hand, a cross-country study finds that firms maintain a higher number of banking relationships in countries with unconcentrated banking sectors, contrary to expectations based on theories that emphasize hold up problems (Ongena and Smith, 2000).¹¹

The evidence on the effects of bank fragility on the likelihood of multiple banking and the number of banking relationships is somewhat conflicting. Using Italian data, Detragiache et al. (2000) find that relationship banks' fragility—measured in terms of the bank's size, volatility of liquidity, and nonperforming loans—has opposing effects on the likelihood of multiple banking and on the number of banking relationships. In particular, they find that bank fragility has a negative effect on the probability of borrowing from multiple banks, but a positive impact on the number of banking relationships, conditional on multiple banking. On the other hand, a study of Argentine banks finds that bank fragility has a positive impact on the likelihood that a firm will borrow from multiple banks (Berger et al., 2001). Finally, Ongena and Smith (2000) do not find a consistent and robust relationship between bank fragility and the number of banking relationships.¹²

Regarding the soft-budget constraint motivation for multiple banking, Ongena and Smith (2000) find that firms maintain a higher number of banking relationships in countries with inefficient judicial systems and poor enforcement of property rights where the potential for soft-budget

⁸ In some cases, these studies measure the number of lending relationships, rather than the more inclusive concept of banking relationships employed here.

⁹ Also consistent with the first cause, one study finds that firms that are foreign affiliates of multinational corporations often choose a private domestic bank for their cash management services (Berger et al., 2003). Presumably, these firms are often using their home nation bank for some other services, although that study did not have data on the firm's use of other banks.

¹⁰ Studies such as Houston and James (1996) and Santos and Winton (2005) offer evidence that public debt borrowing can also help firms mitigate hold up problems.

¹¹ One potential explanation for this result is that in concentrated systems, firms will have fewer banks from which to choose. At the same time, banks in unconcentrated systems are likely to be smaller and firms might need many relationships to satisfy their needs.

¹² In some estimations, they find that bank fragility has a negative impact and bank fragility squared has a positive impact on the number of banking relationships. However, these results disappear when they conduct a number of robustness tests.

constraint problems might be greater.¹³ We are unaware of prior empirical evidence on the fourth motive—costs and benefits to the firm from monitoring. This theory is relatively new and the available data on monitoring costs may be limited.

Our hypotheses about the effects of bank ownership type on multiple relationships and diversification across ownership types are based primarily on extensions of the third and fourth motives for multiple banking relationships in the literature. We broaden the concept of bank fragility in the third motive to describe the banking relationship itself. We hypothesize that relationships with foreign banks may be particularly fragile primarily because these banks are the most likely to leave the country. We also postulate that relationships with state-owned banks may be particularly sturdy primarily because these banks generally are not subject to distress because of government backing. We also broaden the interpretation of monitoring costs and benefits in the fourth motive to include the tolerance of poor loan repayment performance by state-owned banks, giving a net monitoring benefit to firms that borrow from a single state-owned bank in the form of less pressure to repay their loans. These extensions of the third and fourth motives yield the hypotheses that firms with banking relationships with a foreign bank may be most likely to maintain multiple relationships and to diversify their banking relationships across ownership types, and vice versa for state-owned banks.

2.3. *The performance effects of bank ownership type*

We are not aware of any studies that directly examine the effects of bank ownership type on our relationship questions and hypotheses. However, there are a number of studies on the relative performance of foreign and state-owned banks. The extant research generally suggests that the foreign banks perform more poorly on average than private domestic institutions in developed nations (e.g., DeYoung and Nolle, 1996; Berger et al., 2000). However, more relevant here is the common finding that the advantages of foreign banks often outweigh the disadvantages in developing nations in terms of bank performance. Foreign ownership is often associated with greater efficiency (e.g., Claessens et al., 2001; Bonin et al., 2005) and more competitive national banking systems (e.g., Claessens and Laeven, 2004; Martinez Peria and Mody, 2004). The literature is mixed when it comes to the effect on business credit availability with some studies finding positive effects (e.g., Clarke et al., 2002; Berger et al., 2004; Bhaumik and Piesse, 2005) and others finding reduced credit, in particular for opaque firms (Berger et al., 2001; Haber and Musacchio, 2005; Detragiache et al., 2006). Other literature shows that foreign banks provide a greater share of total funds in countries with stronger creditor rights and legal enforcement and less government ownership of banking assets (Esty, 2004) and in countries with smaller cultural and geographical “distances” between the foreign bank headquarters and local branches (Mian, 2006).

The empirical literature on state-owned banks in developing nations generally finds unfavorable performance. Individual state-owned institutions have relatively low efficiency and high nonperforming loans, and large market shares for state-owned banks are associated with reduced access to credit, diminished financial system development, and slow economic growth (e.g., La Porta et al., 2002; Barth et al., 2004; Beck et al., 2004; Berger et al., 2004, 2005b). In some cases, they have also been found to subsidize or direct credit for political purposes (e.g., Cole, 2004;

¹³ In countries with low judicial efficiency and weak property rights, banks might have a greater incentive to refinance to avoid going to the courts.

Sapienza, 2004) or lend mostly to large firms (e.g., Francisco and Kumar, 2004). The low efficiency and high nonperforming loans are not necessarily contrary to the objectives of state-owned banks that are mandated to subsidize some negative net present value projects. However, the generally reduced access to credit, diminished development, slow economic growth, and focus on large firms do not appear to be consistent with their mandates.

3. The Indian banking sector

We distinguish among four categories of banking institutions identified by the Reserve Bank of India (2005) (RBI): *Foreign banks* that mostly entered after 1990 and operate local branches, the state-owned *State Bank of India (SBI)* formed in 1955 and its associates; *nationalized banks* that were formerly private large banks and became state-owned in two waves, 1969 and 1980, and *private Indian banks* that were mostly created after 1990.

Following independence in 1945, the RBI was formed as the central bank and high priority was given to increasing credit to rural areas and small businesses. In 1955, the government took over the largest bank, the Imperial Bank of India, to form SBI. The State Bank of India Act in 1959 directed SBI to take over regional banks that were associated with local governments and make them subsidiaries of SBI, which were later named “associates.” SBI is now the largest commercial banking organization in the country—and one of the largest in the world. SBI and its seven regional associates have a substantial rural branching footprint—of about 14,000 branches of these banks, 74% are located in rural and semi-urban areas (Indian Banks’ Association, 2003).

Given continued pressure to extend bank credit to the agricultural and small business sectors, the Indian government nationalized 14 large banks in 1969 and another 6 banks in 1980 to redirect credit to “underserved” sectors and populations. Unlike SBI, nationalized banks remained corporate entities and retained most of their management and staff. Although their boards of directors were replaced by the state, appointees included representatives from both the government and private industry (Banerjee et al., 2005). RBI continued to fix interest rates on loans, and a significant portion of nationalized banks’ deposit bases were redirected to support government expenditures through statutory measures that required banks to maintain specified fractions of their total deposits as cash balances with RBI and additional fractions in government and quasi-government securities.¹⁴ However, the nationalized banks continue to the present day to maintain relationships with large firms that begun prior to nationalization. Thus, in our empirical analysis, we distinguish between the two state-owned bank categories to allow for the effects of their differences in governance and history on their relationship behavior.¹⁵

Banking sector liberalization and deregulation in India started in the early 1990s as part of a comprehensive reform agenda. This included permission to establish de novo banks and the entry of foreign banks, the deregulation of branch expansion, and the privatization of some state-owned banks. Interest rates were also liberalized and banks were permitted to invest in equity. However,

¹⁴ Previous literature finds that the extension of credit by Indian banks is affected by lending restrictions and other RBI regulations (Bhaumik and Piesse, 2005).

¹⁵ Both SBI and nationalized banks are subject to Central Vigilance Commission (CVC) oversight. The CVC, which was designed to prevent cronyism, can hold loan officers at these banks criminally liable for lost loans (Banerjee et al., 2005). As a result, loan officers in SBI and nationalized banks might focus more on relatively safe loans and hard information lending technologies, since officers may be less likely to be prosecuted when the ex ante probability of loss was low and when hard information is available to document the decisions.

Table 1
Banking statistics

	# Banks	# Branches	# Accounts	Total deposits (million US\$)	Total assets (million US\$)
Foreign	46	251	26,830	12,544	21,579
SBI	8	13,550	989,850	66,146	85,381
Nationalized	20	32,579	2,346,410	115,979	132,856
Private	36	5524	290,800	28,963	34,625

Statistics are from the Reserve Bank of India (RBI) for 2001.

as of 2004, all commercial banks were still required to make loans to “priority sectors” at below-market rates. These sectors consist largely of agriculture, exporters, and small businesses.

Most foreign banks began operating in the 1990s under a license to open branches and are permitted to take deposits and provide credit in accordance with local banking laws and RBI regulations.¹⁶ Between 1994 and 2000, 21 foreign banks were established. Foreign banks have generally not purchased shares of local Indian banks, since foreign banks were restricted to a ceiling of 10% of voting rights, even though foreign banks could legally own up to 74% of equity. Planned revised regulations will allow foreign banks to open 100% capitalized wholly-owned subsidiaries in India. Foreign banks have typically focused their operations in the top 25 cities in the country, likely due in part to restrictions on branch expansion.¹⁷ The foreign banks generally use more modern equipment, pay higher salaries, and attract better-trained employees (IndiaMart, 2004).

Private banks are primarily de novo entrants that were granted banking licenses during the financial liberalization in the early 1990s. A total of 25 de novo private banks began operations between 1994 and 2000. There are also a small number of incumbent private banks that existed before 1990 and some state-owned institutions that have been successfully privatized. An example of the latter is ICICI, which was formed in 1955 as a state-owned institution at the initiative of the Government of India and the World Bank to create a development financial institution for providing medium- and long-term project financing to Indian businesses. During the 1990s, ICICI was privatized and evolved into a private, full-service bank and is now India’s second largest bank offering a wide range of services to retail and corporate customers.

As shown in Table 1, the foreign banks are most numerous, but they have relatively few branches and accounts and also have fewer deposits and assets than the other types. Nationalized banks are the largest type as measured by number of branches, accounts, deposits, and assets. The state-owned banks combined—SBI plus the nationalized banks—dominate the banking sector with about 80% of deposits and assets.

4. Data and summary statistics

We match data for the year 2001 from nonfinancial firms, the banks with which they have relationships, and information on their local market. The firm data are from *Prowess*, an electronic

¹⁶ A few foreign banks, such as Standard Chartered, have had limited operations in India for decades.

¹⁷ Foreign banks currently operate only on a branch license basis under which they are required to keep locally \$25 million in capital for the first three branches. Further expansion does not require additional capital, but requires RBI approval, which is often difficult to receive.

database produced by the Centre for Monitoring Indian Economy (CMIE).¹⁸ This database includes firms that are required to file annual accounting reports and have submitted reports for at least three years. This comprises: (i) firms that are listed on a national exchange (National Stock Exchange or Bombay Stock Exchange), and (ii) all unlisted public limited companies that have sales or assets more than Rs. 200,000,000 or about US \$4.23 million (at 2001 exchange rates). Prowess includes balance sheet, income statement, and other financial information for over 7000 firms over time. Prowess also includes information on the ownership type of the firm and the names of the banks with which the firm maintains relationships. The data set lists up to 26 banks with which the firm has relationships of all types—including lending, deposit, or other types of relationships.¹⁹

We exclude a number of firms from the sample. First, we drop financial firms and firms with missing key financial information, reducing the sample to 4382 firms. We also exclude 628 firms that do not list any relationship banks and 315 firms that have a banking relationship with a financial institution that is not regulated by the RBI and hence does not submit audited financial statements to RBI.²⁰ Finally, we exclude 18 firms for which the ownership of the firm is either cooperative or undisclosed, and one firm with missing information on bank liquidity. These exclusions reduce our sample of firms to 3422.

Table 2, Panel A shows definitions and summary statistics of all firm characteristics based on the final sample of 3422 nonfinancial firms with complete data needed for the regression analyses. For variables that are logged in regressions, we show means for the levels. The average firm size (*Log Assets*) in our sample ranges from an asset size of Rs. 200,000 thousand to Rs. 55 billion, with an average of Rs. 278 million (about US \$6 million). Our sample generally does not include the smallest firms in India due to the requirements for firms to be included in Prowess. Firm age, measured as the natural log of the number of years since incorporation (*Log Age*), ranges from 2 to 178 years, with an average age of 20.95 years.

We include two direct measures of access to nonbank external finance. We use a dummy for firms that are listed on one of the two national exchanges (*Listed*), 25% of the sample. These firms have access to public equity financing, which may reduce their dependence on banks. Listed firms may also have greater transparency because of exchange disclosure requirements. We also include a dummy for firms that belong to Indian business groups (*Business groups*), 36% of the sample. These firms may have access to inter-company loans or be able to use other firms in their group as guarantors.²¹

Our third set of firm variables includes dummies that classify firm ownership, as identified by CMIE. In particular, we distinguish between foreign, state-owned, and private domestic firms (the omitted category). A firm's ownership may affect its access to and need for bank finance. Foreign firms may have cheaper financing overseas or via their parent firm and state-owned firms may secure financing from government agencies (including banks) directly or gain access

¹⁸ Others have used Prowess to study the privatization of state-owned firms (Gupta, 2005) and the effect of firm ownership and industry concentration on changes to entry regulations (Chari and Gupta, 2005).

¹⁹ Our sample includes five firms with syndicated loans underwritten in 2001 (Loan Pricing Corporation). We are unable to identify the nature of the relationship between banks in the consortium and the borrower, which might be “transaction” rather than “relationship” banks. However, the small number of firms with syndicated loans relative to our sample of over 3000 firms should not significantly affect our overall results.

²⁰ Thus, we drop firms with relationships with development banks, co-operative banks, and offshore foreign banks, since we do not have comparable bank data (we use only domestic assets and capital of foreign bank branches).

²¹ Prior research finds that firms belonging to diversified Indian business groups outperform unaffiliated firms (Khanna and Palepu, 2001) and are less likely to become bankrupt during financial distress (Gopalan et al., 2005).

Table 2
Variable definitions and summary statistics

Variable	Definition	Mean	Min.	Max.	Std. Dev.
<i>Panel A. Firm Characteristics</i>					
<i>Firm Size and Age</i>					
Log Assets	Log of total assets in millions Rs. Source: CMIE. (Mean shown is for Assets, not Log Assets.)	277.95	0.02	54918.89	1848.52
Log Age	Log of Age in years. Source: CMIE. (Mean shown is for Age, not Log of Age.)	26.62	2	178	20.95
<i>Firm Access to External Finance</i>					
Listed	Dummy variable equal to 1 if the firm is listed on the Bombay Stock Exchange (BSE) or National Stock Exchange (NSE) and 0 otherwise. Source: CMIE.	0.25	0	1	0.43
Business group	Dummy variable equal to 1 if the firm belongs to an Indian business group and 0 otherwise. Source: CMIE	0.36	0	1	0.48
<i>Firm Ownership</i>					
Foreign firm	Dummy variable equal to 1 if the firm is foreign-owned and 0 otherwise. Source: CMIE.	0.06	0	1	0.25
State-owned firm	Dummy variable equal to 1 if the firm is state-owned and 0 otherwise. Source: CMIE.	0.04	0	1	0.19
<i>Firm Operations</i>					
ROA	The ratio of profit before interest and tax to total assets (with tails cut above 99th and below 1st percentile). Source: CMIE.	0.04	−0.50	0.39	0.11
Leverage	The ratio of total debt to equity. Source: CMIE.	0.39	0	2.45	0.35
R&D expenses	Ratio of R&D expenses to capital. Source: RBI.	0.16	0	43.91	1.61
<i>Panel B. Banking Relationships and Relationship Bank Characteristics</i>					
<i>Banking Relationships</i>					
Multiple banks dummy	Dummy variable equal to 1 if the number of banking relationships is greater than 1 and 0 otherwise. Source: CMIE.	0.60	0	1	0.49
Number of banking relationships	Numerical variable equal to the number of banking relationships. Source: CMIE.	2.73	1	26	2.48
Diversification	Dummy equal to 1 for firms for firms that diversify their relationships across banks of different ownership types, i.e., have relationships with at least two different ownership types.	0.49	0	1	0.50
<i>Relationship Bank Size and Fragility</i>					
Bank size	The log of mean assets (in million Rs.) of relationship banks. Source: Reserve Bank of India (RBI). (Mean shown is for Assets, not Log Assets.)	839,418	2,950.46	3,156,442.00	880,098.40
Bank liquidity	Mean of liquidity ratio (ratio of cash plus balances with other banks plus money market instruments over total assets) for relationship banks. Source: RBI.	0.19	0.04	0.55	0.05
<i>Relationship Bank Ownership</i>					
At least 1 foreign	Dummy variable equal to 1 if at least one relationship bank is a foreign bank and 0 otherwise. Source: RBI.	0.19	0	1	0.39
At least 1 nationalized	Dummy variable equal to 1 if at least one relationship bank is a nationalized bank and 0 otherwise. Source: RBI.	0.73	0	1	0.44

Table 2 (continued)

Variable	Definition	Mean	Min.	Max.	Std. Dev.
At least 1 SBI	Dummy variable equal to 1 if at least one relationship bank is an SBI bank and 0 otherwise. Source: RBI.	0.49	0	1	0.50
At least 1 private	Dummy variable equal to 1 if at least one relationship bank is a private Indian bank and 0 otherwise. Source: RBI.	0.33	0	1	0.47
<i>Panel C. Local Market Characteristics</i>					
Log number of banks in state	Log of number of banks that operate in each state. Source: RBI. (Mean shown is for number of banks, not Log banks.)	61.13	6	68	9.09
Bank ownership concentration	Sum of squared shares of number of banks of ownership type <i>i</i> over total number of banks, where <i>i</i> : foreign, SBI, nationalized and private. Source: RBI.	0.30	0.27	0.67	0.04
At least 1 foreign bank present	Dummy variable equal to 1 if there is at least 1 foreign bank in the state. Source: RBI.	0.97	0	1	0.16
Log population density	Log of density of the population in 1000 people per square kilometer. Source: Census India 2001. (Mean is reported for Population Density, not Log Population Density.)	1.44	1.09	92.94	28.16

indirectly by virtue of an implicit government guarantee. In our sample, approximately 90% of firms are privately-owned, 6% are foreign-owned, and 4% are state-owned.

The fourth group of variables measure firm performance. We include return on assets (*ROA*) and the ratio of total debt to total assets (*Leverage*) to control for profitability and indebtedness, respectively. Average ROA is 0.04 and the average leverage ratio is 0.39.²²

We also include controls for the firm's location and sector in all regressions, but do not display these in the tables. We use dummies for four Indian regions (North, East, South, and West) and six industry sectors (food, textile, chemicals, electronics, machinery and tools and others).²³

Panel B shows our variables for banking relationships, and the average characteristics of all banks with which the firm has a banking relationship. We include a dummy that equals one if the firm has multiple banking relationships (*Multiple banks dummy*) and a separate variable that records the actual number of banking relationships up to 26 (*Number of banking relationships*). About 60% of firms have multiple banking relationships, and the average firm has 2.73 relationships. Finally, we also include a dummy (*Diversification*) for firms that diversify their relationships across banks of different ownership types, i.e., have relationships with at least two

²² In some estimations, we also included sales growth but since this variable was never significant and reduced the sample of firms, these estimations are not shown.

²³ Approximately 40% of firms in the sample are located in Western India, 30% are in the South, 19% are located in the North and 14% are in Eastern India. In terms of sectors, 22% of firms are in the chemicals and pharmaceutical sectors, 30% are in the electronics and machinery sectors, 15% are in the service industry, 10% are in textiles, and 9% are in the foods sector. The remaining 14% are in the "others" category, which includes glass and ceramics, paper and printing, construction, mining and quarrying; extraction of crude petroleum and natural gas; manufacture of coke; refined petroleum products and nuclear fuel; electricity, gas, steam and hot water supply; manufacture of furniture and manufacturing N.E.C.; hotels and restaurants; diversified; etc.

different ownership types. Almost half of the firms, 49%, diversify across bank ownership types, suggesting that diversification is important.

Balance sheet information on banks is from the Accounts of Scheduled Commercial Banks, published by the RBI. Similar to Detragiache et al. (2000), we include the average bank size (*Bank size*) and ratio of liquid assets (cash, balance with other banks, and money market instruments) to total assets (*Bank Liquidity*) of the firm's relationship banks.²⁴ The average bank size is Rs. 839,418 billion (about US \$18,467 billion) in assets.²⁵ The average ratio of liquid to total assets is 0.19.

We also create dummies for the ownership type of banks—foreign, SBI, nationalized, or private. Most firms, 73%, have a relationship with a least one nationalized bank, 49% with an SBI bank, 33% with a private bank, and 19% with a foreign bank.

Panel C shows the local market characteristics used to account for differences in the local economy and supply of banking services, using the Indian state as the local market. CMIE provides information on each firm's "headquarters district," the main location of firm operations. Sample firms are located in 25 different states. We also use information on the total number of banks in the market from the RBI Branch Banking Statistics (RBI, 2005). We find that the average local market has 61 banks, ranging from a minimum of 6 for one very small state to a maximum of 68 (*Log Number of banks in state*). In the model for relationship bank ownership type, we include a dummy for the presence of at least one foreign bank in the state to control for whether the firm has a convenient choice of a foreign bank. At least one foreign bank operates in 16 out of the 25 states of India represented in our sample. However, because most firms are in those 16 states, the mean for this variable (*At least 1 foreign bank present*) is 0.97. In the regressions where we estimate the likelihood that firms will diversify across bank ownership types, we control for the degree of concentration in the bank ownership types operating in the local market. *Bank ownership concentration* is defined as the sum of squared shares of the number of banks of our four ownership types. The mean for this variable is 0.3. We use Census India 2001 to collect population density to proxy for rural versus urban areas (*Log Population density*). The average population density per square kilometer is 1441 people, with a wide range from 109 to 9294 people. All data are for 2001.

5. Empirical methodology

5.1. Determinants of relationship banks' ownership type

Our first model tests the effects of firm and local market characteristics on the ownership type of the firm's relationship banks:

$$\text{Bank ownership type} = f\{\text{Firm characteristics}; \text{Local market characteristics}\}. \quad (1)$$

²⁴ We do not control for banks' nonperforming loans as in Detragiache et al. (2000) because the problem of manipulation of these data through "evergreening"—rolling over overdue loans and/or providing additional credit to cover the required repayments on existing loans—is particularly problematic in India. It has been estimated that the actual nonperforming loan rate in India would be 3 percentage points higher than reported rates if restructured loans were taken into account (Federal Reserve Bank of San Francisco, 2005). Moreover, this problem also appears to be skewed by bank ownership type, being especially severe for state-owned banks in India. However, our results on the significance of relationship bank types do not change if we add the nonperforming loans ratio.

²⁵ The average size of all the commercial banks in our sample (independent of how often they serve as a bank) is considerably lower, approximately US \$2 billion.

Our dependent variables identify a firm's reliance on particular types of banks. We examine if the firm uses at least one bank of a particular ownership type, using dummies which equal 1 if one or more of the relationship banks of a firm is of the given ownership type (foreign, SBI, nationalized, or private) and 0 otherwise. The firm characteristics include measures of firm size, age, access to external finance, ownership type, financial performance, location, and industry type. Local market characteristics include a dummy for the presence of at least one foreign bank (so the firm has a convenient choice of a foreign bank) in the state where the firm's headquarters is located. We also control for the population density of the state where the firm is located.

We estimate Eq. (1) using a probit model to determine the likelihood that at least 1 bank is foreign, SBI, nationalized, or private. This model allows us to test the hypotheses that foreign banks tend to provide banking services for transparent firms (i.e., larger, older, listed, and foreign firms) and to investigate whether state-owned banks tend to establish relationships with firms for which they may have mandates to serve, such as small, opaque firms with less access to private-sector credit, state-owned firms, and firms in rural areas.

5.2. Determinants of multiple banking relationships and number of relationships

Our second model investigates the determinants of multiple relationships and the number of these relationships in two ways. First, following [Detragiache et al. \(2000\)](#), we estimate a two-step Heckman selection model. In the first stage we estimate the likelihood that a firm has multiple banking relationships and in the second stage we estimate the number of relationships. We also use their same exclusion restriction to identify the two-step model. In particular, we assume that firms' R&D expense ratio helps explain whether the firm has more than one banking relationship, because high-intensity research firms may be subject to more rent extraction by single relationship bank, but beyond that will have no effect on the actual number of relationships.²⁶ Second, we study the actual number of banking relationships (*Number of banking relationships*) by estimating a Poisson model that is frequently used with count data.

In order to examine the effects of bank ownership type, we look at cases where firms have a relationship with at least one bank of a given ownership type. This cannot be tested in a single-equation framework, as firms with at least one bank of two different ownership types would by definition have multiple bank relationships.²⁷ Therefore, we estimate four separate equations, each with a different bank ownership type dummy, and test for the equality of bank ownership coefficients across these equations. In all cases, we assume that multiple banking relationships are a function of firm, local market, and relationship banks' characteristics²⁸:

Multiple Relationships (Dummy or Number)

$$= g\{\text{At least one bank of ownership type } i, \text{ where } i = \text{foreign, SBI, nationalized,} \\ \text{or private; Firm characteristics; Bank fragility indicators;} \\ \text{Local market characteristics}\}. \quad (2)$$

²⁶ On the other hand, R&D intensity may be associated with single banking if information leakages to competitors are expected to be more likely with multiple banking ([Yosha, 1995](#))

²⁷ In other words, the dummies for at least one bank foreign, at least one bank SBI, at least one bank nationalized and at least one bank private are not mutually exclusive categories.

²⁸ We constrain the parameters for these control variables to be the same across every equation, although our results do not change significantly if we do not impose these restrictions.

The firm characteristics in Eq. (2) are identical to those in Eq. (1). We expect transparent firms (large, listed, foreign) to be more likely to have multiple relationships because of needs that cannot be fulfilled by a single bank and because they less often require single relationships to address opacity problems or minimize duplicative costs. In contrast, we expect small, young firms with limited access to credit to be more likely to have single relationships because of requirements for fewer services, greater need to exclusivity to resolve information problems, and inability to bear the costs of multiple relationships. We also expect state-owned nonfinancial firms to be more likely to have multiple relationships because they are typically very large and operate in many states.

The relationship bank characteristics include measures of the average size of all banks the firm has a relationship with and the average bank liquidity ratio. While the literature has included firm and market characteristics and sometimes also measures of bank fragility, no prior study of multiple banking has, to our knowledge, included variables to distinguish between bank ownership types.

We use Eq. (2) to test the key hypotheses that relationships with foreign banks may be particularly fragile (most likely to leave the country) and relationships with state-owned banks may be particularly sturdy (least subject to distress, least likely to withdraw due to deterioration of firm condition). We also test the more conventional hypothesis that the number of banking relationships should increase with bank fragility.

Finally, the local market characteristics differ in two ways from those in Eq. (1). First, we exclude the dummy for the presence of at least one foreign bank, which is not necessary for multiple banking. Second, we include the log of the number of banks in the market—the state where the firm's headquarters is located. More local banks may indicate less bank market power, reducing the incentive for multiple banking to avoid bank hold up problems. At the same time, multiple banking may in some cases only be possible in states with a larger number of banks.

5.3. Determinants of the likelihood of diversification of bank ownership type

Our third model investigates whether firms diversify across bank ownership types. In particular, we conduct probit estimations of the likelihood that firms will diversify, where the dependent variable, *Diversification*, is a dummy that equals one if the firm has relationships with at least two different bank ownership types and zero otherwise. To be clear, a diversified firm has multiple banking relationships and not all are with banks of the same ownership type (e.g., a foreign bank and a nationalized bank), and an undiversified firm either has a single relationship or has multiple relationships with the same ownership type (e.g., all foreign banks). As in Eq. (2) for the number of banking relationships, we assume that diversification is a function of firm, local market, and average relationship bank characteristics. We again estimate four separate equations, constraining the firm, bank fragility and local market characteristics to remain the same, varying only the bank ownership type.

$$\begin{aligned} \text{Diversification} = h\{ & \text{At least one bank of ownership type } i, \text{ where } i = \text{foreign, SBI,} \\ & \text{nationalized, or private; Firm characteristics;} \\ & \text{Banks fragility indicators; Local market characteristics} \}. \end{aligned} \quad (3)$$

In Eq. (3), the firm and bank characteristics are the same as those in model (2) for the number of banking relationships. However, in the market characteristics, we replace the log of the number of local banks in the state with an index of bank ownership concentration in the state. This is

defined as the sum of the squared shares of the numbers of banks of each type relative to the total number of banks in the state. Presumably, there will be less diversification of bank ownership type among firms when there is more concentration of bank ownership in the market, simply because firms have fewer choices.

The key hypotheses tested using model (3) are consonant with those for model (2). We test whether firms that have relationships with foreign banks are more likely to diversify across bank ownership types, and vice versa for those with relationships with state-owned banks.

6. Empirical results

Tables 3, 4, and 5 show our regressions results for the determinants of the bank ownership types (Table 3), multiple banking relationships and number of relationships (Table 4), and diversification across bank ownership types (Table 5). We report marginal effects instead of coefficients for the exogenous variables to facilitate evaluation of whether their magnitudes are of economic importance. In most cases, our key exogenous variables of interest are dummy variables such as a bank ownership type (e.g. foreign bank) or firm characteristic (e.g., state-owned firm) that take on the values 0 or 1. For each of these variables, the reported marginal effect is the difference in predicted value for the dependent variable for a dummy value of 1 versus 0, with all other exogenous variables at their means. For the continuous exogenous variables, the reported marginal effects are the derivatives of the predicted dependent variable for small changes in the exogenous variables.

6.1. Results for determinants of bank ownership types

Table 3 shows the marginal effects from a probit model for the determinants of bank ownership types (Eq. (3)). The results in Table 3, column (1) are generally consistent with the hypothesis that foreign banks tend to provide banking services to transparent firms. Foreign banks serve mostly large, well-connected, listed, and foreign firms. A one percent increase in firm size raises the likelihood that firms establish a relationship with a foreign bank by 4.6 percentage points. Listed, foreign-owned enterprises and firms belonging to a business group have a 6.3, 33.1 and 5.4 percentage points higher likelihood of maintaining a relationship with a foreign bank, respectively.

The results in columns (2) and (3) show somewhat mixed results on whether state-owned banks provide banking services to the types of firms they are mandated to serve. SBI is not found to be more likely to serve small, young, private firms, although it is more likely to serve state-owned and rural firms (evident from the negative effect of population density). Notably, government-owned firms have a 38.2 percentage points higher probability of having a relationship with an SBI bank. The other type of state-owned banks, nationalized banks, are significantly less likely to provide banking services for small, young, private, or rural firms. Conversely, low-profitability firms have a higher likelihood of maintaining a relationship with this type of bank relative to well-performing firms, consistent with the evidence in Cole (2004) that these banks often make politically-motivated, as opposed to performance-driven loans.

Finally, results in column (4) show that consistent with what was found for other bank types, large and listed firms also have a higher likelihood of securing a relationship with private banks.

Table 3

Marginal effects for the determinants of bank relationship types—probit estimations

	At least one bank foreign (1)	At least one bank SBI (2)	At least one bank nationalized (3)	At least one bank private (4)
<i>Firm characteristics</i>				
Log of assets	0.046 [8.06]***	0.068 [9.16]***	0.023 [3.73]***	0.063 [8.99]***
Log of age	−0.007 [0.75]	0.026 [1.95]*	0.046 [4.02]***	−0.064 [5.12]***
Listed	0.063 [3.51]***	0.06 [2.36]**	0.082 [3.84]***	0.103 [4.35]***
Business group	0.054 [3.38]***	0.044 [2.04]**	−0.007 [0.41]	−0.005 [0.27]
Foreign-owned	0.331 [10.59]***	−0.044 [1.13]	−0.118 [3.38]***	−0.027 [0.78]
Government-owned	−0.09 [2.77]***	0.382 [6.57]***	−0.012 [0.26]	−0.162 [3.68]***
Return on assets	0.056 [0.80]	0.057 [0.61]	−0.262 [3.33]***	0.118 [1.35]
Debt to total assets	−0.112 [3.28]***	0.078 [2.69]***	0.006 [0.24]	−0.053 [1.85]*
<i>Local market characteristics</i>				
Log population density	0.012 [1.32]	−0.033 [2.59]***	0.017 [1.56]	0.028 [2.21]**
At least one foreign bank present in state	0.102 [2.49]**	−0.084 [1.54]	0.059 [1.19]	0.117 [2.39]**
Observations	3422	3422	3422	3422
Pseudo <i>R</i> -squared	0.17	0.1	0.04	0.09

Robust *z*-statistics are in brackets. Variable definitions are in Table 2.

* Significance at 10%.

** Idem, 5%.

*** Idem, 1%.

However, these banks also tend to serve young firms, as well as those that are not part of business groups, a result which is different from that found for other types of banks.²⁹

6.2. Results for determinants of multiple banking relationships and number of relationships

Table 4 shows the results of our tests for the determinants of whether firms have multiple banking relationships and the number of these relationships. The table shows both stages of the two-stage selection model—likelihood of multiple banking (1st stage), and the number of relationships for those with multiple relationships (2nd stage). This table also shows results from a Poisson model for the actual number of relationships. The findings for the two methods are generally consistent.

²⁹ This result might be due to the fact that private banks have only recently been allowed to operate in India and are therefore forced to enter into relationships with younger firms that did not have already established ties to other, in particular, state-owned banks.

Table 4

Marginal effects of the determinants of multiple banking and the number of banking relationships

	1st stage Heckman Likelihood of multiple banking		2nd stage Heckman Number of banking relationships		Poisson Number of banking relationships	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Firm characteristics</i>						
Log of assets	0.101 [27.57]***	0.092 [24.79]***	1.869 [11.92]***	1.318 [19.51]***	0.582 [40.48]***	0.516 [37.95]***
Log of age	0.002 [0.29]	0.004 [0.61]	0.068 [0.54]	0.073 [0.92]	0.037 [1.66]*	0.041 [1.98]**
Listed	0.195 [16.84]***	0.182 [15.44]***	2.165 [6.42]***	1.223 [7.11]***	0.405 [9.19]***	0.332 [8.11]***
Business group	0.067 [6.53]***	0.062 [6.03]***	0.824 [3.67]***	0.447 [3.36]***	0.172 [4.95]***	0.141 [4.38]***
Foreign-owned	0.107 [6.03]***	0.090 [4.89]***	1.061 [2.77]***	0.391 [1.71]*	0.185 [3.26]***	0.112 [2.15]**
Government-owned	0.075 [3.04]***	0.077 [3.1]**	1.235 [2.77]***	1.132 [4.03]***	0.216 [2.31]**	0.280 [3.18]***
Return on assets	−0.211 [4.67]***	−0.228 [4.98]***	−1.889 [2.12]**	−1.382 [2.48]**	−0.085 [0.62]	−0.167 [1.32]
Debt to assets	0.020 [1.49]	0.028 [2.05]**	0.475 [1.71]*	0.402 [2.3]**	0.202 [4.61]***	0.209 [5.16]***
R&D expenses	−0.004 [1.12]	−0.008 [1.97]**				
<i>Relationship bank characteristics</i>						
Average log size of relationship banks	−0.019 [4.19]***	−0.007 [1.54]	−0.410 [4.07]***	−0.256 [4.02]***	−0.138 [10.34]***	−0.113 [8.54]***
Average liquidity of relationship banks	−0.620 [7.56]***	−0.695 [8.39]***	−9.283 [4.36]***	−7.270 [5.59]***	−2.253 [9.48]***	−2.280 [10.10]***
At least 1 bank foreign		0.333 [38.5]***		3.864 [11.61]***		1.481 [16.89]***
At least 1 bank SBI		0.193 [17.51]***		2.442 [11.22]***		0.981 [17.19]***
At least 1 bank nationalized		0.170 [17.34]***		2.040 [10.84]***		0.788 [17.97]***
At least 1 bank private		0.309 [34.9]***		3.609 [12.3]***		1.394 [20.72]***
<i>Local market characteristics</i>						
Log number of banks in state	0.156 [5.08]***	0.151 [4.79]***	1.506 [2.4]**	0.782 [2.04]**	0.091 [0.82]	0.086 [0.91]
Log population density	−0.010 [1.35]	−0.011 [1.46]	−0.066 [0.46]	−0.021 [0.23]	0.015 [0.59]	0.012 [0.52]
Number of firm observations	3422	3422	3422	3422	3422	3422
<i>Difference tests on relationship bank types</i>						
At least 1 bank foreign— at least 1 bank SBI		0.139 [8.73]***		1.422 [5.09]***		0.501 [4.99]***
At least 1 bank foreign— at least 1 bank nationalized		0.163 [10.05]***		1.824 [6.71]***		0.693 [7.67]***

(continued on next page)

Table 4 (continued)

	1st stage Heckman Likelihood of multiple banking		2nd stage Heckman Number of banking relationships		Poisson Number of banking relationships	
	(1)	(2)	(3)	(4)	(5)	(6)
At least 1 bank foreign—		0.024		0.255		0.087
at least 1 bank private		[2.83]***		[0.95]		[0.63]
At least 1 bank SBI—		0.024		0.401		0.193
at least 1 bank nationalized		[2.00]**		[2.14]**		[2.82]***
At least 1 bank SBI—		−0.115		−1.167		−0.414
at least 1 bank private		[8.47]***		[4.89]***		[4.99]***
At least 1 bank nationalized—		−0.139		−1.568		−0.606
at least 1 bank private		[10.78]***		[6.87]***		[8.28]***

Robust z -statistics are in brackets. Variable definitions are in Table 2.

* Significance at 10%.

** Idem, 5%.

*** Idem, 1%.

We run the models both with and without bank ownership variables. The findings of strong statistical significance and substantial magnitudes for the bank ownership dummies support our innovation of including these variables. Our main focus here is on the differences in effects across the bank ownership types. Hence, at the bottom of Table 4 we report the differences in marginal effects and z -tests for these differences. In column (2), we find that controlling for a number of firm-level variables and for other bank characteristics, firms with relationships with foreign or private banks are significantly more likely to maintain multiple banking relationships and a higher number of relationships relative to state-owned banks (both SBI and nationalized). The likelihood that firms banking with foreign banks have multiple relationships is 13.9 to 16.3 percentage points higher than that observed for the two categories of state-owned banks. Similar differences are found between firms with relationships with private banks relative to those in relationships with state-owned banks. In column (4), we also find that firms with foreign and private banking relationships are likely to have more relationships than state-owned banks, conditional on having multiple banks. The data predict about 1.4 to 1.8 more relationships for those with foreign banks and about 1.2 to 1.6 more relationships for those with private banks than those with state-owned banks. The Poisson differences in column (6) are qualitatively similar, although the numbers of additional relationships are smaller. The findings are consistent with our hypotheses that after conditioning on the other variables, relationships with foreign banks are the most fragile and relationships with state-owned banks are the most durable.³⁰

Another result in Table 4 is that firms that maintain relationships with larger and more liquid banks are less likely to enter into multiple banking relationships. This is contrary to the theory proposed in Detragiache et al. (2000) and to their prior findings for Italian firms, but consistent with results using data on Argentine firms in Berger et al. (2001).³¹ At least two arguments can be

³⁰ Table 4 also shows some differences between the two types of state-owned banks—those with nationalized banks are less likely to enter into multiple relationships and have fewer relationships—but this is not our focus.

³¹ The model by Detragiache et al. (2000) predicts that the probability of multiple banking decreases with bank fragility, but conditional on multiple banking, the fragility of relationship banks has a positive impact on the number of banking relationships. The prediction from Detragiache et al. (2000) regarding the likelihood of multiple banking hinges on the fact that the severity of the adverse selection problem is a decreasing function of bank fragility (see p. 1143).

made to explain these findings. First, if the amount of financing firms are able to obtain initially is a positive function of bank size (larger banks can sustain larger exposures), then firms that are able to secure relationships with large banks at the initial stage may have less need for multiple relationships for additional credits. Second, given that refinancings at later stages of a project are uncertain, firms with more fragile banks (smaller, less liquid) may prefer multiple banks to insure their future access to credit. We also find that firms with relationships with larger and more liquid banks tend to maintain a smaller number of banking relationships, given that they have more than one relationship, consistent with these arguments and with the Italian data.

Finally, not surprisingly, large, listed, well-connected and foreign-owned firms are more likely to maintain multiple relationships and to do business with a larger number of banks. High-profitability firms tend to be less likely to maintain multiple relationships and to operate with a smaller number of banks. This may be due to their greater ability to internally finance some of their operations.

6.3. Results for the determinants of the likelihood of bank ownership type diversification

Table 5 presents the empirical results for the likelihood that firms diversify across bank ownership type. We report marginal effects from simple probit estimations for the likelihood of diversification across all firms in columns (1) and (2), whether or not they have multiple banks. In columns (3) and (4), we examine only those firms with multiple banks because of the possibility that some firms want to diversify, but are too small to have the minimum of two banks needed to diversify or for some other reason have only one bank. For columns (3) and (4), we show the second stages of Heckman probit models for the likelihood of diversification across firms, given multiple banking relationships. The first stages for columns (3) and (4) have the same specifications as the first stages in Table 4 above, with very similar results (not shown).

Consistent with the findings on multiple banking and the number of banking relationships, we find that firms that bank with foreign banks are more likely to diversify across ownership types. Among these firms, the likelihood of diversification is between 15.7 and 23.2 percentage points higher than for those firms banking with state-owned banks (SBI and nationalized banks, respectively), which falls to between 8.1 and 18.8 percentage points higher for those with multiple banks. The findings for differences between firms with relationships with private banks and those with relationships with state-owned banks are nearly the same, since the coefficients on at least one bank foreign and at least one bank private are very close. Finally, there are some differences between the two types of state-owned banks—those banking with SBI banks are found to be 7.5 to 10.7 percentage points more likely to diversify across ownership types, relative to those firms doing business with nationalized banks.

Regarding the impact of other bank ownership characteristics, the results show little in the way of consistency. The effects of bank size are mostly positive and significant, but the signs of the effects of bank liquidity are mostly negative, and are not significant for firms with multiple banking relationships.

In terms of firm characteristics, the findings are generally similar to those for multiple relationships and number of relationships. We find that large and foreign-owned firms, as well as those belonging to business groups, are more likely to diversify across bank ownership types. Such firms tend to run more complex operations that might require different services from different types of banks. Firms with higher levels of profitability are found to be less likely to diversify across bank ownership types, perhaps due to a greater ability to internally finance their operations or to quickly establish a new relationship in the event that their existing banking relationships

Table 5

Marginal effects for the likelihood of diversification of bank ownership types

	Probit model all firms		Heckman probit model (2nd stage) firms with multiple banks	
	(1)	(2)	(3)	(4)
<i>Firm characteristics</i>				
Log of assets	0.109 [26.44]***	0.099 [23.11]***	0.115 [29.43]***	0.095 [17.11]***
Log of age	−0.002 [0.28]	0.002 [0.24]	−0.003 [0.43]	−0.005 [0.60]
Listed	0.166 [12.55]***	0.154 [11.07]***	0.165 [12.87]***	0.122 [6.51]***
Business group	0.033 [2.99]***	0.025 [2.23]**	0.034 [3.03]***	0.009 [0.66]
Foreign-owned	0.096 [4.83]***	0.07 [3.21]***	0.095 [4.66]***	0.048 [1.95]*
Government-owned	0.08 [2.75]**	0.086 [2.90]**	0.083 [3.07]**	0.094 [3.14]**
Return on assets	−0.16 [3.37]***	−0.191 [3.80]***	−0.165 [3.40]***	−0.140 [2.44]**
Debt to assets	−0.042 [2.67]**	−0.035 [2.20]**	−0.041 [2.72]**	−0.067 [3.48]***
<i>Relationship bank characteristics</i>				
Average log size of relationship banks	−0.003 [0.58]	0.012 [2.13]**	0.013 [2.45]**	0.049 [5.29]**
Average liquidity of relationship banks	−0.384 [4.15]***	−0.492 [5.12]***	−0.083 [0.78]	0.177 [1.03]
At least 1 bank foreign		0.459 [18.41]***		0.408 [16.18]***
At least 1 bank SBI		0.302 [22.24]***		0.327 [26.01]***
At least 1 bank nationalized		0.227 [19.39]***		0.220 [17.46]***
At least 1 bank private		0.438 [27.50]***		0.405 [19.27]***
<i>Local market characteristics</i>				
Log bank ownership concentration	−0.659 [4.75]***	−0.574 [4.02]***	−0.610 [4.75]***	−0.610 [3.91]***
Log population density	0.002 [0.30]	0.005 [0.57]	0.006 [0.82]	0.011 [1.21]
Number of firm observations	3354	3354	3354	3354
<i>Difference tests on relationship bank types</i>				
At least 1 bank foreign— at least 1 bank SBI		0.157 [9.24]***		0.081 [6.31]***
At least 1 bank foreign— at least 1 bank nationalized		0.232 [11.92]***		0.188 [11.28]***
At least 1 bank foreign— at least 1 bank private		0.021 [2.71]***		0.003 [1.95]*
At least 1 bank SBI— at least 1 bank nationalized		0.075 [5.62]***		0.107 [6.10]***

Table 5 (continued)

	Probit model all firms		Heckman probit model (2nd stage) firms with multiple banks	
	(1)	(2)	(3)	(4)
At least 1 bank SBI—		−0.136		−0.078
at least 1 bank private		[10.33]***		[6.20]***
At least 1 bank nationalized—		−0.211		−0.185
at least 1 bank private		[15.21]***		[13.18]***

Robust z -statistics are in brackets. Variable definitions are in Table 2.

* Significance at 10%.

** Idem, 5%.

*** Idem, 1%.

are discontinued. Finally, as expected, firms in states with a higher concentration of bank ownership types—i.e., smaller diversity of bank types—are less likely to be able to diversify across ownership types.

7. Conclusions

We formulate and test hypotheses about the links between bank ownership type and relationships using data from an important developing nation. Specifically, we directly address hypotheses about

- (1) the kinds of firms that have banking relationships with foreign, state-owned, and private domestic banks,
- (2) the effects of these bank ownership types on whether firms have multiple banking relationships and the number of these relationships, and
- (3) the effects of bank ownership type on the likelihood that firms diversify across ownership types.

Our analysis uses data from India, one of the largest and fastest growing developing nations, which also has a mix of all the major different bank ownership types. The Indian economy is representative as well of financial market imperfections that are prevalent in many developing countries.

Our data set is particularly informative on these issues because it includes observations for a large number of nonfinancial firms; their banking relationships and markets; and the banks themselves. The data set is for 2001, allowing a period of about 10 years for most of the effects of the liberalization of India's banking sector to have taken effect.

We test the hypothesis that foreign banks may be most likely to have a banking relationship with transparent firms (e.g., large, listed, foreign firms) and examine whether state-owned banks tend to have banking relationships with firms they are mandated to serve (e.g., small firms with limited credit access, state-owned firms, rural firms). We also test hypotheses that firms that bank with foreign institutions may be more likely to maintain multiple relationships, more relationships, and to diversify across ownership types by having at least one other relationship with a different ownership type. We test the converse for firms with state-owned banking relationships—that they are least likely to maintain multiple relationships, have many relationships, or diversify across bank ownership types.

These hypotheses are based primarily on extensions of current theories about banking relationships and multiple relationships. For instance, we build on the theory that firms may have multiple relationships to insure themselves against a premature withdrawal of services due to the financial fragility of their relationship banks. We broaden this concept to describe the fragility of the banking relationship itself. This is linked to bank ownership type based on arguments that relationships with foreign banks may be particularly fragile (most likely to leave the country) and relationships with state-owned banks may be most sturdy (least subject to distress, least likely to withdraw services due to firm deterioration).

Our empirical results are consistent with all of the hypotheses with regard to foreign banks. We find that firms with relationships with foreign banks are more likely than other firms to be transparent and to have multiple banking relationships, and tend to have more banking relationships than other firms. The data are also consistent with the hypotheses that firms with relationships with state-owned banks are less likely than other firms to maintain multiple banking relationships, tend to interact with a smaller number of banks and are less likely to diversify across ownership types. However, there is only mixed support for the hypothesis that state-owned banks establish relationships with the kinds of firms they are mandated to serve—state-owned banks do have more relationships with state-owned firms and rural firms, but not with smaller, more opaque firms.

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