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# **BANK COMPETITION AND ACCESS TO FINANCE**

**Thorsten Beck, Asli Demirgüç-Kunt and Vojislav Maksimovic**

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**Abstract:** Theory makes ambiguous predictions about the effects of bank market structure on access to external finance. Using a unique database for 74 countries and for firms of small, medium and large size we assess the effect of banking market structure on the access of firms to bank finance. We find that bank concentration increases financing obstacles, but only in countries with low levels of economic and institutional development. A larger share of foreign-owned banks dampens the effect of concentration on financing obstacles, while the effect is exacerbated by more restrictions on banks' activities, more government interference in the banking sector, and a larger share of government-owned banks.

**Keywords:** Financial Development; Financing Obstacles; Small and Medium Enterprises; Bank Concentration; Bank Competition

**JEL Classification:** G30, G10, O16, K40

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## 1. Introduction

While the recent empirical literature provides empirical evidence on the positive role of the banking sector in enhancing economic growth through a more efficient resource allocation, less emphasis has been put on the effect of the banking market structure.<sup>1</sup> Theory makes conflicting predictions about the relation between bank market structure and the access to and cost of credit. While general economic theory points to inefficiencies of market power, resulting in less loans supplied at a higher interest rate, information asymmetries and agency problems might result in a positive or nonlinear relation between the market power of intermediaries and the amount of loans supplied to opaque borrowers, in a dynamic setting. Similarly, empirical studies have derived conflicting results, showing a positive or a negative relation between competition in banking and the access to credit, its costs and economic growth. Most of these studies, however, focus on a specific country, mostly the U.S.

This paper explores the impact of bank competition on firms' access to credit for a cross-section of 74 developed and developing countries. Specifically, we use survey data on the financing obstacles perceived by firms and relate these data to the competitive environment in the country's banking market. We use both the market share of the largest three banks and regulatory policies that influence the competitive framework in which banks operate, such as share of bank license applications rejected and restrictions on banks' activities. We control for the ownership structure, and the institutional

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<sup>1</sup> For cross-country studies on finance and growth, see Beck, Levine, and Loayza (2000), Rousseau and Wachtel (2001) and Wurgler (2000). Rajan and Zingales (1998) show that industries that depend more on external finance grow faster in economies with better developed financial sectors. Demirguc-Kunt and Maksimovic (1998) show that countries with better developed banking and stock markets have a higher share of firms that grow beyond the rate predicted by their cash flow. Beck, Demirguc-Kunt and Maksimovic (2002) show that firms with higher financing obstacles grow more slowly, a relation that is dampened by better developed banking systems.

environment. We assess the impact of the market structure on firms of different sizes, while at the same time controlling for a large number of other firm characteristics.

Our results indicate that in more concentrated banking markets firms of all sizes face higher financing obstacles. This effect decreases as we move from small to medium and large firms, and holds when we control for a large array of firm and country characteristics. However, once we control for GDP per capita and its interaction with concentration, we find a significant and positive relation of concentration and financing obstacles only for countries with a GDP per capita below \$ 665, the level of Moldova.

At least as important as economic development, however, seems to be the interaction between bank concentration and regulatory and institutional country characteristics and the ownership structure of the banking system. The relation of bank concentration and financing obstacles turns insignificant in countries with well-developed institutions and a high share of foreign banks. Public bank ownership, a high degree of government interference in the banking system, and restrictions on banks' activities, on the other hand, exacerbate the impact of bank concentration on financing obstacles.

Our results provide evidence for theories that focus on the negative effects of bank market power on access to credit, especially for developing countries. For the most part, the results are not consistent with theories that predict a positive impact of bank concentration on alleviating financing obstacles for small firms and allowing them access to credit. Our findings underline the importance of taking into account the institutional and regulatory framework when assessing the impact of bank concentration on firm's financing obstacles, thus broadening the focus to the competitive and regulatory environment in which banks operate. They also stress the importance of regulations,

institutions, and ownership structure for policy makers who are interested in alleviating financing obstacles. While the concentration of the banking system cannot be changed directly through policies and might be more related to historic determinants than policies, policy makers can influence the ownership structure and regulatory framework of the banking system. For example, removing activity restrictions in a concentrated banking system alleviates the negative impact of bank concentration on access to finance.

This paper makes several contributions to the literature. First, while most empirical papers assessing the effect of bank concentration focus on a specific country, mostly the U.S., this paper uses cross-country analysis, including developed, developing and transition economies. Given the specific regulatory and institutional development of the U.S. a cross-country approach is important for drawing conclusions for policy makers in developing countries. We construct country-level measures of bank concentration from Bankscope and test for the robustness using data from Barth, Caprio, and Levine (2001).

Second, to our knowledge this is the first paper using firm-level data to evaluate the effect of market structure on firms' financing obstacles across a broad cross-section of countries and firms of different sizes.<sup>2</sup> Large parts of the theoretical literature on bank concentration has focused on small and young firms, so that being able to differentiate firms by size is important in testing these theories. We use the World Business Environment Survey (WBES), a major cross-sectional firm level survey conducted in 80 developed and developing countries, which includes the assessment of

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<sup>2</sup> While Cetorelli and Gambera (2001) use industry-level to assess the effect of bank concentration on industry growth, they are not able to differentiate between firms of different sizes. As discussed below, Clarke, Cull and Martinez-Peria (2001) include concentration in their firm-level analysis, but focus on the effects of foreign bank entry.

growth obstacles as perceived by firms of different sizes and other firm-specific information. The detailed information provided about the firms and the inclusion of small and medium-size firms makes this database unique.

Third, unlike previous studies we can exploit cross-country variance not only in bank concentration, but also in the regulatory environment and the ownership structure of the banking sector. We are thus able to take a broader perspective on the competitive environment of the banking market by including measures of the share of bank license applications rejected, restrictions on bank's activities and the ownership structure. We use indicators of regulatory policies and ownership structure from Barth, Caprio, and Levine (2001).

This paper is related to three other recent papers. Cetorelli and Gambera (2001) show that industries that depend more on external finance grow relatively faster in more concentrated banking sectors, while the overall effect of bank concentration on growth is negative. However, they base their analysis on industry-level data rather than individual firms. While they can exploit the variance across industries in term of dependence on external finance, they cannot exploit variance in the size of firms as in this paper. Beck, Demirguc-Kunt, and Maksimovic (2002) explore the effects of financing and legal obstacles as well as corruption on firm growth, using the WBES database. They find that firms that report higher obstacles grow more slowly. This effect is stronger for small firms, but is dampened in countries with higher levels of financial and institutional development. Here we focus on financing obstacles, as opposed to other obstacles to growth and explore whether the structure of the banking market affects financing obstacles. Finally, our paper is closely related to a recent paper using similar data by

Clarke, Cull and Martinez Peria (2001) that assesses the impact of foreign bank ownership on financing obstacles and the share of investment financed with bank finance. They find that a larger foreign bank presence decreases financing obstacles and increases the share of investment financed with bank finance, results that are robust to controlling for bank concentration and regulatory entry restrictions. Furthermore, they also present results that show that concentration has a negative impact on access to bank loans. However, because their study focuses on the impact of foreign penetration on access to credit they do not explore whether concentration impacts large and small firms differently, nor whether the impact is different in countries at different levels of institutional development.

The remainder of the paper is organized as follows. Section 2 discusses the motivation and theoretical underpinnings of our empirical analysis. Section 3 presents the data and section 4 describes the econometric methodology. Section 5 discusses the results and section 6 concludes.

## **2. Motivation**

Theory makes contradictory predictions about the effect of bank concentration on the supply and cost of loans. On the one side, standard economic theory predicts that market power results in a lower supply at a higher cost, thus reducing firm growth (we refer to this prediction as the *structure-performance hypothesis*). On the other side, taking into account informational asymmetries and agency costs leads to theories that predict a positive or nonlinear relation between market power and access to loans for opaque borrowers in a dynamic setting. We refer to this set of theories as the *information-*

*based hypothesis*. Further, other characteristics of the banking sector, such as the ownership structure and legal and informational environment might influence the relation between market concentration and supply and costs of loans. This section will discuss the different theories and the existing empirical literature.<sup>3</sup>

Standard economic theory suggests that any deviation from perfect competition results in less access by borrowers to loans at a higher cost (*structure-performance hypothesis*). Using an endogenous growth model, Pagano (1993) interprets the absorption of resources, resulting in a savings-investment ratio of less than one, and thus the spread between lending and deposit rates as reflecting “the X-inefficiency of the intermediaries and their market power.” Guzman (2000) shows that a banking monopoly is more likely to result in credit rationing than a competitive banking market and leads to a lower capital accumulation rate.

Informational asymmetries between lender and borrower, resulting in adverse selection, moral hazard and hold-up problems, however, may change the relation between market structure and access to loans from a negative to a positive or nonlinear one, as shown in several theoretical contributions. Petersen and Rajan (1995) show that banks with market power have more incentives to establish long-term relationships with young borrowers, since they can share in future surpluses. Similarly, Marquez (2000) shows that borrower-specific information becomes more dispersed in more competitive banking markets, resulting in less efficient borrower screening and most likely in higher interest rates. Dinç (2000), on the other hand, shows that the effect of competition on access to loans depends on the source and level of competition. He shows that there is an inverted

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<sup>3</sup> See also Cetorelli (2001a) for an overview over the empirical and theoretical literature on bank concentration.



U-shaped relation between the amount of relationship lending and the number of banks, with an intermediate number of banks able to sustain the maximum amount of relationship lending. Similarly, Cetorelli and Peretto (2000) show that there are offsetting effects of bank concentration. While bank concentration reduces the total amount of loanable funds, it increases the incentives to screen borrowers and thus the efficiency of lending. The optimal banking market structure is thus an oligopoly rather than a monopoly or perfect competition.

However, all these models assume a high degree of enforcement of contracts and of the capacity of banks to screen potential borrowers and do not model differences in the legal and institutional environments in which banks operate. These assumptions are theoretically important and empirically relevant. The positive relation between market power and lending to small and young borrowers might only hold if lenders are able to recover their collateral in case of failure and if they are able to screen the borrowers before-hand. Recent empirical literature has established a relation between availability and cost of loans and the legal and informational environment in which lenders and borrowers operate.<sup>4</sup> These findings suggest that institutions might affect the relation between market structure and access to loans.

The regulatory structure of the banking system might have important implications for the relation between market concentration and access to finance. High regulatory entry barriers might reduce the contestability and thus competitiveness of the banking

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<sup>4</sup> Beck and Levine (2002), Demirguc-Kunt and Maksimovic (1998) and Rajan and Zingales (1998) show that legal institutions influence the availability of financing to industries and the creation of new establishments. Claessens and Laeven (2003) show that in countries with strong investor protection laws, firms with less collateral have an easier time getting external finance than similar firms in countries with more poorly functioning legal institutions. Pagano and Jappelli (1999) show empirically the importance of information sharing between intermediaries for financial development.

system, independent of the actual market structure. Regulatory restrictions and government interference in the intermediation process, on the other hand, do not have a priori clear relation with the competitiveness of the banking system and borrowers' access to finance. These restrictions might decrease the competitiveness and efficiency in the banking system and impede banks from using their informational advantages. Restricting banks in their activities, however, might also increase their competition in the area they are limited to. Finally, the effect of concentration on access to finance might depend on the regulatory restrictions bank face and vice versa.

The ownership structure of banks might also influence the relation between market power and access to and costs of external financing. Domestically owned banks might have more information and better enforcement mechanisms than foreign owned banks, and so might be more willing to lend to opaque borrowers.<sup>5</sup> Government-owned banks are mostly non-profit-maximizing and often have the explicit mandate to lend to certain groups of borrowers.<sup>6</sup> The relation between bank concentration and access to loans might therefore differ across different ownership structures.

Most empirical studies of the effect of bank concentration on access to external finance and firm growth have focused on individual countries, and mostly the U.S. Hannan (1991) finds strong evidence that concentration is associated with higher interest rates across U.S. banking markets, thus providing evidence for the structure-performance hypothesis. Similarly, Black and Strahan (2002) find evidence across U.S. states that higher concentration results in less new firm formation, especially in states and periods

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<sup>5</sup> There is mixed evidence on the effects of foreign bank entry on small borrowers' access to finance. Compare the survey by Clarke et al. (2003) and the literature quoted therein.

<sup>6</sup> La Porta, Lopez-de-Silanes and Shleifer (2001), however, show that bank lending is more concentrated in banking systems that are dominated by government-owned banks.

with regulated banking markets. Petersen and Rajan (1995), on the other hand, find that small firms are more likely to receive financing at a lower cost and are financially less constrained in more concentrated local banking markets in the U.S. Bergstresser (2001) finds that in the U.S. consumers are financially less constrained in more concentrated banking markets. DeYoung, Goldberg, and White (1999) find for a sample of small and young banks across local U.S. banking markets that concentration affects small business lending positively in urban markets and negatively in rural markets. Jackson and Thomas (1995) find a positive effect of bank concentration across U.S. states on the employment growth rate of new firms in manufacturing industries, and a negative effect on the employment growth rate of mature firms. Using data for Italian provinces, Bonaccorsi di Patti and Dell'Araccia (2003) find that bank concentration has a non-linear relation with firm growth, increases in concentration being associated with higher firm growth rates at lower levels of concentration and lower firm growth rates at higher levels of concentration. Further, the range of a positive relation between concentration and firm growth is larger for industries with a higher degree of opaqueness. Bonaccorsi di Patti and Gobbi (2001) find that concentration has a positive effect on the credit volume to small and medium size Italian firms, and a negative impact on large firms. Finally, using survey data from a panel of small U.S. firms, Scott and Dunkelberg (2001) find that a Herfindahl index of bank concentration is not robustly correlated with the availability and cost of credit, while a firm-based assessment of the competitive environment is.

Cetorelli and Gambera (2001) use industry-level data for 41 countries to explore the effect of bank concentration on growth. They show that while bank concentration imposes a deadweight loss on the overall economy by depressing the average industry

growth rate, it fosters the growth of industries whose younger firms depend heavily on external finance. However, this positive effect is off-set in banking systems that are heavily dominated by government-owned banks. Further, Cetorelli and Gambera show that the positive effect of bank concentration on industries that are heavily dependent on external finance works through an increase in the number of firms rather than an increase in the average size thus rejecting the hypothesis that bank concentration leads to industrial concentration. Using a similar model, Cetorelli (2001b), however, shows that financially dependent industries are more concentrated in countries with more concentrated banking systems.<sup>7</sup>

Overall, both theoretical and empirical contributions yield contradictory conclusions. The *structure-performance hypothesis* predicts a negative relation between bank concentration and access to credit, while the *information-based hypothesis* predicts a positive or non-linear relation. Further, the relation might vary for firms of different sizes and across different institutional environments and ownership structures of the banking system. Using a panel data set of both developed and developing countries and of firms of different sizes, we will therefore test:

- Is bank concentration positively or negatively related to financing obstacles?
- Does the relation between concentration and financing obstacles vary across firms of different sizes?

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<sup>7</sup> Further, Cetorelli (2003a) shows that this relation is substantially weakened in EU member countries indicating a more competitive environment and less impact of bank concentration on concentration in non-financial sectors. He also shows that the pro-competitive deregulation of the European banking industry through the Second Banking Directive has helped reduce the average firm size in non-financial sectors. Using data for the U.S., Cetorelli (2003b) finds that bank competition accelerates the expansion of start-ups, while it slows the expansion of mature enterprises and accelerates their exit.

- Does the relation between concentration and financing obstacles vary across different regulatory regimes, ownership structures and institutional environments?

### **3. Data and Summary Statistics**

This section describes the different data sources and the variables we will be using in the empirical analysis. Our empirical analysis uses data from three main sources: the World Business Environment Survey (WBES) for firm-level data, Bankscope for our main concentration indicator, and Barth, Caprio and Levine (2001) for country-level data on bank ownership structure and regulatory measures. Table I presents the country-level variables for the 74 developed and developing countries in our sample. Descriptive statistics and correlations are in Table II.

The WBES firm-level data consist of firm survey responses of over 10,000 firms in 80 countries, both developed and developing. We have information on firm size, government ownership, foreign ownership, and whether the firm is an exporter. The survey has a large number of questions on the business environment in which firms operate including assessment of growth obstacles firms face. The database also includes information on firm sales, industry, growth, financing patterns, and number of competitors.

We use survey responses on to what extent entrepreneurs perceive finance as an obstacle to growth. To explore the link between bank market structure and the financing obstacles we use the survey question: “How problematic is financing for the operation and growth of your business?” Answers vary between 1 (no obstacle), 2 (minor obstacle), 3 (moderate obstacle), and 4 (major obstacle). Table I shows that perceived

financing obstacles do not only vary across firms within a country, but also significantly across countries. Portuguese firms rate financing obstacles as less than minor (1.73), while firms in Haiti rate financing obstacles as more than moderate (3.48). Overall, 38% of all firms in the sample report financing as major obstacle, 27% as moderate obstacle, 17% as minor and 18% as no obstacle.

We control for several firm attributes such as ownership. Government takes on the value one if the firm is owned by the government, and Foreign takes on the value one if the firm is foreign owned. Our sample includes 12% government owned firms and 19% foreign firms. We include dummy variables for exporting firms, the manufacturing and service sector, as well as the log of the number of competitors. 37% of the firms in our sample are in manufacturing and 45% in service, and on average they face 2.3 competitors. Finally, we include the log of sales in USD as indicator of size, which ranges from  $-2.12$  to  $25.3$ , with an average of  $9.9$ . The correlation analysis in Table II Panel B indicates that government-owned firms, domestically owned firms, non-exporting firms, smaller firms (as measured by sales), and firms with more competitors face higher financing obstacles.

We use bank-level data from the BankScope database to calculate the concentration ratio. The BankScope database covers at least 90% of the banking sector in most countries. We use data on commercial, savings, and cooperative banks as well as non-bank credit institutions to calculate *Bank Concentration* as the share of the assets of the largest three banks in total banking sector assets. We use the average for the concentration measures for 1995-99. This concentration measure has a wide variation, from 18% for the U.S. to 100% for Belize, as Figure I shows.

Firms of all sizes report higher financing obstacles in more concentrated banking systems, as shown by the correlations in Table II and illustrated by Figure II. We split countries into two groups, with concentration ratios below and above the median of 61%. As can be seen, firms of all sizes report higher financing obstacles in countries above the median concentration ratio.

The concentration ratio is significantly and negatively correlated with GDP per capita, as can be seen from the correlation analysis in Table IIC. To distinguish between the effect of banking market structure and general economic development, we control for the log of real GDP per capita and interact it with Concentration to assess whether the relation between concentration and financing obstacles varies across different levels of economic development. Finally, recent research has established a robust relation between well-developed institutions and income per capita, so that GDP per capita can also be seen as an overall proxy for institutional development.<sup>8</sup>

To test the robustness of our results, we use the deposit share of the five largest banks in total banking system deposits, from Barth, Caprio, and Levine (2001). Unlike the BankScope measure, this indicator is based on deposits, and on a survey of Central Banks and regulatory and supervisory authorities. While the survey measure does not suffer from problems of coverage as the BankScope measure, it might be subject to measurement error, due to different definitions across countries. This survey was undertaken in 1999, so that this alternative concentration measure is approximately for the same time period as our principal measure. The correlation coefficient between the two concentration measures is 0.76, significant at the 1%-level.

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<sup>8</sup> Acemoglu, Johnson and Robinson (2001) show a relation between institutional development and economic development that is robust to reverse causation and simultaneity bias.

Bank concentration, as measured by the market share of the largest banks, captures only one dimension of the competitiveness of the banking system. Restrictions on banks' activities and the contestability of the banking market constitute other dimensions. We therefore control for these aspects, as well as interact them with our concentration measure. Specifically, we use *Restrict*, which is an index of the degree to which bank' activities are restricted in the underwriting of securities, insurance, real estate, and in owning shares in non-financial firms. This indicator ranges from 4 to 16, with higher values indicating more restrictions on banks' activities. We use *Fraction Denied*, the fraction of applications for bank licenses rejected as indicator of the contestability of the banking market.<sup>9</sup> Both regulatory indicators are from Barth, Caprio, and Levine (2001). We use an indicator of the amount of information that is available to lenders from credit registries in the country. *Credit Bureau* is the average of four variables that indicate (i) whether the credit registry offers only negative or also positive information about borrowers, (ii) the amount of information available about borrowers, (iii) which institutions have access to the data, and (iv) whether information is available for each loan or only aggregated for each borrower. The indicator is normalized between zero and one, with higher values indicating more information being available to more institutions. Data are from Galindo and Miller (2001) and available for 30 countries.<sup>10</sup> Finally, we use a general indicator of *Banking Freedom* from Heritage Foundation, which

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<sup>9</sup> In the case where there were no applications (and therefore no rejections), this indicator takes the value one.

<sup>10</sup> Galindo and Miller (2001) also take into account which types of loans are reported in the registry. However, including this variable would have reduced our coverage by another six countries. However, results are similar when using this more comprehensive indicator.



indicates the absence of government interference in the banking system and is averaged over the period 1995-99.<sup>11</sup>

We use indicators of the institutional environment of a country to (i) control for institutional development when assessing the effect of concentration, and (ii) assess whether the effect of concentration varies across countries with different levels of institutional development. Specifically, we use *Rule of Law*, an indicator of the degree to which inhabitants of a country can trust the legal system of their country to up-hold their rights. This indicator is from International Country Risk Guide (ICRG) and reflects the assessment of foreign investors. It ranges from one to six, with higher numbers indicating a better legal environment. *Corruption* (ICRG) is an indicator of corruption and ranges from one to six, with higher numbers indicating less corruption. *Institutional Development* is a summary variable from Kaufman, Kraay and Zoido-Lobaton (2001) that averages six indicators proxying for voice and accountability, regulatory quality, political stability, rule of law, control of corruption and effectiveness of government.

As discussed above, the ownership structure of the banking sector might affect both the market structure and the functioning of the banking sector, thus affecting firms' financing obstacles and access to credit. We therefore include the share of banking system's assets in banks that are 50% or more government owned (*Public Bank Share*) or 50% or more foreign owned (*Foreign Bank Share*). Both measures are from Barth, Caprio and Levine (2001). We include a measure of financial intermediary development, *Private Credit*, which is the share of claims by financial institutions on the

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<sup>11</sup> Specifically, this indicator is based on five questions: 1. Does the government own banks? 2. Can foreign banks open branches and subsidiaries? 3. Does the government influence credit allocation? 4. Are banks free to operate without government regulations such as deposit insurance? 5. Are banks free to offer all types of financial services like buying and selling real estate, securities and insurance policies?

private sector in GDP. Finally, we include an indicator of the *Number of Banks* in a country, deflated by GDP in US\$, with data coming from Barth, Caprio and Levine (2001). Recent research has discovered a positive correlation between small (or community) banks and access to finance, especially by SMEs (Berger et al., 2003). While the number of banks is certainly not a perfect measure, a larger number of banks relative to the GDP of a country certainly indicates the existence of more small banks.

To assess the robustness of the relation between market structure and firms' access to external financing and growth, we include other country-level variables. We include the growth rate of GDP per capita since firms in faster growing countries are expected to grow faster and face lower obstacles. We use the inflation rate to proxy for monetary instability, conjecturing that firms in more stable monetary environments face fewer obstacles.

Many of the country-level variables are highly correlated with each other, as shown in Panel C of Table 2. More concentrated banking systems have lower levels of financial, economic and institutional development, have more foreign banks, share less information, and face more restrictions and more government interference. Many of the explanatory country-level variables are also highly correlated with each other, which underlines the importance of controlling for these country characteristics when assessing the impact of bank concentration.

#### **4. The Empirical Model**

To estimate the effect of bank concentration on financing obstacles, we use the following baseline regression:

$$\text{Financing Obstacle}_{j,k} = \alpha + \beta_1 \text{Government}_{j,k} + \beta_2 \text{Foreign}_{j,k} + \beta_3 \text{Exporter}_{j,k} + \beta_4 \text{No. of Competitors}_{j,k} + \beta_5 \text{Manufacturing}_{j,k} + \beta_6 \text{Services}_{j,k} + \beta_7 \text{Size}_{j,k} + \beta_8 \text{Inflation}_k + \beta_9 \text{Growth}_k + \beta_{10} \text{GDP per capita}_k + \beta_{11} \text{Concentration}_k + \varepsilon_{j,k}. \quad (1)$$

Given that Financing Obstacle is a polychotomous dependent variable with a natural order, we use the ordered probit model to estimate regression (1). We assume that the disturbance parameter  $\varepsilon$  has a normal distribution and use standard maximum likelihood estimation. The coefficient of interest is  $\beta_{11}$ ; a positive coefficient would be evidence in favor of the *structure-performance hypothesis*, while a negative or insignificant coefficient evidence for theories of the *information-based hypothesis*. The coefficients, however, cannot be interpreted as marginal effects of a one-unit increase in the independent variable on the dependent variable, given the non-linear structure of the model. Rather, the marginal effect is calculated as  $\phi(\beta'x)\beta$ , where  $\phi$  is the standard normal density at  $\beta'x$ .

To assess whether bank concentration has a different effect on firms depending on their size, we interact concentration with dummy variables indicating whether the firm is small (5-50 employees), medium-size (51-500 employees) or large (more than 500 employees). In alternative specifications, we also control for measures of institutional environment, ownership structure of the banking system and regulatory variables, as well as their interaction with bank concentration.

## 5. Results

The results in Table III indicate that firms face higher financing obstacles in more concentrated banking systems. In column 1 of Table III, Bank Concentration enters significantly positive, indicating that firms in countries with more concentrated banking systems report higher financing obstacles. When we interact Bank Concentration with dummy variables for small, medium, and large firms, the interactions for small and medium firms enter significantly at the 5% level (column 2). Further, the interaction with Small is largest, indicating that the growth-impeding effect of bank concentration is largest for small firms.<sup>12</sup> We confirm our results of a positive relation of bank concentration with the General Financing Obstacle (column 3) with the alternative concentration measure from Barth, Caprio and Levine (2001).<sup>13</sup> Finally, we control for the GDP per capita and its interaction with concentration. When we control for GDP per capita, concentration enters insignificantly (column 4), while when we also control for the interaction of both, concentration enters significantly and positively, and GDP per capita and its interaction with concentration both enter significantly and negatively (column 5). The coefficient sizes indicate that concentration has a positive effect on financing obstacles only in countries with GDP per capita below \$ 3,000, the level of Panama, a lower middle-income country. The significance tests, however, indicate that the relation between concentration and financing obstacles is only significant at GDP per capita levels below \$ 665, the level of Moldova. 25% of our sample are countries with GDP per capita levels below this level of economic development. Finally, the Table III results indicate that foreign owned firms, services firms, larger firms and firms in countries with lower inflation face lower financing obstacles.

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<sup>12</sup> We also find that the interactions with the Small and Medium dummies in column 3 are significantly different from the Large dummy.

Controlling for GDP per capita is also important when assessing the economic significance of the relation between concentration and financing obstacles, as illustrated in Table IV. Here we present the probability that enterprises rank financing as major obstacle to growth (Financing Obstacle=4) at different levels of Concentration, but holding the level of GDP per capita constant. Holding constant all other factors that determine firms' financing obstacles, moving from the 25<sup>th</sup> percentile of Concentration (Peru) to the 75<sup>th</sup> percentile (Senegal) increases the probability that financing is reported as major obstacle by 5%, compared to the sample means of 38%. This effect is stronger for small enterprises (6%) than for large enterprises (2%). However, once we control for the level of GDP per capita, the effect is significantly smaller. For Ethiopia (GDP per capita = \$ 108), moving from the 75<sup>th</sup> to the 25<sup>th</sup> percentile of concentration would imply a 4 percentage points decrease in the probability that a firm rates financing as major obstacle, while for Moldova (GDP per capita = \$ 666), the decrease would be only 2%. Overall, these results are supportive of the structure-performance hypothesis in low-income countries, but inconsistent with the information-based hypothesis.

The market share of the largest three banks, however, is only one dimension of the competitiveness of a banking sector. Contestability, absence of government interference, information sharing and restrictions on banks' activities constitute other important elements of the competitive environment in which banks operate. In Table V, we therefore introduce measures of the regulatory environment and interact them with concentration.

More restrictions on banks' activities, more government interference in the banking system and less information sharing through credit registries exacerbate the

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<sup>13</sup> We also tried regressions with a quadratic term of concentration, but it never entered significantly.

association of bank concentration with financing obstacles, as shown by the results in Table V. Since we also control for GDP per capita, these results suggest that independent of the level of economic development policies that restrict banks' possibilities of diversifying outside the credit and deposit business, increase government interference and restrict information sharing increase the impact that bank concentration has on financing obstacles. However, the coefficient estimates also suggest that firms in more concentrated banking systems face lower financing obstacles if there are few regulatory restrictions on banks' activities. The positive interaction of bank concentration and Restrict is not very widespread, however, since banks in concentrated banking systems face more restrictions on their activities, as shown by the positive correlation in Table II C. Indeed, for most of the sample bank concentration either has an insignificant or adverse effect on financing obstacles and bank finance.<sup>14</sup> While banking freedom does not enter significantly, its interaction with concentration does, indicating that less government interference in banking can dampen the association of concentration with financing obstacles. The coefficient sizes indicate that there is no relation between concentration and financing obstacles in countries with a level of Banking Freedom greater than three. The results on the interaction with Credit Registry indicate that having a well-developed credit registry dampens and eventually eliminates the relation between concentration and financing obstacles.<sup>15</sup> There does not seem to be any relation between

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<sup>14</sup> At Restrict values higher than 8 the impact of concentration on financing obstacles is insignificant or positive.

<sup>15</sup> Interestingly, the positive coefficient on Credit Registry and significance tests suggest that in banking system with concentration ratios below 0.43 the existence of a Credit Registry can increase financing obstacles.

Fraction Denied and financing obstacles and Concentration turns insignificant when we control for Fraction Denied and its interaction with Concentration.<sup>16</sup>

The estimates in Table VI suggest that the positive association of bank concentration with firms' financing obstacles holds only for countries with low levels of institutional development. Here, we interact Bank Concentration with indicators of the institutional environment, while also controlling for GDP per capita. The interaction terms with Rule of Law, Corruption, and Institutional Development enter significantly and negatively in the regression of the General Financing Obstacle, indicating that bank concentration has less of an effect in countries with high levels of institutional development. Considering the coefficient size suggests that there is no effect of bank concentration on financing obstacles in the countries with the highest levels of institutional development.<sup>17</sup> All results are confirmed when we also control for the interaction of GDP per capita and bank concentration.

To illustrate the effect of institutional development on the relation between bank concentration and financing obstacles, take the examples of Chile and South Africa, two middle-income countries. While South Africa had a value of 2.59 for Rule of Law over the period 1995-99, Chile had a value of 5. Bank concentration in South Africa is 0.67 and in Chile 0.46. The results in Table VI suggest a 35.8% probability that firms in Chile rate financing as major obstacle and a 43.6% probability in South Africa.

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<sup>16</sup> While the significance level decreases when we also control for the interaction of concentration with GDP per capita, joint significance tests indicate that the results for Restrict, Banking Freedom and Credit Registry and their interactions with bank concentration hold for countries at most levels of economic development in our sample.

<sup>17</sup> Multicollinearity introduced by including both GDP per capita and institutional development indicators in the regression, which are highly correlated, can explain the positive coefficients on Rule of Law and Corruption.

The presence of foreign banks alleviates the association of concentration with financing obstacles, while public bank ownership exacerbates it, as shown by the results in Table VII. Here we control for financial development, the number of banks, and the ownership structure of the banking system and interact these variables with Bank Concentration. The interaction of Bank Concentration with Foreign Bank Share enters significantly and negatively, suggesting that foreign bank ownership alleviates the negative impact of bank concentration on financing obstacles. The interaction of Bank Concentration with Public Bank Share enters significantly and positively, while Bank Concentration and the share of government-owned banks both enter negatively and significantly. This seems to indicate that government-owned banks can actually help alleviate financing obstacles in countries with low concentration ratios and that bank concentration affects financing obstacles only in banking systems with government-owned banks. There does not seem to be an interaction of bank concentration and Private Credit in their effects on financing obstacles.<sup>18</sup> Neither the number of banks nor its interaction with Concentration enters significantly; further, concentration loses its significance in this regression.<sup>19</sup>

## 6. Conclusions

This paper assessed the importance of the competitiveness of the banking system for financing obstacles firms face. A recently compiled firm database allows us to distinguish between the effect of the market structure on small, medium-size and large

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<sup>18</sup> All results are confirmed when we also include the interaction of GDP per capita with bank concentration.

<sup>19</sup> We also tried a regression with the number of banks and its interaction with GDP per capita but without concentration, but neither the number of banks nor its interaction enters significantly.



firms. Further, a broad cross-country survey on bank regulation allows us to focus on the overall competitive environment in the banking market beyond simple concentration ratios.

We find that bank concentration increases financing obstacles, with a stronger effect for small and medium compared to large firms. When we include GDP per capita and an interaction term with bank concentration we find that this relation only holds for low-income countries, with the relation being insignificant for middle-income and rich countries. However, we also find that independent of the level of economic development, regulatory and institutional country characteristics as well as the ownership structure of the banking system influences the relation between financing obstacles and bank concentration. A high level of institutional development and the presence of foreign-owned banks dampen the relation between concentration and financing obstacles and can turn the relation insignificant. The effect of bank concentration is exacerbated, on the other hand, in countries with more restrictions on banks' activities, high government interference in the banking system and a higher share of government-owned banks. While richer countries tend to have higher levels of institutional development, fewer restrictions on banks' activities and less government-owned banks, our results suggest the importance of institutional and regulatory policies for the relation between banking market structure and firms' access to finance at any level of economic development.

Our results shed light on the theoretical debate on the effects of banks' market power on firms' access to credit. Our findings provide qualified evidence for theories that focus on the negative effects of bank power (*structure-performance hypothesis*), while they are inconsistent with theories that stress the potential positive effects of bank

concentration (*information-based hypothesis*). However, our results also underline the importance of controlling for the economic, institutional and regulatory environment when assessing the effect of market competitiveness. While we find a strong relation between bank concentration and higher financing obstacles in economically and institutionally less developed economies (consistent with the performance-structure hypothesis), this relation is insignificant for institutionally, financially and economically well developed economies.

Our findings send important messages for policy makers, especially in developing countries. While they cannot influence concentration ratios – often determined by historical factors – they can impact the ownership structure of the banking system, its regulatory framework and the overall institutional environment.

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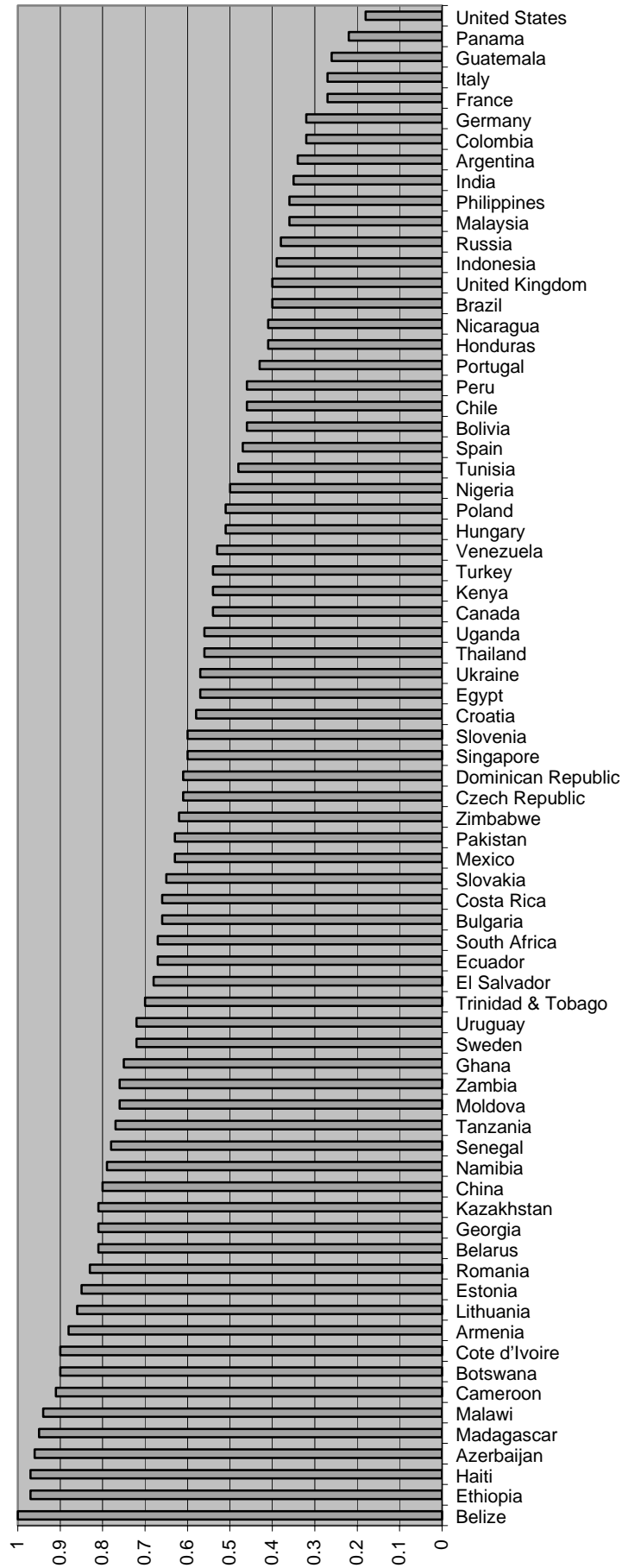
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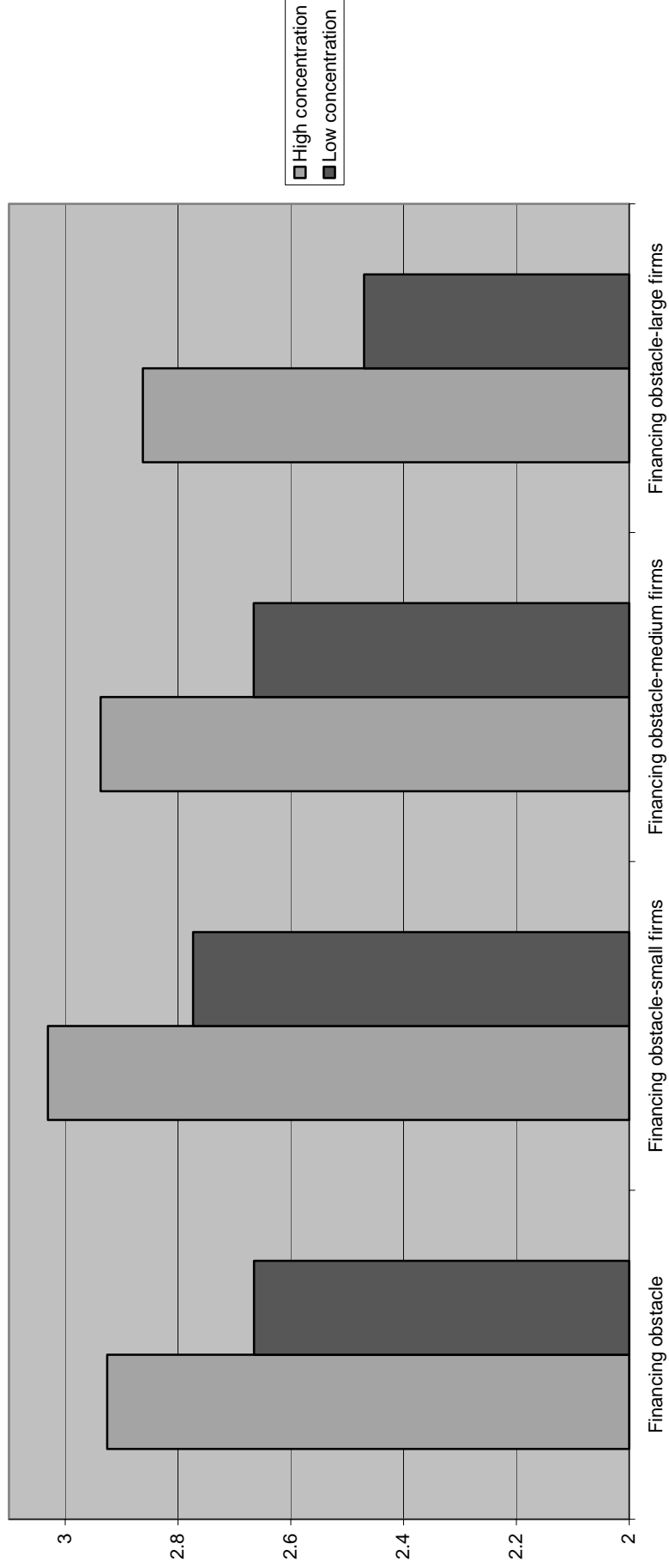
**Figure I: Concentration across Countries**

Concentration is given by the share of the largest three banks in total banking sector assets. Average for 1995-99. Source: BankScope.



**Figure II: Financing Obstacles in High- and Low-Concentration Countries**

Concentration is given by the share of the largest three banks in total banking sector assets. Average for 1995-99. Source: BankScope. Countries are divided according to whether a country's concentration ratio is below or above the median value (0.61). The financing obstacle is the the response to the question "How problematic is financing for the operation and growth of your business?" Answers vary between 1 (no obstacle), 2 (minor obstacle), 3 (moderate obstacle), and 4 (major obstacle). Firms are defined as small if they have less than 50 employees, as medium if they have between 50 and 500, and as large if they have more than 500 employees.



**Table I**  
**Economic Indicators and Obstacles to Firm Growth**

General Financing Obstacle is the response to the question "How problematic is financing for the operation and growth of your business?". Answers vary between 1 (no obstacle), 2 (minor obstacle), 3 (moderate obstacle), and 4 (major obstacle). Concentration is the share of the largest three banks in total banking assets. GDP per capita is real GDP per capita in US\$. Private Credit is claims on the private sector by financial institutions as share of GDP. Rule of Law is the extent to which a country's citizen trust its legal system. Corruption indicates the absence of corruption. Institutional Development is an average of six indicators measuring voice and accountability, control of corruption, regulatory quality, political stability, rule of law, and government efficiency. Foreign Bank Share is the share of assets in banks that are majority foreign owned. Public Bank Share is the share of assets in banks that are majority state-owned. Restrict is an indicator of the degree to which banks' activities are restricted outside the credit and deposit business. Fraction denied is the share of bank license applications rejected. Credit registry is an aggregate indicator of the information available through credit registries. Banking Freedom is a general indicator of the absence of government interference in the banking sector. Detailed variable definitions and sources are given in the appendix.

	General Financing Obstacle	GDP per capita	Private Credit	Rule of Law	Corruption	Institutional Development	Foreign bank Share	Public Bank Share	Restrict	Fraction denied	Credit registry Freedom	Banking Freedom
Argentina	3.03	8,001	0.21	5.00	2.00	0.33	49.00	30.00	7	0.00	0.60	3.80
Armenia	2.65	844	0.04			-0.43						3.00
Azerbaijan	2.86	408				-0.78						2.00
Belarus	3.28	2,235	0.06	4.00	4.00	-0.76	2.80	67.30	13	0.00	0.69	3.00
Belize	2.69	2,738	0.41									3.00
Bolivia	3.04	939	0.51	3.00	3.00	0.02	42.30	0.00	12	1.00	0.59	3.60
Botswana	2.34	3,546	0.11	4.00	3.00	0.56	97.61	2.39	10	0.00		3.80
Brazil	2.71	4,489	0.32	2.05	3.00	0.00	16.70	51.50	10	0.74	0.83	3.00
Bulgaria	3.13	1,418	0.14	4.00	4.00	0.01						3.00
Cameroon	3.07	631	0.14	3.00	2.00	-0.72						2.20
Canada	2.07	20,549	0.83	6.00	6.00	1.43	32.00	0.00	7	0.00		4.00
Chile	2.43	4,992	0.68	5.00	4.00	0.88		11.70	11	1.00	0.65	3.00
China	3.34	677	0.85	5.00	2.00	-0.20			14	0.25		3.00
Colombia	2.68	2,381	0.36	2.00	1.55	-0.41					0.53	4.00
Costa Rica	2.51	3,641	0.15	4.00	5.00	0.81					0.80	3.00
Cote d'Ivoire	2.81	763	0.26	3.00	2.00	-0.19						3.00
Croatia	3.34	3,846	0.00	5.00	2.00	0.03	6.67	36.99	7		0.56	3.00
Czech Republic	3.13	5,163	0.58	5.14	4.00	0.68	26.00	19.00	8	0.36	0.49	5.00
Dominican Republic	2.58	1,712	0.24	4.00	4.00	-0.11					0.49	3.00
Ecuador	3.34	1,538	0.30	3.36	3.00	-0.32					0.49	3.00
Egypt	3.00	1,108	0.33	4.00	2.00	-0.15	4.20	66.60	13	1.00		3.40
El Salvador	2.87	1,706	0.36	3.00	4.00	-0.03	12.50	7.00	13	0.00		4.00
Estonia	2.49	3,664	0.16	4.00	5.00	0.61	85.00	0.00	8	0.00	0.65	4.00
Ethiopia	2.97	109	0.21	5.00	2.00	-0.12						2.00
France	2.76	27,720	0.84	5.00	3.86	1.03			6	0.00		3.00
Georgia	3.23	411				-0.61						2.00
Germany	2.54	30,794	1.06	6.00	5.00	1.37	4.20	42.00	5.00	0.00	0.45	3.60



	General Financing Obstacle Concentration	GDP per capita	Private Credit	Rule of Law	Corruption	Institutional Development	Foreign bank Share	Public Bank Share	Restrict	Fraction denied	Credit registry Freedom
Ghana	3.07	393	0.05	3.00	3.00	-0.14	54.30	37.90	12.00	0.80	3.00
Guatemala	2.97	1,503	0.18	2.14	4.00	-0.51	4.93	7.61	13.00	0.30	3.60
Haiti	3.48	369	0.12	2.59	2.23	-1.14					1.60
Honduras	2.85	708	0.26	2.05	2.00	-0.43	1.60	1.10	9.00	0.20	3.00
Hungary	2.67	4,706	0.22	6.00	5.00	0.87	62.00	2.50	9	0.50	3.80
India	2.54	414	0.21	4.00	3.00	0.00	0.00	80.00	10	0.55	2.00
Indonesia	2.86	1,045	0.52	2.64	1.32	-0.77	7.00	44.00	14	1.00	2.80
Italy	2.11	19,646	0.57	6.00	3.55	0.91	5.00	17.00	10	0.27	3.60
Kazakhstan	3.17	1,313		4.00	3.00	-0.53					2.00
Kenya	2.84	339	0.34	2.45	2.05	-0.78			10	0.85	3.60
Lithuania	2.88	1,907	0.11	4.00	3.00	0.26	48.00	44.00	9	0.67	2.75
Madagascar	3.13	238	0.13	3.00	4.00	-0.38					2.00
Malawi	2.74	154	0.11	4.00	3.00	-0.17	8.30	48.90	13	0.00	3.00
Malaysia	2.65	4,536	1.30	4.59	3.59	0.51	18.00	0.00	10	1.00	3.00
Mexico	3.40	3,393	0.22	2.41	2.73	-0.07	19.90	25.00	12		2.00
Moldova	3.44	666	0.06	5.00	2.00	-0.20	33.37	7.05	7	0.60	2.60
Namibia	1.91	2,325	0.38	6.00	4.00	0.47			11	0.67	4.00
Nicaragua	3.17	447	0.31	4.00	4.00	-0.41					2.80
Nigeria	3.14	254	0.08	3.00	1.45	-1.00	0.00	13.00		0.00	2.20
Pakistan	3.28	503	0.23	3.14	3.00	-0.59					3.40
Panama	2.18	3,124	0.78	3.00	2.00	0.11	38.33	11.56	8	0.00	5.00
Peru	3.04	2,335	0.18	3.00	3.00	-0.18	40.40	2.50	8	0.00	4.00
Philippines	2.68	1,125	0.50	4.00	3.50	0.21	12.79	12.12	7	0.00	3.00
Poland	2.41	3,216	0.12	5.00	4.82	0.70	26.40	43.70	10	0.00	3.00
Portugal	1.73	11,582	0.73	5.00	5.00	1.20	11.70	20.80	9	0.00	3.00
Romania	3.30	1,365	0.09	4.77	3.00	-0.08	8.00	70.00	13	0.38	3.00
Russia	3.22	2,214	0.08	3.45	1.91	-0.54	9.00	68.00	8		3.60
Senegal	3.00	563	0.21	3.00	3.00	-0.30					3.00
Singapore	1.85	25,374	1.11	6.00	4.00	1.44	50.00	0.00	8	1.00	4.00
Slovakia	3.31	3,805	0.30	5.00	3.36	0.28					3.00
Slovenia	2.29	10,226	0.26	5.00	4.00	0.85	4.60	39.60	9	1.00	4.00

	General Financing Obstacle	Concentration	GDP per capita	Private Credit	Rule of Law	Corruption	Institutional Development	Foreign bank Share	Public Bank Share	Restrict	Fraction denied	Credit registry	Banking Freedom
South Africa	2.45	0.67	3,920	1.18	2.59	3.73	0.11	5.20	0.00	8	0.33		3.00
Spain	2.24	0.47	15,858	0.79	4.00	5.00	1.10	11.00	0.00	7	0.00	0.16	3.60
Sweden	1.89	0.72	28,258	0.82	6.00	6.00	1.53	1.80	0.00	9	0.08	0.61	3.60
Tanzania	3.00	0.77	182	0.09	5.00	3.00	-0.13						3.00
Thailand	3.11	0.56	2,835	1.46	5.00	2.14	0.15	7.16	30.67	9	1.00	0.43	3.00
Trinidad & Tobago	3.03	0.70	4,526	0.40	4.00	3.00	0.59	7.90	15.00	9	0.50		4.00
Tunisia	1.69	0.48	2,200	0.60	5.00	3.00	0.30						3.60
Turkey	3.13	0.54	3,007	0.16	3.91	2.00	-0.33	6.00	35.00	12		0.29	4.00
Uganda	3.13	0.56	324	0.04	4.00	2.00	-0.34						3.00
Ukraine	3.45	0.57	867	0.01			-0.58					0.48	2.20
United Kingdom	2.25	0.40	20,187	1.16	6.00	5.00	1.50		0.00	5			5.00
United States	2.33	0.18	29,253	1.84	6.00	4.00	1.30	4.70	0.00	12	0.00	0.83	4.00
Uruguay	2.72	0.72	6,114	0.27	3.00	3.00	0.57					0.51	3.80
Venezuela	2.49	0.53	3,471	0.10	4.00	3.00	-0.37	33.72	4.87	10	0.00	0.49	3.20
Zambia	2.71	0.76	394	0.06	4.00	3.00	-0.20	64.00	23.00	13	0.00		4.00
Zimbabwe	3.03	0.62	693	0.29	4.00	2.00	-0.53						3.00

## Table II Summary Statistics and Correlations

Summary statistics are presented in Panel A and correlations in Panels B and C, respectively. General Financing Obstacle is the response to the question “How problematic is financing for the operation and growth of your business?” Answers vary between 1 (no obstacle), 2 (minor obstacle), 3 (moderate obstacle), and 4 (major obstacle). Government and Foreign are dummy variables that take the value 1 if the firm has government or foreign ownership and zero if not. Exporter is a dummy variable that indicates if the firm is an exporting firm. Manufacturing and Services are industry dummies. Sales is the logarithm of sales in US\$. Number of Competitors is the logarithm of the number of competitors the firm has. Concentration is the share of the largest three banks in total banking sector assets. Restrict is an indicator of the degree to which banks’ activities are restricted outside the credit and deposit business. Fraction denied is the share of bank license applications rejected. Banking Freedom is a general indicator of the absence of government interference in the banking sector. Credit registry indicator is a summary variable of the amount of information and the number of institutions that have access to borrower information from credit registries in a country. Rule of Law is the degree to which citizens trust its country’s legal system. Corruption indicates the degree to which there is no corruption in a country. Institutional Development is an average of six indicators measuring voice and accountability, control of corruption, regulatory quality, political stability, rule of law, and government efficiency. Private Credit is claims on the private sector by financial institutions as share of GDP. Foreign Bank Share is the share of assets in banks that are majority foreign owned. Public Bank Share is the share of assets in banks that are majority state-owned. Growth is the growth rate of GDP. Inflation is the log difference of the consumer price index. GDP per capita is real GDP per capita in US\$. Number of banks is the number of banks in a country multiplied by one million and divided by GDP in US\$. Detailed definitions and the sources are in the data appendix.

### Panel A: Summary Statistics:

Variable	Obs	Mean	Median	Std. Dev.	Max	Min
General financing obstacle	6,716	2.84	3	1.12	4.00	1.00
Government	7,186	0.12	0	0.33	1.00	0.00
Foreign	7,186	0.19	0	0.39	1.00	0.00
Exporter	7,186	0.37	0	0.48	1.00	0.00
Manufacturing	7,186	0.37	0	0.48	1.00	0.00
Services	7,186	0.45	0	0.50	1.00	0.00
Sales	7,186	9.94	12.6292	8.15	25.33	-2.12
Number of Competitors	7,186	0.83	0.6931472	0.33	2.20	0.00
Concentration	74	0.61	0.61	0.21	1.00	0.18
Restrict	48	9.73	9.50	2.39	14.00	5.00
Fraction denied	44	0.36	0.26	0.40	1.00	0.00
Banking Freedom	74	3.21	3.00	0.72	5.00	1.60
Credit registry	30	0.51	0.51	0.18	0.83	0.07
Rule of Law	69	4.09	4.00	1.15	6.00	2.00
Corruption	69	3.24	3.00	1.11	6.00	1.32
Institutional Development	73	0.10	-0.07	0.66	1.53	-1.14
GDP per capita	74	4971.57	2206.96	7712.29	30794.02	109.01
Private Credit	71	0.40	0.26	0.38	1.84	0.00
Foreign Bank Share	43	22.89	11.70	23.94	97.61	0.00
Public Bank Share	45	23.10	15.00	23.43	80.00	0.00
Inflation	74	0.13	0.08	0.16	0.86	0.00
Growth	74	0.02	0.02	0.02	0.07	-0.03
Number of Banks	47	0.001	0.001	0.002	0.00	0.01

**Panel B: Correlations between firm-level variables**

	General financing obstacle	Government	Foreign	Exporter	Manufacturing	Services	Sales	Number of competitors
Government	0.05***	1						
Foreign	-0.17***	-0.06***	1					
Exporter	-0.06***	0.06***	0.24***	1				
Manufacturing	0.02*	0.05***	0.11***	0.32***	1			
Services	-0.10***	-0.06***	-0.06***	-0.26***	-0.69***	1		
Sales	-0.18***	-0.21***	0.27***	0.15***	0.08***	0.01	1	
No. of competitors	0.09***	-0.08***	-0.10***	-0.04***	-0.09***	-0.01	-0.29***	1
Concentration	0.10***	0.11***	-0.03**	0.01	-0.03**	-0.06**	-0.27***	0.11***

**Panel C: Correlations between country-level variables**

	Concentration	Restrict	Fraction denied	Banking Freedom	Credit registry	Rule of Law	Corruption	Institutional Development	GDP per capita	Private Credit	Foreign Bank Share	Public Bank Share	Inflation	Growth
Restrict	0.30**	1												
Fraction denied	0.03	0.22	1											
Banking Freedom	-0.39***	-0.26*	-0.16	1										
Credit registry	-0.04***	0.24	-0.12	0.10	1									
Rule of Law	0.08	-0.34**	-0.06*	0.27**	0.03	1								
Corruption	0.08	-0.31**	-0.29*	0.29**	0.15	0.49***	1							
Institutional Development	-0.32***	-0.53***	-0.11	0.53***	0.11	0.71***	0.73***	1						
GDP per capita	-0.40***	-0.47***	-0.22	0.38***	0.13	0.59***	0.56***	0.79***	1					
Private Credit	-0.43***	-0.25*	0.11	0.33***	-0.08	0.41***	0.32***	0.60***	0.66***	1				
Foreign Bank Share	0.35**	-0.11	-0.05	0.30**	0.20	0.05	0.09	0.14	-0.15	-0.24	1			
Public Bank Share	0.12	0.32**	0.21	-0.38**	-0.09	-0.11***	-0.34**	-0.38***	-0.30**	-0.40***	-0.33**	1		
Inflation	0.14	0.42***	-0.12	-0.10	-0.01	-0.16***	-0.11	-0.35***	-0.29**	-0.39***	-0.08	0.46***	1	
Growth	0.14	0.05	0.35	-0.00	0.18	0.29**	0.31**	0.24**	0.09	0.03	0.14	0.10	-0.31***	1
Number of Banks	-0.03	-0.014	0.03	0.10	-0.02	-0.21	-0.37**	-0.30**	-0.22	-0.19	0.08	-0.07	0.04	-0.32**

**Table III**  
**Concentration, Financing Obstacles and Access to Bank Finance**

The regression estimated is: General Financing Obstacle =  $\alpha + \beta_1$  Government +  $\beta_2$  Foreign +  $\beta_3$  Exporter +  $\beta_4$  Manufacturing +  $\beta_5$  Services +  $\beta_6$  Sales +  $\beta_7$  No. of Competitors +  $\beta_8$  Inflation +  $\beta_9$  Growth +  $\beta_{10}$  Concentration +  $\varepsilon$ . General Financing Obstacle is the response to the question "How problematic is financing for the operation and growth of your business?" Answers vary between 1 (no obstacle), 2 (minor obstacle), 3 (moderate obstacle), and 4 (major obstacle). Government and Foreign are dummy variables that take the value 1 if the firm has government or foreign ownership and zero if not. Exporter is a dummy variable that indicates if the firm is an exporting firm. Manufacturing and Services are industry dummies. Sales is the logarithm of sales in US\$. Number of Competitors is the logarithm of the number of competitors the firm has. Growth is the growth rate of GDP. Inflation is the log difference of the consumer price index. GDP per capita is included in logs. Concentration is the share of the largest three banks in total banking sector assets. Concentration-BCL is an alternative indicator of bank concentration, measuring the deposits of the largest five banks as share of total deposit in the banking system. Small, Medium and Large are dummy variables, indicating the size of the firm. Firms with 5 to 50 employees are defined as small, firms with 51 to 500 employees as medium and firms with more than 500 employees as large. The regression is run with ordered probit. Detailed variable definitions and sources are given in the appendix. P-values are reported in parentheses.

	General Financing Obstacle	General Financing Obstacle	General Financing Obstacle	General Financing Obstacle	General Financing Obstacle
Government	0.062 (0.160)	0.105 (0.023)**	0.060 (0.283)	0.061 (0.164)	0.059 (0.176)
Foreign	-0.352 (0.000)***	-0.330 (0.000)***	-0.322 (0.000)***	-0.363 (0.000)***	-0.362 (0.000)***
Exporter	-0.045 (0.136)	-0.023 (0.459)	-0.042 (0.263)	-0.021 (0.484)	-0.014 (0.643)
Manufacturing	-0.074 (0.057)*	-0.070 (0.074)*	-0.112 (0.024)**	-0.080 (0.040)**	0.199 (0.055)*
Services	-0.282 (0.000)***	-0.292 (0.000)***	-0.313 (0.000)***	-0.239 (0.000)***	-0.074 (0.061)*
Sales	-0.016 (0.000)***	-0.014 (0.000)***	-0.014 (0.000)***	-0.015 (0.000)***	-0.234 (0.000)***
Number of Competitors	0.051 (0.257)	0.043 (0.336)	-0.026 (0.647)	-0.012 (0.802)	-0.015 (0.000)***
Inflation	0.233 (0.024)**	0.275 (0.009)***	0.405 (0.001)***	0.179 (0.083)*	-0.007 (0.883)
Growth	-6.495 (0.000)***	-6.420 (0.000)***	-5.507 (0.000)***	-5.296 (0.000)***	-5.295 (0.000)***
Concentration	0.433 (0.000)***			0.062 (0.446)	0.836 (0.030)**
Concentration BCL			0.239 (0.006)***		
Concentration* Small		0.493 (0.000)***			
Concentration* Medium		0.434 (0.000)***			
Concentration* Large		0.165 (0.080)*			
GDP per capita				-0.146 (0.000)***	-0.088 (0.004)***
Concentration*GDP per capita					-0.104 (0.038)**
Pseudo R <sup>2</sup>	0.034	0.035	0.030	0.041	0.041
Observations	6716	6714	4429	6716	6716

\*, \*\*, \*\*\* indicate significance levels of 10, 5, and 1 percent, respectively.

**Table IV**  
**Concentration, Financing Obstacles and Access to Bank Finance –**  
**Quantifying the Effect**

Based on the regressions of Table III, estimated probabilities of (i) rating financing as major obstacle to the operation and growth of the enterprises (Financing Obstacle=4) and (ii) probability of financing investment with bank finance are presented for the 25%, 50% and 75% percentiles of Concentration. Estimated probabilities are calculated for each enterprise setting all variables at its actual value, except for Bank Concentration, which is set at either the 25%, 50% or 75% percentile of the sample. The probabilities shown are averages (i) for all firms in the sample, (ii) for firms of the specific size class or (iii) for firms in a country at a specific level of GDP per capita.

Bank Concentration at	25% (0.46)	50% (0.61)	75% (0.78)	Change between 25% and 75% percentiles	Based on regression
Average estimated probability that enterprise will rate financing as major obstacle for operation and growth					
All enterprises	0.357	0.380	0.407	0.050	Table III, 1
Small enterprises	0.379	0.406	0.438	0.059	Table III, 2
Medium enterprises	0.367	0.390	0.418	0.051	Table III, 2
Large enterprises	0.282	0.290	0.299	0.017	Table III, 2
GDP per capita = \$ 666	0.430	0.439	0.449	0.019	Table III, 5
GDP per capita = \$ 109	0.524	0.543	0.566	0.042	Table III, 5

**Table V**  
**Concentration, Financing Obstacles and Access to Bank Finance –**  
**The Interaction with the Regulation of the Banking Sector**

The regression estimated is: General Financing Obstacle =  $\alpha + \beta_1$  Government +  $\beta_2$  Foreign +  $\beta_3$  Exporter +  $\beta_4$  Manufacturing +  $\beta_5$  Services +  $\beta_6$  Sales +  $\beta_7$  No. of Competitors +  $\beta_8$  Inflation +  $\beta_9$  Growth +  $\beta_{10}$  GDP per capita +  $\beta_{11}$  Concentration +  $\beta_{12}$  Regulation +  $\beta_{13}$  Concentration\*Regulation +  $\varepsilon$ . General Financing Obstacle is the response to the question “How problematic is financing for the operation and growth of your business?” Answers vary between 1 (no obstacle), 2 (minor obstacle), 3 (moderate obstacle), and 4 (major obstacle). Government and Foreign are dummy variables that take the value 1 if the firm has government or foreign ownership and zero if not. Exporter is a dummy variable that indicates if the firm is an exporting firm. Manufacturing and Services are industry dummies. Sales is the logarithm of sales in US\$. Number of Competitors is the logarithm of the number of competitors the firm has. Growth is the growth rate of GDP. Inflation is the log difference of the consumer price index. GDP per capita is included in logs. Concentration is the share of the largest three banks in total banking sector assets. Regulation is one of four regulatory variables. Restrict is an indicator of the degree to which banks’ activities are restricted outside the credit and deposit business. Fraction denied is the share of bank license applications rejected. Banking Freedom is a general indicator of the absence of government interference in the banking sector. Credit registry indicator is a summary variable of the amount of information and the number of institutions that have access to borrower information from credit registries in a country. Detailed variable definitions and sources are given in the appendix. P-values are reported in parentheses.

	General Financing Obstacle	General Financing Obstacle	General Financing Obstacle	General Financing Obstacle
GDP per capita	-0.128 (0.000)***	-0.155 (0.000)***	-0.127 (0.000)***	-0.229 (0.000)***
Concentration	-2.076 (0.000)***	0.008 (0.953)	0.671 (0.024)**	1.461 (0.002)***
Restrict	-0.094 (0.000)***			
Concentration*Restrict	0.217 (0.000)***			
Fraction denied		-0.231 (0.202)		
Concentration*Fraction denied		0.525 (0.116)		
Banking Freedom			0.065 (0.273)	
Concentration*Banking Freedom			-0.204 (0.025)**	
Credit Registry				1.355 (0.000)***
Concentration*Credit Registry				-2.600 (0.001)***
Pseudo R <sup>2</sup>				
Observations	4783	3926	6716	3254

\*, \*\*, \*\*\* indicate significance levels of 10, 5, and 1 percent, respectively.



**Table VI**  
**Concentration, Financing Obstacles and Access to Bank Finance –**  
**The Interaction with the Institutional Environment**

The regression estimated is: General Financing Obstacle =  $\alpha + \beta_1$  Government +  $\beta_2$  Foreign +  $\beta_3$  Exporter +  $\beta_4$  Manufacturing +  $\beta_5$  Services +  $\beta_6$  Sales +  $\beta_7$  No. of Competitors +  $\beta_8$  Inflation +  $\beta_9$  Growth +  $\beta_{10}$  GDP per capita +  $\beta_{11}$  Concentration +  $\beta_{12}$  Institution +  $\beta_{13}$  Concentration\*Institution +  $\varepsilon$ . General Financing Obstacle is the response to the question “How problematic is financing for the operation and growth of your business?” Answers vary between 1 (no obstacle), 2 (minor obstacle), 3 (moderate obstacle), and 4 (major obstacle). Government and Foreign are dummy variables that take the value 1 if the firm has government or foreign ownership and zero if not. Exporter is a dummy variable that indicates if the firm is an exporting firm. Manufacturing and Services are industry dummies. Sales is the logarithm of sales in US\$. Number of Competitors is the logarithm of the number of competitors the firm has. Growth is the growth rate of GDP. Inflation is the log difference of the consumer price index. GDP per capita is included in logs. Concentration is the share of the largest three banks in total banking sector assets. Institution is one of four variables. Rule of Law is the degree to which citizens trust its country’s legal system. Corruption indicates the degree to which there is no corruption in a country. Institutional Development is an average of six indicators measuring voice and accountability, control of corruption, regulatory quality, political stability, rule of law, and government efficiency. GDP per capita is real GDP per capita. The regression is run with ordered probit. Detailed variable definitions and sources are given in the appendix. P-values are reported in parentheses.

	General Financing Obstacle	General Financing Obstacle	General Financing Obstacle
GDP per capita	-0.134 (0.000)***	-0.063 (0.000)***	0.034 (0.110)
Concentration	1.314 (0.000)***	1.608 (0.000)***	0.201 (0.017)**
Rule of Law	0.089 (0.020)**		
Concentration*Rule of Law	-0.274 (0.000)***		
Corruption		0.038 (0.380)	
Concentration*Corruption		-0.386 (0.000)***	
Institutional Development			-0.273 (0.000)***
Concentration*Institutional Development			-0.283 (0.008)***
Pseudo R <sup>2</sup>			
Observations	6111	6111	6687

\*, \*\*, \*\*\* indicate significance levels of 10, 5, and 1 percent, respectively.

**Table VII**  
**Concentration, Financing Obstacles and Access to Bank Finance –**  
**The Interaction with the Structure of the Banking Sector**

The regression estimated in columns 1-3 is: General Financing Obstacle =  $\alpha + \beta_1$  Government +  $\beta_2$  Foreign +  $\beta_3$  Exporter +  $\beta_4$  Manufacturing +  $\beta_5$  Services +  $\beta_6$  Sales +  $\beta_7$  No. of Competitors +  $\beta_8$  Inflation +  $\beta_9$  Growth +  $\beta_{10}$  GDP per capita +  $\beta_{11}$  Concentration +  $\beta_{12}$  Bank +  $\beta_{13}$  Concentration \* Bank +  $\epsilon$ . General Financing Obstacle is the response to the question "How problematic is financing for the operation and growth of your business?" Answers vary between 1 (no obstacle), 2 (minor obstacle), 3 (moderate obstacle), and 4 (major obstacle). Government and Foreign are dummy variables that take the value 1 if the firm has government or foreign ownership and zero if not. Exporter is a dummy variable that indicates if the firm is an exporting firm. Manufacturing and Services are industry dummies. Sales is the logarithm of sales in US\$. Number of Competitors is the logarithm of the number of competitors the firm has. Growth is the growth rate of GDP. Inflation is the log difference of the consumer price index. GDP per capita is included in logs. Concentration is the share of the largest three banks in total banking sector assets. Bank is one of four variables. Private Credit is claims on the private sector by financial institutions as share of GDP. Foreign Bank Share is the share of assets in banks that are majority foreign owned. Public Bank Share is the share of assets in banks that are majority state-owned. Number of Banks is the number of banks in a country divided by GDP in US\$. The regression is run with ordered probit. Detailed variable definitions and sources are given in the appendix. P-values are reported in parentheses.

	General Financing Obstacle	General Financing Obstacle	General Financing Obstacle	General Financing Obstacle
GDP per capita	-0.161 (0.000)***	-0.121 (0.000)***	-0.123 (0.000)***	-0.148 (0.000)***
Concentration	0.010 (0.923)	0.411 (0.003)***	-0.315 (0.035)**	0.034 (0.790)
Private Credit	-0.033 (0.717)			
Concentration*Private Credit	0.247 (0.156)			
Foreign Bank Share		0.006 (0.027)**		
Concentration*Foreign Bank Share		-0.012 (0.002)***		
Public Bank Share			-0.006 (0.002)***	
Concentration* Public Bank Share			0.015 (0.000)***	
Number of banks/GDP				-34.927 (0.115)
Concentration* Number of banks/GDP				39.617 (0.326)
Pseudo R <sup>2</sup>				
Observations	6346	4405	4578	4654

\*, \*\*, \*\*\* indicate significance levels of 10, 5, and 1 percent, respectively.

## Appendix : Variables and Sources

<b>Variable</b>	<b>Definition</b>	<b>Original source</b>
Banking freedom	General indicator of the absence of government interference in the banking sector	Heritage Foundation
Corruption	Measure of corruption in government. It ranges from 1 to 6 and is an average over 1995-97. Lower scores indicate that "high government officials are likely to demand special payments" and "illegal payments are generally expected throughout lower levels of government" in the form of "bribes connected with import and export licenses, exchange controls, tax assessment, policy protection, or loans."	International Country Risk Guide (ICRG).
Credit Registry	Average of four variables that indicate (i) whether the credit registry offers only negative or also positive information about borrowers, (ii) the amount of information available about borrowers, (iii) which institutions have access to the data, and (iv) whether information is available for each loan or only aggregated for each borrower. The indicator is normalized between zero and one, with higher values indicating more information being available to more institutions.	Galindo and Miller (2001)
Exporter	Dummy variable that takes on the value one if firm exports, zero otherwise.	World Business Environment Survey (WBES)
Firm size dummies	A firm is defined as small if it has between 5 and 50 employees, medium size if it has between 51 and 500 employees and large if it has more than 500 employees.	World Business Environment Survey (WBES)
Foreign	Dummy variable that takes on the value one if any foreign company or individual has a financial stake in the ownership of the firm, zero otherwise.	World Business Environment Survey (WBES)
Foreign bank share	Share of banking assets in banks that are majority owned by foreign shareholders	Barth, Caprio and Levine (2001)
Fraction denied	Share of bank license applications rejected. If there were no applications, the value is one	Barth, Caprio and Levine (2001)
GDP per capita	Real per capita GDP, average 1995-99	World Development Indicators
General Financing Obstacle	How problematic is financing for the operation and growth of your business: no obstacle (1), a minor obstacle (2), a moderate obstacle (3) or a major obstacle (4)?	World Business Environment Survey (WBES)
Government	Dummy variable that takes on the value one if any government agency or state body has a financial stake in the ownership of the firm, zero otherwise.	World Business Environment Survey (WBES)
Growth	Growth rate of GDP, average 1995-99	World Development Indicators
Inflation rate	Log difference of Consumer Price Index	International Financial Statistics (IFS), line 64

Institutional Development	Average value of six indicators measuring voice and accountability, political stability, regulatory quality, government effectiveness, control of corruption and rule of law. Each of these indicators, in turn is constructed from a wide array of survey indicators in the respective area.	Kaufman, Kraay and Zoido-Lobaton (2001)
Law and Order	Measure of the law and order tradition of a country. It is an average over 1995-97. It ranges from 6, strong law and order tradition, to 1, weak law and order tradition.	International Country Risk Guide (ICRG).
Manufacturing	Dummy variable that takes on the value one if firm is in the manufacturing industry, zero otherwise.	World Business Environment Survey (WBES)
No. of Competitors	Regarding your firm's major product line, how many competitors do you face in your market?	World Business Environment Survey (WBES)
Number of Banks	Number of banks multiplied by one million and divided by GDP in US\$	Barth, Caprio and Levine (2001) and IFS
Private Credit	$\{(0.5)*[F(t)/P_e(t) + F(t-1)/P_e(t-1)]\}/[GDP(t)/P_a(t)]$ , where F is credit by deposit money banks and other financial institutions to the private sector (lines 22d and 42d), GDP is line 99b, P_e is end-of period CPI (line 64) and P_a is the average CPI for the year.	IFS
Public bank share	Share of banking assets in banks that are majority owned by the government	Barth, Caprio and Levine (2001)
Restrict	Degree to which banks' activities are restricted outside the credit and deposit business	Barth, Caprio and Levine (2001)
Sales	Logarithm of firm sales	World Business Environment Survey (WBES)
Services	Dummy variable that takes on the value one if firm is in the service industry, zero otherwise.	World Business Environment Survey (WBES)