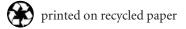# Enterprise Size, Financing Patterns, and Credit Constraints in Brazil

Analysis of Data from the Investment Climate Assessment Survey

Anjali Kumar
Manuela Francisco

THE WORLD BANK

Enterprise Size, Financing Patterns, and Credit Constraints in Brazil

Analysis of Data from the Investment Climate Assessment Survey

Anjali Kumar
Manuela Francisco

THE WORLD BANK
Washington, D.C.

Anjali Kumar is Lead Financial Economist in the Finance cluster of the Latin American and Caribbean Region of the World Bank. Manuela Francisco is Consultant to the World Bank on leave from the University of Minho.

Contents

Preface

This paper investigates the importance of firm size with respect to access to credit, relative to firm performance, and other factors which may affect creditworthiness, such as management education, location, or the industrial sector to which the firm belongs. The principal findings are that size strongly affects access to credit, compared to performance as well as other variables, suggesting quantitative limitations to credit access. Looking at short-versus long-term loans, the impact of size on access to credit is greater for longer-terms loans. Further, looking at the ownership of the lending institution, it is found that public financial institutions are more likely to lend to large firms. Finally, examining the role of financial constraints relative to other constraints faced by the firm, it is found however that financial access constraints may have a less significant differential impact across firms of different sizes than other constraints though cost of finance as a constraint is very important.

Introduction

Should firm size affect the ability of a firm to access external capital for growth? If access to external financing is based on current performance, or expected future performance—that is, on returns or expected returns—size *per se* should not have an impact on access to external finance. Yet in many countries it is perceived that small firms face particular disadvantages in the credit market.

This paper examines the extent to which firm size affects financing patterns and restricts access to finance in one country, Brazil, based on an Investment Climate Survey of 1642 firms constructed in 2003, which includes firms in thirteen Brazilian states (out of 27) and nine industrial groups. The following key questions are addressed: (i) whether small firms financing patterns differ from large firms, and whether small firms have less access to credit and face more credit constraints than larger firms; (ii) the importance of firm size, compared to performance, or other factors, in assessing access to credit and credit constraints; (iii) whether credit provision criteria are different for fixed capital (long-term loans) and for working capital (short-term loans), (iv) whether bank ownership—public, private or foreign—impacts differentially upon on credit provision across firm sizes, and (v) the role of credit constraints relative to other constraints, in relation to firm size.

The present section discusses the questions examined, reviews results of former studies on firm size and access to finance, and discusses the data sample and the variables used in the present investigation. Section 2 investigates financing patterns by firm size and analyzes differentials in access to credit, evaluating the role of size, among other factors, as a constraint to financial access. Section 3 examines the differential impact of financial institutions' ownership on the provision of credit to firms of different sizes. Section 4 investigates the role of financial access as a constraint to growth, relative to other factors, for firms of different sizes. Finally, Section 5 presents overall conclusions.

Firm Size, Performance, and Characteristics: Impact on Financing and Access to Credit

Studies of the extent to which firm size affects financing patterns, at the cross country level, have looked primarily at differentials in debt equity ratios, and results suggest that size does affect financing patterns (Demirguç-Kunt and Maksimovic 1999). Large firms have more long-term debt as a proportion of total assets compared to smaller firms, and are more likely to use external finance compared to small firms (Beck, Demirguç-Kunt, and Maksimovic 2002, 2003). More disaggregated investigations of sources of finance have also looked at the use of trade credit, finding that large firms are significantly associated with less trade credit finance (Demirguç-Kunt and Maksimovic 2001). The greater use that smaller firms make of trade credit is more prominent in countries where the legal infrastructure is weak. As the legal infrastructure strengthens, across a spectrum of countries, the use of trade credit is reduced for all firm sizes. Moreover, comparing bank financing and trade credit, these studies suggest that size plays a larger role in access to bank financing than in access to trade credit. In the present study, data from the Investment Climate Survey on Brazil permits disaggregation of sources of financing into a wider spectrum, beyond debt and equity finance, or bank finance versus trade credit. It also permits the separation of financing sources for short and long term capital.

In assessing the factors which would affect access to credit, traditional theory would suggest that in well-functioning credit markets, lenders would base their decisions on the overall financial soundness of firms and on expected performance and projected cash flows, adjusted for risks and transaction costs, rather than upon firm size. Measures readily available for expected performance, adjusted for risks, are difficult to construct, however at a very simple level, many authors have found that greater sales and profits are associated with greater access to credit (for example, Bigsten and others 2003; Topalova 2004). In addition, firms with increasing sales, increasing turnover (sales/assets) ratios, lower volatility of sales or lower liabilities to assets ratios, would be expected to have greater access to credit and less credit constraints.

Yet, empirical studies have also found that smaller and younger firms are more credit constrained than larger and long established firms. Bigsten and others (2003) also report that small firms are less likely to obtain a loan than large firms. Levenson and Willard (2000) find that constrained firms are smaller, younger, and more likely to be owned by their founders. Furthermore, Levy (1993) reports that lack of access to finance emerges as the binding constraint for smaller and less established firms.[1]

Several reasons have been pointed out why access to credit may be affected by firm size in addition to performance. First, greater constraints may be faced by small firms due to market imperfections, in the form of greater informational opacity. Though not unique to small firms, this may be considerably more relevant because of relatively poor quality and provision of financial information. This leads to greater difficulties in credibly conveying their quality or the quality of their projects (Binks and Ennew 1996). Small firms, and especially small young

---

1. This analysis presents however two caveats. One is that empirically it is difficult to disentangle creditworthy firms from non-creditworthy firms and therefore it is unclear if higher constraints are well justified or not. Moreover, a survival bias hides important information regarding non-surviving firms whose failure may result from credit constraint.

firms, lack the long credit history of larger and longer established firms. Also small firms do not have publicly-known contracts (supplier, customer, or labor-related), and do not trade securities that are continuously priced in public markets. Moreover, unlike large firms their performance is not regularly assessed by independent market analysts, and they may be unable to provide audited financial statements (Berger and Udell 1998; Saito and Villanueva 1981). External financial agents must consider the provision of finance under imperfect and asymmetric information (Berger and Udell 1994) related both to the *ex ante* evaluation of the project and the firm and the *ex post* monitoring of performance. Information is particularly important for debt financing, where the lender is not a beneficiary of upside gains, but is a potential loser in the event of downside firm failure. It has been argued that such information asymmetries, and thus adverse selection and moral hazard, lead to credit rationing (Stiglitz and Weiss 1981); a situation where, with a given total supply of credit, some entities are unable to obtain a loan at any interest rate. Such credit rationing may explain the credit constraints that small firms face (Lung and Wright 1999; Berger and Udell 1994).

Second, to the extent that the adverse effects of information asymmetry may be reduced by the provision of collateral (Angelini and others 1998; Berger and Udell 1994) it is argued that smaller firms face greater difficulties. Larger firms tend to own more assets for collateral. Also in large firms, managers' investments in the firm can also constitute a pledge of performance (Bester 1987; Binks and Ennew 1996). In the case of small (unlisted) firms pledged collateral is often of a personal nature (Avery and others 1998). Greater reliance on personal assets may discourage investments at the margin as they imply additional risk (Binks and Ennew 1996).

Third, in addition to informational opacity, small firms may be associated with real risk differentials compared to large firms, since they are known to have a high failure rate compared to larger firms (Lund and Wright 1999; Gertler and Gilchrist 1994). Small and especially new firms and may also have relatively more volatile earnings due to less opportunities for diversification of their output or client base (Chittenden and others 1993; Hughes and Storey 1994; Klapper and others 2002). Smaller firms may thus be less likely to survive economic downturns (Gertler and Gilchrist 1994). Evidence has shown that small business closures occur in the first three years of operations (Bank of England, 1994). By contrast, larger firms can potentially be more diversified and thus better protected against economic fluctuations (Brewer and others 1996; Saito and Villanueva 1981). Furthermore, larger firms are usually older and better established, which itself demonstrates their survival under market competition.

Such differences between large and small firms are translated into higher bank transaction cost of lending to small firms. These real transaction cost differentials refer to search, information, evaluation, monitoring as well as higher risk. Saito and Villanueva (1981) estimate the real cost of lending to small firms being approximately twice that of lending to large firms. In the present study, the extent to which small firms face greater credit constraints is empirically examined, and the importance of size differentials is compared with variables reflecting firm performance, adjusted as far as possible for risk.

Other Factors Affecting Access to Credit

Looking at other variables which could affect firms' access to finance, it has been suggested that there may be an "industry effect." Banks may favor firms of specific industries as clients,

lending more to 'growth' industries (Rajan and Zingales 1998). An alternative explanation for an industry effect is that some industries are more likely to depend on external financing than others, depending upon initial project scale, cash flows and requirements for continuing investment (Rajan and Zingales 1998; Bigsten and others 2002).[2] Industrial effects could thus be hypothesized to arise from factor intensity differentials, so that more capital-intensive firms, with higher credit needs, may face proportionally greater constraints.

There may also be a "regional effect" so that financial access differentials in different firm locations can arise from differentials in bank density across regions, which themselves may reflect differentials in income and levels of economic activity. In Brazil there are sharp income differences between the five main regions, where the Southeast is three times as rich as the Northeast in per capita income terms. Kumar and others (2004) find that there is a large variation in branch density across different regions of Brazil. While the South and Southeast are relatively well branched, access to bank branches is relatively limited in the North and Northeast. Well branched regions, and as a consequence, greater ratios of banks per firm would be expected to ease physical access and also lower information asymmetry problems and as a result ease credit access.[3]

Next, there may also be an "ownership" effect of the firm (private domestic, private foreign, or state) and credit access. Foreign firms may have more access to credit and less credit constraints than domestic private firms. Foreign firms are usually highly visible, well known and publicly listed and traded. Previous studies in Brazil suggest that foreign firms outperform domestic counterparts (Willmore 1986). State firms may have more credit access (especially from public banks) relative to private domestic and private foreign firms. If it is argued that state firms are generally obliged to make their financial situation public, decreasing the agency costs associated with information asymmetries, such firms would be expected to have superior access. One the other hand, if access to credit depends on performance, state owned firms have often been shown to perform less well than private firms (for example, Majumbar 1998; Vinning and Boardman 1992) which would suggest that state firms should be more credit constrained than private firms.

The extent to which different levels of managerial education affect access to credit and credit constraints is also explored. This has not been addressed in previous empirical studies. However, various authors have raised the importance of managerial education. Jensen and McGuckin (1997) maintain that variations in firm performance are largely associated not with traditional characteristics such as location, industry, size, age, or capital, but rather with intangibles specific to the firm such as the managerial capital of the firm or the skill of its workforce. At the individual level, Kumar (2004) found a strong education effect in explaining access to financial services in Brazil. We expect that firms with more educated managers have more access to credit than firms with less educated managers, as a result of their ability to smooth complicated loan application procedures, presenting positive financial information, and/or building closer relationships with banks. Furthermore, better educated managers are more likely to have managerial skills in finance, marketing production, and international business that would lead to firm's growth.

---

2. Another industry specific hypothesis could be to check for differential effects of government policies, which sometimes aim to promote specific sectors of the economy. In Brazil, government policy has offered credit incentives to export oriented industries for example.

3. A state level analysis is not attempted in this paper.

Bank Relationships, Bank Ownership and Access to Credit

Looking at the extent to which access to credit may be affected by the lender, studies have pointed out that closer banking relationships could reduce transaction costs that emanate from information asymmetries. Closer banking relationship can facilitate the flow of information between borrower and lender, easing the bank's assessment of managerial skills, business prospects, firm needs and resources. The better informed the bank the more it will be able to apply prospects-based lending methods rather than collateral-based lending (Binks and Ennew 1997). Closer relationships could be established through longer association, uniqueness of association, or interaction over multiple financial products, that allow the bank to learn about the firm's cash flows (Peterson and Rajan 1994). There is a broad empirical literature with evidence that closer relationships (length of the relationship or exclusive relations) are associated with lower credit constraints. Chakravarty and Scott (1999) find that the relationship duration and the number of activities between households and lenders significantly lower the probability of being credit-rationed. Cole (1988) finds that a lender is more likely to extend credit to a firm that has an existing savings accounts and other financial services. Also Peterson and Rajan (1994) report that the length of the relationship has a positive and significant impact on credit availability. Ferri and Messori (2000) report that close customer relationships between local banks and firms promote a better allocation of credit in the North and Center of Italy but worse in the South.[4]

One measure used to proxy the closeness of bank relationships is the extent to which such relationships are unique. Peterson and Rajan (1994) and Cole (1998) find that firms that borrow from multiple banks are charged at significantly higher rates and face lower availability of credit. These results are interpreted to suggest that multiple relationships decrease the value of the private information generated by the potential lender (Cole 1998). However, on the contrary, it has also been argued (Binks and Ennew 1996) that the vast majority of small firms do not need a close relationship with their banks because they require standard services. Furthermore they state that banks need to be selective when developing relationships since such services are costly in terms of people and time. The present paper investigates the extent to which unique banking relationships affect access to credit.

Another factor which may differentially affect access to credit for firms of different sizes may be the ownership of the lending financial institution. Foreign banks may provide more credit to large corporate firms for two reasons; first, foreign banks tend to "cherry pick" good clients with the offer of superior services, and second, foreign banks are usually located in large financial centers away from small firms (Berger, Goldberg, and White 2001; Clarke and others 2001). Clarke and others (2001, 2002) find that foreign bank penetration improves financing conditions for enterprises of all sizes, but this process seems to benefit

---

4. There are also studies that focus on the role of firm-lender relationships and the *pricing* of credit. In Diamond (1989), Peterson and Rajan (1993), and Boot and Thakor (1994) it is predicted that loan interest rates should decline over time though Greenbaum et al. (1989), and Sharpe (1990) maintain that lenders charge lower interest rates in early periods. Empirically, studies have found contradictory results. Peterson and Rajan (1994) find that the length of the relationship has no effect on the cost of credit. Berger and Udell (1995) find that the cost of borrowing in credit lines decreases with long term bank—borrower relationships and that collateral is less frequently required. The impact of bank relationships and the cost of credit is not examined in the present study.

larger firms more. Public banks on the contrary may have a closer association with small firms as they are often mandated to ease credit to small and new firms as a mean of overcoming perceived market failures.

Other Factors Affecting Access to Credit

Heterogeneity of firms in terms of access to credit may also arise due to other characteristics, which we broadly group under three categories: competitiveness, credibility, and capacity for innovation. Competitiveness may be reflected in age, where survival suggests that firms are at least as competitive on average, as other existing firms. Being an older firm should also lower informational opacity (Frazer 2004).[5] Another indicator of competitiveness, in a global sense, is whether firms are exporters or not. Firms' transparency and credibility should clearly affect their access to credit, and some researchers have pointed out that formal sector firms may be deemed more transparent, or firms which are members of a group or trade association (Binks and Ennew 1996). Finally, innovation and technological change are majors drivers of economic growth (Solow 1957). At the firm and industry level, recent contributions have found strong links between technological change and productivity, and between R&D and a firm's growth (Long and others 2003; Griliches 1998, for a survey). Innovative capacity may be suggested by the education of the workforce as human capital influences growth (Barro and Sala-i-Martin 1995), Lucas (1988), and Romer (1990). The results of Laursen and others (1999) corroborate this thesis. They find that the availability of a high fraction of employees with higher education was in general conducive to growth.

Data and Sample Characteristics

Table 1 summarizes the sample composition according to region, industry, ownership, manager's education, and sales growth. Looking at a simple parameter to measure firm performance, about 65 percent of firms claimed to have increasing sales over the reference period. In terms of region, firms are located mainly in the more affluent South and Southeast (around 77 percent), The North and Northeast together make up 16 percent of the sample, however the North alone accounts for only around 1.5 percent of the sample.[6]

In terms of industry, almost half the firms (46 percent) belong to the Garment and Furniture sectors; over a fifth (21.7 percent) belong to the Machinery and Shoe and Leather sectors, taken together. In terms of ownership, the vast majority of firms (94 percent) are private domestic firms. Private foreign ownership and government ownership represent 5.3 percent and 0.4 percent of the sample respectively. Only seven firms are state-owned,

---

5. Our threshold is two years as the majority of Brazilian firms that leave the market do so within the first two years (BNDES, 2003)

6. The Southeast, South, and Center-West are the richest regions, with per capita incomes of R\$ 9,316, R\$ 9,387, and R\$ 7,260, respectively. The Northeast and North are the poorest regions, with incomes of R\$ 3,255 and R\$ 4,312 per capita, respectively. With regard to branch density, the Southeast has the largest number of branches (9263), whereas the South and Center-West have 3446 and 1283 branches, respectively. The Northeast, the poorest region, has 2383 branches and North has only 623 branches. (Appendix Table A.1)

Table 1. The Dataset: Characteristics of Sample Firms

Region	No. firms (%)	Industry	No. firms (%)	Ownership	No. firms (%)	Manager's education	No. firms (%)	Sales growth	No. firms (%)
North	24 (1.5)	Food Processing	127 (7.7)	Private Domestic	1549 (94.4)	Post Graduate	331 (20.2)	Increased	1042 (64.6)
Northeast	238 (14.5)	Textiles	106 (6.5)	Private Foreign	86 (5.2)	Graduate	500 (30.5)	Decreased	390 (24.2)
Center-West	121 (7.4)	Garments	442 (26.9)	State	7 (0.4)	Incomplete University	249 (15.2)	Unchanged	182 (11.3)
Southeast	713 (43.4)	Shoes & Leather	173 (10.5)			Vocational Training	185 (11.3)		
South	546 (33.2)	Chemicals	84 (5.1)			Secondary School	158 (9.6)		
		Machinery	183 (11.2)			Incomplete Sec. School	62 (3.8)		
		Electronics	79 (4.8)			Primary School	95 (5.8)		
		Auto-parts	130 (7.9)			Incomplete Primary School	60 (3.7)		
		Furniture	315 (19.2)						

Source: World Bank, Investment Climate Survey—Brazil, 2003.

of which six belong to the chemicals industry and one belongs to the electronics industry. State owned firms are large; three have more than 500 employees, six out of seven have annual sales of more than R$60 million per year. By contrast only 3.6 percent of private domestic firms have more than 500 employees and only 8.5 percent have sales of over R$60 million per year. Foreign-owned firms account for 5 percent of the sample, and around half are in the Machinery and Auto-parts industries. Foreign private firms are larger than domestic private firms; a fifth have more than 500 employees, and over a third have sales exceeding R$60 million.

Managers of about half the firms have completed university education. Yet, in 10 percent of firms, the manager's education does not exceed primary school. In more technologically intensive sectors such as Chemicals and Electronics, 80 percent of the managers hold a post graduate degree.

Measures of Firm Size

Alternative criteria for classifying firm size were tested. The most widely used criterion in Brazil is the number of employees, as defined by the Ministry of Industrial Development and External Trade.[7] This classification has also been adopted by the Brazilian Institute of Geography and Statistics (IBGE) and the Institute for the Support of Micro and Small Firm (SEBRAE).[8]

An alternative classification, based on sales volume, is used by Brazil's development Bank (the BNDES).[9] In addition, classification of firms by size deciles and quintiles was also investigated. For the most part, the study uses only the first definition, since there appears to be a high degree of co-movement of findings using alternative definitions. Using both the sales criterion and the number of employees, micro and small firms represent the largest share of the sample; around 70 percent taken together (Table 2). Micro firms form the largest share of the sample according to the sales criterion (46 percent of firms, with annual sales of around R$1.2 million); small firms represent the largest share on the employment criterion (52 percent, employing between 20 and 99 workers). A breakdown of the sample by firm size and by select firm characteristics is presented in Appendix Table A.2.

Construction of Other Variables

To test the hypotheses described above regarding firms' access to credit, the variables described above were constructed as follows: Firms' performance is proxied by a series of

---

7. Ministério do Desenvolvimento Indústria e Comércio Exterior. Note that this classification leads to an uneven distribution of firms in each sample category; a higher threshold for micro firms or a lower threshold for large firms could have corrected this. However apart from its widespread use within Brazil, this definition also coincidentally corresponds to that used by the Bank in all other ICA data analysis.

8. *Instituto Brasileiro de Geografia e Estatística* and *Serviço Brasileiro de Apoio às Micro e Pequenas Empresas*.

9. Banco Nacional de Desenvolvimento Econômico e Social., or National Bank for Economic and Social Development. *SEBRAE* uses a different definition for size according to sales. It follows the definition of Law 9841 of 10/5/99, in which a firm is classified as micro if its sales are lower than R$244,000; small if its sales are equal or greater than R$244,000 and lower than R$1,200,000; and medium or large if its sales are equal or greater than R$1,200,000.

Table 2. The Dataset: Alternative Classifications of Firm Size

	Number of employees (Nos.)	Number of firms	%	Sales (R$ 000 per year)	Number of firms	%
Micro	0 to 19	330	20	<1,200	736	46
Small	20 to 99	861	52	≥1,200 & <10,500	468	30
Medium	100 to 499	376	23	≥10,500 & <60,000	268	17
Large	More than 500	75	5	≥60,000	170	7
	500–999	53				
	1000–1999	12				
	2000–4999	7				
	>5000	3				
Total		**1642**	**100**		**1642**	**100**

Source: World Bank, Investment Climate Survey—Brazil, 2003.

variables including sales growth, turnover (sales to asset ratio), and leverage. For regional effects, five standard national regions are introduced as variables: North, Northeast, South, Southeast, and Center-West. Dummy variables for these are weighted by regional income per capita and by bank branch density. For industrial effects, nine industrial sectors are introduced, using the standard industrial (CNAE) classification, weighted by capital intensity, measured as the ratio of machinery and equipment costs to labor costs.[10] Managerial education is captured at eight levels.[11] Firm ownership is classified in three categories; state-owned, private domestic and private foreign. Bank ownership was classified similarly, for each firm based upon the main bank the firm used.

Additional control variables include whether the firm age is below five years, and whether or not the firm is an exporter (as measures of survival and competitiveness), firm status (incorporated or not); membership of a trade group or association, and use of external auditors, as measures of transparency. Finally, the proportions of the workforce with higher education (proxied by the percentage of workforce that use computers), and capacity utilization, were used as measures of innovation and capacity utilization.

The last group of variables, on bank relationships and creditworthiness, were measured by whether the firm has a unique bank relationship, whether the firm has collateral, whether the firm has an overdraft or line of credit, and finally, by the ownership of the main banking institution for each firm. A list of variables and their construction is given in Appendix Table A.3.

---

10. Textiles, Auto-Parts, Chemicals, Food Processing, Electronics, Machinery, Furniture, Leather & Shoes, and Garments.

11. Post graduate degree, university degree, incomplete university degree, vocational training after secondary school, complete secondary school, incomplete secondary school, complete primary school, and incomplete primary school.

Firm Size, Financing, Access to Credit, and Credit Constraints

Our analysis of access to financial services and firm size begins with a simple comparison of financing patterns across firms of different sizes. This is followed by a more specific question related to the role of size compared to performance and firm characteristics in explaining access to credit. Two models have been specified, to test the robustness of results obtained.

Firm Size and Financing Patterns

Based on data in the survey which provides a detailed breakdown of sources of funds (internal capital, banks, trade credit, leasing, credit cards, government funds, and informal sources), and separates these by uses (fixed and working capital, we use mean difference tests to investigate whether the sources of funds vary significantly across firm sizes.[12] Results are summarized in Table 3 later and detailed in Appendix Table A.4 and Appendix Table A.5 . In terms of importance, for all firm sizes, and for both working capital and for new investments, internal funds constitute the primary source of finance, especially for fixed capital (55 percent, compared to 45 percent for working capital).[13] Next in importance as a source of finance, for both working capital and new investments, is credit from the banking system, followed by trade credit, which for working capital contributes a substantial 14 to 16 percent of total financing. Informal sources can be important for working capital finance. Leasing, credit card finance, and equity play a minor role as financing sources.[14]

Looking at financing patterns across firms of different size, the findings which stand out are first, that differentials by size may be more pronounced for fixed capital than for working capital. In terms of the overall separation between external and internal funds, large firms use significantly more external funds to finance new investments (59 percent compared to 41–46 percent for other size categories). For working capital, differences are low (44.2 compared to 41.2 percent, and there is no steady progression across size categories). Trade credit too does not appear to vary systematically by firm size for working capital, however its is surprisingly also important as a source of finance for new investments, and here its importance does vary across firm size, representing around 12 percent for micro firms and between 7 and 9 percent for other firm sizes.[15] For bank finance and for funding

---

12. F-tests and Chi-Squared-Tests. Note that these can only test for differences from the mean and not for individual pairs of categories. Thus for example we cannot test whether the north is significantly different from the south, or whether the southeast is significantly different from the north. We test for significant differences in the use of internal funds across regions.

13. The results are corroborated by previous findings for Brazil. Brazilian firms primarily rely on internal finance, secondly, on debt finance and thirdly, on equity (Junior and Melo, 1999), confirming the Pecking Order theory. Equity finance represents a more important source of financing for larger firms than for other firms reflecting the equity gap.

14. Credit card use for financing working capital varies significantly (at 5%) across firm size when firms are classified according to sales only. Equity as source of financing for new investment varies significantly across firm size, being more important for medium and large firms, when size is defined according to sales and deciles and quintiles of sales.

15. Internal funds, local bank finance and trade credit represent around 80% of the total of the sources of financing for all firm sizes.

Table 3. Firm Size and Sources of Finance: Working Capital and New Investments

No. of employees	Working capital				New investments			
	Micro 0–19	Small 20–99	Medium 100–499	Large >500	Micro 0–19	Small 20–99	Medium 100–499	Large >500
Internal funds	44.2	43.3	44.8	41.2	58.7[†]	57.8[†]	54.0[†]	41.0[†]
Bank finance[1]								
Foreign	0.8[§]	0.9[§]	1.7[§]	4.9[§]	0.0[§]	0.8[§]	2.6[§]	3.2[§]
Local private	10.8	12.7	12.6	8.5	5.7	6.9	5.4	1.4
Local public[2]	11.9*	15.2*	17.6*	25.2*	10.4[§]	14.1[§]	19.1[§]	34.5[§]
Of which government funds	0.8[§]	1.9[§]	2.9[§]	6.0[§]	4.5[§]	6.5[§]	12.5[§]	25.3[§]
Trade credit	14.2	16.3	13.7	14.2	11.9*	8.6*	6.6*	9.2*
Leasing	0.5	0.9	0.8	0.3	2.2	3.1	3.5	5.0
Informal sources	10.5[§]	5.5[§]	1.8[§]	0.2[§]	4.4[§]	2.4[§]	0.4[§]	0.0[§]
Equity finance	2.7	2.7	4.7	1.8	3.5	3.8	6.0	4.0
Credit card finance	0.8	1.0	0.3	0.0	0.5	0.2	0.2	0.0
Others	3.6	1.5	2.0	3.7	2.7	2.3	2.2	1.7
Total (%)	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Total no. of firms	**328**	**860**	**373**	**72**	**247**	**716**	**324**	**64**

1. This disaggregation does not derive directly from the questionnaire. Local commercial bank finance is disaggregated into local private and local public finance according to the main bank the firm does business with.
2. Government funds are included in the local public bank finance category.
Statistical significance: * significant at 10%, † significant at 5%, and § significant at 1%.
Source: Based on World Bank, Investment Climate Survey data—Brazil, 2003.

from informal sources, there are significant differences across size categories for both fixed and working capital. Informal sources are very important for working capital finance for micro firms, representing 10.5 percent of working capital financing needs for micro firms, compared to only 0.2 percent for large firms.[16]

Second, a larger percentage of firms among medium and large firms have overdrafts or line of credit (81 and 83 percent respectively), compared to micro and small firms (60 and 76 percent respectively). As firm size increases the amount available through an overdraft or credit line as a percentage of sales increases sharply (from 33 percent for micro firms to 546 percent for large firms). Moreover, micro and small firms are charged higher interest rates on their overdrafts (around 5 percent) compared to medium and large firms (3 and 4 percent respectively). Sample data suggests that as size increases, the number of banks firms do business with also increases (Appendix Table A.6).

16. This also suggests that our later analysis of the impact of size on financing patterns could have been enhanced if the use of specific credits requested or received was known. Unfortunately, information on this has not been provided.

Third, separating banks by ownership, it emerges that public banks are more significant providers of capital for larger firms.[17] Micro firms use public banks for only 12 percent of their working capital needs and 10 percent of new investment finance, in contrast to 25 and 34 percent for large firms. Private commercial banks by contrast appear to supply micro, small and medium firms with a larger proportion of their needs than large firms, especially working capital needs (11–13 percent, compared to 8.5 percent for large firms). Private commercial banks account for a negligible proportion of large firms' working capital needs (only 1.4 percent, compared to 5.4–6.9 percent for micro to medium firms). Foreign commercial banks like public banks are far more important for large firms, and even provide for a significant part of their working capital needs (5 percent), in addition to the finance of fixed capital (3.2 percent).[18]

Sources of financing appear also to be affected by the other explanatory variables; region, manager's education, industry and sales growth. Better off regions use a higher proportion of external funds than poorer regions. Thus, the South uses less internal funds and more commercial bank finance, for both working capital and fixed investments, compared to other regions, while the North uses twice as much internal finance as other regions. In terms of the number of bank relationships, as size increases, the number of banks clearly increases (Appendix Table A.7). In terms of region and education, firms in the South work with a larger number of banks on average than firms from other regions. An examination of managerial education suggests that firms where managers holds post-graduate degrees use more finance from foreign banks and equity finance compared to other firms. More educated managers also work with a larger number of banks (Appendix Table A.8).

Access to Credit and Credit Constraints—Sample Frequencies

Moving from overall patterns of financing, to access to credit specifically, the next part of the analysis examines the relation between constraints in access to credit and firm size, performance, and other factors. Firms with access to credit are defined as those that express a demand for credit, apply for a bank loan and receive it.[19] Constrained firms are those that express a demand for a bank loan but either (i) apply for a bank loan and are rejected, or (ii) do not apply.[20] The data shows that 59 percent of large firms have loans, compared to 27 percent of micro firms. About 54 percent of large firms that did not apply for credit reported that they did not need a loan, compared to 39 percent of micro firms. About 61 percent of micro firms that did not apply for a bank loan reported other reasons

---

17. Local commercial banks were not separated into private and public banks in the data on financing sources. However the public bank share has been constructed by inference, using the name of the principal bank provided by each respondent.

18. These results are similar to those in Kumar (2004) which reports that for individuals, private banks were more active for small depositors and small loan segments than public banks.

19. This is access to credit in a narrow sense. In a wider definition, firms that do not have a loan but also have no demand (either because there is no need or because they can finance their needs in other ways) can also be defined as having access to credit.

20. Reasons cited in the questionnaire for not applying despite expressed demand include factors related to the environment such as complicated application procedures, corruption in the allocation of bank credit, or expectation of rejection, as well as cost related factors such as high interest rates or strict collateral requirements.

(such as application procedures, collateral requirements, interest rates, or expectations of being rejected) compared to 46 percent among large firms. Only 2.7 percent of large firms did not have a loan because their application was rejected, compared to 9.4 percent for micro firms. About 38 percent of micro firms did not apply for bank loans (even though they needed one) because of other reasons cited above. For large firms that percentage corresponds to 18 percent.

Cost-related factors, in the form of high interest rates, are the principal reasons cited for not applying for a loan, and for this, the proportion of affected firms is similar for all firm sizes (Appendix Table A.9).

Application procedures and collateral requirements are next in importance, and these represent a higher barrier for micro and small firms than medium and large firms. None of the large firms failed to apply for a loan due to expectations of being rejected, unlike micro and small firms. Corruption and expectations of being rejected are not reported as important barriers.[21]

Around two thirds of all loans (67 percent) require collateral, which on average represents around 125 percent of loan value (Appendix Table A.10). Collateral is used for a larger proportion of large firms' loans (81 percent) compared to micro firms (43 percent). Buildings and machinery together form the largest share of collateral for firms of all sizes, together representing around half of all collateral. The use of personal assets and intangible assets as collateral does vary significantly across firm size. Large firms use less personal assets (7 percent) compared to other firms (between 10 and 20 percent), but more intangible assets (35, compared to 11 to 17 percent for other firms).

Looking at other factors which could affect access to credit and credit constraints, it is found first a simple performance related variable, sales growth, does exhibit an association with access to credit but the result is not significant statistically. Firms with decreasing sales have a greater rejection rate (15.5 percent) compared to firms with increasing sales (9.1 percent). And a large number of firms with declining sales do not apply for a loan because they expect to be rejected (2.4 percent) compared to firms with increasing sales (0.5 percent). Regional variations, by contrast, are significant. The percentage of firms with loans is lower in the North (16.7 percent) than in the South (41.4 percent). And firms from South are less credit constrained (28 percent) compared to firms from other regions (between 31 and 46 percent).[22] Managerial education does not vary significantly with the percentage of firms that have loans though with regard to the reasons for not applying for a loan (Appendix Table A.9), application procedures are a greater barrier for firms with less educated managers compared to firms with more educated managers. About 18 percent of the firms in which managers have incomplete primary education report application procedures to represent the main reason for not applying for a loan, compared to 5 percent of firms in which the manager has a post graduate degree. About 40 percent of the firms with the lowest educated managers report that loan application was the main reason for

---

21. An investigation of reasons for loan application rejection suggests lack of collateral and poor credit history are the main factors. An analysis of size effects is limited since of the 193 observations, only 3 are for large firms.

22. The requirement of collateral also varies significantly across regions. A smaller percentage of firms in the North reported that financing required collateral (50%) compared to other regions (between 60% and 70%).

rejection, while only 12 percent of the firms with post graduate managers have reported so. Finally, the percentage of firms across different industries that have a loan varies between 30 and 40 percent but differences are not statistically significant.[23]

Relative Importance of Factors Affecting Credit: A Simple Model

To test whether size, performance, industry, region and manager's education explain the probability of having a loan, we first estimate a maximum likelihood probit model incorporating these variables, and estimate the marginal effects of these variables on access to credit as defined above. Appendix Table A.11 reports the marginal effects. The results indicate first that firm size dominates all other effects—region, industry, manager's education, firm ownership, and performance. Small, medium and large firms respectively have probabilities of having a loan which exceed micro firms by 9, 22, and 34 percentage points respectively.

The Relative Importance of Factors Affecting Access to Credit An Alternative Model

In order to test the robustness of the results, an alternative estimation was undertaken, using a two step maximum likelihood probit with sample selection, to deal with possible selection bias between access to credit and demand for a loan.[24] This model allows us to estimate the probability of having a loan (or being unconstrained) given that the firm has demand for a loan. In the first stage (first model) we estimate the probability of having demand for a bank loan, and in a second stage (the second model) we estimate access to credit defined by the probability of having a bank loan. The first model can be interpreted as demand for credit and the second model as supply of credit. Firm characteristics and the firm's willingness to invest[25] explain the demand for credit. The supply of credit shall reflect firms characteristics and the banks' evaluation of firms' risk.

Demand for credit = $\alpha + \beta$ firms'characteristics + δ firm's willingness to invest + ε

Supply of Credit = $\alpha + \beta$ firms'characteristics + δ banks' evaluation of firms' risk + ε

Firms' characteristics (which explain both models) are firm size, region, industrial group, ownership, managers' education, capacity utilization, age, exporter status, corporate status, group membership, and innovative capacity (percentage of workers that use a computer regularly). In addition to firm characteristics, demand for credit is also explained by proxies for firm's willingness to invest—captured here by whether a bank has an overdraft or line of credit,[26] the percentage of inputs bought on credit and cited

---

23. Firm ownership is not investigated, since the sample may be unrepresentative, with only 7 state-owned firms and 86 foreign firms out of 1642 firms,

24. The selectivity bias derives from the fact that only firms with demand for credit will be in the market for a loan.

25. Theoretically the willingness to invest (apply for a loan) should consider the cost of alternative sources of financing, including internal sources of financing.

26. In the first model (demand for credit) overdraft is capturing the availability of alternative resources to the bank loan, whereas in the second model is capturing firms'worthiness.

macroeconomic obstacles to growth (economic uncertainty, macroeconomic instability, and cost of credit). The access to a bank loan model is explained by firms characteristics (as described above) and by variables that aim to capture firms' risk—performance variables (turnover, sales growth, leverage),[27] information transparency (external auditor), the nature of the banking relationship (unique or not), and whether the firm has an overdraft and collateral or not.

Appendix Table A.12 reports the results, which indicate first that medium and large firms have a greater probability of having loans than micro firms. Being a firm with more than 500 employees increases the probability of having a loan by 25 percentage points compared to firms with less than 20 employees (micro firms). Being a medium-sized firm (100–499 employees) increase the probability of having a loan relative to micro firms by 15 percentage point. Apart from size, the other relevant variables included innovative capacity, as measured by the percentage of workforce that uses computers. An increase of one percentage point in this segment of the workforce increases the likelihood of having a loan by 4 percentage points. Additionally, having an overdraft has a positive impact on the probability of having a loan (by 16 percentage points). Note that having a unique bank relationship decreases the probability of having a loan, by 11 percent.

Next, to further investigate differences in access which may arise from loan duration (i.e., linked to the purpose of the loan), we split the sample into long term loans and short term loans. Loans with a minimum duration of 24 months are classified as long term, while loans below this threshold are deemed to be short term. This threshold represents a popularly used distinction between loans for working capital and for loans for fixed capital in Brazil.[28] Appendix Table A.13 presents the main findings: access to long term loans varies with firm size, and also with workforce education, creditworthiness (as measured by overdrafts) and the numbers of banks firms do business with. By contrast, the only significant variable in explaining loans for working capital (short term loans) is having an overdraft facility. Firms that have an overdraft facility increase their probability of having a short term loan by 6.5 percentage points. Firm size, unique bank relationships, and percentage of workers that use computers play no role in explaining short-term loans. Only the overdraft facility is relevant in explaining short-term loans, suggests that loans for working capital are treated as extensions of overdrafts. This may imply that small firms may have easier access to credit for keeping the business running, while facing greater financing obstacles for new investments that allow growth and expansion.

The findings above that the firms that work with only one bank are more credit constrained are not in line with previous work (Rajan and Zingales 1994) which hypothesizes that the establishment of a unique banking relationship can aid access to credit. Firms appear to find it beneficial to build up a relationship with several institutions.[29]

---

27. To mitigate the endogeneity problem we use lagged variables.

28. At the BNDES bank, loans for working capital in Brazil are defined to have a maximum of 24 months and loans for fixed capital have a minimum of 24 months and a maximum of 120 months.

29. The findings of Rajan and Zingales, 1994, focused on the effect of unique banking relationships on lowering the cost of credit, however, rather than on raising quantitative access. In the present exercise a specification with the numbers of banks as opposed to the unique versus multiple bank relationships was also examined and results were similar.

Financial Institution Ownership and Access to Credit

The previous sections focus on the characteristics of the enterprises. This section aims to characterize the finance provider, in particular the finance provider's ownership.

Domestic banks are the principal financial institutions which sample firms deal with, and public banks (45 percent of enterprises) are somewhat more important, in terms of numbers of firms, than private banks (42 percent or enterprises).[30] Private foreign banks are the principal institutions for only 12.7 percent of sample firms (Table 4).

Banco do Brasil, a public domestic bank, is the principal bank for 593 firms, or 36 percent of the total sample. It is also the most important financial institution for small firms, though micro firms appear to engage most importantly with the Caixa Economica Federal, the second largest bank, also publicly owned. In contrast to Banco do Brasil, Caixa Economica Federal's clients include few mid sized firms and no large firms. The second most important bank for firm of all sizes is Bradesco, a privately owned domestic bank. Its importance as the main bank does not vary across firm size.[31]

A larger percentage of firms which are clients of public banks have loans (53 percent) compared to firms which are primarily private bank clients (42 and 45 percent, respectively). Also a larger percentage of firms which are clients of public banks have overdrafts (80 percent) compared to firms that work with private domestic and private foreign banks (70 and 76 percent, respectively). Furthermore, a lower percentage of firms that work primarily with public banks have bank loan rejections (13 percent) compared to firms that work with private domestic and private foreign banks (21 and 14 percent, respectively), and a

---

Table 4. Bank Ownership: No. and Percentage of Firms by Ownership Category

Type of institution	No. of firms	%
Domestic Private Banks	687	42.3
Foreign Private Banks	207	12.7
Public Banks	725	45.0
Total	1626	100

Source: World Bank, Investment Climate Survey—Brazil, 2003.

---

30. Data on bank ownership are not requested directly in the questionnaire, however firms are asked to name the financial institution which they principally use. The ownership of the banks named was classified based on data provided by the Central Bank of Brazil. Only one firm reports to be doing business with BNDES, which is a large second tier (wholesale) lender to enterprises. However, funds from BNDES are channeled through both public and private banks, as lines of credit.

31. There is no significant difference in the type of bank firms do business with across firm size. However firm ownership seems to be correlated with bank ownership. State firms do more business with public banks and less with foreign private banks. Foreign firms do less business with public banks (25%) compared to private domestic firms (46%), and more with private foreign banks (22%) compared to private domestic firms (12%).There are significant differences in the type of banks firms do business with across regions. While the percentage of firms in the South that do business with public banks is 59%, the same percentage is 22% in the North. However, differences across regions do not appear to follow regional income differences, and industrial differences do not reflect relative factor intensity.

Table 5. Access to Credit and Credit Constraints—Breakdown per Type of Bank			
	Private domestic bank	Private foreign bank	Public bank
Have a loan (%)	42.4§	44.9§	53.4§
Loan application rejected	20.8†	14.3†	12.6†
Constrained	55.8§	53.1§	43.8§
Have overdraft	70.1§	75.8§	79.6§
Required collateral	67.3	65.2	67.4

Statistical significance: * significant at 10%, † significant at 5%, and § significant at 1%.
Source: World Bank, Investment Climate Survey—Brazil, 2003.

lower percentage of firms that work with public banks are constrained (44 percent) compared to firms that work with private domestic and private foreign banks (56 and 53 percent, respectively; see Table 5).

To test whether access to credit varies according to bank ownership we split the sample according to bank ownership—that is, into (i) firms that work mainly with public banks, and (ii) firms that work mainly with private banks.

The results illustrate that, from the sample of firms that work primarily with a public bank, large firms are the most likely to have a bank loan (Appendix Table A.14). However, among firms that work mainly with private banks,[32] larger firms are not more likely to have bank loans than smaller firms. For private banks, firms with higher technological and innovative capacity (as measured by the number of workers that use computers), with greater rate of sales growth and that have an overdraft, are more likely to have a loan. Nevertheless, firms that work with more than one bank and that are new (below five years old) are less likely to have a loan. In sum, the results suggest that for public banks firm size is the main indicator of credit worthiness, whereas private banks resort on other indicators such as performance (sales growth), whether the firm is new and whether the firm has an overdraft or credit line. Furthermore, the results suggest that among their clients, public banks may tend to favor large firms over small firms.

To further investigate the effect of bank ownership on the likelihood of having a loan we add interactive dummies (firm size times public bank dummy), to capture whether the effect of working with a public bank and the probability of having a loan varies with firm size. If public banks aim to address market failures we should expect that smaller firms that work with public banks are more likely to have a bank loan compared to small firms that work with private banks. The results reported show (Appendix Table A.15), however, that smaller firms that work primarily with public banks are not more likely to have a loan than small firms that work with private banks. Together, these results suggest that first, public banks clearly do not give privileged access to credit to micro and small firms, and second, that among their clients, public banks may tend to favor large firms over small firms.

---

32. Private domestic banks and private foreign banks are combined, to even sample size for these two categroies.

A second approach adopted for the analysis of the role of public banks focused particularly on the lines of credit extended by Brazil's wholesale, second-tier development bank, the BNDES, to other banks, public and private, for investment loans. These lines of credit, which have a minimum duration of 24 months and a maximum duration of 120 months, are a huge source of investment funding in Brazil.[33] Assuming that all loans within this category are via BNDES credit lines, we estimate the probability of having a loan from a public source (directly via a public bank or via these BNDES credit lines). We expect small firms and export-oriented firms to be more likely to have bank loans than non-exporters.

The results show, on the contrary, that larger firms are more likely to access to loans. Being a large, medium, or small firm increases the probability of having a loan by 27 percentage points, 24 percentage points and 12 percentage points respectively, compared to micro firms (Appendix Table A.16). We also find that though BNDES seeks to promote exporting firms, they are not more likely to have access to credit than non-exporting firms. BNDES' own statistics tend to confirm these findings. Although every year large firms capture a lower share of BNDES resources, they still receive the greatest proportion at present—70 percent in 2003.[34]

Financial Access as an Obstacle to Growth Compared to Other Variables

To conclude the analysis, we investigate the importance of financial access as a constraint to growth, relative to other constraints (Appendix Table A.17). This analysis is based on a question which asks respondents to rank potential obstacles to growth in order of importance. Costs of financing are reported to be the main obstacle to growth for 57 percent of all firms. Access to financing is ranked seventh (34.5 percent of respondents) after cost of financing, tax rates, corruption, economic and regulatory policy uncertainty, and macroeconomic instability; however the question is narrowly interpreted.[35] Clearly firms face a number of obstacles and cost of financing may be a greater overall barrier in Brazil than access.

The question examined here however is the differential impact of various obstacles, and especially, financial obstacles, across firm size. Both access to financing and costs of financing are smaller obstacles to growth for larger firms relative to other sizes. Only 25 percent of large firms rated access to finance as a "very high" obstacle to growth, in contrast to 34 percent for medium and small firms and 38 percent for micro firms. The cost of financing is classified as a very high obstacle to growth by 45 percent of large firms and by 57 percent by firms of other sizes.[36] However significant results were obtained for the impact of firm

---

33. According to a source within BNDES, it is directly and indirectly responsible for around 25% of credit provision in Brazil.

34. In 2002, micro and small, medium, and large firms received, respectively, 16%, 6% and 78%. In 2003, micro and small, medium, and large firms received, respectively, 22%, 8% and 70% (BNDES sources).

35. The question asks whether financial access, and specifically collateral, may be a barrier. However this may suggest a narrow interpretation of financial access and lead to some exclusion in responses.

36. The probability of classifying access to finance as the a very high obstacle to growth is 24% for large firms and 30% for other firms. The probability of classifying cost of financing as a very high obstacle to growth is 37% for large firms and between 42% and 47% for other firms. These probabilities are based on an ordered logit model.

Table 6. Firm Size and Finance Related Obstacles to Growth

No. of employees	Access to financing				Cost of financing			
	Micro 0–19	Small 20–99	Medium 100–499	Large >500	Micro 0–19	Small 20–99	Medium 100–499	Large >500
No obstacle	16.5	13.4	14.3	14.7	8.3	4.2	7.0	2.7
Low obstacle	7.1	8.3	9.2	13.3	3.4	3.1	4.0	2.7
Medium obstacle	17.1	16.2	17.0	21.3	7.4	7.7	7.8	13.3
High obstacle	21.1	28.1	25.3	25.3	23.1	28.0	24.1	36.0
Very high obstacle	38.2	34.1	34.2	25.3	57.8	57.0	57.2	45.3
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Statistical significance: * significant at 10%, † significant at 5%, and § significant at 1%.
Source: World Bank, Investment Climate Survey—Brazil, 2003.

size and other obstacles to growth. Larger firms are less likely to rate tax rates and corruption as very high obstacles to growth (Appendix Table A.18).[37]

Conclusion

This paper investigates the importance of firm size, firm performance, and other factors which may affect firms' access to finance. The specific questions examined are, first, the extent to which financing patterns vary across firm size. Second, we examine the extent to which small firms may have less access to credit and face more credit constraints than larger firms. Third, we investigate the relative importance of firm size, among other factors, in assessing access to credit and credit constraints. Fourth, we examine the extent to which characteristics of financial institutions, in terms of ownership, differentially affect firms' access to credit. Our final question is an analysis of finance as a perceived obstacle to growth, compared to other factors, and the importance of such perceived obstacles across firms of different sizes. The analysis is undertaken in the context of Brazil, using a survey dataset based upon an Investment Climate Assessment, which provides information on variables not included in previous work, including information on multiple sources and uses of credit, bank ownership, firm size and ownership, as well as location, industrial sector, and other data.

Results suggest, first, that sources of finance vary by firm size, and moreover, size may affect access to investment financing more strongly than to working capital financing. The absence of data on uses of credit, in our analysis of credit constraints may limit the quality of its conclusions.

---

37. Similar results are obtained using an ordered probit (where the predicted outcome is rating the obstacle as a 'very high' obstacle). For instance large firms are less likely to classify tax rates and corruption as very high obstacles to growth than micro firms by respectively 11 percentage points and and 17 percentage points.

Since money is fungible, is the distinction between these categories relevant? We would argue that although long term loans may be diverted towards short term uses, it may not be possible to obtain sufficient volumes of short term resources to satisfy significant long term investment needs. Moreover, formal financial institutions make a clear distinction between such loans (for example, the BNDES bank lines of credit are not usually extended for periods of below 24 months). Data which indicate a significantly higher proportion of internal funds for investment financing for all size categories would tend to support this.

Next, our results clearly indicate that size is an important determinant of credit access and credit constraints. Large and medium firms are more likely to have a loan, and less likely to have credit constraints. Moreover, size appeared to have a much more significant effect on determining access to credit than performance-related variables. Also, there is an effective quantitative limit in the allocation of credit to smaller sized borrowers. Whether such an allocation of credit can be deemed to suggest the presence of credit market failures, however, is not clear. To the extent that smaller firms are genuinely more risky for lenders and involve higher transaction costs, or to the extent that there is strong informational opacity (or unreliability) below a certain threshold, the findings above may not imply market failures. However, the limited significance of performance variables suggests at the least, that lenders do not significantly base their decisions to lend on performance. In addition, the results did not corroborate the hypothesis of a robust industry, region, or education effect.

The foregoing analysis was limited by a number of factors, however, which could affect its results. First, as pointed out above, the ICA questionnaire does not permit distinctions between loans requested or obtained for fixed capital, or working capital. Second, we did not undertake an analysis of the extent to which other financing sources apart from bank loans (for example, trade credit or informal sources) behaved with respect to size, performance or other factors determining their credit availability. Third, the nature of the performance variables used was limited; in particular, the questionnaire did not permit direct investigation of profits or returns on equity or assets. It was particularly difficult to devise robust measures of risk adjusted returns and the only variable we have used for this was sales adjusted for and weighted by age, as a risk proxy. Nevertheless, the absence of significance of performance variables is striking.

Results also indicate that firms that conduct business with one bank only decrease their probability of having a loan. Admittedly, the number of banks used by a firm is also strongly correlated with size. Firms with overdraft facilities and with greater innovation capacity (as measured by the proportion of the workforce which is educated) also exhibit easier access to credit and less credit constraints. The unimportance of the unique banking relationship differs from previous work in this area (for example, Peterson and Rajan 2002) and seems to suggest possible gains to firms of diversifying their sources of finance, whether because of lending limits or other reasons.

Third, our results suggest that public banks are the main source of finance for all firm sizes; however, public banks appear to favor large firms somewhat more than smaller ones, among their clients, and there is no evidence to suggest that public banks are addressing significantly addressing this group or that micro and small firms receive proportionally more credit from public banks than other firms.

Again, our results were rendered difficult by the limitations of the data, where the question on sources of finance did not distinguish between banks on the basis of ownership. Therefore the share of private versus public banks was constructed on the basis of data providing the main bank relationship for each firm, rather than the bank at which a specific loan application was made or rejected. Second, the questionnaire also fails to distinguish between direct and indirect sources of public bank funding. In the case of Brazil, a substantial volume of firm financing, especially perhaps, investment financing, is provided by a wholesale bank, the BNDES, through lines of credit extended to both public and private retail banks. Efforts were made to capture this effect both via assumptions on government funds, typically channeled via the BNDES to private banks, and by trying to identify second tier relending with the knowledge of the term for such loans.

Fourth and finally, cost of financing and access to financing are among the major reasons reported as obstacles to growth for all firms; however other reasons such as taxation and corruption are also important. Large firms are less likely to elect these as the major obstacle to growth compared to smaller firms. However we fail to find a statistically significant difference across firm size. Questionnaire difficulties again may explain this finding as the question on financial access was narrowly phrased to focus on difficulties of collateral provision.

Appendix

Table A.1. GDP, Population, and Branch Density per State

	GDP per capita (R$)	GDP (millions, R$)	Population	No. Branches	Branch per capita
North	**4,312**	**57,027**	**13,225,186**	**623**	**21,228**
Rondônia	4,321	6,083	1,407,776	85	16,562
Acre	3,351	1,921	573,262	31	18,492
Amazonas*	7,169	20,736	2,892,454	132	21,913
Roraima	3,623	1,219	336,461	17	19,792
Pará	3,435	21,748	6,331,295	261	24,258
Amapá	4,523	2,253	498,121	19	26,217
Tocantins	2,590	3,067	1,184,170	78	15,182
Northeast	**3,255**	**157,302**	**48,326,267**	**2383**	**20,280**
Maranhão*	1,796	10,293	5,731,069	247	23,203
Ceará*	2,858	21,581	7,551,085	348	21,699
Paraíba*	2,959	10,272	3,471,443	151	22,990
Bahia*	3,957	52,249	13,204,195	710	18,597
Piauí	1,941	5,575	2,872,231	108	26,595
Rio Grande do Norte	3,490	9,834	2,817,765	130	21,675
Pernambuco	3,962	31,725	8,007,320	425	18,841
Alagoas	2,649	7,569	2,857,305	117	24,421
Sergipe	4,514	8,204	1,817,457	147	12,364
Southeast	**9,316**	**684,730**	**73,500,429**	**9263**	**7,935**
Minas Gerais*	6,261	113,530	18,132,886	1828	9,920
Espírito Santo	7,148	22,538	3,153,050	315	10,010
São Paulo*	10,642	400,629	37,646,025	5484	6,865
Rio de Janeiro*	10,160	148,033	14,570,177	1638	8,895
South	**8,387**	**213,389**	**25,442,828**	**3446**	**7,383**
Santa Catarina*	8,541	46,535	5,448,425	811	6,718
Rio Grande do Sul*	9,129	94,084	10,306,058	1379	7,474
Paraná*	7,511	72,770	9,688,457	1256	7,714
Center-West	**7,260**	**86,288**	**11,885,399**	**1283**	**9,264**
Mato Grosso do Sul	6,505	13,736	2,111,606	220	9,598
Mato Grosso*	5,650	14,453	2,558,053	226	11,319
Goiás*	4,898	25,048	5,113,924	545	9,383
Distrito Federal	15,725	33,051	2,101,812	292	7,198
Brazil	**6,954**	**1,198,736**	**172,380,788**	**16998**	**10,141**

Source: IBGE and Central Bank of Brazil.

23

Table A.2. The Dataset (Size, Region, Industry, Manager's Education, Sales Growth)

	Size (No. of employees)					Size (No. of employees)			
	Micro 1–19	Small 20–99	Medium 100–499	Large >500	Total	Micro 1–19	Small 20–99	Medium 100–499	Large >500
Regions									
North	8.3	66.7	20.8	4.2	100	14.8	16.0	11.2	12.0
Northeast	20.6	58.0	17.6	3.8	100	12.7	6.4	5.3	5.3
Southeast	21.1	53.4	21.2	4.3	100	45.5	44.3	40.2	41.3
South	16	49.6	28.9	5.5	100	26.4	31.5	42.0	40.0
Center-West	34.7	45.5	16.5	3.3	100	0.6	1.9	1.3	1.3
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Industry									
Food Processing	12.6	35.4	39.4	12.6	100	7.0	4.8	8.2	14.7
Textiles	21.7	38.7	29.2	10.4	100	30.0	30.5	19.7	9.3
Garments	22.4	59.3	16.7	1.6	100	8.5	11.3	10.9	9.3
Shoes & Leather	16.2	56.1	23.7	4.0	100	3.9	5.9	3.7	8.0
Chemicals	15.5	60.7	16.7	7.1	100	13.6	9.4	13.0	10.7
Machinery	24.6	44.3	26.8	4.4	100	3.3	6.3	2.9	4.0
Electronics	13.9	68.4	13.9	3.8	100	4.8	6.7	11.4	17.3
Auto-parts	12.3	44.6	33.1	10.0	100	23.6	19.9	16.5	5.3
Furniture	24.7	54.3	19.7	1.3	100	0.0	0.0	0.3	0.0
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Manager's Education									
Post-Graduate	10.9	42.0	32.9	14.2	100	10.9	16.2	29.0	62.7
Graduated Univ.	16.8	53.8	25.8	3.6	100	25.5	31.3	34.3	24.0
Incomplete Univ.	15.7	60.6	21.3	2.4	100	11.8	17.6	14.1	8.0
Vocational Training	28.1	55.7	15.1	1.1	100	15.8	12.0	7.4	2.7
Sec. School	23.4	55.1	20.9	0.6	100	11.2	10.1	8.8	1.3
Incomplete Sec. School	30.6	58.1	11.3	0.0	100	5.8	4.2	1.9	0.0
Primary School	38.9	45.3	15.8	0.0	100	11.2	5.0	4.0	0.0
Incomplete Primary School	43.3	51.7	3.3	1.7	100	7.9	3.6	0.5	1.3
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Sales Growth									
Sales Increased	17.4	51.1	25.6	5.9	100	55.7	63.1	72.0	83.6
Sales Decreased	28.2	52.3	17.4	2.1	100	33.6	24.2	18.3	11.0
Sales Unchanged	19.2	58.8	19.8	2.2	100	10.7	12.7	9.7	5.5
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Source: World Bank, Investment Climate Survey, 2003.

Table A.3. Definition and Construction of Variables

Basic variable	Measures
Size	Size dummies according to the number of employees: micro: 0–19; small: 20–99; medium: 100–499; and large more than 499. Size is also classified according to quintiles and deciles of the sales and numbers of employees.
Performance/ Risk-adjusted performance	
Rate of sales growth	Percentage of sales growth (%)
Leverage	Liabilities/capital (%)
Turnover	Sales/assets (%)
Industry	Nine sectors using CNAE classification: food processing, textiles, garments, shoes and leather products, chemicals, machinery, electronics, auto-parts, furniture. We also weigh the industrial dummies by capital factor intensity.[1]
Region	Five national regions: North, Northeast, South, Southeast, and Center-West. We also weight those dummies by regional income per capita and by branch density.
Ownership	Three types of ownership: state, private domestic and private foreign. [2]
Education	Eight levels of education: post graduate degree, university degree, incomplete university degree, vocational training after secondary school, complete secondary school, incomplete secondary school, complete primary school, and incomplete primary school.
Relation with the banks/ credit worthiness proxies	
Unique Bank Relationship	(=1) if the firm does business with only one bank, (=0) if the firm does business with more than one bank
Bank Ownership	Three types of bank ownership: public, private domestic and private foreign.
Overdraft or line of credit	(=1) if the firm has an overdraft or line of credit, (=0) if the firm has not an overdraft or line of credit
Collateral	(=1) if the firm owns the buildings or land, (=0) otherwise
Competition, Credibility, Capacity Use and Innovation	
New firm	(=1) if the firm is below the age of two years old, (=0)) if the firm is above the age of five years old
Exports	(=1) if the firm exports more than 10% of its production, (=0) if the firm exports less than 10%
Credibility proxies	
External auditor	Annual financial statements are reviewed by an external auditor
Belongs to an economic group	(=1) if the firm belongs to an economic group, (=0) if the firm does not belong to an economic group
Status	(=1) if the firm is a SA, (=0) if the firm is not a SA

Table A.3. Definition and Construction of Variables(*Continued*)

Basic variables	Measures
Belongs to a producer or trade association	(=1) if the firm belongs to a producer or trade association, (=0) if the firm does not belong to a producer or trade association
Innovation and Capacity Utilization	
Computers use	Workforce that regularly use computer in their jobs (%)
Capacity utilization	2002–2000 Average capacity utilization (%)

1. Factor intensity: capital (machinery and equipment) cost/labor costs.
2. The definitions of ownership follows the World Bank classification: (i) Private Domestic—firm with a private domestic capital share that is (1) higher than the government capital share and higher than the foreign capital share, and (2) the government share, and the foreign share if applicable, is less than 10%; (ii) Private Foreign—firm with a foreign capital share that is (1) 10% or more and (2) higher than the government capital share; and (iii) State—firm with a government capital share that is (1) 10% or more and (2) higher than the foreign capital share (for the purpose of this classification the private domestic capital share is irrelevant when the government capital share is 10% or more).

Source: World Bank, Investment Climate Survey—Brazil, 2003.

Table A.4. Source of Finance—Working Capital

	Size				Region					Education		
	Micro	Small	Medium	Large	North	Northeast	Center-west	Southeast	South	Post. graduate	Graduate	Incomplete university
Internal funds	44.2	43.3	44.8	41.2	52.9§	45.9§	55.0§	46.3§	36.6§	40.7	44.8	42.0
Bank finance												
Local[1]	21.9	26.0	27.3	27.7	18.5§	20.6§	15.1§	26.9§	28.5§	25.7	26.3	26.5
Local private	10.8	12.7	12.6	8.5								
Local public[2]	11.9*	15.2*	17.6*	25.2*								
Of which government funds	0.8§	1.9§	2.9§	6.0§								
Foreign Operations finance	0.8§	0.9§	1.7§	4.9§	1.0	0.9	1.0	1.4	1.1	2.4*	1.2*	0.8*
Trade credit	14.2	16.3	13.7	14.2	9.4§	16.0§	13.2§	12.5§	19.1§	15.1	14.3	15.4
Leasing	0.5	0.9	0.8	0.3	0.8	0.2	0.9	0.7	1.1	0.5	0.5	1.1
Informal sources	10.5§	5.5§	1.8§	0.2§	2.3	7.4	5.8	4.9	5.3	3.7	5.1	6.1
Government funds					4.2	2.2	3.0	1.9	2.4	2.6	2.5	2.0
Equity finance	2.7	2.7	4.7	1.8	9.8	2.5	4.4	2.8	3.3	5.9§	3.0§	3.0§
Credit card finance	0.8	1.0	0.3	0.0	1.0	1.1	0.3	0.7	0.8	0.4	1.0	0.7
Others	3.6	1.5	2.0	3.7	0.0	3.3	1.3	1.9	1.7	3.0	1.3	2.3
Total	100	100	100	100	100	100	100	100	100	100	100	100
No. of firms	328	860	373	72	24	234	119	712	544	328	498	249

1. For firm size we disaggregate local finance into local private and local public. This disaggregration does not derive directly from the questionnaire. Local commercial bank finance is disaggregated into local private and local public finance according to the main bank the firm does business with.
2. Government funds are included in the local public bank finance category.

Statistical significance: * significant at 10%, † significant at 5%, and § significant at 1%.

Source: World Bank, Investment Climate Survey—Brazil, 2003.

Vocational training	Secondary school	Incomplete secondary	Primary school	Incomplete prim. school	Industry									Sales growth		
					Food processing	Textiles	Garments	Leather & shoes	Chemicals	Machinery	Electronics	Auto-parts	Furniture	Increased	Decreased	Unchanged
42.9	47.5	45.4	48.0	40.9	44.4	39.8	47.6	44.0	50.1	41.4	39.1	43.1	40.0	47.2§	35.7§	42.1§
25.4	25.2	21.7	25.5	21.4	22.5†	27.4†	22.3†	28.6†	18.8†	26.9†	28.1†	31.4†	26.9†	24.7	28.3	25.0
1.0*	0.3*	1.3*	0.8*	0.7*	2.4*	2.4*	0.7*	0.6*	3.0*	1.6*	0.7*	1.0	1.0*	1.6*	0.6*	0.7*
14.5	15.1	20.0	14.2	22.3	14.8	13.1	14.7	14.4	16.2	17.5	15.9	10.2	17.7	14.3	16.5	16.7
1.3	0.5	0.5	2.1	0.5	1.6	0.5	0.7	0.6	0.4	1.3	0.7	0.7	0.6	0.8	0.6	1.0
7.7	5.0	8.0	5.5	5.4	5.6†	0.9§	6.9§	6.8§	2.2§	4.7†	2.5§	2.0§	7.1§	3.9§	8.6§	5.9§
3.3	1.4	1.0	1.1	0.9	2.4	3.1	2.4	0.9	2.3	2.8	1.4	2.0	2.4	2.5*	2.2*	0.7*
1.9§	1.2§	1.8§	1.1§	3.5§	3.9§	7.0§	1.9§	2.5§	2.5§	1.2§	7.8§	7.3§	2.1§	3.0	2.9	4.0
1.1	0.7	0.2	0.4	0.6	1.0	0.5	1.4	0.3	1.2	0.3	0.7	0.2	0.4	0.6*	1.3*	0.3*
1.0	3.0	0.3	1.3	3.8	1.4	5.0	1.4	1.2	3.5	2.4	3.2	2.0	1.6	4.0	3.2	3.4
100	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
183	**157**	**61**	**95**	**60**	**125**	**105**	**441**	**171**	**83**	**182**	**79**	**129**	**315**	**1038**	**390**	**181**

Table A.5. Source of Finance: New Investments

	Size				Region					Education		
	Micro	Small	Medium	Large	North	Northeast	Center-west	Southeast	South	Post graduate	Graduate	Incomplete university
Internal funds	58.7†	57.8†	54.0†	41.0†	54.8§	61.0§	61.7§	59.6§	49.2§	53.4	56.7	57.9
Bank finance Local[1]					15.7§	10.3§	9.7§	11.5§	17.0§	12.1	11.8	14.9
Local private	5.7	6.9	5.4	1.4								
Local public[2]	10.4§	14.1§	19.1§	34.5§								
Of which government funds	4.5§	6.5§	12.5§	25.3§								
Foreign Operations finance	0.0§	0.8§	2.6§	3.2§	0.0*	0.3*	0.3*	1.6*	1.3*	2.5*	1.5*	0.5*
Trade credit	11.9*	8.6*	6.6*	9.2*	8.3	8.5	8.7	9.3	8.2	6.9†	8.3†	7.4†
Leasing	2.2	3.1	3.5	5.0	1.7†	1.2†	0.4†	4.1†	3.4†	2.9	3.1	3.3
Informal sources	4.4§	2.4§	0.4§	0.0§	2.5	3.5	2.9	2.2	1.8	1.3	2.1	3.1
Government funds					7.0§	7.0§	8.6§	5.9§	12.1§	10.8	9.5	7.6
Equity finance	3.5	3.8	6.0	4.0	9.1	4.0	6.1	3.7	4.5	8.4§	4.6§	1.7§
Credit card finance	0.5	0.2	0.2	0.0	0.9	0.4	0.1	0.2	0.3	0.1	0.5	0.3
Others	2.7	2.3	2.2	1.7	0.0	3.8	1.4	2.0	2.2	1.7	1.9	3.3
Total	100	100	100	100	100	100	100	100	100	100	100	100
No. of firms	247	716	324	64	23	178	110	569	471	276	429	200

1. For firm size we disaggregate local finance into local private and local public. This disaggregration does not derive directly from the questionnaire. Local commercial bank finance is disaggregated into local private and local public finance according to the main bank the firm does business with.
2. Government funds are included in the local public bank finance category.

Statistical significance: * significant at 10%, † significant at 5%, and § significant at 1%.

Source: World Bank, Investment Climate Survey—Brazil, 2003.

Vocational training	Secondary school	Incomplete secondary	Primary school	Incomplete prim. school	Industry									Sales growth		
					Food processing	Textiles	Garments	Leather & shoes	Chemicals	Machinery	Electronics	Auto-parts	Furniture	Increased	Decreased	Unchanged
54.3	57.9	58.3	61.2	53.9	52.8*	46.2*	61.3*	59.2*	52.3	53.3*	56.3*	51.1*	57.3*	57.9*	52.5*	52.4*
14.5	14.1	14.3	14.7	14.5	13.7	11.7	13.8	13.7	12.2	14.9	13.6	14.5	10.4	13.1	12.7	15.3
0.6*	0.8*	0.0*	0.0*	0.0*	1.1§	6.1§	0.6§	0.3§	1.3§	1.3§	1.5§	0.8§	1.0§	1.4	0.5	1.8
10.9†	8.4†	9.6†	9.6†	19.9†	7.8*	16.2*	9.2*	8.0*	3.5*	8.5*	8.8*	4.6*	9.8*	7.1†	13.0†	10.0†
5.0	2.2	3.9	1.5	2.8	3.8	1.4	1.7	2.4	2.3	5.3	1.4	5.2	4.4	3.2	2.0	4.7
3.5	2.8	1.5	1.9	1.4	1.7	0	2.8	2.7	2	2.4	1.2	1.8	2.9	1.6†	3.0§	4.0§
5.6	8.5	6.2	7.6	1.9	12.6†	10.3†	5.7†	6.9†	11.9†	10.0†	5.1†	9.5†	9.5†	9.3*	7.7*	4.5*
3.9§	1.9§	2.2§	1.5§	2.8§	5.8§	5.5§	2.0§	3.8§	7.5§	3.4§	10.1§	9.6§	2.6§	3.9	5.8	4.1
0.1	0.2	0.0	0.1	0.0	0.1	0.0	0.4	0.0	1.4	0.4	0.4	0.0	0.1	0.2	0.5	0.1
1.7	3.2	4.1	1.9	2.8	0.6	2.4	2.6	3.1	5.6	0.7	1.5	2.8	2.1	2.2	2.1	3.1
100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
145	126	46	74	54	110	83	365	143	70	152	68	109	249	906	286	138

Table A.6. Overdrafts, Credit Lines and Trade Credit

	Size				Region							
	Micro	Small	Medium	Large	North	Northeast	Center-West	Southeast	South	Post graduate	Graduate	Incomplete university
No. Inst. Firms business with	2.1†	3.0†	4.8†	8.2†	3.0*	3.0*	2.9*	3.4*	3.8*	4.5*	3.7*	3.1*
Overdraft or credit line												
Firms with overdraft facility or line of credit (%)	60.2§	75.7§	82.9§	80.8§	83.3§	61.9§	66.1§	75.7§	79.7§	81.1§	76.5§	75.8§
Of which used (%)	44.4	46.6	46.9	51.9	36.15	49.5	44.3	45.5	47.8	46.1	45.4	49.4
Average interest rate (monthly rate, %)	5.1§	4.9§	3.9§	3.1§	5.6	4.8	4.3	4.7	4.3	3.7§	4.2§	4.7§
Trade credit												
Firms that use supplier credit	76.9	82.1	82.6	84.9	70.8	79.7	77.7	80.3	84.6	83.2	83.1	79.5
Inputs purchased on credit	79.5*	82.2*	85.2*	82*	85.9§	73.1§	73.2§	84.3§	83.5§	84.8*	84.3*	79.8*
Sales paid before delivery	6.8	5.3	6.1	8.8	1.4	6.8	7.4	5.8	5.8	6.6	6.6	5.9
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
No. of firms	**330**	**861**	**376**	**75**	**23**	**178**	**110**	**569**	**471**	**276**	**429**	**200**

Managers' education					Industry									Sales growth		
Vocational training	Secondary school	Incomplete secondary	Primary school	Incomplete prim. school	Food processing	Textiles	Garments	Leather & shoes	Chemicals	Machinery	Electronics	Auto-parts	Furniture	Increased	Decreased	Unchanged
3.0*	2.7*	2.5*	2.5*	2.3*	4.1	4.5	2.7	3.0	5.5	3.9	2.9	4.1	3.1	3.7	2.9	3.1
71.4§	69.6§	67.7§	58.9§	66.6§	74.6	75.2	70.1	72.3	73.8	78.0	79.7	82.9	74.5	78.2§	68.7§	67.6§
45.9	49.2	41.9	45.8	50.3	47.4†	56.2†	43.1†	50.1†	40.0†	45.8†	35.6	48.7†	49.6†	45.7*	54.5*	56.9*
5.2§	5.9†	5.5†	5.7†	4.8†	3.6	4.2	5.1	4.5	3.5	4.9	4.5	4.2	4.8	4.4	5	4.6
82.0	81.0	77.4	80.0	68.3	76.2	74.3	80.7	82.1	72.6	83.5	83.5	85.3	84.8	81.1	83.8	76.9
77.3*	80.9*	78.3*	83.1*	85.3*	77.5§	79.9§	79.8§	86.1§	77.2§	84.1§	90.9§	90.2§	81.0§	82.7	82.3	80.3
5.3	4.6	8.1	3.0	5.4	3.3§	5.5§	3.5§	1.9§	9.2§	12.6§	3.1§	3.0§	10.2§	6.2	6.4	4.3
100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
145	126	46	74	54	110	83	365	143	70	152	68	109	249	906	286	138

Table A.7. Firm Size and Number of Banks Firms Do Business with

No. of banks	No. firms	Size (no. employees)—frequencies				Size (no. of employees)—%				Total
		Micro 0–19	Small 20–99	Medium 100–499	Large >500	Micro 0–19	Small 20–99	Medium 100–499	Large >500	
0	10	5	5	0	0	50	50	0	0	100
1	273	112	133	25	3	41.0	48.7	9.2	1.1	100
2	464	114	291	55	0	24.8	63.3	12.0	0.0	100
3	351	63	217	64	7	17.9	61.8	18.2	2.0	100
4	197	21	97	71	8	10.7	49.2	36.0	4.1	100
5	119	7	58	47	7	5.9	48.7	39.5	5.9	100
6	69	4	27	35	3	5.8	39.1	50.7	4.3	100
7	33	1	6	22	4	3.0	18.2	66.7	12.1	100
8	0	0	9	21	6	0.0	25.0	58.3	16.7	100
9	8	0	2	4	2	0.0	25.0	50.0	25.0	100
10	35	0	5	14	16	0.0	14.3	40.0	45.7	100
>10	38	0	9	16	13	0.0	23.7	42.1	34.2	100
Total	**1597**	**327**	**859**	**374**	**69**	**20.1**	**52.7**	**23.0**	**4.2**	**100**
Average		**2.1**	**3.0**	**4.8**	**8.2**					

Source: World Bank, Investment Climate Survey—Brazil, 2003.

Table A.8. Size, Region, Education, Industry, and Sales Growth Effects on Access to Credit and Credit Constraints

	Size				Region					Education		
	Micro	Small	Medium	Large	North	Northeast	Center-west	Southeast	South	Post graduate	Graduate	Incomplete university
Total no. of firms	329	860	374	73	24	236	121	711	544	328	499	249
Have a bank loan (% of total no. of firms)	27.1§	31.9§	43.9§	58.9§	16.7§	33.1§	28.9§	32.1§	41.4§	38.7	36.7	30.9
Do not have a bank loan (% of total no. of firms)	72.9§	68.1§	56.1§	41.1§	83.3§	66.9§	71.1§	67.9§	58.6§	61.3	63.3	69.1
Total (% of total no. of firms)	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Do not have a loan												
Rejected (% of do not have a loan)	12.9	10.2	8.6	6.7	10.0	12.7	10.5	9.1	11.3	8.5	8.5	13.4
Did not apply (% of do not have a loan)	87.1	89.8	91.4	93.3	90.0	87.3	89.5	90.9	88.7	91.5	91.5	86.6
Total (% of do not have a loan)	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Did not apply												
No need (% of did not apply)	39.2*	44.5*	51*	53.6*	38.9	42.8	51.9	44.4	45.9	47.8	44.8	47.6
Other reasons[2] (% of did not apply)	60.8*	55.5*	49*	46.4*	61.1	57.2	48.1	55.6	54.1	52.2	55.2	52.4
Total (% of did not apply)	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Total of firms constrained (% of total no. firms)	47.7	40.7	29.7	20.5	54.2	41.9	38.0	40.4	34.6	34.5	37.3	40.2
Application was rejected (% of total no. firms)	9.4	7.0	4.8	2.7	8.3	8.5	7.4	6.2	6.6	5.2	5.4	9.2
Did not apply (% of total no. firms)	38.3	33.7	24.9	17.8	45.8	33.5	30.6	34.2	27.9	29.3	31.9	30.9

1. For firm size we disaggregate local finance into local private and local public. This disaggregration does not derive directly from the questionnaire. Local commercial bank finance is disaggregated into local private and local public finance according to the main bank the firm does business with.
2. Government funds are included in the local public bank finance category.
Statistical significance: * significant at 10%, † significant at 5%, and § significant at 1%.
Source: World Bank, Investment Climate Survey—Brazil, 2003.

Vocational training	Secondary school	Incomplete secondary	Primary school	Incomplete prim. school	Industry									Sales growth		
					Food processing	Textiles	Garments	Leather & shoes	Chemicals	Machinery	Electronics	Auto-parts	Furniture	Increased	Decreased	Unchanged
184	158	62	95	60	126	105	441	173	84	182	79	129	315	1041	390	182
36.4	27.2	32.3	33.7	35	37.3	40	35.4	31.8	35.7	33.5	30.4	38.0	33.3	34.9	35.9	35.7
63.6	72.9	67.7	66.3	65	62.7	60	64.6	68.2	64.3	66.5	69.6	62.0	66.7	65.2	64.1	64.3
100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
11.1	12.2	11.9	11.1	12.8	13.9*	4.8*	11.9*	8.5*	7.4*	7.4*	3.6*	7.5*	15.2*	9.1§	15.6§	6.8§
88.9	87.8	88.1	88.9	87.8	86.1*	95.2*	88.1*	91.5*	92.6*	92.6*	96.4*	92.5*	84.8*	90.9§	84.4§	93.2§
100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
39.8	46.5	40.5	41.1	44.1	35.3†	43.3†	45.8†	60.8†	44.0†	48.2†	50.0†	34.3†	40.0†	46.1	44.8	43.2
60.2	53.5	59.5	58.9	55.9	64.7†	56.7*	54.2†	39.2†	56†	51.8†	50†	65.7†	59.9†	53.9	55.2	56.8
100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
40.8	43.0	43.5	42.1	40.0	43.7	35.2	38.5	30.1	38.1	36.8	35.4	41.9	43.8	37.8	39.7	37.9
7.1	8.9	8.1	7.4	8.3	8.7	2.9	7.7	5.8	4.8	4.9	2.5	4.7	10.2	6.0	10.0	4.4
33.7	34.2	35.5	34.7	31.7	34.9	32.4	30.8	24.3	33.3	31.9	32.0	37.2	33.7	31.8	29.7	33.5

Table A.9. Reasons for Not Applying for a Bank Loan and Reasons for Bank Loan Rejection

Reasons for not applying for a bank loan	Size				Region							
	Micro	Small	Medium	Large	North	Northeast	Center-west	Southeast	South	Post graduate	Graduate	Incomplete university
Do not need loans	39.4*	44.7*	51.3*	53.6*	38.9	42.8	51.9	44.4	45.9	47.8	44.8	47.6
Applications procedures	13.5*	9.4*	7.3*	0.0*	0.0	11.6	11.7	9.2	9.3	4.89†	8.3†	8.2†
Collateral requirements	7.7*	9.2*	4.2*	3.6*	5.6	8.7	9.1	7.3	7.5	6.52	7.3	10.9
Interest rates are too high	36.5	33.2	33.0	32.1	50.0	36.2	23.4	35.0	32.7	35.9	35.1	30.6
Corruption in the allocation of bank credit	1.0	0.6	0.0	3.6	0.0	0.0	1.3	0.5	1.1	0.5	0.35	0
Did not expected to be approved	1.4	0.8	0.5	0.0	0.0	0.0	1.3	1.4	0.4	0.5	0.7	1.4
Others	0.5*	2.3*	3.7*	7.1*	5.6	0.7	1.3	2.3	3.2	3.8	3.5	1.4
Total (%)	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Total no. of firms	**208**	**524**	**191**	**28**	**18**	**138**	**77**	**437**	**281**	**184**	**288**	**147**
Reasons for rejection												
Lack of collateral	41.9	41.7	22.2	50.0	50.0	30.0	33.3	14.7	41.7	35.3	51.9	43.5
Incompleteness of the application	19.4	16.7	11.1	0.0	0.0	15.0	0.0	14.7	16.7	11.8*	3.7*	21.7*
Lack of feasibility of the project	3.2	10.0	22.2	0.0	0.0	10.0	0.0	17.6	8.3	5.9	7.4	13.0
Poor credit history	25.8	21.7	38.9	50.0	50.0	35.0	66.7	44.1	16.7	41.2	29.6	21.7
Others	9.7	10.0	5.6	0.0	0.0	10.0	0.0	8.8	16.7	5.9	7.4	0.0
Total (%)	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Total no. of firms					**2**	**20**	**3**	**200**	**36**	**17**	**27**	**23**

Statistical significance: * significant at 10%, † significant at 5%, and § significant at 1%.
Source: World Bank, Investment Climate Survey—Brazil, 2003.

Managers' education					Industry									Sales growth		
Vocational training	Secondary school	Incomplete secondary	Primary school	Incomplete prim. school	Food Processing	Textiles	Garments	Leather & shoes	Chemicals	Machinery	Electronics	Auto-parts	Furniture	Increased	Decreased	Unchanged
39.8	46.5	40.5	41.1	44.1	35.3†	43.3†	45.8†	60.7†	44.0†	48.2†	50.0†	34.2†	40.1†	46.1	46.1	46.1
13.4†	15.8†	8.1†	12.5†	17.7†	10.3	6.7	11.2	10.3	8.0	8.9	0.0	6.8	12.4	9.1	9.1	9.1
5.8	8.9	2.7	8.9	8.8	8.8	8.3	7.6	7.5	8.0	7.1	7.7	13.7	5.1	7.2	7.2	7.2
36.9	24.6	45.5	35.7	29.4	38.2†	40.0†	32.7†	18.7†	36.0†	27.7†	36.5†	42.5†	40.1†	34.0	34.0	34.0
1.9	1.0	2.7	1.8	0	1.5	0.0	0.8	0.0	0.0	0.0	1.9	1.4	0.6	0.7	0.7	0.7
1.9	0	0		0	1.5	0.0	0.4	0.9	0.0	1.8	1.9	1.4	0.6	0.5†	0.5†	0.5†
0	2.97	0		0	4.4	1.7	1.6	1.9	4.0	6.3	1.9	0.0	1.1	2.4	2.4	2.4
100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
103	101	37	56	34	68	60	251	107	50	112	52	73	177	614	210	108
38.5	21.4	20.0	28.6	40.0	27.3	33.3	38.2	40.0	25.0	55.6	50.0	66.7	34.4	37.1	46.2	25.0
7.7*	35.7*	0.0*	28.6*	40.0*	9.1	0.0	26.5	10.0	25.0	11.1	0.0	0.0	15.6	21.0	10.3	12.5
7.7	21.4	0.0	14.3	0.0	0.0	33.3	5.9	10.0	25.0	11.1	0.0	0.0	15.6	8.1	10.3	25.0
23.1	21.4	60.0	0.0	0.0	36.4	33.3	23.5	30.0	0.0	22.2	50.0	33.3	25.0	22.6	28.2	25.0
23.1	0.0	20.0	28.6	20.0	27.3	0.0	5.9	10.0	25.0	0.0	0.0	0.0	9.4	11.3	5.1	12.5
100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
13	14	5	7	5	11	3	34	10	4	9	2	6	32	62	39	8

Table A.10. The Importance of Collateral and Shares of Collateral

	Size				Region							
	Micro	Small	Medium	Large	North	Northeast	Center-west	Southeast	South	Post graduate	Graduate	Incomplete university
Loans that required collateral	42.7§	63.1§	82.9†	81.4§	50.0*	70.5*	71.4*	60.5*	72.0*	78.7§	66.1§	70.1§
Collateral as % of the loan value	121.6	131.6	119.7	117.9	110	139.9	120.3	128.5	118.0	125.4	117.3	115.8
Share of collateral												
Buildings, land	33.7	25.9	30.0	18.8	50.0	35.5	25.0	23.0	28.7	28.6	26.6	29.2
Machinery	24.5	23.1	21.0	20.0	0.0†	14.3†	15.8†	21.5†	26.8†	19.4	19.2	28.1
Intangible assets	11.2†	15.6†	16.6†	34.8†	0.0†	10.1†	26.0†	23.5†	13.3†	20.5	15.9	13.9
Personal assets	14.2†	20.9†	10.2†	7.0†	50.0	21.8	16.3	16.0	11.6	10.8	17.2	16.4
Other	16.4	14.6	22.2	19.4	0.0	18.4	17.0	16.1	19.7	20.7	21.1	12.4
Total (%)	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Source: World Bank, Investment Climate Survey—Brazil, 2003.

Managers' education					Industry									Sales growth		
Vocational training	Secondary school	Incomplete secondary	Primary school	Incomplete prim. school	Food processing	Textiles	Garments	Leather & shoes	Chemicals	Machinery	Electronics	Auto-parts	Furniture	Increased	Decreased	Unchanged
56.7§	53.5§	80.0§	62.5§	47.6§	78.7§	73.8§	54.5§	58.2§	73.3§	68.9§	58.3§	85.7§	73.3§	69.4	64.3	58.5
157.0	138.8	131.8	123.8	108.6	135.8	122.5	130.7	107.7	115.9	129.6	141.1	111.9	125.7	123.2	121.5	148.6
32.0	21.1	6.3	33.5	36.1	21.8	24.4	31.1	27.5	26.3	31.1	31.4	19.6	29.4	23.6†	33.7†	38.4†
17.9	41.1	28.1	23.0	16.0	20.6	15.8	22.6	21.6	12.2	27.4	14.3	32.7	21.0	24.9	16.3	17.2
18.9	15.2	12.5	16.0	28.9	19.7	28.1	13.2	20.3	19.5	13.5	14.3	21.5	14.7	17.2	14.5	23.2
13.4	15.2	25.0	15.0	19.0	13.4	20.5	16.4	14.1	4.9	12.5	25.7	11.7	17.3	16.2	14.9	9.3
17.8	7.4	28.1	12.5	0.0	24.5	11.3	16.7	16.6	37.0	15.6	14.3	14.4	17.7	18.0	20.7	11.8
100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table A.11. Regression Results—Firm Characteristics, Performance and the Probability of Having a Loan

	Having a loan	Having a loan[1]	Having a loan[2]
Size			
Small firms	0.090†	0.087†	0.087†
	(2.20)	(2.13)	(2.13)
Medium firms	0.222§	0.219§	0.219§
	(4.56)	(4.50)	(4.50)
Large firms	0.338§	0.336§	0.336§
	(4.28)	(4.25)	(4.25)
Industry			
Food processing	0.110*	−0.002	−0.002
	(1.75)	(0.21)	(0.21)
Textile	0.098	−0.029*	−0.029*
	(1.20)	(1.78)	(1.78)
Shoes and Leather products	0.096	−0.014	−0.014
	(1.28)	(0.26)	(0.26)
Chemicals	0.034	−0.007	−0.007
	(0.37)	(1.02)	(1.02)
Machinery	0.075	−0.008	−0.008
	(1.03)	(0.68)	(0.68)
Electronics	0.099	−0.001	−0.001
	(1.03)	(0.16)	(0.16)
Auto-parts	0.016	−0.009	−0.009
	(0.21)	(1.57)	(1.57)
Furniture	0.053	−0.025	−0.025
	(0.82)	(1.32)	(1.32)
Region			
South	0.068*	0.026*	0.180*
	(1.89)	(1.87)	(1.87)
Center-West	−0.006	−0.003	−0.092
	(0.09)	(0.11)	(0.11)
North	−0.186	−0.150	−2.890
	(1.26)	(1.26)	(1.26)
Northeast	−0.005	−0.007	−0.026
	(0.11)	(0.14)	(0.14)
Firm Ownership			
State firms	0.212	0.213	0.213
	(0.91)	(0.92)	(0.92)
Foreign firms	−0.031	−0.031	−0.031
	(0.38)	(0.38)	(0.38)

Table A.11. Regression Results—Firm Characteristics, Performance and the Probability of Having a Loan (*Continued*)

	Having a loan	Having a loan[1]	Having a loan[2]
Education			
University degree	0.005	0.006	0.006
	(0.10)	(0.13)	(0.13)
Incomplete university	−0.056	−0.057	−0.057
	(1.03)	(1.03)	(1.03)
Vocational training after secondary school	0.003	0.002	0.002
	(0.05)	(0.04)	(0.04)
Secondary school	−0.103	−0.104	−0.104
	(1.62)	(1.64)	(1.64)
Incomplete secondary school	−0.053	−0.054	−0.054
	(0.61)	(0.62)	(0.62)
Primary School	−0.002	−0.003	−0.003
	(0.03)	(0.05)	(0.05)
Incomplete primary school	0.010	0.009	0.009
	(0.12)	(0.10)	(0.10)
Performance			
Sales growth*	−0.030	−0.030	−0.030
	(0.96)	(0.96)	(0.96)
Observations	**1116**	**1117**	**1117**

*Sales growth of 2001. *Note:* We exclude from the analysis firms that do not need a loan.
Control dummies : Micro firms, Garments industry, Southeast, Post Graduate, and decreasing rate and unchanged sales growth.
1. Regional dummies are weighted by regional income. Southeast (the richest region) is the control dummy. Industry dummies are weighted by capital intensity ratio (capital costs/labor costs). Garments industry (the lowest capital intensity ratio) is the control dummy.
2. Regional dummies are weighted by branch density. Southeast (the region with the largest branch density) is the control dummy. Industry dummies are weighted by capital intensity ratio (capital costs/labor costs). Garments industry is the control dummy.

Statistical significance: * significant at 10%, † significant at 5%, and § significant at 1%.

Table A.12. The Impact of Firm Size on the Likelihood of Having a Loan: Model 2

	Having a loan (Including overdrafts)[1]	Having a loan (Excluding overdrafts)[2]
Size		
Small	0.034	0.048
	(0.63)	(0.89)
Medium	0.154†	0.172†
	(2.33)	(2.59)
Large	0.248§	0.252†
	(2.42)	(2.32)
Performance		
Turnover (sales/assets)	−0.000	−0.000
	(0.88)	(0.95)
Leverage	0.000	0.000
	(0.20)	(0.23)
Sales growth	0.001	0.001
	(1.27)	(1.37)
Firm characteristics		
Exporter	0.002	0.000
	(0.05)	(0.01)
SA	0.034	0.043
	(0.33)	(0.43)
Group	0.038	0.035
	(0.49)	(0.45)
Capacity utilization	0.001	0.001
	(0.86)	(0.86)
New firm	−0.077	−0.077
	(1.37)	(1.37)
% workforce that use computers	0.003†	0.003†
	(2.44)	(2.44)
External auditor	0.050	0.050
	(0.90)	(0.76)
Collateral	0.014	0.026
	(0.32)	(0.61)
Relation with banks		
Overdraft	0.158§	
	(3.40)	
Bank unique relationship	−0.111†	−0.138†
	(2.02)	(2.45)

Table A.12. The Impact of Firm Size on the Likelihood of Having a Loan: Model 2 (*Continued*)

	Having a loan (Including overdrafts)[1]	Having a loan (Excluding overdrafts)[2]
Other control variables		
Industry	Yes	Yes
Region	Yes	Yes
Firm ownership	Yes	Yes
Education	Yes	Yes
Observations	1088	1088
Wald chi2	74.55	64.96

1. This refers to firms who have demand for a loan and have received a loan. The universe here is limited to firms which demand for a loan. This models concerns to the second stage model of the two step maximum likelihood probit: supply of credit model.
2. The dummy which controls for whether firms have an overdraft or not is excluded from this specification.

Statistical significance: * significant at 10%, † significant at 5%, and § significant at 1%.

Source: Authors' calculations based on World Bank, Investment Climate Survey—Brazil, 2003.

Table A.13. The Likelihood of Having a Loan According to Its Duration

	Long term loans (Including overdrafts)[1]	Long term loans (Excluding overdrafts)[1,2]	Short term loans (Including overdrafts)[1]	Short term loans (Excluding overdrafts)[1,2]
Size				
Small	0.066	0.080	−0.024	−0.034
	(1.18)	(1.36)	(1.21)	(1.15)
Medium	0.208[§]	0.229[§]	−0.034	−0.030
	(2.95)	(3.15)	(0.96)	(0.89)
Large	0.248[†]	0.246*	0.113	0.048
	(1.95)	(1.89)	(0.77)	(0.78)
Performance				
Turnover (sales/assets)	−0.004	−0.005	0.000	0.000
	(1.48)	(1.61)	(0.68)	(0.61)
Leverage	0.000	0.000	0.000	0.001
	(1.16)	(0.24)	(0.67)	(0.71)
Sales growth	0.002*	0.002*	0.001	−0.000
	(1.73)	(1.79)	(0.42)	(0.38)
Firm characteristics				
Exporter	0.032	−0.035	0.041	0.035
	(0.62)	(064)	(1.26)	(1.21)
SA	−0.004	0.001	−0.005	0.043
	(0.04)	(0.01)	(0.68)	(0.75)
Group	0.077	0.076	−0.029	−0.014
	(0.96)	(0.91)	(0.30)	(0.35)
Capacity utilization	0.001	0.002	−0.000	0.001
	(1.00)	(1.34)	(1.01)	
New firm	−0.034	−0.042	−0.039	−0.052
	(0.62)	(0.68)	(0.69)	(1.78)
% workforce that use computers	0.005[§]	0.005[§]	−0.001	−0.001
	(3.39)	(3.37)	(1.17	(1.52)
External auditor	0.054	0.050	0.012	−0.006
	(0.97)	(0.85)	(0.34)	
Collateral	0.028	0.043	−0.014	−0.022
	(0.64)	(0.93)	(1.04)	(0.96)
Relation with banks				
Overdraft	0.141[§]		0.065[†]	
	(2.88)		(2.33)	
Bank unique relationship	−0.177[§]	−0.216[§]	0.029	0.032
	(3.04)	(3.54)	(0.73)	(0.97)

Table A.13. The Likelihood of Having a Loan According to Its Duration (*Continued*)

	Long term loans (Including overdrafts)[1]	Long term loans (Excluding overdrafts)[1,2]	Short term loans (Including overdrafts)[1]	Short term loans (Excluding overdrafts)[1,2]
Other control variables				
Industry	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes
Firm ownership	Yes	Yes	Yes	Yes
Education	Yes	Yes	Yes	Yes
Observations	**1088**	**1088**	**1088**	**1088**
Wald chi2	**76.38**	**70.07**	**63.00**	**41.99**

1. This refers to firms who have demand for a loan and have received a loan. The universe here is limited to firms which demand for a loan. This models concerns to the second stage model of the two step maximum likelihood probit: supply of credit model.
2. The dummy which controls for whether firms have an overdraft or not is excluded from this specification.

Statistical significance: * significant at 10%, † significant at 5%, and § significant at 1%.

Source: Authors' calculations based on World Bank, Investment Climate Survey—Brazil, 2003.

Table A.14. The Impact of Bank Ownership on the Firm's Likelihood of Having a Loan—Model 2—Sample Split by Bank Ownership

	Having a loan (Including overdrafts)[1]		Having a loan (Excluding overdrafts)[1,2]	
	Public bank	Private bank	Public bank	Private bank
Size				
Small	0.036	0.000	0.035	0.012
	(0.43)	(0.01)	(0.43)	(0.19)
Medium	0.171*	0.090	0.171*	0.107
	(1.80)	(1.17)	(1.81)	(1.31)
Large	0.298†	0.167	0.294†	0.208
	(2.39)	(1.20)	(2.40)	(1.39)
Performance				
Turnover (sales/assets)	0.003	−0.002	0.002	−0.002
	(0.55)	(1.62)	(0.55)	(1.62)
Leverage	0.002	0.002	0.002	0.003
	(0.60)	(0.76)	(0.59)	(0.76)
Sales growth	0.001	0.002†	0.001	0.002†
	(0.30)	(2.31)	(0.31)	(2.07)
Firm characteristics				
Exporter	−0.001	−0.019	−0.002	−0.025
	(0.01)	(0.31)	(0.03)	(0.40)
SA	0.028	0.118	0.026	0.118
	(0.20)	(0.09)	(0.19)	(0.01)
Group	−0.122	0.115	−0.122	0.094
	(0.89)	(1.67)	(0.89)	(1.11)
New firm	0.411	−0.694§	0.122	−0.016†
	(0.89)	(1.47)	(0.89)	(2.45)
Capacity utilization	0.001		0.003	0.002
	(0.30)	(0.93)	(0.32)	(1.31)
% workforce that use computers	0.011	0.013†	0.003	0.002
	(1.26)	(1.33)	(1.27)	(1.33)
External auditor	−0.266	0.071	−0.078	0.078
	(0.92)	(1.24)	(0.92)	(1.23)
Collateral	−0.002	0.001	−0.002	0.019
	(0.04)	(0.03)	(0.03)	(0.39)
Relation with banks				
Overdraft	−0.008	0.161§		
	(0.08)	(3.19)		
Bank unique relationship	−0.070	−0.122*	−0.070	−0.170†
	(0.83)	(1.79)	(0.84)	(2.49)

Table A.14. The Impact of Bank Ownership on the Firm's Likelihood of Having a Loan—Model 2—Sample Split by Bank Ownership (*Continued*)

	Having a loan (Including overdrafts)[1]		Having a loan (Excluding overdrafts)[1,2]	
	Public bank	Private bank	Public bank	Private bank
Other control variables				
Industry	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes
Firm ownership	Yes	Yes	Yes	Yes
Education	Yes	Yes	Yes	Yes
Observations	500	582	500	582
Wald chi2	33.93	57.89	33.92	49.67

1. This refers to firms who have demand for a loan and have received a loan. The universe here is limited to firms which demand for a loan. This models concerns to the second stage model of the two step maximum likelihood probit: supply of credit model.
2. The dummy which controls for whether firms have an overdraft or not is excluded from this specification.

Statistical significance: * significant at 10%, † significant at 5%, and § significant at 1%.

Source: Authors' calculations based on World Bank, Investment Climate Survey—Brazil, 2003.

Table A.15. The Impact of Bank Ownership on the Firm's Likelihood of Having a Loan—Model 2—Consolidated Sample

	Having a loan (Including overdrafts)[1]	Having a loan (Excluding overdrafts)[1,2]
Size		
Small	0.040	0.036
	(0.56)	(0.50)
Medium	0.211[†]	0.211[†]
	(2.47)	(2.44)
Large	0.274[†]	0.263*
	(1.97)	(1.89)
Public Bank	0.137	0.137
	(1.46)	(1.42)
Small firm—Public Bank	−0.009	−0.004
	(0.09)	(0.04)
Medium firm—Public Bank	−0.098	−0.097
	(0.81)	(0.79)
Large firm—Public Bank	−0.077	−0.072
	(0.40)	(0.37)
Performance		
Turnover (sales/assets)	−0.003	−0.003
	(0.77)	(0.76)
Leverage	0.000	0.000
	(0.17)	(0.22)
Sales growth	0.002	0.002
	(1.52)	(1.52)
Firm characteristics		
Exporter	−0.002	−0.007
	(0.05)	(0.13)
SA	0.026	0.024
	(0.26)	(0.23)
Group	0.038	0.038
	(0.49)	(0.45)
New firm	−0.077	−0.080
	(2.52)	(1.35)
Capacity utilization	0.001	0.003
	(1.07)	(1.07)
% workforce that use computers	0.003[†]	0.003[†]
	(2.21)	(2.32)
External auditor	0.046	0.049
	(0.83)	(0.83)

Table A.15. The Impact of Bank Ownership on the Firm's Likelihood of Having a Loan—Model 2—Consolidated Sample (*Continued*)

	Having a loan (Including overdrafts)[1]	Having a loan (Excluding overdrafts)[1,2]
Collateral	0.012	0.011
	(0.27)	(0.27)
Relation with banks		
Overdraft	0.374[§]	
	(2.87)	
Bank unique relationship	−0.144[†]	−0.149[†]
	(2.52)	(2.53)
Other Control variables:		
Industry	Yes	Yes
Region	Yes	Yes
Firm ownership	Yes	Yes
Education	Yes	Yes
Observations	**1084**	**1084**
Wald chi2	**33.93**	**33.93**

1. This refers to firms who have demand for a loan and have received a loan. The universe here is limited to firms which demand for a loan. This models concerns to the second stage model of the two step maximum likelihood probit: supply of credit model.
2. The dummy which controls for whether firms have an overdraft or not is excluded from this specification.

Statistical significance: * significant at 10%, [†] significant at 5%, and [§] significant at 1%.

Source: Authors' calculations based on World Bank, Investment Climate Survey—Brazil, 2003.

Table A.16. Probability of Having a Loan from a Public Bank or a BNDES Credit Line

	Having a loan (Including overdrafts)[1]	Having a loan (Excluding overdrafts)[1,2]
Size		
Small	0.040	0.036
	(0.56)	(0.50)
Size		
Small firm	0.121[†]	0.135[†]
	(2.15)	(2.58)
Medium firm	0.243[§]	0.253[§]
	(3.55)	(4.04)
Large firm	0.270[†]	0.261[†]
	(2.47)	(2.61)
Performance		
Turnover (sales/assets)	−0.000	−0.000
	(0.54)	(0.39)
Leverage	0.001	0.001
	(0.40)	(0.52)
Sales growth	0.002*	0.008
	(1.85)	(0.20)
Firm characteristics		
Exporter	−0.002	0.014
	(0.04)	(0.29)
SA	−0.023	−0.079
	(0.23)	(0.89)
Group	−0.010	0.013
	(0.13)	(0.18)
Capacity utilization	0.000	0.001
	(0.54)	(1.07)
New firm	0.004	−0.018
	(0.02)	
% workforce that use computers	0.005[§]	0.005[§]
	(3.17)	(3.86)
External auditor	0.066	0.040
	(1.17)	(0.80)
Collateral	0.055	0.072*
	(1.25)	(1.83)
Relation with banks		
Overdraft	0.166[§]	
	(3.18)	

Table A.16. Probability of Having a Loan from a Public Bank or a BNDES Credit Line (*Continued*)

	Having a loan (Including overdrafts)[1]	Having a loan (Excluding overdrafts)[1,2]
Bank unique relationship	−0.059 (0.99)	−0.121[†] (2.27)
Other Control Variables:		
Industry	Yes	Yes
Region	Yes	Yes
Firm Ownership	Yes	Yes
Education	Yes	Yes
Observations	**1088**	**1088**
Wald chi2	**68.58**	**75.21**

1. This refers to firms who have demand for a loan and have received a loan. The universe here is limited to firms which demand for a loan. This models concerns to the second stage model of the two step maximum likelihood probit: supply of credit model.
2. The dummy which controls for whether firms have an overdraft or not is excluded from this specification.

Statistical significance: * significant at 10%, † significant at 5%, and § significant at 1%.

Source: Authors' calculations based on World Bank, Investment Climate Survey—Brazil, 2003.

Table A.17. Obstacles to Growth—Firm Size and Other Factors

	Access to financing	Cost of financing	Tax administration	Tax rates	Economic and regulatory policy uncertainty	Macroeconomic instability	Corruption
Small	0.015 (0.20)	0.076 (0.95)	0.004 (0.06)	0.073 (0.98)	0.053 (0.71)	0.022 (0.30)	−0.094 (1.22)
Medium	−0.027 (0.31)	−0.005 (0.05)	−0.082 (0.98)	0.011 (0.12)	−0.018 (0.22)	0.037 (0.44)	−0.238§ (2.73)
Large	−0.203 (1.53)	−0.137 (1.01)	−0.259* (1.95)	−0.282† (2.12)	−0.037 (0.28)	0.175 (1.23)	−0.454§ (3.66)
Control Variables							
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm ownership							
Education							
Observations	**1616**	**1623**	**1636**	**1641**	**1639**	**1637**	**1634**

Note: Micro firms is the control dummy.

Statistical significance: * significant at 10%, † significant at 5%, and § significant at 1%.
Regression estimates based on World Bank, Investment Climate Survey—Brazil, 2003.

Table A.18. The Relative Importance of Obstacles to Growth and Firm Size

	No obstacle	Degree of obstacle				Total	Weighted average[38]	Differences across size test
		Low	Medium	High	Very high			
Tax rates	3.2	2.3	10.1	33.4	51.1	100	32.71	(0.058)*
Cost of Financing (e.g. interest rates)	5.6	3.3	7.9	26.5	56.7	100	32.54	(0.056)*
Economic and regulatory policy uncertainty	2.9	4.5	16.8	32.8	43.1	100	30.89	(0.185)
Macroeconomic instability (inflation, exchange rate)	2.8	4.0	18.3	33.5	41.4	100	30.67	(0.592)
Corruption	10.4	7.9	14.5	20.1	47.1	100	28.56	(0.000)§
Tax administration	7.7	6.6	19.6	33.4	32.7	100	27.68	(0.421)
Access to Financing (e.g., collateral)	14.3	8.5	16.8	25.9	34.5	100	25.78	(0.352)
Labor regulations	10.4	9.6	23.2	29.9	27.0	100	25.37	(0.032)†
Anti-competitive or informal practices	10.2	10.9	22.5	28.6	27.8	100	25.29	(0.346)
Crime, theft and disorder	16.6	14.1	17.1	20.8	31.4	100	23.63	(0.000)§
Skills and education of available workers	12.9	14.9	32.5	28.9	10.7	100	20.94	(0.015)†
Legal system/conflict resolution	21.3	17.5	28.4	19.9	13.0	100	18.60	(0.007)§
Customs Regulations	30.4	9.4	22.4	20.4	17.4	100	18.50	(0.000)§
Trade Regulations	30.8	12.2	22.2	19.4	15.4	100	17.64	(0.000)§
Business Licensing and Operating permits	26.6	19.2	24.4	18.2	11.6	100	16.90	(0.192)
Transportation	39.2	17.4	24.1	14.1	5.2	100	12.87	(0.465)
Electricity	45.8	15.8	18.2	13.7	6.6	100	11.97	(0.207)
Standards and Quality (INMETRO)	40.4	22.6	21.1	10.3	5.6	100	11.81	(0.003)§
Access to Land	52.0	13.7	14.5	13.2	6.6	100	10.87	(0.000)§
Patents and Registered Trademarks (INPI)	47.2	19.9	16.8	10.1	6.0	100	10.78	(0.015)†
Telecommunications	66.5	14.2	13.1	4.6	1.6	100	6.06	(0.344)

Statistical significance: * significant at 10%, † significant at 5%, and § significant at 1%.
Source: World Bank, Investment Climate Survey—Brazil, 2003.

References

Aaronson, Daniel, Raphael Bostic, Paul Huck, and Robert Townsend. 2000. "Supplier relationships and small business use of trade credit." Federal Reserve Bank of Chicago Working Paper 2000–28.

Angelini, P., R. Di Salvo, and G. Ferri. 1998. "Availability and cost of credit for small businesses: customer relationships and credit cooperatives." *Journal of Banking & Finance* 22:925–954.

Avery, Robert, Raphael Bostic, and Katerine Samolyk. 1998. "The role of personal wealth in small business finance." *Journal of Banking & Finance* 22:1019–1061.

Baldwin, John, Guy Gellatly, and Valerie Gaudreault. 2002. "Financing innovation in new small firms: new evidence from Canada." Analytical Studies Branch, Research Paper Series No. 11F0019 No. 190.

Bank of England. "Finance for small firms." Various reports.

Barro, Robert, and Xavier Sala-I-Martin. 1995. "Economic Growth." New York, McGrawhill.

Bechetti, Leonardo, and Giovanni Trovato. 2002. "The determinants of growth for small and medium sized firms. The role of the availability of external finance." *Small Business Economics* 19:291–306.

Beck, Thorsten, Ross Levine, and Norman Loayza. 2000. "Finance and the sources of growth." *Journal of Financial Economics* 58:261–300.

Beck, Thorsten, Asli Demirguç-Kunt, and Vojislav Maksimovic. 2002. "Financing patterns around the world: The role of institutions." Policy Research Working Paper 2905, World Bank.

———. 2003. "Financial and legal institutions and firms size." Policy Research Working Paper 2997, World Bank.

Berger, Allen, Seth Bonime, Lawrence Goldberg, and Lawrence White. 2000. "The dynamics of market entry: the effects of mergers and acquisitions on de novo entry and small business lending in he banking industry." *Journal of Business*. Forthcoming.

Berger, Allen, Asli Demirguç-Kunt, Ross Levine, and Joseph Haubrich. 2004. "Bank concentration and competition: an evolution in the making." *Journal of Money, Credit, and Banking*. Forthcoming.

Berger, Allen, Laurence Goldberg, and Lawrence White. 2001. "The effects of dynamic changes in bank competition on the supply of small business credit." *European Finance Review* 5:115–139.

Berger, Allen, Iftekhar Hasan, and Leora Kappler. 2004. "Further evidence on the link between finance and growth: an international analysis of community banking and economic performance." *Journal of Economics Services Research*. Forthcoming.

Berger, Allen, Leora Kappler, and Gregory Udell. 2001. "The ability of banks to informationally opaque small business." *Journal of Banking & Finance* 25:2127–2167.

Berger, Allen, Anthony Saunders, Joseph Scalise, and Gregory Udell. 1998. "The effects of bank mergers and acquisitions on small business lending." *Journal of Financial Economics* 50:187–229.

Berger, Allen, and Gregory Udell. 1994. "Lines of credit and relationship lending in small firm finance." The Wharton Financial Institution Center Working Paper 94–11.

———. 1998. "The economics of small business finance: the roles of equity and debt markets in the financial growth cycle." *Journal of Banking & Finance* 22:613–673.

Berkowitz, Jeremy, and Michelle White. 2002. "Bankruptcy and small firms' access to credit." NBER Working Papers 9010.

Berlin, Mitchel, and Loretta Mester. 1998. "On the profitability and cost of relationship lending." *Journal of Banking & Finance* 22:873–897.

Bester, Helmut. 1987. "The role of collateral in credit markets with imperfect information." *European Economic Review* 31(1987):887–899.

Bigsten, Arne, Paul Collier, Stefan Dercon, Marcel Fafchamps, Bernard Gauthier, Jan Gunning, Mans Soderbom, Abena Oduro, Remco Oostendorp, Cathy Patillo, Francis Teal, and Albert Zeufack. 2000. "Credit constraints in manufacturing enterprises in Africa." *Journal of African Economies* 12(1):104–125.

Binks, Nartin, and Christine Ennew. 1996. "Growing firms and credit constraint." *Small Business Economics* 8:17–25.

———. 1997a. "Smaller business and relationship banking: the impact of participative behaviour." *Entrepreneur Theory and Practice* 21(4):83–92.

———. 1997b. "The relationship between U.K. banks and their small business customers." *Small Business Economics* 9:167–178.

Blasio, Guido. 2003. "Does trade credit substitute for bank credit? Evidence from firms-level data." IMF Working Paper 03/166.

BNDES. 2003. "Firmas e emprego demografia das firmas brasileiras." Informe-se BNDES No 50.

Boot, Arnoud, and Anjan Thakor. 1994. "Moral hazard and secured lending in an infinitely repeated credit market game." *International Economic Review* 35(4):899–920.

Brewer, Elijah, Hesna Genay, William Jackson, and Paula Worthington. 1996. "How are small firms financed? Evidence from small business investment companies." *Economic Perspectives* 20(6).

Carpenter, Robert, and Bruce Peterson. 2002. "Is the growth of small firms constrained by internal finance?" *The Review of Economics and Statistics* 84(2):298–309.

Carrol, Robert, Douglas Holts-Eakin, Mark Rider, and Harvey Rosen. 2000. "Personal income taxes and the growth of small firms." NBER 7980.

Cavaluzzo, Ken, and John Wolken. 2002. "Small business loan turndowns, personal wealth and discrimination." Board of Governors, Federal Reserve System. Processed.

Chakravarty, Sugato, and James Scott. 1999. "Relationships and rationing in consumer loans." *Journal of Business* 2(4)523–544.

Chittenden, Francis, and Martyn Robertson. 1993. *Small Firms.* Sage Publications, Inc.

Clarke, George, Robert Cull, and Maria Soledad Martinez Peria. 2001. "Does Foreign Bank Penetration Reduce Access to Credit in Developing Countries? Evidence from Asking Borrowers." World Bank Working Papers 2716.

Clarke, George, Robert Cull, Maria Soledad Martinez Peria, and Susana Sanchez. 2002. "Bank Lending to Small Businesses in Latin America: Does Bank Origin Matter?" *Journal of Money, Credit and Banking.* Forthcoming.

Cole, Rebel. 1998. "The importance of relationships to the availability of credit." *Journal of Banking & Finance* 22:959–977.

Demirgüç-Kunt, Asli, and Vojislav Maksimovic. 1996a. "Financial constraints, use of funds, and firm growth." Policy Research Working Paper 1671, World Bank.

———. 1996b. "Stock market development and firm financing choices." *The World Bank Economic Review* 10(2).

———. 1998. "Law, finance, and firm growth." *The Journal of Finance* 53(6):2107–2137.

———. 1999. "Institutions, financial markets and Firm debt maturity." *Journal of Financial Economics* 54:295–336.

———. 2001. "Firms as Financial Intermediaries: Evidence from Trade Credit Data." World Bank. Processed. http://econ.worldbank.org/files/2517_wps2696.pdf

Demsetz, Harold, 1973. "Industry Structure, Market Rivalry, and Public Policy." *Journal of Law & Economics* 16(1):1–9.

Diamond, Douglas. 1989. "Reputation acquisition in debt markets." *The Journal of Political Economy* 97(4):828–862.

Fazarri, Steven, and Michael Athey. 1987. "Asymetric information, financing constraints, and investment." *The Review of Economics and Statistics* 69(3):481–487.

Ferri, Giovanni, and Marcello Messori. 2000. "Bank-firm relationship and allocative efficiency in the Northeast and Central Italy and in the South." *Journal of Banking & Finance* 24:1067–1095.

Fluck, Zsuzsanna. 1999. "Capital Structure Decisions in Small and Large Firms: A life-cycle theory of financing." New York University, Leonard N. Stern School Finance Department Working Paper Series No. 99–069.

Frazer, Garth. 2004. "Which Firms Die? A Look at Exit from Manufacturing in Ghana." University of Toronto. Processed.

Freel, Mark. 1999. "The financing of small firm product innovation within the UK." *Technovation* 19:707–719.

Gallup, John, Jeffrey Sachs, and Andrew Mellinger. 1998. "Geography and economic development." NBER Working Paper No. 6849.

Gertler, Mark, and Simon Gilchrist. 1994. "Monetary policy, business cycles, and the behavior of small manufacturing firms." *The Quarterly Journal of Economics* 109(2):309–340.

Giudici, Giancarlo, and Stefano Paleari. 2000. "The provision of finance to innovation: a survey conducted among Italian technology based small firms." *Small Business Economics* 14:37–53.

Goldberg, Lawrence, and Lawrence White. 1998. "De novo banks and lending to small business: an empirical analysis." *Journal of Banking & Finance* 22:851–867.

Griliches, Z. 1998. "R&D and productivity, the econometric evidence." Chicago, University Chicago Press.

Guiso, Luigi, Paola Sapienza, and Luigi Zingales. 2002. "Does local financial development matter." NBER Working Paper No. 8923.

Hamilton, Robert, and Mark Fox. 1998. "The financing preferences of small firm owners." *International Journal of Entrepreneurial Behavior & Research* 4(3).

Hancock, Diana, and James Wilcox. 1998. "The credit crunch and the availability of credit to small business." *Journal of Banking & Finance* 22:983–1014.

Hanson, James. 2004. "The role of state owned financial institutions: policy and practice." Sixth Annual Financial Markets and Development conference, Washington, D.C.

Harris, Milton, and Artur Raviv. 1990. "Capital structure and the informational role of debt." *The Journal of Finance* 45(2):321–349.

Hart, Peter, and Nicholas Oulton. 1996. "Growth and size of firms." *The Economic Journal* 106(438):1242–1252.

Hubbard, R. Glenn. 1998. "Capital-Market imperfections and investment." *Journal of Economic Literature* 36(1):193–225.

Hughes, A., and D.J. Storey. 1994. *Finance and the Small Firm.* London: Routledge.

Johnson, Simon, John McMillan, and Christophe Woodruff. 2002. "Property rights and finance." NBER Working Paper No. 8852.

Jordan, Judith, Julian Lowe, and Peter Taylor. 1998. "Strategy and financial policy in UK small firms." *Journal of Business and Accounting* 25(1 & 2):1–27.

King, Robert, and Ross Levine. 1993. "Finance and growth: Schumpeter might be right." *The Quarterly Journal of Economics* 108(3):717–737.

Klapper, Leora, Virginia Sarria-Allende, and Victor Sulla. 2002. "Small and medium-size enterprise financing in Eastern Europe." World Bank Policy Research Working Paper 2933.

Kocenda, Evzen, and Jan Svejnar. 2003. "Ownership and firm performance after large-scale privatization" William Davidson Working Paper No. 471a.

Kumar, Anjali, and Thorsten Beck, Cristine Campos, Soumya Chattopadhyay. 2004. "Access to Financial Services in Brazil." World Bank. Processed.

Kumar, Jayesh. 2003. "Ownership Structure and corporate firm performance." Indira Gandhi Institute of Development Research. Processed.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny. 1997. "Legal determinants of external finance" NBER Working Paper No. 5879.

———. 2002. "Government ownership of banks." *The Journal of Finance* 57(1):265–301.

Laeven, Luc. 2001. "Financial Liberalization and Financing Constraints: Evidence from Panel Data on Emerging Economies." World Bank. Processed.

Laursen, Keld, Volker Mahnke, and Per Vejrup-Hansen. 1999. "Firm growth a knowledge structure perspective." Processed.

Levenson, Alec, and Kristen Willard. 2000. "Do Firms Get the Financing They Want? Measuring Credit Rationing Experienced, by Small Businesses in the U.S." *Small Business Economics* 14:83–94.

Levy, Brian. 1993. "Obstacles to Developing Indigenous Small and Medium Enterprises: An Empirical Assessment." *The World Bank Economic Review* 7(1)65–83.

Long, Michael, John Wald, and Jingfeng Zang. 2003. "A cross sectional analysis of firm growth options." Processed.

Lopez-Gracia, Jose, and Cristina Aybar-Arias. 2000. "An empirical research to the financial behavior of small and medium sized companies." *Small Business Econo*mics 14:55–63.

Love, Inessa. 2002. "Financial development and financing constraints: international evidence from the structural investment model." *Review of Financial Studies*. Forthcoming.

Lucas, Robert (1998) "On the mechanisms of economic development" Journal of monetary economics 22, 3–42.

Majumdar, Sumit, and Pradeep Chhiber. 1998. "State investors and state owner: consequences of firm performance in India." *Economic Development and Cultural Change.*

Meyer, Laurence. 1998. "The present and future roles of banks in small business finance." *Journal of Banking & Finance* 22:1109–1116.

Myers, Stewart. 1984. "The capital structure puzzle." *The Journal of Finance* 39(3):575–592.

Myers, Stewart, and Nicholas Majluf. 1984. "Corporative financing and investment decisions when firms have information that investors do not have." *Journal of Financial Economics* 13:187–221.

Modigliani, Franco, and Merton Miller. 1958. "The cost of capital, corporation finance and the theory of investment." *American Economic Review* 48:261–297.

Natke, Paul. 1999. "Financial repression and firm self-financing of investment: empirical evidence from Brazil." *Applied Economics* 31:1009–1019.

Nickell, Stephen, and Daphne Nicolitsas. 1995. "How does financial pressure affect firms." Centre for Economic Performance Discussion Paper No. 266.

Nkusu, Mwanza. 2003. "Interest rates, credit rationing, and investment in developing countries." IMF Working Paper 03/63.

Papadimitriou, Dimitri, Ronnie Phillips, and Randal Wray. 1994. "An alternative in small business finance." Levy Institute Public policy brief No. 12/1994.

Peek, Joe, and Eric Rosengren. 1998. "Bank consolidation and small business lending: It's not just bank size that matters." *Journal of Banking & Finance* 22:799–819.

Petersen, Mitchell, and Raghuram Rajan. 1994. "The benefits of lending relationships: evidence from small business data." *The Journal of Finance* 49(1):3–37.

———. 2002. "Does distance still matter? The information revolution in small business lending." *The Journal of Finance* 42(6):2533–2570.

Pollard, Jane. 2003. "Small firm finance and economic geography." *Journal of Economic Geography* 3(4):429–452.

Rajan, Raghuram, and Luigi Zingales. 1998. "Financial dependence and growth." *The American Economic Review* 88(3):559–586.

Romer, Paul. 1990. "Endogenous technological change." *Journal of Political Economy* 98:71–102.

Rousseau, Peter, and Paul Wachtel. 2000. "Equity markets and growth: cross-country evidence on timing and outcomes, 1980–1995." *Journal of Banking and Finance* 24:1933–1957.

Russo, Paolo, and Paola Rossi. 2001. "Credit constraints in Italian industrial districts." *Applied Economics* 33:1469–1477.

Saito, Katrine, and Delano Villanueva. 1981. "Transactions costs of credit and the small scale sector in the Philippines." *Economic Development and Cultural Change* 29(3):631–639.

Schiantarelli, Fabio, and Alessandro Sembenelli. 1996. "Form of ownership and financial constraints." World Bank Policy Research Paper 1626.

Sharpe, Steven. 1990. "Asymmetric information, bank lending and implicit contracts: a stylized model for customer relationships." *The Journal of Finance* 45(4):1069–1087.

Short, Helen. 1994. "Ownership, control, financial structure and the performance of firms." *Journal of Economic Surveys* 8(3):203–249.

Solow, R. 1957. "Technical change and the aggregate production function." *Review of economics and Statistics* 39:312–320.

Stiglitz, Joseph, and Andrew Weiss. 1981. "Credit rationing in markets with imperfect information." *The American Economic Review* 71(3):393–410.

Strahan, Philip, and James Weston. 1998. "Small business lending and the changing structure of the banking industry." *Journal of Banking & Finance* 22:821–845.

Terra, Maria. 2003. "Credit constraints in Brazilian firms: evidence from panel data." *Revista Brasileira de Economia* 57(2):443–464.

Topalova, Petia. 2004. "Overview of the Indian Corporate Sector: 1989–2002." IMF Working Paper 04/64.

Vinning, Aidan, and Anthony Boardman. 1992. "Ownership versus competition: efficiency and public enterprise." Public choice 73:205–239.

Wachtel, Paul. 2003. "How much do we really know about growth and finance?" *Economic Review—Federal Reserve of Atlanta* (First quarter 2003):33–47.

Watson, Robert, and Nick Wilson. 2002. "Small and Medium size enterprise financing: a note of the empirical implications of a pecking order." *Journal of Business Finance and Accounting* 29(3 & 4):557–578.

Willmore, Larry. 1986. "The comparative performance of foreign and domestic firms in Brazil." *World Development* 14(4):289–502.

Wilson, Nicholas, and Barbara Summers. 2002. "Trade credit terms offered by small firms: survey evidence and empirical analysis." *Journal of Business Finance and Accounting* 29(3 & 4):317–351.

Enterprise Size, Financing Patterns, and Credit Constraints in Brazil is part of the World Bank Working Paper series. These papers are published to communicate the results of the Bank's ongoing research and to stimulate public discussion.

This study investigates the importance of firm size with respect to access to credit, relative to firm performance and other factors which may affect creditworthiness—such as management education, location, and the industrial sector to which the firm belongs.

The principal findings are that size strongly affects access to credit, compared to performance as well as other variables, suggesting quantitative limitations to credit access. Looking at short versus long-term loans, the impact of size on access to credit is greater for longer terms. Regarding ownership of the lending institution, the study finds public financial institutions are more likely to lend to large firms. Finally, examining the role of financial constraints relative to other constraints faced by the firm, financial access constraints may have a less signficant differential impact across firms of different sizes than other constraints, though cost of finance as a constraint is very important.

World Bank Working Papers are available individually or by subscription, both in print and online.