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**Article**

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## ABSTRACT

*Using survey data on Italian manufacturing firms, this paper examines firms' capital structure and their access to financial debt, notably bank loans. We find that the share of financial debt in total liabilities is, on average, smaller for small firms than for large ones. However, this is not because the typical small firm borrows less than a large firm, but because small firms are more likely not to borrow at all. For firms that do borrow, the share of financial debt varies little with firm size. The absence of financial debt on the balance sheet of many firms is mainly because they do not want to borrow, not because lenders do not want to lend. Thus, credit rationing does not appear to be a widespread phenomenon, but when it happens, lack of size and equity seems to play a key role.*

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# Small business finance in Italy

## 1. Introduction

Italy is a country of small businesses and compared to other nations at a similar stage of development the average size of its firms is small. To illustrate, the 3.2 million firms in Italy have an average staff of 4.4 employees while the average firm size - measured by number of employees - in Germany, France, and the United Kingdom is respectively 10.3, 7.1 and 9.6.<sup>1</sup> Furthermore, in Italy, firms with less than 100 employees account for close to 70 percent of total employment while in Germany, France, the United Kingdom, and the United States this type of firm does not contribute to more than 30 percent of employment. Mirroring the role of small businesses, firms with more than 500 employees (conventionally taken as the threshold for defining "large" businesses) account for only 15 percent of employment in Italy whereas firms of this size contribute to at least 40 percent of employment in many other countries.



**Luigi Guiso**

Small is not necessarily beautiful. One concern addressed in this paper is the adequacy of finance for small businesses. There are a number of reasons for raising this question for this particular subset of firms. To begin with, a large part of economic growth is thanks to the growth in the size of existing establishments and the creation of new ones, and the growth of existing firms and start-ups, which typically start small, crucially depend on access to external finance. For instance, for Italy, Guiso *et al.* (2002) find, that credit availability has a strong impact on the growth potential of individual firms and on the creation of new ones.

Second, a large body of literature argues that small businesses are likely to suffer most from information and incentive problems, limiting their ability to obtain external finance. Two strands of literature can be distinguished. One is on investment and finance, and it shows that investment is sensitive to cashflow, with investment-cashflow sensitivity typically limited to small businesses - a result suggesting that smaller firms suffer from financial constraints while larger firms do not (see, among others, Fazzari *et al.* 1988, Hoshi *et al.* 1991, Bond and Meghir 1994, and Hubbard 1998). A variant of this literature examines the link between firm growth and finance; Wagenvoort (this volume), for instance, finds that small companies have higher growth-cashflow sensitivities than large ones, indicating that external finance constraints may prevent small and medium-sized firms to fully exploit their growth potential. The other strand is on the transmission channel of monetary policy and the relevance of the credit channel. Here too the empirical evidence is consistent with the idea that monetary policy contractions and banking crises adversely affect small businesses, in particular because they have no access to sources of finance other than bank loans (see, for example, Gertler and Gilchrist 1994).

A final reason - related to the previous one - that makes the supply of finance to small businesses of particular interest is that small businesses appear to have a limited geographical access to finance. A growing literature argues that distance matters in the

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<sup>1</sup> See Kumar *et al.* (1999).

*Small businesses are of high interest for various reasons, including their importance for employment and their inherent weakness in raising external finance.*

provision of funds, especially for small firms. Petersen and Rajan (2002), for instance, provide evidence for the importance of distance in the provision of bank credit to small firms. Similarly, Lerner (1995) documents the importance of distance in the venture capital market. The immediate impact of distance on small firms is that their capital structure and debt capacity are determined by the conditions offered on local financial markets given that they can only borrow locally. Developments in local markets – such as those experienced in many countries over the 1990s with waves of bank consolidation – may have strong effects on the supply of finance to small firms.

Against this background, this paper provides a thorough analysis of small business finance in Italy. Section 2 sets the stage, describing the capital structure of small businesses on the basis of microeconomic data, while Section 3 presents evidence on the determinants of capital structure of small and medium-sized firms and examines their ability to match the maturity of assets and liabilities. Section 4 presents data on credit rationing of small businesses and identifies factors that affect the probability that a firm has no access to credit markets. Probing deeper on previous results in the literature, we provide strong evidence that size is a major determinant of the probability of success in obtaining as much bank finance as needed. But we also show that other features, previously neglected, are even more important. Furthermore, we examine the structure of firm-bank relationships in Italy and examine their importance for firms' access to loans. Section 5 concludes.

## **2. The capital structure of small firms**

To describe the capital structure of small businesses and how it varies with firm attributes, microeconomic data are needed. We draw data from the 1999 Survey of Manufacturing Firms (SMF), which *Mediocredito Centrale*, an investment bank, conducts every three years on a sample of over 4,000 mostly small and medium-sized firms and some larger firms (with more than 500 employees) in manufacturing.<sup>2</sup> The main purpose of the survey is to collect information on several aspects of firms' activities, with a focus on technological innovation and investment in research and development (R&D). However, firms' balance sheets and income statements for the past three years are appended to the survey. This data offers a fair description of firms' assets and liabilities and key profitability indicators. The latest year in the sample is 1997 and small and medium-sized firms are those with less than 500 employees. In what follows, we present different ways of measuring capital structure and we use these measures to analyse the capital structure of firms in different size classes; we then examine the composition of firms' liabilities, the participation of firms in financial debt instruments – notably loans, the maturity structure of debt, and the structure of firms' assets as well as their profitability and financial fragility.

There are different ways of measuring capital structure, each measure having its pros and cons and, ultimately, its usefulness will depend on the purpose of the investigation. Since most of the firms in the data set are non-listed,<sup>3</sup> market-based measures – most appropriate for some purposes – are not available. Consequently, this paper relies on three book-based measures of capital structure. The first is the ratio of total debt to total assets.

<sup>2</sup> The new wave, referring to 2001, has not yet been released. For more details about the survey see the Annex.

<sup>3</sup> In the sample of firms with up to 500 employees (our reference sample), only 28 firms are listed.

Total debt, i.e. the numerator of this measure, comprises all non-equity liabilities of the firm: short and long-term bank debt, accounts receivable (trade debt), bonds, pension liabilities, and other debt financing such as loans from firms belonging to the same group. The main advantage of this broad measure is that it indicates what would be left to shareholders in case of liquidation. Its shortcoming is that it also includes pension liabilities<sup>4</sup> and trade debt, which may have little to do with financing decisions: the former, for instance, largely reflect the age structure of firms' employees, and the latter may mirror firms' commercial policy. The second measure, namely the ratio of financial debt to total assets, partially accounts for these drawbacks, as financial debt equals total debt minus pension liabilities and trade debt. But as pension liabilities and trade debt contribute to the financing of assets, they still affect firms' capital structure measured in this way and, thus, differences in leverage across firms may still be due to differences in liability items that may have little to do with firms' financing decisions. Our third measure corrects for this distortion by computing capital structure as the ratio of financial debt to capital, with capital being defined – for the purpose of this paper – as the sum of financial debt and the book value of equity.

Table 1 shows – for firms in different size classes – the three measures of capital structure and other indicators that inform about firms' sources of finance. With regard to the SMF sample as a whole, we observe a total debt to asset ratio of the median firm of 57 percent. With 21 percent – also for the median firm – the financial debt to asset ratio is markedly lower, mainly because of the importance of trade debt, which is equivalent to 21 percent of total assets. The third measure, i.e. financial debt relative to capital, amounts to 43 percent, implying that for the median firm in the sample EUR 1 of equity gears EUR 0.77 of financial debt.

How do these ratios vary across firms? For the whole SMF sample, the standard deviation for all three measures is about 28 percent, 20 percent, and 32 percent, respectively, indicating that total debt and financial debt as source of finance vary considerably across firms, as does financial debt relative to capital. More interesting – given the topic of this paper – are the differences in capital structure for firms in different size classes, ranging from very small firms (less than 30 employees) to larger medium-sized (250 to 500 employees) and large firms (more than 500 employees). As Table 1 indicates, the main differences are clearly between the very small enterprises, on the one hand, and larger enterprises on the other hand. To illustrate, the total debt asset ratio of the median firm in the size class “100-249” is almost 20 percentage points higher than that of the median, very small firm, and differences of a similar size exist for the financial debt to asset ratio. Overall, larger businesses rely more on external debt finance than the very small firms. The distinction between the very small and larger firms is even more striking with regard to the financial debt to capital ratio: while the very small firms use only EUR 0.3 of financial debt for one euro of equity, larger firms use between EUR 0.95 and EUR 1.2 of financial debt. This suggests that firm size amplifies the financial debt capacity of firms.

We now take a look at the structure of firms' liabilities. Trade debt is equivalent to about 21 percent of assets for the SMF sample as whole, but appears to be somewhat less

*Very small firms use far less financial debt than larger firms.*

<sup>4</sup> In Italy, pension liabilities offer a cheap way to raise funds for small businesses since the interest rate on them, the so called “legal interest”, is typically well below the market rate.

**Table 1. Capital structure of manufacturing firms in Italy**

	Total SMF sample	Number of employees				
		<30	30-99	100-249	250-500	>500
Total debt/assets	0.572 (0.504) [0.281]	0.448 (0.419) [0.313]	0.605 (0.555) [0.250]	0.640 (0.614) [0.175]	0.611 (0.596) [0.193]	0.598 (0.575) [0.197]
Financial debt/assets	0.206 (0.223) [0.196]	0.092 (0.172) [0.195]	0.245 (0.251) [0.193]	0.299 (0.297) [0.164]	0.299 (0.284) [0.172]	0.248 (0.254) [0.167]
Financial debt/capital	0.434 (0.404) [0.316]	0.231 (0.322) [0.333]	0.493 (0.448) [0.301]	0.562 (0.520) [0.241]	0.546 (0.491) [0.258]	0.488 (0.462) [0.246]
Trade debt/assets	0.214 (0.216) [0.164]	0.159 (0.188) [0.193]	0.241 (0.236) [0.152]	0.237 (0.245) [0.118]	0.219 (0.235) [0.103]	0.223 (0.244) [0.117]
Bank debt/financial debt	0.954 (0.781) [0.316]	1.000 (0.789) [0.334]	0.962 (0.789) [0.309]	0.902 (0.769) [0.295]	0.838 (0.728) [0.302]	0.809 (0.691) [0.322]
Equity/assets	0.210 (0.252) [0.166]	0.198 (0.239) [0.169]	0.227 (0.228) [0.164]	0.236 (0.264) [0.155]	0.241 (0.280) [0.164]	0.235 (0.278) [0.160]

Notes: The table reports the median, (mean) and [standard deviation]; for definition of variables see text.

Source: Own calculation based on the 1999 Survey of Manufacturing Firms (SMF) of *Mediocredito Centrale*.

*Leverage does not vary a lot across median firms of different size classes.*

important for the very small firms. For the SMF sample as whole, banks provide about 95 percent of total financial debt of the median firm. The importance of bank debt moderately decreases with firm size: for very small firms, bank debt fully accounts for financial debt whereas for large firms, bank debt makes up 80 percent of financial debt. Although not shown in Table 1, it is worth noting that for the median firm, bonds do not contribute to finance irrespective of the size class; for the average firm in the SMF sample, bonds account for less than 4 percent of financial debt. The share of equity equals 21 percent for the median firm in the SMF sample, and median equity ratios do not vary a lot across size classes though the very small firms have the lowest ratio and are thus most leveraged. In sum, the debt structure of small businesses is rather simple: trade debt plays a conspicuous role, banks are the main source of financial debt and, by extension, bond finance is negligible.

Median and average values conceal the fact that some firms do not use certain debt instruments at all.<sup>5</sup> But for a comprehensive analysis of small business finance, we surely need to know whether non-participation in certain debt instruments is a relevant phenomenon. Table 2 suggests that it is. In the total SMF sample, 76 percent of the firms have financial debt, and 70 percent have bank debt, implying that almost one third of firms has no bank debt. As such, this does not tell us whether these firms do not want to or

<sup>5</sup> Obviously, this does not apply if the median is zero, which is only the case for bond finance.

cannot raise bank debt. Yet, it highlights that some small businesses have incomplete sources of funds. A large majority (77 percent) have trade debt, but again a non-negligible fraction receives no credit from suppliers. Although the median firm issues no bonds at all, and the average firm very little, 19 percent of firms issue bonds, which is perhaps more than one would expect in light of median and average values. Among the firms that issue bonds, this source of funding accounts for about 10 percent of financial debt. Table 2 finally shows that about 45 percent of firms do not have long-term financial debt and more than half do not have long-term bank debt.

**Table 2. Importance of various debt instruments for manufacturing firms in Italy**

		Number of employees				
	Total SMF sample	<30	30-99	100-249	250-500	>500
Percentage of firms that use:						
Financial debt	75.6	58.5	85.4	97.5	98.0	99.4
Bank debt	70.3	53.1	79.7	93.6	94.1	95.5
Trade debt	76.7	60.2	85.6	99.3	100.0	100.0
Bonds	19.2	19.3	16.0	25.8	24.8	17.9
Long-term financial debt	54.9	33.7	65.5	84.6	87.1	89.3
Long-term bank debt	42.9	25.3	51.2	70.3	68.4	74.7

Notes: For definition of variables see text.

Source: Own calculation based on the 1999 Survey of Manufacturing Firms (SMF) of *Mediocredito Centrale*.

Of course, an intriguing question is how participation in various debt instruments varies across size classes. For all debt instruments, the participation rate increases with size class. The following is worth highlighting: almost half of the very small firms have no bank debt while only 6 percent of the larger small and medium-sized firms operate without bank loans; all firms with more than 100 employees have trade debt while 40 percent of the very small firms do not; the proportion of firms with long-term debt rapidly increases with firm size (only 34 percent of the very small firms compared to almost 90 percent of firms with more than 100 employees have long-term debt). Overall, it is difficult to believe that diversities in production technologies across firms in different size classes cause the variation in debt participation rates. It is more likely that this variation reflects differences in debt contracting problems and the existence of fixed costs of debt finance. Whatever the reason, access to debt finance seems to be more challenging for the very small firms.

We have already touched upon the maturity structure of debt and will now further develop this aspect. Specifically, we examine the maturity structure of financial debt and bank debt, the latter being the key component of the former. We classify debt with a maturity of more than 18 months as long term and use the share of long-term debt in the total to measure the maturity structure of debt. As Table 3 shows, for the median firm in the sample, only 28 percent of total financial debt is long term, implying a relatively short maturity. Debt maturity increases sharply with firm size, as indicated by the jump in the share of long-term debt from 16 percent (firms with less than 30 employees) to over 30 percent (firms with more than 30 employees).

*The use of debt instruments varies considerably with firm size: most striking is many small firms do not borrow at all.*

**Table 3. Maturity structure of debt of manufacturing firms in Italy**

		Number of employees				
	Total SMF sample	<30	30-99	100-249	250-500	>500
Financial debt						
Long-term as a fraction of total	0.278 (0.340) [0.315]	0.160 (0.273) [0.313]	0.300 (0.360) [0.318]	0.373 (0.414) [0.294]	0.312 (0.372) [0.295]	0.355 (0.385) [0.289]
Long-term as a fraction of total for firms that have long-term debt	0.395 (0.448) [0.287]	0.378 (0.439) [0.292]	0.397 (0.452) [0.291]	0.435 (0.470) [0.267]	0.370 (0.418) [0.280]	0.369 (0.428) [0.273]
Bank debt						
Long-term as a fraction of total	0.131 (0.247) [0.294]	0.000 (0.183) [0.274]	0.161 (0.259) [0.296]	0.265 (0.325) [0.296]	0.242 (0.303) [0.300]	0.320 (0.350) [0.302]
Long-term as a fraction of total for firms that have long-term debt	0.267 (0.327) [0.297]	0.211 (0.296) [0.296]	0.263 (0.327) [0.297]	0.320 (0.368) [0.289]	0.293 (0.337) [0.297]	0.418 (0.445) [0.270]

Notes: The table reports the median, (mean) and [standard deviation]; for definition of variables see text.  
Source: Own calculation based on the 1999 Survey of Manufacturing Firms (SMF) of *Mediocredito Centrale*.

*The maturity structure of debt seems too short relative to the lifespan of assets.*

The maturity of financial debt is probably too short to adequately match the maturity of assets. To illustrate this, recall from Table 1 that, for the median firm in the sample, financial debt is equivalent to about 21 percent of assets (see Table 1). With long-term financial debt accounting for 28 percent of total financial debt, this implies that long-term financial debt covers only 6 percent of total assets. While the structure of assets will be investigated further below, we note here that fixed assets (net of depreciation) - i.e. assets with a long lifespan - account for about 14 percent of total assets and, thus, long-term financial debt only covers roughly 40 percent of fixed assets. This ratio is much lower for very small firms: with a share of fixed assets in total assets of 13 percent, a financial debt to asset ratio of 9 percent (see Table 1), and a share of long-term financial debt in total financial debt of 16 percent, long-term financial debt is equivalent to only 11 percent of fixed assets.

Table 3 also shows the conditional debt maturity, which is the share of long-term financial debt in total debt for firms that actually have long-term debt. This is relevant because, as we have seen, almost half of the firms do not have long-term debt. Conditional on having it, long-term debt represents about 40 percent of total debt for the median firm in the sample. An interesting finding is that conditional debt maturity varies very little across size classes. This suggests that the sharp maturity lengthening observed when moving from very small firms to larger firms before restricting the



sample to the firms with long-term financial debt is mainly due to the jump in the participation rate reported in Table 2.

Table 3 shows similar results for the maturity structure of bank debt. For the median firm in the whole sample, 13 percent of bank debt is long-term; but the median very small firm has no long-term bank debt; by contrast, one quarter of the bank debt of firms with 100 to 500 employees is long term. The measure for conditional bank debt maturity is 27 percent and – though increasing with size – is less sensitive to size than the measure of unconditional maturity.

*The median very small firm does not use any long-term bank debt.*

We conclude this section with a few remarks on the structure of assets, profitability, and financial fragility – the main data on these issues are summarised in Table 4. To start with the structure of assets, the share of net tangible assets (i.e. fixed assets minus depreciation) in total assets amounts to 14 percent for the median firm of the full SMF sample. The importance of tangible assets does not vary much across size classes, which confirms that differences in the structure of assets across size classes cannot explain the divergence documented previously in debt maturity. To substantiate this conclusion, we have computed the expected asset lifespan – expressed in years and calculated as the inverse of the depreciation rate. Although there are no substantial differences across size classes, the expected asset lifespan is longer for smaller firms than for larger ones, implying that smaller businesses should rely more on long-term debt than larger ones – which they do not. Overall, in contrast to the structure of liabilities, the structure of assets varies little across size classes.

**Table 4. Asset structure, profitability, and financial fragility of manufacturing firms in Italy**

		Number of employees				
	Total SMF sample	<30	30-99	100-249	250-500	>500
Assets						
Tangible assets (net)/total assets	0.140 (0.180) [0.162]	0.132 (0.171) [0.161]	0.149 (0.192) [0.169]	0.141 (0.185) [0.169]	0.134 (0.166) [0.101]	0.142 (0.171) [0.108]
Expected asset lifespan (in years)	11.7 (14.1) [13.9]	11.4 (14.5) [16.8]	12.2 (14.5) [11.1]	11.1 (13.1) [9.3]	9.7 (12.0) [12.6]	9.1 (10.2) [6.5]
Gross return on assets (in %)	10.4 (11.6) [9.2]	10.1 (11.6) [9.3]	10.8 (12.0) [9.9]	10.3 (10.9) [8.3]	10.0 (10.4) [10.8]	10.8 (11.9) [8.3]
Financial fragility						
Inverse coverage ratio (ICR)	0.286 (0.503) [4.39]	0.312 (0.383) [1.76]	0.271 (0.594) [5.73]	0.250 (0.465) [2.47]	0.264 (0.841) [2.31]	0.241 (0.238) [2.14]
Percentage of firms with ICR >0.7	22.3	27.7	18.1	15.7	17.5	16.8

Notes: The table reports the median, (mean) and [standard deviation]; for definition of variables see text.

Source: Own calculation based on the 1999 Survey of Manufacturing Firms (SMF) of *Mediocredito Centrale*.

### Box 1. Sources of investment finance of small and medium-sized manufacturing firms in Italy

Table B1 shows how small and medium-sized enterprises (SMEs) in the Italian manufacturing sector financed their gross fixed capital formation during 1995-97. Internally generated funds accounted for the bulk of finance, covering on average almost half of fixed investment. The second most important source was bank finance, of which over one third (not shown) was short-term and one third at subsidised interest rates. Transfers and fiscal subsidies covered 11 percent of investment cost. Leasing covered 16 percent, suggesting that this form of finance is a good substitute for long-term bank debt. Interestingly, there is little difference between the average very small firm and larger firms. However, fairly high standard deviations for the full SMF sample (not shown) suggest that there is considerable diversity in the ways firms finance their investment.

The last three rows of Table B1 show, respectively, the share of firms that used no bank debt, bank debt only, and internal funds only, to finance their investment. Very few firms used only bank debt and there is no difference among firms of different sizes. About one fifth of the firms relied only on internally generated funds, and this share is similar across size classes. Finally, half of the firms financed their investment without any bank debt.

The SMF sample indicates similar results as to the financing of expenditure on R&D. In fact, the internal funds are even more important for R&D than for investment in general. It is interesting to note that subsidies accounted for only 5 percent of the financing of R&D, but more than two thirds of firms in the SMF sample have received them.

Overall, the flow-of-funds analysis is remarkably consistent with that based on stocks in suggesting that many firms, small ones in particular, do not use external finance.

**Table B1. Sources of investment finance of manufacturing SMEs in Italy, 1995-97**

	Number of employees		
	Total SMF sample	<30	100-500
Sources of finance (in % of total finance)			
New equity	1.5	1.1	1.5
Internal funds	47.3	47.3	47.9
Bank debt	15.0	13.9	15.3
Bank debt (subsidised)	7.6	7.2	7.5
Transfers and fiscal subsidies	11.0	10.2	10.8
Leasing	16.5	19.7	15.9
Other sources	1.1	0.6	1.1
Importance of bank finance and internal funds			
Share of firms with no bank finance (in %)	50.9	53.3	47.1
Share of firms with 100% bank finance (in %)	5.6	6.3	4.7
Share of firms with 100% internal funds (in %)	21.0	22.3	22.0

Notes: The table reports the mean, averaged over 1995-97.

Source: Own calculation based on the 1999 Survey of Manufacturing Firms (SMF) of *Mediocredito Centrale*.

Profitability, measured by gross return on assets, does not vary across size classes. Table 4 shows that the gross return on assets (earnings before interest, taxes, and depreciation to assets) represents 10-11 percent for the median firm in all size classes. It also appears that size does not affect firms' net profitability given that the median net return on assets amounts to about 2 percent for all size classes (not shown).

Financial fragility, however, seems to differ between size classes. As a measure of financial fragility we use the inverse coverage ratio (i.e. interest expenses in percent of gross profits). As Table 4 indicates, this ratio is significantly higher for very small businesses (31 percent) than for larger firms. Given that very small firms are less leveraged than larger firms, a higher inverse coverage ratio reflects higher interest rates paid by very small firms compared to larger firms. To further assess the financial fragility of small businesses, we have calculated the fraction of firms for which the value of the inverse coverage ratio is higher than 0.7. This threshold has been chosen because for a firm with an inverse coverage ratio in excess of 0.7, a decline in profitability equivalent to one standard deviation would make the firm unable to meet its interest obligations. For the whole SMF sample, about 22 percent of firms exceed this critical threshold; among very small businesses, 28 percent find themselves in that position, which compares to only 16-18 percent in the case of larger firms. All this suggests that the financial position of very small businesses is relatively weak.

To summarise our findings on the capital structure of small firms in Italy, the data reveal considerable differences in the pattern of financing across firms of different sizes. Most differences arise from heterogeneity in the use of financial debt and long-term debt rather than from heterogeneity in leverage or (conditional debt) maturity. A substantial number of firms, particularly among the very small ones, do not rely on financial debt; flow-of-funds data, which show that fixed investment and especially expenditure on R&D are predominantly financed by internal funds, confirm this result (see Box 1). For firms that actually use financial debt, capital structure and debt maturity is very similar across median firms of different size classes.

*For firms that use financial debt, capital structure and debt maturity is very similar across median firms in different size classes.*

### 3. The determinants of capital structure

This section investigates the determinants of capital structure of small and medium-sized manufacturing enterprises (SMEs) in Italy.<sup>6</sup> In this context, we will shed light on the question whether firms that do not use financial debt, in particular bank loans, do so voluntarily or are excluded from the credit market. We will, first, present a set of variables that possibly determine a firm's capital structure, and we will provide descriptive statistics on the link between capital structure and these variables (Section 3.1). We will then analyse the extent to which these variables affect the probability that a firm uses financial debt, notably bank loans (Section 3.2). Finally, going beyond descriptive statistics and an analysis of the probability of having financial debt, we will use regression analyses to further explore the relation between capital structure and our set of variables (Section 3.3).

<sup>6</sup> To avoid confusion, we recall that in addition to the abbreviation SME, this paper uses the abbreviation SMF for the Survey of Manufacturing Firms of *Mediocredito Centrale*.

### 3.1 Possible determinants of capital structure

The set of possible determinants accounted for in this paper are:

- firm size, measured by the average number of employees;<sup>7</sup>
- firm age;
- firm profitability, measured by gross return on assets;
- firm ability to pledge collateral, measured by two indicators, namely (i) the firm's participation in a "collective collateral association" (the so-called Confidi<sup>8</sup>) and (ii) the share of net tangible assets in total assets;
- firm attitude towards R&D and innovation, measured by two dummy variables, the first is equal to 1 if the firm has invested in R&D in the three years covered by the survey (zero otherwise) and the second is equal to 1 if the firm has either bought or sold patents over the past three years;
- ownership concentration, measured by the share of the largest shareholder;
- three dummy variables, indicating whether or not the firm (i) is listed, (ii) reports an interest in going public, and (iii) has received financial subsidies (the dummy equals 1 if the firm has the mentioned characteristic; it is zero otherwise)
- a measure of trust and a measure of court inefficiency, with trust measured by the proportion of people in a province that participate in referenda and court inefficiency measured by the number of pending trials per capita (this approach follows Guiso *et al.* 2002).

*There is virtually no leverage-size relationship for firms that use financial debt.*

Table 5 reports these characteristics by quartile of the total debt to asset ratio.<sup>9</sup> The following relations between leverage and firm characteristics merit particular attention. First, low-leverage firms are much smaller than highly leveraged ones; from the first to the second quartile of leverage, the number of employees rises from 33 to 86 and levels off for higher quartiles. Figure 1 - which shows a locally weighted smoothing of the relation between the ratio of financial debt to capital and log employment - provides further evidence for the link between leverage and firm size; when size exceeds about 32 employees, the curve flattens. Figure 1 also shows the leverage-size relationship for the firms using financial debt; interestingly, conditional on using financial debt, firms of different sizes have similar leverage; thus, the strong relation between size and (unconditional) leverage is entirely due to the strong effect of size on the probability of using financial debt - an issue that we will discuss in detail below. Second, firm age and ownership concentration seem to be largely unrelated to leverage; and leverage also seems unrelated to whether or not a firm is listed, but not too much can be inferred from this indicator because only 28 firms in our sample are listed. Third, low-leverage firms generate a higher return on assets: firms in the first and second quartile have achieved a return on assets of about 12 percent and 14 percent, respectively, which compares to a

7 Using total assets or sales as size indicators yields similar results.

8 Confidi are associations where participants share funds that can be pledged as collateral when applying for a bank loan.

9 The ratio of total debt to assets and the other capital structure indicators discussed in the previous section (i.e. financial debt relative to assets and financial debt relative to capital) are highly correlated; thus, splitting the sample on the basis of the other indicators yields results similar to those shown in Table 5.

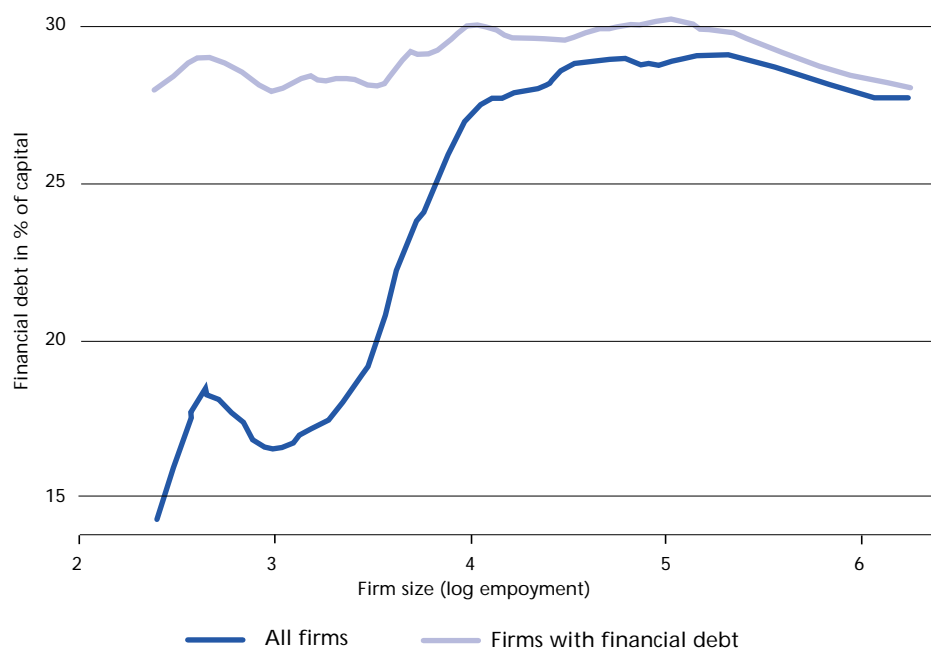
**Table 5. Characteristics and capital structure of manufacturing SMEs in Italy**

	Firms sorted by the ratio of total debt to assets			
	1. Quartile	2. Quartile	3. Quartile	4. Quartile
Total debt/total assets (in%)	9.0	44.6	65.3	81.4
Firm characteristics:				
Employment (number of employees)	33.2	86.5	89.1	69.6
Age (years)	19.7	26.5	25.4	22.2
Gross return on assets (in %)	12.1	14.3	10.9	9.4
Collateral association (indicator)	0.031	0.048	0.052	0.057
Tangible assets/total assets (in %)	15.5	19.5	19.4	18.0
Ownership concentration (in %)	53.7	58.3	55.1	53.9
Listed (0,1)	0.005	0.016	0.005	0.003
Intention to go public (0,1)	0.009	0.027	0.032	0.031
Investment in R&D (0,1)	0.216	0.334	0.370	0.361
Buying or selling of patents (0,1)	0.023	0.043	0.044	0.055
Recipient of financial subsidies (0,1)	0.322	0.470	0.463	0.418
Features of operating environment:				
Trust (in %)	82.6	83.1	83.4	84.3
Court inefficiency (indicator)	0.038	0.040	0.040	0.037

Notes: The table reports summary statistics of firm characteristics by quartile of the total debt/asset ratio, for definition of variables see text.

Source: Own calculation based on the 1999 Survey of Manufacturing Firms (SMF) of *Mediocredito Centrale* and firms' balance sheet data.

**Figure 1. The relation between leverage and firm size**



Notes: The relation is estimated non-parametrically using locally weighted smoothing of the dependent variable (leverage) on the explanatory variable (firm size).

Source: Own calculation based on the 1999 Survey of Manufacturing Firms (SMF) of *Mediocredito Centrale*.

rate of about 9 percent for firms in the top quartile. Fourth, there seems to be a positive relation between leverage on the one hand and, on the other hand, the intention to go public, the share of firms that have invested in R&D, the share of firms that have traded patents (suggesting that leverage is positively correlated with the importance of innovative activities), and the use of financial subsidies (suggesting that part of the differences in leverage across firms may reflect the fact that some firms receive subsidies that increase leverage). Finally, leverage - more generally the structure of capital - does not seem to be linked to the degree of trust and court inefficiency in a province.

Obviously, these simple bivariate relationships do not control for the effect of other variables and may disappear, or show up significantly, in controlled regressions, which we present next.

### 3.2 To have or not to have financial debt?

As pointed out in Section 2 (Table 2), a substantial fraction of small firms does not hold any financial debt and many do not participate in certain forms of financing such as bond issues or trade credit. Against this background, it is important to understand the factors that determine whether or not firms rely on certain types of finance, in particular financial debt and bank loans. The relevant issue here is whether non-participation is voluntary - reflecting a comparison of the benefits and costs of participation - or signals exclusion from the financial debt market.

To investigate this issue, we apply probit regressions to assess whether and how the probability of using financial debt and bank loans changes with changes in the characteristics of firms listed above.<sup>10</sup> The results of the regression analyses, shown in Table 6, are very similar for financial debt and bank debt. This is not surprising since bank debt is the main component of financial debt (see Table 1) and only 17 percent of the firms without bank debt have other financial debt. Given this similarity, we will only comment on the link between firm characteristics and the likelihood that firms have bank loans on their balance sheets, but the comments apply to financial debt as well.

*Small firms are less likely to use financial debt, but the effect of size on the probability of borrowing becomes weaker once firms have more than 30-40 employees.*

For brevity, we concentrate on results that are statistically significant. First, having a positive amount of bank debt is strongly correlated with firm size. The log form implies that an increase in employment by one unit has a stronger effect on the probability of having bank debt in the case of small firms than in the case of large firms. Indeed, further non-linear terms of log size (not shown) are statistically significant in the regressions, implying a strongly non-linear relation between the probability of holding debt and firm size. To illustrate these results, Figure 2 shows the non-parametric estimate of the relation between the probability of holding bank debt and (log) size. A fair characterisation is that for firms below a threshold of roughly 30-40 employees size strongly affects the probability of borrowing from banks, or having financial debt; for firms above this threshold, size has little impact. Second, controlling for size, the probability of using bank debt increases with the age of the firm. One possible interpretation is that older firms have gained enough reputation to be able to access bank finance. Third, highly profitable firms are less likely to

<sup>10</sup> In addition to these characteristics, all regressions include industry dummies (using a two digit classification) to account for differences in financial needs arising from differences in technology. It turns out that the estimated coefficients are statistically not significant.

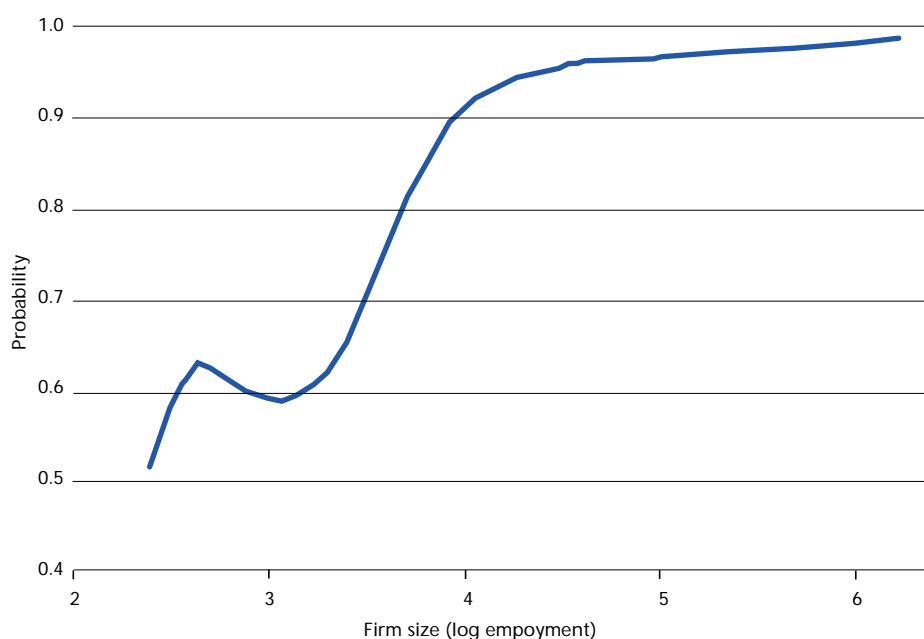
**Table 6. Factors determining the use of financial and bank debt of manufacturing SMEs in Italy**

	Financial debt (regression 1)	Bank debt (regression 2)
Firm characteristics		
Employment (log)	0.733***	0.579***
Age (log)	0.141***	0.150***
Gross return on assets	-0.538*	-0.728***
Collateral association	0.244*	0.265**
Tangible assets/total assets	1.292***	1.369***
Ownership concentration	-0.005	-0.077
Listed	-0.050	-0.152
Intention to go public	-0.156	-0.063
Investment in R&D	0.237***	0.162***
Recipient of financial subsidies	0.240***	0.165***
Equity/assets	-0.446***	-0.875***
Features of operating environment		
Court inefficiency	5.366**	5.458*
Pseudo R <sup>2</sup>	0.204	0.173
Number of observations	3,054	3,054

Notes: The table reports results of probit regressions for the probability that a firm uses financial debt (regression 1) and bank debt (regression 2); \*\*\* (\*\*) [\*] indicates that the coefficient is significant at the 1% (5%) [10%] confidence level.

Source: Own calculation based on the 1999 Survey of Manufacturing Firms (SMF) of *Mediocredito Centrale*.

**Figure 2. The relation between the probability of using bank debt and firm size**



Notes: The relation is estimated non-parametrically using locally weighted smoothing of the dependent variable (an indicator variable for whether the firm uses bank debt) on the explanatory variable (firm size).

Source: Own calculation based on the 1999 Survey of Manufacturing Firms (SMF) of *Mediocredito Centrale*.

have bank debt, which probably reflects substitution of cheaper internal funds for more expensive external finance. Fourth, firms that invest in R&D are more likely to hold bank debt, possibly because R&D investment signals promising growth opportunities, which, in turn, facilitate access to external finance. Fifth, our measures of the ability to pledge collateral are all statistically significant and have the expected sign: firms that belong to a collective collateral association and/or have considerable tangible assets are more likely to have bank debt. Sixth, firms that receive financial subsidies are obviously more likely to have bank debt. Finally, firms that operate in a less efficient judicial environment are more likely to use bank debt. The sign of this variable may seem puzzling at first sight. However, a less efficient judicial environment has two effects. On the one hand, it makes lenders less willing to lend since they fear a lack of legal protection. This shrinks the supply of loans and may lead to rationing, thus lowering the probability of obtaining bank debt. On the other hand, shortcomings in the judicial setting reduce the penalty for borrowers in case of default and thus encourage borrowing from banks. The probit estimates suggest that the second effect dominates the first, but the overall impact is small.

While the results are informative, they do not yet tell us whether firms without bank debt voluntarily refrain from borrowing or have no access to loans. The latter would imply that almost half of the very small firms are completely excluded from the bank loan market (Table 2). Theoretical models of firms' debt capacity help discriminate between the two explanations. Many models of firm financing with moral hazard, reviewed in Tirole (2001), imply that lenders are willing to provide finance only if a borrower's equity exceeds a certain minimum. If so, the level of equity should have a positive effect on the probability that a firm has bank debt. But if the absence of bank debt reflects choice, with equity essentially substituting debt, the level of equity should have a negative effect on this probability.

*The absence of financial debt on the balance sheet of many firms seems to reflect firms' choice rather than credit rationing by lenders.*

To test whether the absence of debt reflects choice or fate, we have included equity (expressed as a fraction of total assets) as an explanatory variable in the probit regressions for the use of financial debt and bank debt. Table 6 shows that equity has a strong negative and significant effect on the probability of having financial debt - bank debt in particular. This suggests that, in general, the absence of financial debt reflects firms' choice, but not exclusion from the credit market because of a lack of equity. Two qualifications should be made. First, the negative effect of equity on the probability of using bank debt does not mean that exclusion from the loan market does not occur. We will document in Section 4 that small businesses face credit rationing and that limited equity plays a key role in explaining this. Second, even if a firm voluntarily decides not to use bank debt, it may do so because the cost of bank debt exceeds its benefits. Small firms, in particular, may find bank debt not attractive if it carries too high an interest rate, reflecting the presumption that lending to small businesses is riskier than the provision of funds to larger firms. The rather important role of size in explaining why firms do not carry bank debt - notably in the case of the very small businesses - may indeed reflect unattractive loan conditions together with fixed costs of debt.<sup>11</sup>

<sup>11</sup> Needless to say the effect of equity could be different across types of firms. Firms with a lot of cash are less likely to need funding and, thus, equity should mostly have a negative effect on the probability of having debt. By contrast, firms with low cash may need funding and thus equity may have a positive (or less negative) effect. If we split the sample according to cash needs, measured by the ratio of investment to cashflow, we find that the effect of equity is strongly negative for firms with cash needs below the median (i.e. these firms have a high cashflow compared to investment), but is small - and not statistically different from zero - for firms with high cash needs (high cashflow compared to investment).



### 3.3 Estimating the impact of firm characteristics on capital structure

Using Tobit regression techniques we have estimated the effect of various firm characteristics on capital structure, with capital structure measured, alternatively, by the ratio of total debt to assets, financial debt to assets, bank debt to assets, and by the ratio of financial debt to capital. Table 7 summarises the main results of this analysis.

In explaining the main findings, it is useful to start with the observation that the results are qualitatively invariant to the specific measure of capital structure; in light of this, we comment only on the last column in Table 7, which shows the effect of firm characteristics on the ratio of financial debt to capital.

**Table 7. Determinants of capital structure of manufacturing SMEs in Italy**

	Total debt/assets (regression 1)	Financial debt/assets (regression 2)	Bank debt/assets (regression 3)	Financial debt/capital (regression 4)
<b>Firm characteristics</b>				
Employment (log)	0.071***	0.067***	0.057***	0.104***
Age (log)	0.010	0.004	0.002	-0.069
Gross return on assets	-0.409***	-0.470***	-0.447***	-0.752***
Collateral association	0.035*	0.023*	0.022	0.066**
Tangible assets/total assets	0.095***	0.190***	0.153***	0.193***
Ownership concentration	-0.059***	-0.019	-0.033**	-0.042*
Listed	-0.143***	-0.060	-0.078*	-0.148**
Intention to go public	0.017	0.007	0.010	0.022
Investment in R&D	0.0413***	0.033***	0.035***	0.055***
Recipient of financial subsidies	0.020**	0.033***	0.017**	0.058***
<b>Features of operating environment</b>				
Court inefficiency	-0.679**	-0.333**	-0.158	-0.926**
Pseudo R2	0.520	0.450	0.345	0.133
Number of observations	3,068	3,086	3,122	3,069
Left-censored observations	6	675	855	679

Notes: The table reports results of Tobit regressions for various measures of firm leverage; \*\*\* (\*\*) [\*] indicates that the coefficient is significant at the 1% (5%) [10%] confidence level.

Source: Own calculation based on the 1999 Survey of Manufacturing Firms (SMF) of *Mediocredito Centrale*.

A firm's ratio of financial debt to capital - leverage for short - increases strongly with size: raising the size of the firm from its median (log) value (about 33 employees) to its 99th percentile increases leverage by 22 percentage points. There are several interpretations for the effect of size on leverage. One is that size may be a proxy for the transparency of the firm. Large, possibly listed firms are usually considered less opaque than smaller firms, implying that lenders are better informed and, thus, more willing to lend. That said, less opaque firms should be in a better position to issue information-sensitive securities such as equities, which reduces leverage. *A priori*, the impact of an increase in transparency is thus unclear since both effects work in opposite directions. However, the second effect is

unlikely to be very relevant in our sample, which mainly includes unlisted firms for which the dominant source of external finance is bank lending (see Table 1). Another interpretation of the positive effect of size on leverage is that size could be a proxy for the probability of distress: since smaller firms are typically more likely to fail than larger ones, their access to financial debt is more difficult. This is consistent with the larger variability in performance of smaller firms, especially at the beginning of their activities.<sup>12</sup> If this is so, the leverage of younger firms, which typically are even riskier, should be more sensitive to size. But we also have to account for the length of the relationship that firms have with lenders, notably banks. With a well-established firm-bank relationship, the debt capacity of a firm should be less responsive to the probability of distress and, thus, the link between size and leverage should be flatter for these firms. To examine the link between the age and size of a firm and its leverage as well as the link between firm-bank relationship and size, on the one hand, and leverage on the other hand, we consider two cases. In the first case, we have split the sample according to firm's age and in the second according to the length of the firm-bank relationship using the sample median as the splitting criteria. In both cases the coefficients on size are similar in both sub-samples, suggesting that firm size may be capturing the probability of distress, but it may also be picking up other variables relevant for the capital structure of firms.

Looking at the partial effect of firm age on capital structure, Table 7 indicates that there is no detectable link between the two. By contrast, there is a negative and significant relationship between profitability and the level of financial debt relative to capital: leverage falls with profitability mainly because relatively profitable firms generate ample internal funds and, thus, need less external funds to finance their investment (see also Box 1).

*Firms' ability to pledge collateral strengthens their capacity to borrow, in particular when bank-firm relationships are not yet well-established.*

Collateral is important for capital structure as well: all other things being equal, firms belonging to a collective collateral association can afford a ratio of financial debt to capital that is 6.6 percentage points higher than the ratio of firms not belonging to such an association; this is a remarkable effect - equivalent to 16 percent of the SMF sample average financial debt to capital ratio. Likewise, firms with more tangible assets can borrow more. This link is, however, not particularly strong: increasing the share of tangible assets from the median to the 95th percentile (i.e. from 14 to 47 percent) would increase leverage by only 3.4 percentage points. If tangible assets are indeed capturing ability to pledge collateral, their effect on leverage should be lower for firms with strong bank ties. This is because - as Berger and Udell (1995), for instance, have argued - bank ties partly substitute for collateral and, thus, firms with stronger ties need to pledge less collateral. To test this hypothesis, we have split the sample into two sub-samples, using the median length of the main firm-bank relationship (which is eight years) as a sorting criteria; this analysis shows indeed that the tangible-asset coefficient is 55 percent larger for firms with short relationships compared to firms with long relationships.

Ownership concentration lowers the ability of the firm to raise financial debt. This runs counter to the idea that tightly controlled firms can more easily commit to repay debt. A possible explanation is that tightly controlled firms also find it easier to transform assets

<sup>12</sup> For instance, Guiso and Parigi (1999) compute the conditional variance of future sales growth on a sample of Italian manufacturing firms based on the firms' self-reported subjective distribution of expected demand growth. The authors show that, controlling for expected growth, this measure of uncertainty strongly decreases with the size of the firm.

at the expense of external financiers, engage in assets substitution, and expropriate debt holders by taking excessive risk. In fact, Myers and Rajan (1998) have shown that transformation risk reduces debt capacity.

Listed firms are – as expected – less leveraged since they can more easily raise equity in the market. At the same time, the mere willingness to go public does not have a statistically significant effect on leverage.

Not surprisingly, firms with financial subsidies are more levered: receiving subsidised loans raises, all other things being equal, financial debt relative to capital by 5.8 percentage points on average, a relevant effect that, if not controlled for, could distort comparisons across firms.

Finally, operating in a province with inefficient courts significantly lowers a firm's debt capacity – both statistically and economically. To illustrate, if the level of inefficiency of the most inefficient province could be reduced to that of the sample median, the average leverage of firms located in this province would go up by 7.5 percentage points – all other things being equal. Interestingly, this effect is opposite to the one we found with the probit regression, which suggested that the probability of using financial debt increases with the degree of inefficiency. Since the Tobit estimates presented here combine the effect of the regressors on the extensive margin (the decision to rely on financial debt) with that on the intensive margin (how much debt to raise given that a positive amount has been opted for), the Tobit estimates suggest that the latter effect dominates. Furthermore, it implies that the effect on the intensive margin is actually larger than what Tobit estimates suggest.<sup>13</sup>

### 3.4 A short summary and a variation on the theme

We have seen that the share of financial debt in total liabilities rises with firm size. But we have also learned that once size exceeds a certain threshold, a further increase in size does not fundamentally change the capital structure of firms. One of our key findings is that the positive link between size and the relative importance of financial debt exists largely because small firms often do not have any financial debt at all on their balance sheets. Looking only at those firms that have financial debt, we find no link between firm size and the share of financial debt. But this implies that size must have an effect on the probability of having financial debt. This is indeed what our empirical analysis suggests: firms below a threshold of roughly 30-40 employees are far less likely to have financial debt than firms above this threshold.

A variation on this theme emerges when analysing the link between firm size and the maturity structure of debt. Our main findings on this variation are summarised in Box 2. Suffice to note here that the probability of having long-term debt sharply increases with firm size. But what does all this imply for small firms' access to the market for financial debt, notably bank loans? It is informative to find that the probability of using financial

*The capital structure of firms and the maturity structure of their debt depend largely on whether or not firms borrow, but not on how much they borrow if they borrow.*

<sup>13</sup> To shed further light on this issue, we have run a Heckman two-step estimator distinguishing the decision of whether to use financial debt from the decision of how much debt to have, given that a positive amount of debt is being used. The results of this exercise (not reported) show that the effect of court inefficiency is strongly negative and twice as large as in the regression for leverage, but positive in the decision of whether to use debt. The two-step estimator also reveals that size mainly affects the extensive margin but leaves the intensive margin basically unaffected. This is consistent with the descriptive evidence shown in Figures 1 and 2.

## Box 2. Determinants of debt maturity

A striking feature of small and medium-sized firms in the SMF sample is that almost half of them have no long-term financial debt and close to 60 percent have no long-term bank debt. For the very small businesses, the situation is even more pronounced: two-thirds have no long-term financial debt and three-quarters have no long-term bank debt. Table B2 reports a probit regression for the probability that firms have long-term bank debt and a Tobit regression for debt maturity, measured by the share of long-term bank debt in total bank debt (we have also run regressions for long-term financial debt and the maturity of financial debt; the results - not shown - are very similar to those for bank debt).

**Table B2. Determinants of debt maturity of manufacturing SMEs in Italy**

	Use of long-term bank debt (probit regression)	Maturity of bank debt (Tobit regression)
Firm characteristics		
Employment (log)	0.498***	0.105***
Age (log)	0.090**	0.005
Gross return on assets	-0.639**	0.359***
Collateral association	0.200*	0.025
Tangible assets/total assets	1.499***	0.568**
Ownership concentration	-0.254***	-0.099**
Listed	0.110	0.093
Intention to go public	0.158	0.039
Investment in R&D	0.137**	-0.001
Depreciation rate	-1.105***	-0.567***
Recipient of financial subsidies	0.292***	0.091***
Features of operating environment		
Court inefficiency	-0.752	-0.615
Pseudo R2	0.15	0.10
Number of observations	2,841	1,998
Left-censored observations	n.a.	744
Right-censored observations	n.a.	47

Notes: The probit regression estimates the effect of the explanatory variables (first column) on the probability of using long-term bank; the two-limit Tobit regression provides estimates for the relation between the explanatory variables and debt maturity; \*\*\* (\*\*) [\*] indicates that the coefficient is significant at the 1% (5%) [10%] confidence level.

Source: Own calculation based on the 1999 Survey of Manufacturing Firms (SMF) of *Mediocredito Centrale*.

To start with the results of the probit regression, we first note that the probability of using long-term bank debt sharply increases with firm size. To illustrate, for the median firm (32 employees), the probability to have long-term bank debt is 64 percentage points lower than for the 95th percentile firm (432 employees). Older firms are also more likely to rely on long-term debt. Firms with a high return on assets use long-term debt less frequently, as they can replace costly external debt finance of any maturity with cheaper internally generated funds.

The ability to pledge collateral has a positive impact on the probability of using long-term debt. The economic effect of participating in a collective collateral association is particularly important: belonging to such an association raises the probability of using long-term bank debt by almost 7 percentage

points. Firms with a higher share of tangible assets are also more likely to rely on long-term debt: increasing the share of tangible assets raises the probability of using long-term bank debt by about 10 percentage points - a remarkable effect, equal to about 20 percent of the unconditional probability of using long term debt.

There is more to say about the impact of collateral. As argued by Hart and Moore (1994), the maturity of debt should be positively related with the expected lifespan of assets. Given that lifespan and the rate at which capital depreciates are inversely related, one would expect a negative relationship between the depreciation rate and the maturity of debt. The rationale is that when assets and, by extension, collateral lose their value slowly, lenders keep their ability to extract debt service payments; this should make them more willing to commit funds for longer periods. Table B2 shows that the depreciation rate has indeed a negative effect on the probability of using long-term bank debt: lowering the rate of depreciation from its 90th percentile (24 percent a year) to its median value (8 percent a year) increases - all other things being equal - the probability of using long-term bank debt by 7 percentage points. Overall, this shows that firms try to match the maturity of assets and liabilities.

With regard to the other firm characteristics, it is worth noting that ownership concentration has a negative effect on the use of long-term debt. One interpretation is that tightly controlled firms are reluctant to run the risk of releasing control in case of bankruptcy and, thus, avoid debt, particularly long-term debt; another is that lenders are reluctant to lend to tightly controlled firms, particularly long term, because tightly controlled firms can more easily extract surplus from controlling the assets at the expense of the external financiers. Finally, note that court inefficiency has no statistically significant impact on the probability of borrowing long term. One plausible explanation is that judicial inefficiency hampers lending in general, irrespective of whether short- or long term.

Turning to the results of the Tobit regression, we stress that debt maturity is an increasing function of firm size. However, it is unaffected by age. Given that age has a positive impact on the probability of using long-term debt, the absence of a link between age and maturity implies that once firms use long-term debt, the debt maturity is negatively correlated with the age of the firm. This is indeed what one finds if a two-stage Heckman model is fitted to the data.

More profitable firms can afford longer maturities. Thus, the effect of profitability on debt maturity is just opposite to the profitability effect on the probability of using long-term debt: conditional on using long-term debt, which is less likely the more profitable the firm is, the maturity of debt lengthens with the profitability of the firm.

The proxies for collateral have a positive impact on debt maturity while the rate of capital depreciation significantly shortens the maturity of debt. These results confirm that firms tend to match the maturity of assets and liabilities.

debt (of short and long maturity) is lower the smaller firms are. But this does not tell us whether this reflects firms' choice or credit rationing by lenders. However, the negative impact of a firm's equity on the probability of having financial debt is consistent with the hypothesis that the absence of debt reflects choice, but is inconsistent with rationing. But whether small businesses face rationing remains unanswered. We tackle this issue in the next section.

#### **4. Credit rationing of small businesses and the role of firm-bank relationship**

The SMF includes questions (and answers) that allow studying whether firms are excluded from the credit market and how possible exclusion depends on firm size. More specifically, firms were asked whether, in 1997, they (i) demanded a larger volume of loans at the

*A firm can be considered credit-rationed if it applied for a loan, was willing to pay at least the going market interest rate, and was nevertheless turned down.*

prevailing market interest rate, (ii) were willing to pay a slightly higher interest rate to obtain additional loan finance, and (iii) applied for additional loans but were turned down.<sup>14</sup> Answers to these questions can be used to identify credit-rationed firms. To this end, we adopt two definitions of credit rationing. One is relatively broad, considering a firm credit rationed if it applied for additional loan finance, but was turned down. Following this definition, all firms with a positive answer to question (iii) are classified as credit rationed; we shall call this credit rationing of type 1. The other definition is narrower, considering a firm credit rationed only if it was turned down although it was willing to pay a higher interest rate to obtain additional loan finance. Following this definition, all firms with a positive answer to questions (ii) and (iii) are classified as credit rationed; we shall call this credit rationing of type 2.

In addition to collecting this type of information, the SMF also enquires about firm-bank relationships. In particular, firms are asked to describe their relationship with banks along four dimensions: the number of banks they borrow from, the share of loans obtained from the main lender, the length of the relationship with the main lender, and the location of the main lender; the purpose of the last aspect is to determine whether the main lender is a local bank, i.e. one that has its headquarters in the same region as the firm (Box 3 elaborates on small firms and the nature of firm-bank relationships). An important strand of literature, starting with Sharpe (1990) and followed by Petersen and Rajan (1992), argues that stronger ties between a firm and its bank(s) – essentially resulting from long-term relationships – translate into implicit contracts that make lenders more willing to lend to the firm. Hoshi *et al.* (1991), for instance, show that Japanese firms that are affiliated with a *keiretsu* depend less on internally generated funds than firms without such ties; the authors see this as evidence for the hypothesis that tight firm-bank relationships help avoid credit constraints.

Table 8 shows summary statistics that describe two important aspects. One is the composition of the SMF sample if we use the answers to the credit-rationing question as a sorting device. The second aspect concerns the link between the answers to the credit-rationing question, on the one hand, and certain firm characteristics and the information on firm-bank relationship on the other hand.

To analyse the composition of the SMF sample, note that in Table 8 firms have been grouped as follows:

- Column 1 comprises the full SMF sample (4,267 firms);
- Column 2 provides information on firms that demanded more loans at the prevailing interest rates (602 firms), i.e. those firms with a positive answer to the first credit-rationing question;
- Column 3 covers the firms that were willing to pay a slightly higher interest rates to obtain additional bank finance (220 firms), i.e. those firms with a positive answer to the second credit-rationing question;
- Column 4 consists of the firms that did apply for additional loans but were turned down (155 firms), i.e. those firms with a positive answer to the third credit-rationing question;
- Columns 5 and 6 complement the picture, showing information on firms that were not turned down (4,112 firms) and on firms that demanded and received additional loans (447 firms).

<sup>14</sup> A Bank of Italy survey on a sample of manufacturing firms raised similar questions; for a study of this survey see Guiso (1997).

### Box 3. Small firms and the nature of firm-bank relationships in Italy

As Table B3 shows, a distinctive feature of firm-bank relationships in Italy is that most firms borrow from more than one bank. More specifically, 94 percent of the firms in the SMF sample rely on multiple banking, and the median number of relationships (not shown) is five, which compares to a median of one in the United States. The average number of relationships increases monotonically with firm size; but even very small firms tend to borrow from quite a number of banks.

Table B3. Key features of small firms' relationships with banks in Italy

	Total SMF sample	Number of employees			
		<30	30-100	100-250	250-500
Number of relationships	6.1	4.4	6.2	9.3	11.1
Share of firms with multiple relationships (in %)	94	91	97	98	95
Share of loans from main bank (in%)	30	32	29	27	25
Length of relationship with main bank (in years)	16.1	14.8	16.1	17.9	18.9
Percentage of firms where main bank is local	66	67	65	55	60

Notes: The table shows the average of various measures; banks include commercial banks, saving and loans associations, savings banks, credit unions, and mortgage banks.

Source: Own calculation based on the 1999 Survey of Manufacturing Firms (SMF) of *Mediocredito Centrale*.

Obviously, the number of relationships offers only a partial view. Looking at the main relationship, we find that the share of loans extended by the main lender amounts to an average of 30 percent for the whole SMF sample; this share decreases slightly with firm size. The importance of the main bank varies a lot with the number of firm-bank relationships (not shown): for firms with two relationships, the share of the main bank amounts to 84 percent; for firms with three to five relationships, the main bank accounts, on average, for 46 percent of a firm's borrowing. While the share of the main bank decreases with the number of relationships, there nevertheless remains an asymmetry in the sense that the main bank continues to dominate; this suggests that small businesses, while diversifying their sources of bank funds, try to retain as much as possible the advantages of having a main lender.

Another important dimension of firm-bank relationships is their duration. The average length of firms' relationship with their main lender is 16 years, suggesting that firms seek long-term relationships with the main lender.

An interesting question is whether there is a correlation between the size of firms and that of banks. One feature of small businesses is their lack of transparency and, thus, the need for closer monitoring. Tight relations with banks can be away of mitigating the information problems that arise in small businesses. But which banks are better placed to solve these problems? In general, loan officers of small banks are closer to firm's managers than loan officers of larger banks, allowing the former a better monitoring of firms' actions. Thus, small banks seem to be a good match for small firms. The teaming up of small firms with small banks (and vice versa) is indicated by the high percentage of firms (66 percent) that use a local bank as their main bank, i.e. one that has its headquarters in the same province as the firm. This is consistent with evidence presented by Padoa-Schioppa (1994), who shows that the overwhelming majority of banks that act as main lenders to small firms have their headquarters in the province where the firms are located. Overall, small, local banks tend to concentrate their lending on small businesses and typically act as main lenders.

To summarise, the structure of bank-firm relations among small businesses is such that only a small fraction of manufacturing firms entertain a single relationship. The vast majority borrows from several banks and the number increases with the size of the firm.

**Table 8. Summary statistics on the demand for and access to credit of manufacturing SMEs in Italy**

	Type of firm					
	(1) All (4,267)	(2) Demanding more loans (602)	(3) Willing to pay higher interest rate (220)	(4) Turned down (155)	(5) Not turned down (4,112)	(6) Demanding more loans but not turned down (447)
Percentage of firms that were ...						
... demanding more loans	14.1	100.0	82.6	100.0	11.1	100.0
... willing to pay higher interest rate	5.2	30.1	100.0	47.0	3.5	23.6
... turned down	3.6	24.2	33.4	100.0	...	...
... turned down & willing to pay higher rate	1.7	11.9	33.4	47.0	...	...
Firm characteristics						
Employment (number of employees)	67.7	55.7	58.9	54.5	68.1	55.9
Age	23.1	21.2	21.9	21.3	23.1	21.2
Gross return on assets (in %)	11.6	9.4	9.5	8.1	11.7	9.8
Equity/asset (in %)	25.2	20.6	19.5	16.1	25.5	22.1
Debt/assets (in %)	50.2	53.7	54.5	57.8	49.9	52.5
Features of firm-bank relationship						
Number of bank relationships	6.1	6.0	5.7	6.0	6.1	5.9
Share of loans from main bank (in %)	30.3	34.0	36.0	34.9	0.3	33.5
Percentage of firms where main bank is local	65.6	70.4	71.6	68.2	60.8	71.0
Length of relationship with main bank (years)	16.1	14.4	15.1	13.8	16.2	14.6

Source: Own calculation based on the 1999 Survey of Manufacturing Firms (SMF) of *Mediocredito Centrale*.

Let us first take a look at the share of firms in the SMF sample that gave a positive answer to the credit-rationing questions (column 1 and rows 1 to 3): 14 percent of all firms in the SMF sample had a demand for additional loan finance; 5.2 percent of all firms (i.e. more than one-third of those demanding additional loan finance) were willing to pay a (slightly) higher rate to receive the additional finance; finally, 3.6 percent of the firms in the sample were turned down, which means that one out of four firms that demanded additional loans was denied credit. An important point to note is that the fraction of firms that were turned down is far below the fraction of firms with zero debt, implying that credit rationing cannot explain why a substantial number of firms do not have bank debt on their balance sheets.

We now highlight some features of those firms (and their relationship with banks) that expressed a demand for additional loan finance (column 2 and rows 5 to 13): these firms had, on average, 56 employees and thus were smaller than the average SMF firm (68 employees); compared to the average SMF firm, they also had a lower return on assets



(9.4 percent), less equity (equivalent to about 21 percent of assets), slightly more financial debt (54 percent of assets), and a somewhat shorter relationship with their main lender (14.4 years), which was a local bank in 70 percent of the cases.

What can we observe about the firms that were turned down, i.e. credit-rationed firms of type 1? Column 4 and row 4 indicate that 47 percent of these firms were ready to pay a higher interest rate, i.e. they encountered type 2 credit rationing. Given that the share of turned-down firms in the SMF sample is 3.6 percent – let us call this the unconditional probability of credit rationing – credit rationing of type 2 thus applied to about 1.7 percent of firms in the SMF sample (column 1, row 4). For comparison we note that 30 percent of all firms demanding additional loan finance were willing to pay higher interest rates while only about 24 percent of the firms that were not turned down would have been willing to pay more for their loans. This comparison suggests the following interpretation: firms that were turned down value an extra euro of bank finance more than firms that were not rejected.

When we compare the characteristics of credit-rationed firms (of type 1 from here on) with those that were not turned down, the following picture emerges (see columns 4 and 5). Credit-rationed firms were somewhat smaller (54 employees compared to 68), two years younger, and less profitable; they also had a much lower equity ratio (16 percent compared to almost 26 percent) and more financial debt. In terms of firm-bank relationships, the two groups are very similar although the average credit-rationed firm had a somewhat shorter relationship with its main bank, which was more likely to be a local bank.

Overall, the summary statistics shown in Table 8 point at characteristics of firms and their relationships with banks that could help assess the probability that small and medium-sized firms are credit rationed. To evaluate more precisely the role of these characteristics and their statistical significance, we have run probit regressions for the probability that firms' credit demand is turned down. Table 9 shows the results, with each column representing a different specification of the regression.

The first three regressions look at the probability of credit rationing as a function of firm characteristics and features of the province in which firms operate, but we do not yet account for the features of firm-bank relationships. In discussing the results and their theoretical underpinning, we start with five issues and we mainly use column 1 to highlight them.

First, firm size has a strong negative impact on the probability of credit rationing: all other things being equal, increasing firm size from the median to the 95<sup>th</sup> percentile reduces the probability of being turned down by 2.6 percentage points. This is a remarkable effect given that the unconditional probability of being turned down is 3.6 percent. The empirical evidence is thus consistent with *a priori* reasoning, suggesting that size is relevant for credit market access because information on larger firms is more easily available or transferable, which reduces information asymmetries and thus alleviates access to credit markets. Moreover, larger firms are more likely to have access to non-bank finance and a geographically larger market, the latter allowing them to switch banks more easily if turned down by one of the banks. This is consistent with evidence shown in

*Although credit rationing happens, it is not a widespread phenomenon in Italy.*

**Table 9. Determinants of credit rationing of manufacturing SMEs in Italy**

	Regression (1)	Regression (2)	Regression (3)	Regression (4)	Regression (5)
Firm characteristics					
Employment (log)	-0.18***	-0.19***	-0.18***	-0.19***	-0.17*
Age (log)	-0.035	-0.028	-0.036	0.028	0.004
Gross return on assets	-1.37**	-1.43***	-1.38**	-1.19**	-0.10
Collateral association	0.362**	0.388**	0.359**	0.310*	0.218
Tangible assets/total assets	0.527**	0.556***	0.522**	0.506**	0.874**
Ownership concentration	0.0025	0.0024	0.0025	0.0025	0.0016
Intention to go public	0.212	0.239	0.208	0.192	-0.098
Investment in R&D	0.134	0.131	0.130	0.149	0.104
Equity/assets	-1.72***	-1.63***	-1.71***	-1.65***	-1.64***
Bank debt/assets	0.519**	0.536**	0.522**	0.558**	0.226
Features of firm-bank relationship					
Number of bank relationships				-0.0001	0.0024
Share of loans from main bank (in %)				0.0011	0.0001
Length of relationship with main bank (years)				-0.0083	-0.0048
Percentage of firms where main bank is local				0.1033	-0.0052
Features of operating environment					
Trust	- 2.2***		- 2.7**	- 2.7**	- 0.7**
South			0.095	0.097	0.073
Court inefficiency		5.49**			
Observations	3,541	3,541	3,541	3,236	446
Pseudo R2	0.0085	0.0079	0.0089	0.0091	0.054

Notes: The table reports results of probit regressions for the probability that the demand of a firm for an additional loan is turned down; the left-hand side variable is an indicator equal to 1 if the firm wanted more loans in 1997, applied for them, and was turned down by a financial intermediary; it is equal to zero otherwise; \*\*\* (\*\*) [\*] indicates that the coefficient is significant at the 1% (5%) [10%] confidence level.

Source: Own calculation based on the 1999 Survey of Manufacturing Firms (SMF) of *Mediocredito Centrale*.

Guiso *et al.* (2002), who find that smaller firms depend more heavily on developments in local bank markets.

Second, firms that can offer more and better collateral should, in principle, have better access to finance because pledging collateral encourages borrowers to use finance wisely. There is a counterargument, however. Stiglitz and Weiss (1981, 1986) have pointed out that collateral requirements may result in adverse selection: firms with larger amounts of marketable wealth may be more inclined to take higher risks, assuming entrepreneurs are risk averse; furthermore, among firms that can offer more and/or better collateral there is likely to be a larger proportion of firms that undertook risky projects in the past, which – by chance – were successful. In these circumstances, collateral may be a proxy for (unobservable) risk taking and, thus, high collateral could be associated with a high probability of credit rationing. Overall, the effect of collateral on the probability of credit rationing is *a priori* ambiguous. Against this background, what does the probit regression tell us? Table 9 indicates that tangible assets and participation in a collective collateral

*In theory, the effect of collateral on the probability of credit rationing is ambiguous. Our empirical results do not give a clear-cut answer either.*

association have a positive and statistically significant effect on the probability that credit demand is rejected. Being part of a collective collateral association, for instance, raises the probability of being turned down by 3.2 percentage points, virtually doubling the unconditional probability that additional credit demand is being denied. This suggests that the negative effects of collateral on access to credit outweigh the positive effects. An alternative (and in our view more plausible) explanation is that our indicators of collateral reflect self-selection: firms with a high probability of being turned down – because they are riskier and their willingness to bear risk is not observable, for instance – may twist the composition of their assets towards assets that can be pledged, and they may participate in collective collateral associations to avoid credit rationing. Self-selection would bias results towards finding a positive correlation between the probability of being turned down and the measures of collateral. This is indeed what we find.

Third, let us look at the effect of equity. Holmström and Tirole (1997) and Tirole (2001) have argued that credit demand of firms may be rejected simply because they lack equity. Loan contract models that account for moral hazard often have the property that finance will not be forthcoming if the firm's equity falls below a certain threshold. The results of our probit regression are fully consistent with this hypothesis. There is a negative and significant relation between the probability of credit rationing and the equity ratio and, as a result, the credit demand of firms with more equity is less likely to be turned down. To illustrate the effect, note that an increase in the equity to asset ratio by one standard deviation (corresponding to an increase of 16 percentage points) lowers the probability of rationing by 1.6 percentage points, i.e. halving it compared to the unconditional probability. In this context, note that the credit demand of more profitable firms is less likely to be rejected than the demand of less profitable firms – as one would expect.

*Lack of equity has a strong effect on the probability of credit rationing.*

Fourth, financial leverage – measured by the ratio of bank debt to total assets – can be expected to have an impact on the probability of credit rationing. There are at least two reasons why a highly indebted firm may face problems in obtaining additional bank loans – even if the investment to be financed is profitable. One is that having substantial financial debt limits the collateral available that could be pledged when demanding additional bank loans. Second, as emphasised by Myers (1977) and the subsequent literature, seniority of the initial debt and limitations to debt renegotiation may make the new project undesirable to new investors. In sum, a debt overhang induces rationing. The results of the probit regression on the SMF data set are consistent with this view: the more financial debt a firm has, the higher chances are that a demand for additional credit will be rejected.

Finally, firms located in a province with a high level of trust and, thus, with potentially severe penalties imposed by the local community in case of misbehaviour, are less likely to be turned down. Furthermore, the effect of social enforcement is economically important: all other things being equal, an increase in trust equivalent to a jump in the trust indicator from the 5<sup>th</sup> percentile to the 95<sup>th</sup> percentile lowers the probability of credit rationing by 3.4 percentage points. The regressions in columns 2 and 3 offer an elaboration on the theme. In column 2, the trust variable has been replaced by a measure of court inefficiency (with the measure differing across provinces). It turns out that court inefficiency has a positive and statistically significant effect on the probability of rationing, consistent with the idea that lack of enforcement shrinks the supply of loans. However, when we regress the probability of rationing on trust and court inefficiency (not shown), only the latter is

*The efficiency of the judicial system has a strong effect on the supply of loans.*

statistically significant. In essence, as trust and court inefficiency are negatively correlated (correlation coefficient -0.23), it is difficult to isolate their distinct contributions. In light of this, the regression in column 3 uses the trust variable again, but also adds a dummy variable indicating whether or not a firm is located in the South of Italy to make sure that the trust variable is not measuring geographical differences. The results show that this is not the case and that trust continues to have a significantly negative impact on the probability of credit rationing. Overall, these results are consistent with the recent literature on law and finance, started by La Porta *et al.* (1998), that shows that legal variables and the efficiency of the judicial system strongly affect the supply of loans since well-functioning legal institutions can more promptly penalise default and strategic non-repayment of loans. For a given level of legal penalty, social regret and punishment exercised by the members of the community of the borrower can also contribute to the enforcement of repayment promises, as shown by Guiso *et al.* (2002).

We now widen the scope of the analysis (column 4) and examine how the nature of firm-bank relationships influences the probability of credit rationing. It turns out that none of the four variables describing firm-bank relationship is statistically significant, although the duration of the relationship with the main lender comes close. This suggests that what probably matters for reducing information asymmetries or enhancing commitment to repay is the duration of the relationship with the main lender rather than the number of banks the firm borrows from or the location of the bank. However, when interpreting these results one needs to bear in mind that an endogeneity bias possibly affects the firm-bank relationship variables since the firms may choose the configuration of lending relations, making it hard to isolate the effect of the nature of the relationship on access to credit.

The results discussed so far are based on the full SMF sample. A possible objection is that these results are picking up the effect of firm characteristics (and features of firm-bank relationships) on the probability that a firm applies for a loan rather than on the probability that a loan applicant is turned down. To account for this we have run the probit regression only for those firms that actually asked for more loans. The results are summarised in column 5. As the estimates show, all variables retain their sign though some cease to be statistically significant, mainly because estimates are now based on a much smaller sample. Interestingly, among the variables that are robust to this choice of sample are firm size and the equity to asset ratio: both have a negative and statistically significant effect on the probability of rationing even in this smaller sample. It is worth illustrating the magnitude of these effects: for firms that applied for a loan, increasing firm size from the median to the 95<sup>th</sup> percentile reduces the probability of credit rationing by almost 11 percentage points; increasing the equity-asset ratio from the median to the 95<sup>th</sup> percentile reduces the probability of credit rationing by about 17 percentage points; to put things into perspective, we recall from Table 8 (column 2, row 3) that the unconditional probability of being turned down is 24 percent. Thus, size and equity are critical in explaining differences across firms in the access to the credit market.

## 5. Conclusions

This paper has shown that a distinctive feature of small business finance in Italy is the fairly limited use of financial debt, which largely consists of bank debt. Almost one-third of the firms in the SMF sample have no bank debt, and the share of firms without bank debt is

even larger in the case of very small businesses. Among firms that have positive financial debt, the capital structure is the same across firms of different sizes.

In principle, the absence of bank debt on the balance sheet of many firms could be either because firms choose not to borrow or because banks decide not to lend. The findings of this paper suggest that the first possibility is more likely. In fact, the fraction of firms with no bank debt at all is much larger than the fraction of firms that have experienced credit rationing, which implies that many firms with zero debt are not excluded from the credit market. Furthermore, firms with more equity are less likely to have financial debt on their balance sheets. As more equity improves a firm's capacity to borrow, this feature is inconsistent with the hypothesis that the absence of financial debt reflects credit rationing. While credit rationing may thus not be a widespread phenomenon, it is nevertheless true that firm size and equity help explain differences across firms in their access to the credit market.

## Annex

### The SMF Survey

The 1999 Survey of Manufacturing Firms (SMF) is the main data source used for this paper. The SMF is conducted every three years on a sample of small and medium-sized manufacturing firms with at least 10 employees. The 1999 sample comprises 4,497 firms, covering the period 1995-1997. The survey collects information on a variety of aspects, including the level and structure of employment, level and type of investment, research and development (R&D) activities, location, ownership structure, industrial sector, year of foundation, capacity utilisation, total sales, export sales, and innovation activity. It also includes the flow of funds for fixed investment and for investment in R&D over the three years preceding the survey. For most of the firms interviewed in the survey the last three balance sheets are also available. For firms with less than 500 employees, the sample is stratified by gross product per employee in order to ensure that it is representative. Also, detailed information on mergers, acquisitions and break-ups is available. A special section reports information on firms' relations with financial intermediaries, access to bank credit, and on firms' credit applications that have been denied, which allows the identification of credit-rationed firms.

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