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Article

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ABSTRACT

This paper examines whether small and medium-sized enterprises (SMEs) in Europe suffer from a structural financing problem that hinders their growth. To this end, we estimate growth-cashflow sensitivities for firms in different size classes. Our results show that the sensitivity of company growth to cashflow rises as company size falls, which suggests that SMEs indeed encountered finance constraints that prevented them from fully exploiting their growth potential during the sample period 1996-2000. However, within each size class, quoted firms - even when small - tend to suffer less from finance constraints than unquoted firms.

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Are finance constraints hindering the growth of SMEs in Europe?

The little things are infinitely the most important
A. Conan Doyle, *The Adventures of Sherlock Holmes*

1. Introduction

Small and medium-sized enterprises (SMEs) play an essential role in the European economy.¹ To illustrate, they account for around two-thirds of jobs and half of the turnover in the non-agricultural business sector. Furthermore, empirical research suggests that SMEs help stabilise overall employment, especially during an economic downturn (among others, see Davis and Haltiwanger 1992, Fendel and Frenkel 1998). Moreover, there are indications (Eurostat 2002) that SMEs are, on average, as innovative as large-scale enterprises. Given the prominent role of SMEs, a financial environment that promotes their growth is essential for the success of EU economies. By extension, limited access to external finance – often reported by small and medium-sized businesses – could unduly restrict employment and growth in the EU.

Although anecdotal evidence indeed points at financing problems of small businesses, this cannot be taken as hard proof. Small and medium-sized firms may have incentives to complain to trigger financial support from the government. They may also find it unfair that they are asked to pay higher interest rates and/or provide more collateral for their loans than large companies. But lenders may have good reasons to do so. After all, the probability of default tends to decrease with the size of a firm. More generally, lending usually follows the business cycle and it is, thus, standard practice that financial institutions tighten credit conditions in some periods and relax them in others. In an economic downturn, complaints of SMEs about financing constraints could thus well reflect cyclical problems rather than structural ones.

Against this background, this paper analyses whether SMEs suffer from a structural financing problem that hinders their growth. To this end, we address two broad questions. First, do capital structures of firms differ across size classes? To motivate this question, one needs to bear in mind that a possible lack of external finance for small businesses could show up on the liability side of their balance sheet. For instance, a large share of relatively expensive financing sources, such as trade debt, could be an indication that SMEs suffer from finance constraints more than large firms. Also, a low proportion of bank debt could indicate difficulties of small businesses to access credit markets. But financing problems may also be revealed on the asset side of the balance sheet. For example, a company that has limited finance opportunities often needs a higher cash position.

Finding differences between the capital structures of large firms, on the one hand, and small firms, on the other hand, may hint at difficulties of SMEs to access external finance.



Rien Wagenvoort

¹ In defining SMEs, we adopt in this paper the size classification of the European Commission and, thus, consider a firm with less than 250 employees an SME. We distinguish three SME size classes: (i) very small, so-called micro firms (less than 10 employees), (ii) small firms (10-49), and (iii) medium-sized firms (50-249). To compare SMEs with large-scale enterprises, this paper uses data on large firms (250-4,999) and very large firms (5,000 or more employees).

But it would not tell us whether or not a possibly distinct capital structure of SMEs hinders their growth - which is the second key question that we plan to address. To motivate this question, suffice to note here that modest bank borrowing, for instance, could reflect deliberate choice rather than supply constraints. To answer this question we provide a formal empirical test of finance constraints. Following Carpenter and Petersen (2002), we estimate for different size classes of firms the sensitivity of a firm's growth rate to cashflow. Relatively high growth-cashflow sensitivities indicate that firms need to rely extensively on internal funds to finance new investment projects. In other words, the growth of these companies will be restricted by the profit generating capacity of their existing production facilities.

The remainder of the paper proceeds as follows. In Section 2, we briefly discuss why SMEs may be at disadvantage compared to large firms when raising external finance. In Section 3, we look at key characteristics of firms' balance sheets. In addition to providing a static analysis, we examine the dynamic behaviour of capital structure of firms in different size classes. In section 4, we present and estimate a simple model of firm growth. The purpose of this model is to test for the empirical relevance of finance constraints of small and medium-sized manufacturing and construction firms in the EU. By splitting the sample on a finance characteristic of firms, namely whether or not firms are quoted on the capital markets, we gain further insights into the determinants of possible finance constraints. In Section 5, we discuss how possible finance constraints could be mitigated. Finally, Section 6 concludes.

2. Why is raising external finance especially challenging for SMEs?

Problems of asymmetric information in the credit market may lead to credit rationing.

In developing an answer to this question, we begin by pointing out that firms may suffer from credit rationing (Stiglitz and Weiss 1981), which essentially means that they do not get as much credit as they want although they are willing to pay the going market interest rate and meet other conditions set by lenders. To understand why this is possible, recall that in most markets excess demand would lead to a price increase, which - in turn - increases supply and reduces demand until an equilibrium between the two is achieved. But in credit markets, lenders may be unwilling to raise the interest rate and increase the supply of loans even if there is unsatisfied demand. The key to understanding credit rationing are information asymmetries between lenders and borrowers. Information asymmetries may prevent lenders from observing the true nature of borrowers; they may also prevent lenders from influencing the behaviour of borrowers once the credit contract is signed. In principle, lenders could raise the risk premium on loans, but doing so may increase the probability of default by attracting riskier borrowers (adverse selection) and/or by encouraging riskier behaviour of borrowers (moral hazard). Since adverse selection and moral hazard could cause the lenders' expected payoff to diminish when raising the interest rate, they may refrain from raising rates beyond a certain level even if this means not fully satisfying the demand for credit. The negative welfare effects of such credit rationing are underinvestment and lower growth.

There are a number of reasons why especially smaller firms could be vulnerable to credit rationing. One reason is that small and young businesses often have no access to capital markets and, therefore, rely heavily on credit markets to finance investment projects when internal funds have been exhausted. Another reason is that smaller firms typically

suffer more from information asymmetries than larger ones. Many smaller firms are younger and have less credit history. In addition, they face less rigorous reporting requirements and, as a result, information on them is less easily available. More fundamentally, small firms may be more reluctant than large firms to be fully open about their business structure, growth opportunities, and strategic orientation. Family-owned businesses, for instance, are sometimes hesitant to make their ownership structure public. A final reason why smaller firms could be particularly vulnerable to credit rationing is that they often have less collateral that could shield creditors from the harmful effects of adverse selection and moral hazard.

Credit rationing apart, external finance tends to be more expensive for small firms than for large ones. An obvious explanation is that fixed costs of lending – which are not proportional to the size of the loan (e.g. administrative costs and the costs of collecting information about the borrower) – inevitably make small loans more expensive than large loans.

External finance tends to be more expensive for small enterprises than for large ones.

One could also argue that small firms are, on average, riskier for the lender than large ones and, thus, need to be charged a higher interest rate. But the argument is not as straightforward as it appears at first sight. It is true that small firms may have a higher probability of failing; in particular, start-ups have a high probability (more than 50 percent) of perishing within their first five years and – consequently – small, young firms are rightly perceived as riskier (OECD 1997). But it is also true that simply comparing small and large firms individually is inappropriate since credit risk can partially be diversified away for smaller firms. A well-diversified basket of many small borrowers could be less risky than a portfolio of the same size comprising loans to large customers. To investigate this issue we looked at a concept of risk that differs from default probabilities, namely the variance in the return on equity. Indeed, preliminary calculations (not shown) on our database indicate the following: the variance in the return on equity of a synthetic firm created with a portfolio of EUR 1 billion of total assets of micro firms is considerably lower than the variance in the return on equity of a synthetic firm that represents EUR 1 billion invested in very large firms. The same result applies when small firms or medium-sized firms are compared with large and very large firms. This suggests that the underlying business risk is lower with small and medium-sized firms than with larger firms if banks construct well-diversified loan portfolios. However, this does not necessarily imply that lending to a pool of SMEs is less costly for credit institutions. In addition to the expected default probability and/or the variance in the return on equity, institutions need to account for the expected recovery rate when setting the lending rate. Small and medium-sized firms often have less collateral to underpin the repayment of the loan. Considering all these effects, even a diversified SME loan portfolio could be riskier than one consisting of loans to large companies.

A more mundane explanation for relatively high costs of SME lending is a possible lack of competition among lenders, which enables them to charge interest rates that are in excess of what the underlying credit risk requires. In general, it is plausible to argue that SMEs have fewer options when raising external finance, and this makes them depend more on a limited number of financial institutions. But there is also a specific dimension: small businesses are usually entirely dependent on the local bank market whereas large firms can shop around on global financial markets. In this context, it is worth noting that there is evidence for a clear relationship between bank size and SME lending, with large banks devoting a lesser proportion of their assets to small business loans (see, among others, Berger *et al.* 1998). In

SME risks also explain why raising external finance can be challenging.

fact, small, local banks may have an advantage in offering SME finance because of their local knowledge and experience. While this strengthens the bank-firm relationship and, thus, helps reduce information asymmetries, it tends to create market power, allowing banks to extract rents from SMEs. We discuss this problem in more detail in Section 5.

To summarise, asymmetric information, limited competition in local banking markets, but also SME risks explain why one would expect that raising external finance is especially challenging for SMEs. In the next section, we take the first step in analysing whether there is empirical evidence for this expectation.

3. Capital structure and firm size

In this section, we compare average balance sheets of EU firms in different size classes. The main purpose is to document how firms of different sizes are financed. Data sources and sample selection criteria are spelled out in detail in Box 1. Suffice to note here that the focus is on manufacturing and construction firms, which are grouped in five size classes - three for small and medium-sized enterprises and two for large firms (see Table B1), and that in this section the sample includes roughly 200,000 observations on 45,000 firms over the period 1988-2000. For data quality reasons we restrict the sample in section 3 to firms that carry financial debt and trade debt.

Although this section is on the capital structure of firms, it is useful to first look at the asset structure of the average firm in different size classes. After all, if there are important differences in the asset structure across size classes, one may expect to find differences on the liability side of the balance sheet as well. For instance, an obvious way to mitigate the credit rationing problem and to contain the cost of finance is to pledge some of the fixed assets as collateral in the credit contract. Indeed, many empirical studies find a significant positive relationship between the share of fixed assets in total assets and the share of debt in total liabilities (see, for instance, Guiso, this volume).

We distinguish four broad categories of assets: fixed assets, trade credit², other current assets, and cash. Fixed assets include tangible assets (e.g. machinery and buildings), intangible assets (patents, for instance), and other fixed assets such as investments in subsidiaries. Trade credit on the asset side of the balance sheet is a receivable; it represents bills customers owe to the company. Other current assets include stocks as an important component, and cash includes cash equivalents such as liquid securities.

Figure 1 reveals two striking differences across size classes. One is that trade credit is substantially higher for SMEs than for large firms. We will elaborate on this feature later on when discussing trade debt on the liability side of the balance sheet. The other difference is that the share of fixed assets clearly increases with size: fixed assets account for only one-third of SMEs' total assets, but represent almost half the total assets of very large firms. How do these differences affect firms' capital structure?

In theory, the structure of assets should have no bearing on the composition of liabilities. The famous irrelevance theorem of Modigliani and Miller (1958) asserts that the investment

2 It is common practice in the academic literature to use the term trade credit for bills payable and the term trade debtors for bills receivable. We deviate from this terminology and reserve the term trade debt for bills payable. The logic equivalent for bills receivable is then trade credit.

Box 1. Data sources and sample selection

In this study, we use the AMADEUS DVD (June 2002) and OSIRIS CD-ROM (2002) of Bureau Van Dijk (Brussels). The first source contains the balance sheets and income statements of some 4 million firms (all size classes); the second source provides data on 22,000 listed corporates. Initially, we have selected a subset of 211,374 firms in manufacturing and construction for the period 1988-2001 from AMADEUS. By selecting firms in these industries the original sample of 4 million firms is reduced to firms that generally need to make a considerable investment in fixed assets. In this way, we choose firms for which finance requirements are in general also considerable. For reasons of data processing capacity, we only select those companies that had at least 10 employees in the final year available. The category of "very small firms" (see footnote 1) is limited to a subgroup of very small firms that had less than 10 employees over the period. Our sample selection criteria thus exclude many very small stagnant or shrinking firms. Where this choice may create a distorted picture due to the sample selection bias, we do not show the very-small-firm case. From the original sample of 211,374 firms, different samples are created for the capital structure analysis (Section 3) and the growth analysis (Section 4); the purpose is to maximise the number of available and reliable observations for each analysis. In both sections, we exclude observations for 2001 since the number of firms for which data is reported is too small to construct a representative sample.

There are several shortcomings with Bureau Van Dijk's data sets. Firstly, for 5 percent of the observations, the sum of individual assets on the balance sheet is not equal to reported total assets, the sum of individual liabilities is not equal to total liabilities, or total assets are zero or negative. These observations are excluded from the capital structure analysis. Secondly, a thorough comparison with firms' annual reports reveals that zero values in the AMADEUS database are often data errors. Hence, for the analysis in Section 3, we ignore firms with zero total financial debt, zero trade debt, and zero trade credit. Thirdly, the AMADEUS database is not consistent in the definition of financial debt across different countries. In this study, financial debt includes short and long-term bank loans, commercial paper, bonds, and leasing contracts. AMADEUS adopts a broadly similar definition only for Belgium, Greece, Ireland, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom. Reflecting this limitation, Figures 1-4 and Figure 6 include only these countries. For cross-country comparisons (Figure 5), we use the BACH database (Eurostat 2001) for the remaining EU countries. Where two databases overlap, the data are very similar. This supports the validity of the cross-country comparisons in Section 3. Unfortunately, the BACH database is far too restricted to serve as a representative sample for all EU countries over the period 1988-2001. Finally, we exclude in the analysis of Section 3 observations that show negative stocks or negative "other current liabilities".

Even when excluding obviously erroneous observations, extreme observations can still spoil the statistical analysis. We therefore trim each variable to reduce the influence of outliers. We leave out 1 percent of the total number of observations on each variable; 0.5 percent of each side of the distribution. After applying the data cleaning procedures, the selected final sample for the analysis in Section 3 contains 194,208 firm observations. Table B1 shows how the observations are distributed over the different size classes. Box 2 and Box 3 explain - among other things - sample selection criteria as well as outlier detection and cleaning mechanisms used in Section 4.

The results for each size class shown in Figures 1 to 6 represent weighted averages. Each firm is weighted according to its size relative to the sum of total assets of all firms in its size category.

Table B1 Distribution of firm observations over size classes as shown in Figures 1-6.

Size class	Very small	Small	Medium	Large	Very large
Number of employees	# < 10	10 ≤ # < 50	50 ≤ # < 250	250 ≤ # < 5,000	# ≥ 5,000
Number of firm observations	9,152	84,800	73,359	25,582	1,315
Percentage of total observations	5%	44%	38%	13%	1%

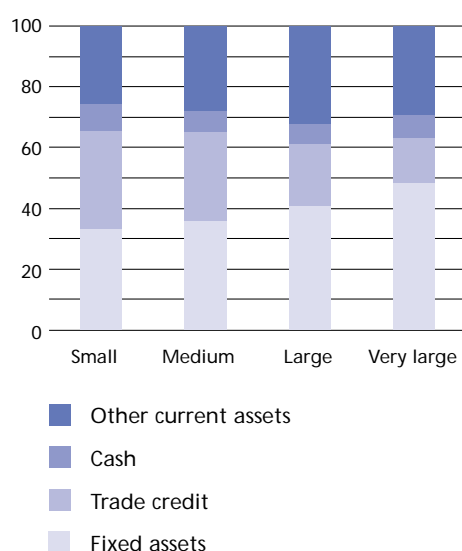
On average, firms in different size classes have a broadly similar share of equity in total liabilities.

and financing decisions can be taken independently since the value of a firm is only determined by its assets and does neither depend on the type nor the maturity of the claims on the firm. In practice, however, capital structure matters.³ For instance, debt can provide tax shields that increase the value of the firm. That said, the cost of possible financial distress when leverage is excessive could offset the tax advantages of debt. But this offsetting effect is probably the lower the more collateral firms can offer. In light of this, one could expect large firms, which have more fixed assets to pledge as collateral than small firms, to have a comparatively high share of debt on the liability side of their balance sheets.

This is not at all the case, however. Distinguishing four types of liabilities (shareholder funds - or equity, financial debt, trade debt, and other liabilities),⁴ Figure 2 shows that, on average, the share of equity in total liabilities is broadly the same across size classes and, by definition, the share of total debt is similar too. More specifically, the share of equity moderately increases with firm size, from 34 percent for small firms to 37 percent for the largest firms. One possible explanation for the lower equity share in the case of small firms is that this category includes a relatively larger proportion of young firms that may not yet have accumulated substantial profits to be added to shareholder funds. The mirror image of a somewhat lower equity share is that debt accounts for a slightly higher share in liabilities of smaller firms. In sum, in contrast to what the asset structure could suggest, we find that larger firms, on average, do not carry more debt.

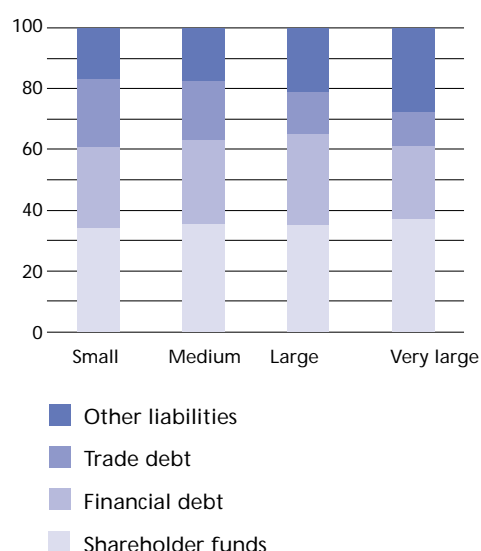
Having said this, the structure of debt differs markedly across size classes. In particular, smaller firms seem to rely less on other liabilities than larger firms; at the same time, they rely much more on trade debt than large companies. Let us look at these two types of liabilities one by one.

Figure 1. Asset structure by size class, in %



Source: Own calculation based on AMADEUS DVD

Figure 2. Liability structure by size class, in %



Source: Own calculation based on AMADEUS DVD

³ See Myers (2001) for an excellent overview of the theory and empirics of corporate capital structure.

⁴ Financial debt mainly consists of short and long-term bank debt and, for quoted firms, bonds and commercial paper; it also includes leasing contracts. Trade debt consists of unpaid bills, and other liabilities include, for instance, pension claims and provisions for restructuring costs.

The reasons why other liabilities, which include pension claims and provisions for future restructuring cost, account for a much larger part of the liabilities of larger companies than for smaller companies are not entirely clear. But a possible explanation for this result is that especially larger firms have to build up pension funds. In some countries, small firms do not make pension promises or do not need to book pension liabilities. Furthermore, the age distribution of employees of large firms may differ from that of small firms. Another potential explanation is that the accounts of larger firms are more transparent and comprehensive. For instance, large firms are more likely to properly account for the cost of future restructuring than small enterprises.

Turning to trade debt, we note first that several researchers have argued that smaller firms have a finance motive in addition to a transaction motive when using this type of debt. The finance motive implies that companies resort to expensive trade debt only when cheaper sources of funds have been exhausted. If this is so, the empirical finding that smaller firms rely heavily on trade debt could be seen as evidence that small and medium-sized firms face financing problems. In line with such a view, Nilsen (2002) finds that small businesses, and non-rated large companies, increase the share of trade debt in total liabilities during periods of monetary contractions. Wagenvoort and Hurst (1999) report that SMEs tend to reduce trade debt as they become older. Older firms are less likely to suffer from information problems. As a consequence, they may have better access to bank debt and substitute loans for trade debt.

SMEs rely more on trade debt than large enterprises.

However, this does not necessarily support the view that trade debt has an important financing function. Wagenvoort and Hurst (1999) also reason that the overall liquidity position of firms needs to be taken into account when discussing the function of trade debt. The authors measure liquidity as the ratio of liquid assets (cash plus trade credit) to liquid assets plus trade debt. A high liquidity ratio shows that the firm is in a strong position to cover short-run liabilities; all other things being equal, a decline in trade debt leads to a higher liquidity ratio. To the extent that trade debt is used as a source of financing – and not mainly to smooth transactions – trade debt is expensive. In these circumstances, one would expect that other forms of finance (e.g. bank loans) replace trade debt as young, initially finance-constrained firms grow older; by extension, one would expect an increase in the liquidity ratio. Wagenvoort and Hurst (1999) find, however, that in practice this does not happen. The liquidity ratio only moderately improves for SMEs that grow older. Against this background, the hypothesis that small and medium-sized firms use trade debt to finance their investment becomes less convincing. This is because liquid assets, such as trade credit, are reduced more or less in line with trade debt as firms mature. In sum, when firms get older the overall management of receivables and bills to be paid seems to improve, suggesting that SMEs keep trade debt foremost for a transaction motive.

All this indicates that we cannot look at trade debt in isolation, but have to examine it in conjunction with items on the asset side of firms' balance sheets, notably trade credit and cash. To start with trade credit, we have already emphasised its importance, in particular for small firms (Figure 1). Looking at the balance of trade debt and trade credit, it turns out that small and medium-sized firms are at a disadvantage relative to larger firms. As Figure 3 indicates, manufacturing and construction firms of all size classes extend more trade credit than they receive. Hence, they are all net creditors to the rest of the economy

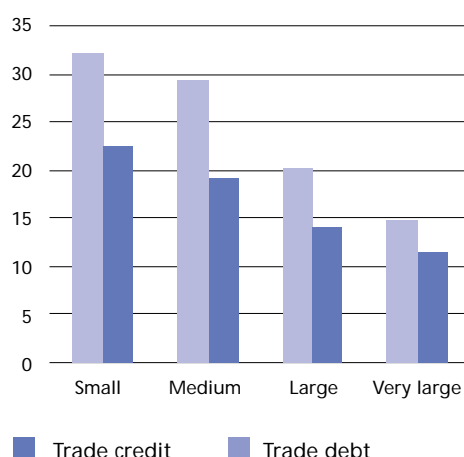
Small firms are the largest net providers of trade credit.

(i.e. the household, government, and foreign sectors as well as firms outside manufacturing and construction). But it is clear from Figure 3 that especially SMEs are, relative to their balance sheets, large net providers of trade credit.

In explaining this result, it is plausible to argue that smaller firms are less able than large firms to insist on prompt payment. This, in turn, may be because SMEs operate in a more competitive environment and/or are perceived as higher credit risk. Despite the cost of extending trade credit on a net basis, SMEs may have to offer this financial service just to stay in business. Whatever the reasons, it is somewhat ironic that this service is offered by firms that are believed to find it particularly challenging to obtain external finance on good terms. The gap between trade credit and trade debt needs to be financed with other sources of finance, like bank debt. Another conclusion is that, with trade debt falling short of trade credit, SMEs cannot systematically use current liabilities to finance long-term capital investment.

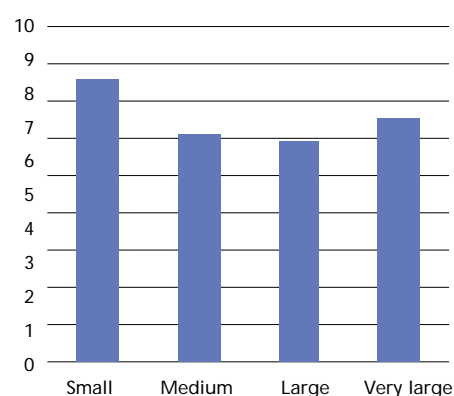
The other components of liquid assets are cash and cash equivalent items. Opler *et al.* (1999) find that the same factors that can explain a firm's capital structure also determine a firm's cash holdings. For example, companies with a higher share of fixed assets are generally more leveraged and keep a lower stock of cash.⁵ Figure 4 supports this finding; it reveals that small firms, which have a lower share of fixed assets in total assets than larger firms, have higher cash holdings (relative to total assets) than medium-sized and large companies. The economic rationale for this behaviour is that small firms are liable to face greater uncertainty regarding short-term refinancing and, therefore, choose to hold more liquid assets to meet unexpected expenses. Obviously, this is costly since, at the

Figure 3. Trade credit and trade debt (in % of balance sheet total)



Source: Own calculation based on AMADEUS DVD

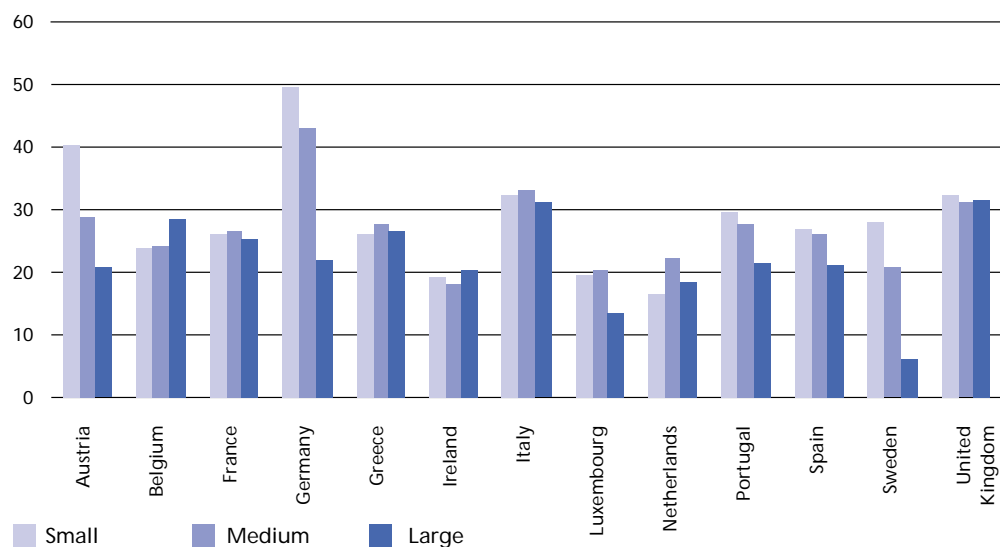
Figure 4. Cash (in % of total assets)



Source: Own calculation based on AMADEUS DVD

⁵ The relationship between fixed assets and financial debt does not come to the front in Figures 1 and 2 because we condition on size. Within each size class the standard result in empirical capital structure analyses is expected to hold.

Figure 5. Financial debt of enterprises in EU countries (in % of total liabilities)



Sources: Own calculations based on Amadeus DVD for Belgium, Greece, Ireland, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom; Eurostat (Enterprises in Europe, sixth report) for Austria, France, Germany, and Italy.

margin, cash holdings are financed by debt; the spread between the cost of debt and the return on cash (and cash equivalents) represents a liquidity insurance premium that larger firms with better access to credit need not pay.

In the remainder of this section we will discuss two important variations on our theme: first, differences in the capital structure of firms across individual EU countries and, second, the flexibility that firms in different size classes have in adjusting their capital structures to firm growth.

Let us start with a brief look at the regional dimension. Figure 5, which shows the importance of financial debt across size classes for individual EU countries, suggests that in some countries (e.g. Austria, Germany, and Sweden) differences across size classes are more pronounced than in other countries. Germany stands out because its small and medium-sized firms have an unusually high share of financial debt on their balance sheets – not only relative to large firms in Germany but also compared to SMEs in other EU countries. Hommel and Schneider (this volume), who analyse the German case in more detail, point at the idiosyncrasies of the German firm-bank relationships, the attitude of German company owners towards outside equity, and – probably most important – the tax system as key reasons for the high financial debt of German SMEs. More generally, the large cross-country differences clearly indicate the continuing importance of country-specific features. It follows that any proposal aimed at improving the financing conditions for SMEs must rest on a sound understanding of country-specific circumstances.

Turning to the flexibility that firms have in adjusting their capital structures, it is useful to note, first, that the static analysis presented so far rests on balance sheet data that are

Large differences in the capital structure of SMEs continue to exist across countries.

averaged over the period 1988-2000. Obviously, period averages cannot show how capital structures respond to firm growth. Moreover, the average capital structure for each size class hides a large diversity of financing patterns within each class; indeed, the standard deviations of the liability shares shown in Figure 2 are of similar magnitude as the shares themselves.

To analyse the scope for adjusting capital structure, we distinguish, in each size class, four categories that reflect the growth experience of firms. Specifically, for a given year, we classify firms as either (i) growing, (ii) fast growing, (iii) stagnant, or (iv) fast shrinking.⁶ Figure 6 indicates how the share of financial debt in total liabilities varies with firm growth.

As a point of reference, we note that during 1988-2000, the average firm experienced an increase in their financial debt ratio, with a stronger upward drift in the case of large and very large firms (see in Figure 6 the columns “full sample”). As very large firms were much less leveraged than other firms at the depth of the recession in 1993, the more rapid increase in large firms’ financial debt ratio has led to a notable convergence of financial debt ratio across size classes. In explaining why larger firms increased their financial debt ratio more rapidly than other firms, one could suspect that larger firms had better investment opportunities. This was, however, not the case: over the last decade, the assets of smaller firms grew more rapidly than those of large firms.

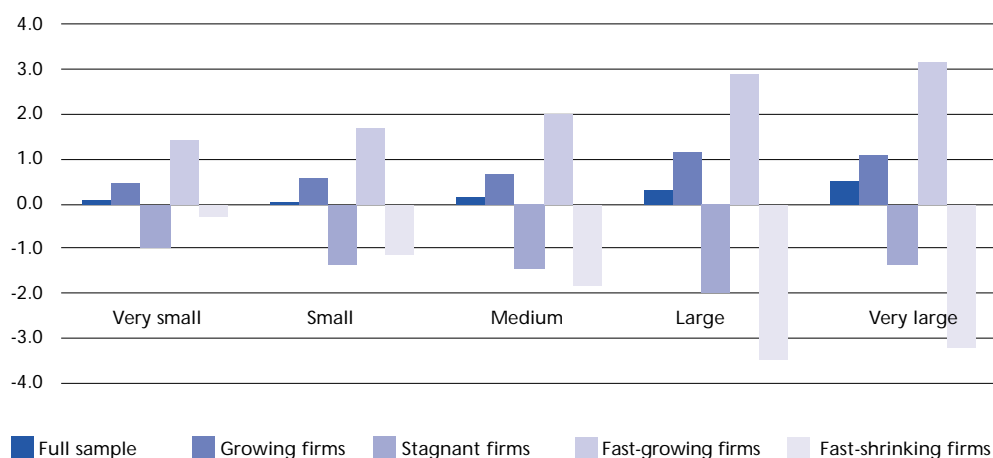
But how does the financial debt ratio behave if we distinguish firms according to their growth experience and their size? Let us focus first on the link between growth and financial debt. As Figure 6 suggests, the financial debt ratio increases when a firm expands, and it falls when a firm shrinks. What is more, the financial debt ratio increases (falls) the faster, the faster the firm grows (shrinks). This behaviour helps firms to adjust to changing growth opportunities. For instance, an increase in financial debt helps a firm to grow faster in an expansion, essentially overcoming a lack of shareholder funds. In other words, once retained earnings are exhausted, a firm needs to look for external finance, and if it goes first to the bank and/or debt market before raising external equity, its financial debt ratio rises. Likewise, when a firm is not growing, the financial debt ratio is likely to fall, as new borrowing is limited and existing debt is paid back.

Small businesses have less flexibility in adjusting financial debt to changing growth opportunities.

Probably the most striking message of Figure 6 is that small firms seem to have less flexibility in adjusting their financial debt ratio: the ratio increases (falls) at a slower rate in fast-growing (fast-shrinking) small firms than in fast-growing (fast-shrinking) large firms. Our interpretation of this result is that small firms have less flexibility in adjusting financial debt in response to changing growth conditions. When growth prospects are good, small firms may find it difficult to fully exploit their growth potential. Likewise, when growth prospects are bad, small firms may keep more financial debt on their balance sheets than large firms to avoid financing problems as and when growth prospects improve.

⁶ In any one year, we classify a firm as (i) “growing” if its asset grew by up to 15 percent, (ii) “fast growing” if asset growth was in excess of 15 percent, (iii) “stagnant” if its assets declined by up to 15 percent, and (iv) “fast shrinking” if assets declined by more than 15 percent.

Figure 6. Annual average change in ratio of financial debt to total liabilities, in %



Source: Own calculations based on Amadeus DVD

To summarise the gist of the descriptive analysis presented in this section: the capital structure of firms does not differ markedly across size classes, and the average SME is neither undercapitalised nor overcapitalised compared to large firms; while SMEs rely more on trade debt than larger firms, this financing source is more than offset by trade credit granted by SMEs and, thus, SMEs are net trade creditors, in contrast to conventional wisdom; an important result is that SMEs appear to be less flexible than larger firms in adjusting the structure of their balance sheets to changing growth opportunities.

The average SME is neither undercapitalised nor overcapitalised.

The last result could indicate that SMEs are indeed credit constrained. However, while our descriptive analysis may provide some hints, it cannot determine whether or not this has a tangible impact on the growth of SMEs and the economy as a whole. To address this issue, a more rigorous empirical approach is warranted. This takes us to the next section.

4. Empirical evidence for finance constraints

This section presents empirical evidence for finance constraints affecting small and medium-sized firms in Europe. We focus on two types of evidence:⁷ first, surveys and, second, a model of firm growth, which we estimate on the basis of data published in firms' annual reports.

Under the aegis of the European Commission, the European Observatory of SMEs regularly surveys over 7,600 small and medium-sized firms in 19 European countries. Figure 7, which reflects 1999 and 2001 survey results (European Commission 2000, 2002), indicates that about 15 percent of the firms with less than 50 employees feel that finance

⁷ Several other approaches have been adopted to establish the empirical significance of finance rationing. For instance, Berger and Udell (1992) test for credit rationing by explaining the stickiness of commercial loan rates on more than a million loans of US banks between 1977 and 1988. They suggest that equilibrium credit rationing is not a significant macroeconomic phenomenon. Guiso (this volume) follows another approach. Using survey data on small, Italian manufacturing firms, he applies probit regression techniques to estimate, among other things, the probability of a firm's credit request being rejected. He shows that this probability decreases with firm size, even when controlling for other firm characteristics.

is the major constraint to the development of their business. About 9 percent of medium-sized firms (50-249 employees) consider insufficient access to finance the main bottleneck. The results of the 2001 survey suggest that the financing situation of SMEs has remained largely unchanged in recent years.

Figure 8 reveals large disparities in the perception of finance constraints across EU countries. For instance, almost one quarter of the Greek SMEs report that finance is the major restriction for future growth whereas only 5 percent of the SMEs in the Netherlands express worries about finance. It is tempting to think that differences across countries reflect differences in the degree of financial sector development. However, Figure 8 also shows that a non-negligible number of SMEs perceives finance constraints even in countries, such as the United Kingdom, with well-developed banking and capital markets. This suggests that finance constraints do not only stem from a lack of financial sector development. As a matter of fact, the Competition Commission of the United Kingdom reported in March 2002 (UK Competition Commission 2002) that the four largest financial institutions in England and Wales overcharged SMEs during 1998-2000.

The surveys reviewed here do not provide overwhelming evidence that also medium-sized firms suffer from finance constraints, given that only less than 10 percent of the companies reply that finance is the major bottleneck. Factors other than finance seem to be more important. To illustrate, the majority of SMEs – across all size classes – consider the lack of skilled labour the most important obstacle to business performance. That said, a survey carried out by Eurostat (2002) suggests that finance constraints could be more binding for particular SME activities: 28 percent of medium-sized firms report (in May 2001) that finance is the most important obstacle to innovation. Likewise, 24 percent of small-firm respondents and 22 percent of large-firm respondents, feel that a shortage of finance is holding back innovation in their enterprises. Therefore, in practice, finance constraints seem to be especially relevant to innovative firms, and among innovators problems of finance are felt across all size classes.

SMEs consider a lack of skilled labour a more important obstacle to growth than finance.

Figure 7. Share of firms considering access to finance the major business constraint, by size class, in %

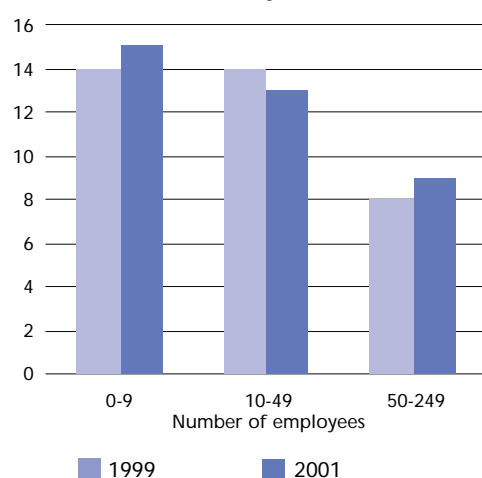
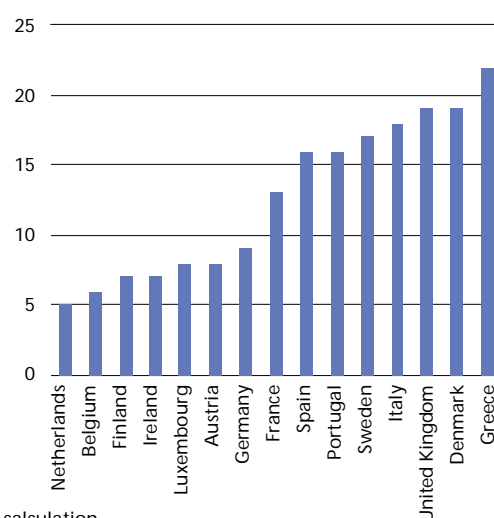


Figure 8. Share of SMEs considering access to finance the major business constraint, by country (1999), in %



Sources: European Commission (2000 and 2002), and own calculation.

Surveys are certainly informative, but they have shortcomings. One is that simply asking for the views of SME managers cannot provide hard evidence for finance constraints. Indeed, one can imagine that respondents have an incentive to overstate financing problems to foster public support. Nevertheless, we believe that their responses provide interesting insights. Another shortcoming is that while SME managers may perceive external finance as expensive, banks may have included in the proposed interest rate a justified risk premium. If firms are not willing to borrow at this rate, they can hardly be considered finance constrained although entrepreneurs are likely to report in the survey that finance holds back the growth of their businesses.

Simply asking for the views of SME managers cannot provide hard evidence of finance constraints.

All this calls for a more rigorous approach to the question of whether finance constraints hinder SME growth. One way to tackle this question empirically is to estimate a firm's optimal investment ratio and to assess whether or not the firm is in a position to realise that level of investment. The underlying idea of this approach is the following. In a perfect capital market, the type of finance (equity vs. debt or internal vs. external finance) does not determine how much a firm invests and, thus, the firm should be in a position to realise its desired level of investment. By contrast, when capital markets are imperfect and the firm faces external finance constraints, the availability of internal finance may limit the investment of a firm. Against this background, the empirical test for finance constraints boils down to testing whether financial variables, such as the amount of available internal funds, have a significant impact on the firm's investment and, thus, its growth. If they do, it is reasonable to conclude that the firm faces an external finance constraint. This is because in the absence of external finance constraints one would not expect to find a statistically significant and economically important link between a firm's internal finance and its investment.

Fazzari *et al.* (1988a, 1988b) initiated a voluminous literature that presents strong empirical evidence, within a neoclassical investment model with capital adjustment costs, that the empirical investment rate is highly sensitive to cashflow, i.e. a key component of internal finance. Many of these studies split the sample of firms on certain characteristics, such as dividend payouts and size, that allow differentiating, *a priori*, a group of firms that is likely to be finance constrained from a group that is not. Comparing empirical investment-cashflow sensitivities of the two groups usually confirms prior expectations. Overall, these results are interpreted as finance rationing being a real phenomenon.

Kaplan and Zingales (1997, 2000) critically review the adopted methodology. They argue, correctly, that for empirical investment-cashflow sensitivities to be informative about finance constraints, we must have, *a priori*, a convincing theoretical case for a positive relationship between investment-cashflow sensitivities, on the one hand, and the degree of finance constraints on other hand. But Kaplan and Zingales then wrongly argue that this means that investment-cashflow sensitivities need to be decreasing in cashflow. Kaplan and Zingales (1997) furthermore compare annual report information on firms' liquidity position and financing needs with the investment-cashflow sensitivities resulting from the regression model of Fazzari *et al.* Interestingly enough, some of the firms that Fazzari *et al.* earmarked as "likely to be finance constrained" reported in their annual reports that finance did not curb firm growth. Overall, Kaplan and Zingales conclude that empirical investment-cashflow sensitivities are uninformative about possible finance constraints.

Commenting on this critique, Fazzari *et al.* (2000) convincingly stress that when *a priori* classifying firms according to whether or not they can be expected to encounter finance

constraints, internal wealth - which is the sorting characteristic suggested by Kaplan-Zingales - is not the relevant issue. What is needed is a sorting characteristic that classifies firms, *a priori*, according to the finance supply function they face, and the key is to separate firms that encounter less binding finance supply functions from those that have to operate under more binding finance supply functions. An important issue here is that the sorting characteristic must be exogenous instead of endogenous to the model. Both internal wealth and dividend payouts (as in the seminal papers of Fazzari *et al.* 1988a, 1988b) are not perfect screening devices. Overall, we agree nonetheless with Fazzari *et al.* that the cashflow sensitivity is a useful indicator for the relative importance of financing problems across different groups of firms. Against this background, we take a look at one contribution that follows this approach before developing our own model.

Higher growth-cashflow sensitivities are a sign of bigger finance problems.

Carpenter and Petersen (2002) follow the approach of Fazzari *et al.* (1988a, 1988b). But instead of examining how possible finance constraints could affect investment (as Fazzari *et al.* (1988a, 1988b) do), they investigate how possible finance constraints could affect total asset growth. After all, investment in fixed assets covers only part of the use of a firm's funds. Production, cash holdings, and late payments also need to be financed. To take into account the full spectrum of the use of finance, Carpenter and Petersen propose to estimate the sensitivity of a firm's growth rate to its cashflow, with the growth rate measured by the relative change in total assets. The test on the relevance of finance constraints boils down to the same principle as applied to models of investment: higher growth-cashflow sensitivities are a sign of bigger financing problems. Carpenter and Petersen (2002) find for small, quoted firms in the United States that the growth-cashflow sensitivity of firms that use external equity is lower than the growth-cashflow sensitivity of firms that make little use of external equity. They therefore conclude that financing constraints are binding for the latter companies.

In the remainder of this section, we develop a simple model of firm growth, which is similar to the one in Carpenter and Petersen (2002). Our model relates firm growth to the availability of internal finance (measured by the ratio of cashflow to total assets), profit opportunities (measured by Tobin's *Q*), leverage (equity ratio), and size (log of total assets), and it controls for firm-specific fixed effects and time effects. Box 2 sets out the model, the sample selection procedure, and the regression method in more detail. But three points are worth mentioning here. First, we include *Q* to control for a firm's investment opportunities; this reflects the notion that firms with good investment opportunities (high value of *Q*) are likely to grow more rapidly than firms with more limited investment opportunities (low value of *Q*). To arrive at estimates for *Q* - i.e. the market value of a firm relative to its replacement costs - we need the market value of shareholder funds. Most SMEs are not quoted on stock markets. Hence, the market value of shareholder funds is not directly available. In Box 3 we present a solution to this problem. In a nutshell, we explain *Q*-values of quoted companies and use the econometric model to obtain *Q*-values of unquoted companies. Second, we include the size variable to pick up differences in investment opportunities between size classes that the *Q*-values do not capture. The inclusion of both Tobin's *Q*, as a measure of investment opportunities, and the size variable should assuage the Kaplan-Zingales critique that investment-cashflow sensitivities depend on the curvature of the investment demand function. Third, leverage is included not only because it may carry additional information on finance constraints but also because it may signal risk.

Let us elaborate on the internal finance theory of growth, which is behind the idea of testing empirically the relation between firm growth and the availability of internal finance. By definition, the growth of a firm without any access to external finance cannot exceed the growth of its own funds. Furthermore, a firm with difficult access to external finance is likely to retain all profits; obviously, this applies to a firm with good investment opportunities, but it is also true when opportunities are temporarily poor because the firm cannot rely on external finance when investment opportunities subsequently improve. Overall, for firms with reasonably good investment prospects but without any access to external finance, we would expect a one-to-one relationship between firm growth and cashflow (see Box 2, equation 2). More generally, we define growth-cashflow sensitivity as the change in total assets generated by an increase of one unit of cashflow.

What about the growth-cashflow sensitivity of a firm with easy access to external finance? The growth of such a firm can be larger than the growth of its internal funds, and such a firm is likely to pay out dividends more often than a firm with difficult access to external finance. In principle, a fully unconstrained firm could decide to use none of its cashflow for new investment projects and pay out all profits as dividends. For such a firm, new assets could be financed by new debt and/or new equity and, therefore, one may expect that there is no significant relationship between cashflow and firm growth. In practice, however, this is unlikely to be the case. There could be a significantly positive relationship between firm growth and cashflow simply because companies first use their retained earnings before applying for external funding – even if the cost of internal funds equals the cost of external funds. In sum, we would expect the growth-cashflow sensitivity of firms with easy access to external finance to be smaller than one, but not necessarily zero.

Having established the range of values that growth-cashflow sensitivity can take⁸, we need to set a benchmark that allows assessing differences in finance constraints of firms in different size classes. It is plausible to argue that the very large firms are probably the least finance constrained since they have easy access to capital markets. Therefore, we choose the estimated growth-cashflow sensitivity of very large firms as a benchmark for firms in other size categories. By comparing growth-cashflow sensitivities across size classes, including a category of very large, essentially unconstrained companies, we obtain evidence of finance constraints.

Figure 9 shows estimated growth-cashflow sensitivities across size classes. Obviously, cashflow is a key determinant of firm growth – irrespective of firm size. But we find striking differences across size classes. At one end of the range, we find that the growth-cashflow sensitivity of very large firms is lower than 0.5. At the other end, growth-cashflow sensitivity is close to one for small and very small firms, suggesting that finance constraints appear particularly acute for firms with less than 50 employees. For medium-sized firms (50-249 employees), the growth-cashflow sensitivity has been estimated at 0.7, indicating finance constraints are less binding than in the case of smaller firms. The figure also shows that even large firms (250-4,999 employees) are, on average, less flexible in their financing opportunities than very large firms. Overall, we conclude that – after controlling for investment opportunities – the growth of smaller firms is to a larger extent determined by the availability of internal funding than the growth of larger firms.

Growth-cashflow sensitivities of small firms indicate that finance constraints are binding.

8 Strictly speaking, as argued by Carpenter and Petersen (2002), growth-cashflow sensitivities may slightly exceed 1 if high cashflow allows the firm to increase its debt level.

Box 2. Modelling firm growth

Methodology

Following Carpenter and Petersen (2002), we consider a simple model that relates firm growth to the availability of internal finance and other explanatory factors:

$$(1) \quad g_{it} = c_i + cfr_{it} \beta_1 + Q_{t-1,i} \beta_2 + \frac{E_{t-1,i}}{TA_{t-1,i}} \beta_3 + \ln(TA_{t-1,i}) \beta_4 + d_t \beta_5 + \varepsilon_{it}$$

where $g_{it} = (TA_{it} - TA_{t-1,i})/TA_{t-1,i}$ is the growth rate of total assets of firm i between the end of period $t-1$ and the end of period t ; $cfr_{it} = \text{Cashflow}_{it}/TA_{t-1,i}$ is the ratio of cashflow (after-tax profits plus depreciation) to total assets; Tobin's $Q_{t-1,i}$ (a measure of investment opportunities) at the beginning of period t is computed with equation (2) of Box 3; E_{it} is the book value of equity; d_t are time dummies; c_i are firm-specific fixed effects; and ε_{it} is the error term.

Discussion

The relationship between firm growth and cashflow

For a firm without any access to external finance the theoretical relationship between growth and the cashflow ratio is one-to-one if the firm has good investment opportunities and, hence, retains all profits. In this case, the following accounting identity holds:

$$(2) \quad g_{it} \equiv \delta_{it} + cfr_{it}$$

where δ_{it} is the depreciation rate applied to $TA_{t-1,i}$ during period t . Firm-specific fixed effects in equation (1) will pick up the constant component of the depreciation rate.

The relationship between firm growth and the equity ratio

In addition to the variables considered by Carpenter and Petersen (2002), we include leverage (ratio of equity to total liabilities) and a proxy for firm size (the natural logarithm of total assets). The coefficient on the equity ratio can also measure finance constraints in addition to growth-cashflow sensitivity. Firms with a solid capital structure at the beginning of period t are, *a priori*, less likely to be finance constrained than highly leveraged firms. Hence, if the sample contains finance-constrained firms, we expect to find a positive relationship between the growth rate and the equity ratio. We note, however, that leverage may also be a proxy for business risk. If firms with more risky projects carry less debt, a positive relationship between the growth rate and the equity ratio can also simply imply that risky ventures exhibit higher growth rates. In these circumstances, one cannot draw definite conclusions about the relevance of finance constraints by solely looking at the coefficient on the equity ratio.

Controlling for investment opportunities

We control for investment opportunities by including an estimate for Tobin's Q (see Box 3). We take Q at the beginning of period t because our objective is to test for finance constraints during period t . Q at the end of period t signals expectations of investment opportunities that may arise only after period t . Our estimate of Tobin's Q cannot be expected to deliver a perfect proxy for investment opportunities. Therefore, the size variable is included to control for different investment opportunities, which are not captured by the estimated Q , between smaller and larger firms within each size class. To summarise, our model includes two variables, the cashflow ratio and the equity ratio, which may pick up finance constraints, and two other variables, Tobin's Q and size, which control for the possibility that companies of different size may have different investment opportunities.

Gibrat's law

The "Law of Proportional Effect", first advocated by Gibrat in 1931, dictates that the growth rate of a firm is independent of its initial size (for an extensive discussion of Gibrat's law and its empirical relevance see Sutton 1997). For the relatively short period under investigation in this paper, our empirical results strongly reject the hypothesis that the increment to a firm's size is proportional to its current size. We find that small firms grow faster than larger firms. Table A1 in the Annex shows that coefficients on the size variable are close to -1 for all size classes. Evidently, this does not mean that the same result holds for other periods in history. Gibrat's law may still apply over a longer period.

Regression technique

We estimate equation (1) in first differences to eliminate the fixed effects. Before applying OLS, both the dependent variable and the explanatory variables are trimmed to reduce the influence of outliers on the estimates. Specifically, we leave out 1 percent of the total number of observations on each variable; 0.5 percent of each side of the distribution. Not necessarily the same observations are ignored for different variables. Hence, in total, more than 1 percent (namely 3.7 percent) of the observations in the original sample are left out. Due to limited available computation capacity, we cannot apply Minimum Volume Ellipsoid (MVE) weights (see Box 3) instead of the data trimming procedure. Data trimming is less reliable since it does not take into account the correlations between the variables. The firm observations on equation (1) contain both quoted and unquoted companies. This allows us to construct a sample that is considerably larger than the sample used to estimate the Q-model. Obviously, our Tobin's Q estimate can only be a proxy of investment opportunities and, as a consequence, measurement errors are present. OLS will thus underestimate the coefficient on Tobin's Q. We have been unable to solve this estimation problem satisfactorily. Estimates obtained with an instrumental variable regression technique turn out very similar to OLS estimates since no good instruments are available.

Data

The balance sheet and income statement of manufacturing and construction firms are taken from the AMADEUS DVD ROM (June 2002) of Bureau Van Dijk. We have eliminated firm observations with negative total assets. Data availability in both OSIRIS and AMADEUS restricts the sample period for equation (1) to the period 1996-2000, with year 1995 observations used to construct lagged variables. After cleaning for outliers and anomalous observations, there are 355,693 firm observations left in the sample.

Results

Table B2 shows basic descriptive statistics of the sample. Firm size (measured by total assets) varies from EUR 14,000 to EUR 31 billion. Investment opportunities were good during the second half of the 1990s. On average, firms grew in total assets at a rate of 10 percent a year and Tobin's Q was equal to 1.14.

Table A1 in the Annex contains the regression results, which are extensively discussed in the main text.

Table B2. Descriptive statistics of the variables included in the growth model (1)

	Mean	Median	Minimum	Maximum	Standard deviation
g_{it}	0.10	0.07	-1.00	2.06	0.24
cfr_{it}	0.10	0.08	-0.58	0.89	0.09
$Q_{t-1,i}$	1.14	0.99	0.28	5.49	0.55
$E_{t-1,i}/TA_{t-1,i}$	0.32	0.30	-0.39	0.86	0.20
$\ln(TA_{t-1,i})$	7.96	7.82	2.64	17.24	1.55

Box 3. Estimating firms' investment opportunities

Methodology

We estimate the investment opportunities of a firm by computing Tobin's Q , i.e. the market value of the firm relative to its replacement costs. A company will invest in an additional unit of capital if the marginal value of the investment exceeds its marginal costs. Marginal q is difficult to measure, but Hayashi (1982) shows that under certain assumptions marginal q is equal to average Q . For quoted firms we approximate average Q as follows:

$$(1) \quad Q_{it} = \frac{E_{it}^m + B_{it}}{TA_{it}}$$

where TA_{it} is the book value of total assets of firm i in period t ; B_{it} is the book value of total debt; and E_{it}^m is the market value of equity as determined on the stock exchange. Evidently, for unquoted firms, like most of the SMEs, the market value of equity is not directly available. We therefore resort to a two-step procedure to estimate the investment opportunities of a firm.

In step one, we explain Q -values (as computed in (1)) of quoted firms with firm-specific variables – such as firm size, capital structure, and profitability – and non-firm-specific variables, including the firm's industry and country of residence, as well as time dummies. Using the data on quoted firms, we obtain parameter estimates of the following Q -model:

$$(2) \quad \ln(Q_{it}) = d_j \beta_j + d_t \beta_t + d_k \beta_k + ROA_{it} \beta_1 + ROA_{t-1,i} \beta_2 + ROA_{t-2,i} \beta_3 + \ln(TA_{it}) \beta_4 + \frac{E_{it}}{TA_{it}} \beta_5 \\ + ROA_{it}^2 \beta_6 + ROA_{t-1,i}^2 \beta_7 + ROA_{t-2,i}^2 \beta_8 + \ln(TA_{it}) \beta_9 + \frac{E_{it}^2}{TA_{it}^2} \beta_{10} + \varepsilon_{it}$$

where d_j are 14 country dummies (Austria is default); d_t are six time dummies (2001 is default); d_k are 73 industry dummies; ROA_{it} is the ratio of earnings (before interest, taxes, depreciation, and amortisation) to total assets; E_{it} is the book value of equity; and ε_{it} is the error term.

In step two, we compute Q -values for all firms, including quoted and unquoted companies, by inserting in the right-hand side of equation (2) the parameter estimates for β_j , β_t , β_k and $\beta_1, \dots, \beta_{10}$, and by setting the error term equal to zero. We include squared explanatory variables to allow for non-linearities.

Discussion

Market valuation of equity

Investors may make wrong predictions about future investment opportunities. Incorrect valuations of equity can be due to forecast errors of general trends or firm-specific forecast errors. General forecast errors are made for all firms to the same degree. By computing Q -values as described in step two, the idiosyncratic component of investors' incorrect stock evaluation of a firm's real investment opportunities will not affect our predicted Q -value. Idiosyncratic errors will, on average, cancel out. However, the general forecast error will lead to a general over- or underestimation of the firms' investment opportunities. This does not necessarily pose a problem to the estimation of the growth equation (1) in Box 2 if firm managers and stock investors make the same general forecast error. However, if managers and stock investors have different views, estimated growth-cashflow sensitivities may be biased. There is no strong reason to believe that this bias will have a different impact on SMEs than on large firms. Comparing growth-cashflow sensitivities across size classes is thus a useful tool to detect financing constraints even when investors may make wrong predictions.

Valuation of debt

Since we do not take into account the market valuation of debt, Tobin's Q , as computed in (1), is sensitive to leverage. Therefore, leverage, as measured by the ratio of equity to total liabilities, needs to be included in equation (2).

Regression technique

Two observations are warranted. First, firm-level databases are notorious for hosting extreme observations. To limit the impact of outliers on the regression estimates we adjust outlying observations downward by multiplying the data set with Minimum Volume Ellipsoid (MVE) weights (based on the re-sampling algorithm as explained in Hinloopen and Wagenvoort 1997). MVE distances measure how far an observation (including both dependent and independent variables) is located from the centre of the data. Second, a scatter plot revealed that Q -values are truncated from below. Indeed, one would expect a firm to dissolve when its market value drops substantially below its replacement value. When the sum of the individual assets of a firm is considerably higher than the value of the combined assets, the firm will be liquidated. As a consequence, OLS applied to equation (2) will give biased estimates. We therefore employ the truncated regression technique as described in Maddala (1983). OLS results are shown in Figure B1 for comparison.

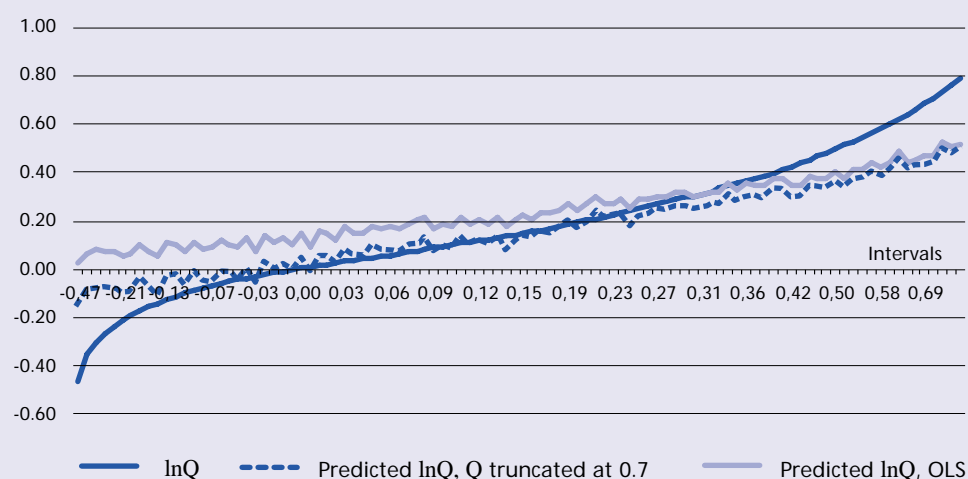
Data

11,128 firm observations on listed industrial companies in the EU during 1993-2001 were selected from the database OSIRIS (Bureau Van Dijk, Brussels). OSIRIS contains balance sheets and income statements of quoted firms. We rely on the BLOOMBERG database to provide information on the market value of equity. Firm observations with negative book value for equity are eliminated. Tobin's Q -model is estimated for the period 1995-2001 since observations for 1993 and 1994 are used to construct lagged variables in equation (2).

Results

Table A2 in the Annex shows parameter estimates of equation (2) based on truncated regression with the cut-off value for Tobin's Q chosen at 0.7. The explanatory power of the model is high given that the adjusted R^2 is equal to 0.63. However, as Figure B1 shows, the explanatory power of the model is unsatisfactory with regard to predicting relatively low as well as high Q -values. But the model works fine for Q -values between 0.8 and 1.5. The investment opportunities of the majority of firms are valued within this interval. Figure B1 also clearly illustrates that OLS estimates are inadequate in predicting Tobin's Q over the full range of average Q -values in 100 intervals except where diamonds (average values for actual $\ln Q$) cross triangles (average values for $\ln Q$ predicted with OLS).^a

Figure B1 Predicting Tobin's Q values for quoted firms^a



^a $\ln(Q)$ is sorted and average values of $\ln(Q)$ are computed for 100 observations in 100 intervals. Hence, Figure B1 shows 100 average values of $\ln(Q)$ and 100 corresponding predicted values obtained with OLS, and 100 corresponding predicted values obtained with truncated regression.

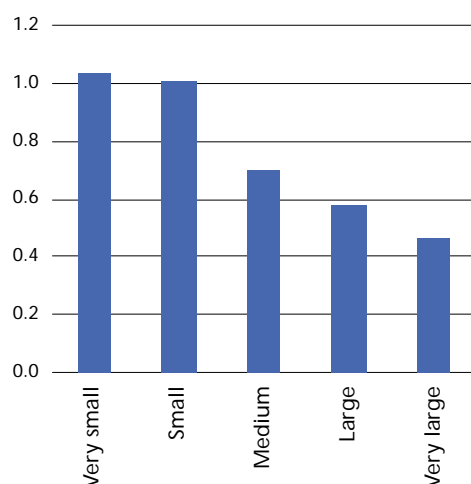
Table A1 in the Annex provides additional evidence that SMEs may face greater difficulties in obtaining external finance than large firms. It shows the regression results of the growth model spelled out in Box 2. Two findings are worth highlighting. One is that our empirical model has more explanatory power for the three size categories representing SMEs than for the two groups of large firms and, more generally, the explanatory power of the model clearly diminishes with firm size. To illustrate, for small and very small firms the model can explain about 55 percent of the variation in growth rates whereas for very large firms it can explain only 42 percent. The decline in explanatory power with size is not entirely surprising: as our empirical measure of investment opportunities (Tobin's Q) may be inaccurate, we expect the model to be more successful for finance-constrained companies. Second, we find a positive and significant relationship between the equity ratio and firm growth, indicating that highly leveraged firms may have greater difficulties in obtaining finance and, hence, exploiting their growth potential. But also here we find that the relationship of the model is stronger for SMEs than for the group of larger firms.

Growth-cashflow sensitivities are higher for unquoted firms than for quoted ones.

As emphasised in Section 2, information asymmetries are at the heart of possible financial market failures. Our analysis indeed supports the view that better information can play a crucial role in reducing finance constraints. To arrive at this conclusion, we have split the sample into two groups: quoted and unquoted companies. Reporting requirements are usually higher for quoted companies. As a result, more and better information is available for quoted firms and, *a priori*, asymmetric information problems should be less relevant. Indeed, our estimates – summarised in Figure 10 – show higher growth-cashflow sensitivities for unquoted firms than for quoted ones; the difference is especially pronounced for small firms, with growth-cashflow sensitivities of quoted firms being 20 percent lower than for unquoted firms.

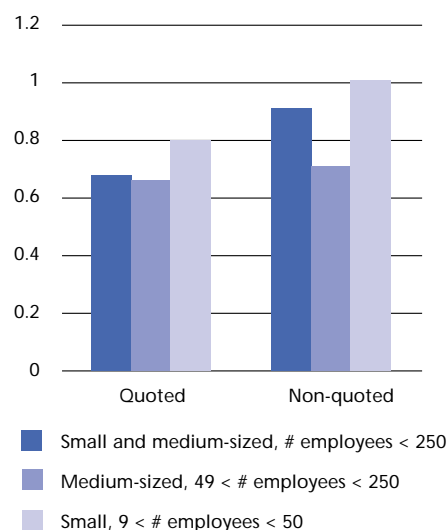
We end this section with a few remarks on possible differences in growth-cashflow sensitivities across countries. Figure 11 shows that growth-cashflow sensitivities of SMEs are broadly similar for most of EU countries. This evenness contrasts with the findings -

Figure 9. Growth-cashflow sensitivities, by size class



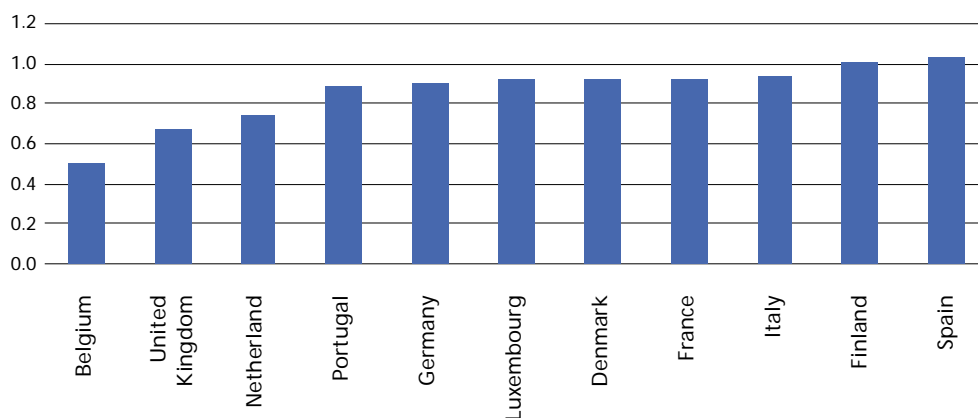
Source: Own calculations based on AMADEUS DVD

Figure 10. Growth-cashflow sensitivities (quoted vs. unquoted SMEs)



Source: Own calculations based on AMADEUS DVD

Figure 11. SME growth-cashflow sensitivities in selected EU countries



Source: Own calculations based on AMADEUS DVD-ROM

summarised in Figure 5 - that leverage of small and medium-sized enterprises varies considerably across countries. This means that while national factors, such as the tax systems and regulations, play an important role in determining the capital structure of firms, they appear to have less influence on the degree of finance constraints. There are however three countries - namely Belgium, the Netherlands, and the United Kingdom - where finance constraints seem to matter less. We cannot yet fully explain why these countries stand out. In general, however, one cannot dismiss the possibility that the overall development, structure, and efficiency of a country's capital and banking markets have an impact on how binding finance constraints are. Beck *et al.* (2002), among others, find in a cross-country study that underdeveloped financial and legal systems impede firm growth. That said, it remains to be verified whether the differences in SME growth-cashflow sensitivities that we have identified in this paper are the result of differences in financial system developments across the EU.

Growth-cashflow sensitivities of SMEs are broadly similar across EU countries.

To summarise the essence of this section, we note, first, that our empirical work supports survey results, suggesting that finance constraints tend to hinder the growth of small and very small firms; on average, the growth of these firms is one-to-one related to internal funds, notably retained profits. Second, while finance constraints seem to be less binding for medium-sized enterprises, their growth nevertheless depends more on the availability of internal funds than the growth of large firms. Third, we have presented empirical evidence for the importance of equity: highly leveraged firms have greater difficulties in tapping external finance and, hence, exploiting their growth potential. Finally, our results support the view that more and better information on firms alleviate finance constraints and thus foster firm growth.

5. Mitigating finance constraints

We can only provide a sketch of measures that could alleviate finance constraints of small and medium-sized enterprises. It is useful to distinguish between public policy measures, on the one hand, and efforts that lenders and borrowers can take on the other hand.

A variety of public policy schemes have been set up to mitigate finance rationing of SMEs. Examples include direct loans, interest subsidies, and loan guarantees - extended by both

national and international institutions in and outside the EU. While such schemes usually benefit the recipients and help ease finance constraints, it has been questioned whether they improve the allocation of resources in an economy. For instance, Williamson (1994) argues – in the context of an asymmetric information model – that government intervention in the credit market through direct lending, loan guarantees, and interest rate subsidies cannot lead to a Pareto improvement in the allocation of funds, which essentially means that gains accruing to the beneficiaries of such schemes come at the expense of others in the economy. Overall, while the case for public intervention is challenging to make on efficiency grounds, considerations of fairness and equity could justify intervention if the purpose is to create a level playing field in the credit market for large and small firms.

The slightly sober assessment of the efficiency effects of public intervention should not really come as a surprise. This is because public intervention as mentioned above will find it difficult to address the root of finance constraints, namely information asymmetries. However, where public intervention reduces information problems, for instance, by setting up an information sharing mechanism between lenders (see below), it may lead to efficiency gains.

A lack of finance does not necessarily imply a lack of debt.

Moving on to what lenders and borrowers can do to alleviate finance constraints, we recall first that lack of finance does not necessarily imply a lack of debt. As we know from Figure 5, in some countries, such as Germany, small businesses are possibly overleveraged, and we demonstrated in the previous section that companies with a robust capital structure are less likely to be finance constrained given that growth-cashflow sensitivities tend to decrease with the equity ratio. This clearly highlights the importance of equity for overcoming credit constraints. To the extent that the lack of equity stems from tax and regulatory frameworks (see, for instance, Hommel and Schneider, this volume), the best approach for public intervention is to remove the cause of the problem instead of dealing with its symptoms. In addition, it is true that SMEs are often not sufficiently transparent or willing, or both, to attract outside equity. It seems uncontroversial that improvements in this area have a role to play in alleviating the access of small and medium-sized firms to finance – both equity and debt.

An important means of reducing information asymmetries between borrowers and lenders is the establishment of long-term relationships (Boot 1999). Indeed, the potential for reducing information asymmetries through relationship banking is one of the main reasons why banks exist in the first place, and banks clearly have an advantage over capital markets in supplying funds to SMEs that need relatively small amounts of finance. In addition, there is evidence (see, among others, Berger *et al.* 1998) that local, often small banks have a higher share of SME loans in their portfolio than large, global banks. This is mainly because small, local banks have a comparative advantage in building valuable relationships with small customers.

While relationship banking reduces information asymmetries, it could create a hold-up problem for the borrower: once a borrower has developed a relationship with only one external financier, this so-called house-bank has proprietary information on the borrower. This enables the house-bank to overcharge, within limits, the borrower without facing a serious threat of losing her to a competitor. If the borrower nevertheless tries to switch banks, a potential lender may interpret the attempt to switch itself as a sign that the

borrower has problems that are known to its current house-bank. In sum, the hold-up problem may considerably reduce the advantages of establishing firm-bank relationships.

Nevertheless, the solution to information asymmetries probably still lies in providing better information to lenders, but in such a way that this information does not become an informational monopoly of a single bank. One possible way to achieve this is for firms to establish relationships with more than one bank (multiple firm-bank relationships). Dietsch, Guiso, and Hommel and Schneider (all this volume) present empirical evidence on multiple firm-bank relationships in selected EU countries. Suffice to point out here that while reducing the hold-up problem, multiple firm-bank relationships do not solve, but may even worsen the information problem, because signing loan contracts with more than one lender diminishes the value of individual firm-bank relationships. Information sharing among lenders helps maintain the value of individual firm-bank relationships. A recent study (Jappelli and Pagano 2002) shows that information sharing increases bank lending and reduces credit risk, regardless of whether information sharing is privately or publicly organised. Advancements in information technology also contribute to a better dissemination of information on potential borrowers and, as a result, make SMEs less dependent on local, small banks and stimulate larger banks to increasingly target small customers. A recent study (Frame *et al.* 2001) on the two hundred largest US banking organisations examines the effect of automated scoring of small business lending. The introduction of credit scoring is found to be associated with an eight-percent increase (about USD 4 billion per institution) in the portfolio share of small business loans. With information sharing that maintains the advantages of individual firm-bank relationships in a context of multiple firm-bank relationships, the hold-up problem can be further reduced by making it less costly for SMEs to switch banks. Switching costs should therefore be kept at a minimum. It seems natural for banks to create barriers that make it difficult for clients to switch so that monopoly rents can be extracted. Properly designed regulation and the promotion of competition hold considerable potential to keep switching costs low.

Information sharing among lenders helps maintain the value of individual firm-bank relationships.

6. Conclusions

Finding empirical evidence of finance constraints is inherently difficult, and very little is factually known about their relevance and consequences. Certainly, in a number of EU countries, small and medium-sized firms complain about limited access to credit markets and/or excessive financing costs. These complaints, however, do not tell us whether lenders have turned down firms for the wrong reasons. This paper substantiates the perception expressed by potential borrowers: our analysis shows that the sensitivity of company growth to cashflow rises as company size falls, which suggests that SMEs indeed encounter finance constraints that prevent them from fully exploiting their growth potential. The smaller the firm is, the stronger the binding nature of finance is.

Two caveats are worth mentioning. First, the analysis shown in this paper rests on the assumption that managers of firms across all size classes have the same preferences and wish to follow the same profit maximisation strategy. In practice, preferences differ, in particular with regard to providing information and accepting the scrutiny, even the influence, of external financiers. In light of this, we cannot exclude that the growth-constraining obstacles to finance reflect, in part, managers' choice rather than financial market imperfections.

*There is no such thing as
a typical SME.*

Second, in deriving the results we found that there is no such a thing as a typical SME. The variation in balance sheet structure within each size class is much more important than the variation across the average firm of each size class. Some small businesses are therefore more likely than others to be finance constrained. Young and information-opaque borrowers with little credit history are more vulnerable to imperfections in financial markets than more mature firms. We find that quoted firms, even when small, suffer less from finance constraints than unquoted firms. Geographical differences are also an important determinant of the liability structure of the balance sheet, suggesting that national factors need to be taken into account when addressing the problem of finance constraints.

We have also sketched how to address the problem of finance constraints, pointing out that public policy can be helpful, but that SMEs and banks themselves have considerable scope for mitigating the problem. More generally, when thinking about solutions it is good to bear in mind that often “the little things are infinitely the most important”.

Table A1. First difference regression results of the firm growth model (equation (1) of Box 2)

Explanatory variable ^a	Very small		Small		Medium		Large		Very large	
	Parameter ^b	t-value	Parameter ^b	t-value	Parameter ^b	t-value	Parameter ^b	t-value	Parameter ^b	t-value
cfr_{it}	1.04*	25.5	1.00*	101.2	0.70*	57.5	0.58*	26.9	0.46*	4.0
$Q_{t-1,i}$	0.05*	4.7	0.03*	13.4	0.04*	12.1	0.04*	7.3	0.07	1.5
$E_{t-1,i}/TA_{t-1,i}$	0.57*	12.0	0.70*	63.7	0.49*	39.1	0.33*	15.3	0.42*	3.2
$\ln(TA_{t-1,i})$	-1.09*	-64.0	-0.99*	-244.6	-0.98*	-194.3	-0.95*	-98.4	-0.95*	-16.4
d_{1996}	0.10*	12.9	0.05*	30.3	0.05*	25.8	0.03*	9.0	0.00	0.0
d_{1997}	0.12*	17.4	0.06*	41.4	0.05*	30.5	0.04*	11.4	0.04	1.8
d_{1998}	0.15*	22.3	0.08*	58.7	0.08*	50.4	0.09*	29.1	0.15*	7.9
d_{1999}	0.14*	21.8	0.09*	69.0	0.09*	53.5	0.06*	20.0	0.07*	3.3
Adjusted R2	0.55		0.56		0.51		0.47		0.42	

a TA_{it} is the book value of total assets of firm i , in period t , E_{it} is the book value of equity, cfr_{it} is the ratio of cashflow to total assets and Q_{it} is Tobin's Q as computed in Box 3, equation (2).

b Parameter estimates with an asterisk are significantly different from zero at the 95% confidence interval.

Table A2. Truncated regression^a results of Tobin's Q-model (equation (2) of Box 3)^b

Explanatory variable ^c	Parameter estimate ^d	t-value
$d_{Belgium}$	0.141*	3.51
$d_{Denmark}$	0.115*	2.97
$d_{Finland}$	0.039	0.89
d_{France}	0.114*	3.33
$d_{Germany}$	0.150*	4.31
d_{Greece}	0.570*	12.61
$d_{Ireland}$	0.233*	5.01
d_{Italy}	0.230*	5.55
$d_{Luxembourg}$	0.143	1.44
$d_{Netherlands}$	0.138*	3.73
$d_{Portugal}$	0.095	1.66
d_{Spain}	0.140*	3.16
d_{Sweden}	0.239*	6.39
$d_{United Kingdom}$	0.100*	2.98
d_{1995}	-0.007	-0.30
d_{1996}	0.080*	3.54
d_{1997}	0.116*	5.24
d_{1998}	0.058*	2.67
d_{1999}	0.148*	6.87
d_{2000}	0.054*	2.48
ROA_{it}	1.833*	5.99
$ROA_{t-1,i}$	1.335*	3.81
$ROA_{t-2,i}$	0.510	1.86
$\ln(TA_{it})$	0.120*	3.98
E_{it}/TA_{it}	-0.643*	-5.10
ROA_{it}^2	3.375*	3.33
$ROA_{t-1,i}^2$	-0.943	-0.84
$ROA_{t-2,i}^2$	0.019	0.02
$\ln(TA_{it})^2$	-0.004*	-3.27
E_{it}^2/TA_{it}^2	0.723*	5.20
Adjusted R ²		0.63

a The cut-off value for Tobin's Q is set at 0.7.

b Sector dummies are not shown but are included in the regression.

c TA_{it} is the book value of total assets of firm i in period t , E_{it} is the book value of equity, ROA_{it} is the ratio of earnings (before interest, taxes, depreciation, and amortisation) to total assets.

d Parameter estimates with an asterisk are significantly different from zero at the 95% confidence interval.

References

- Beck, T., Demirgüç-Kunt, A. and Maksimovic, V. (2002). "Financial and legal constraints to firm growth; does size matter?". World Bank Working Paper No. 2784.
- Berger, A.N. and Udell, G.F. (1992). "Some evidence on the empirical significance of credit rationing". *Journal of Political Economy*, (100:5), pp. 1047-1077.
- Berger, A.N., Saunders, A., Scalise, J.M. and Udell, G.F. (1998). "The effects of bank mergers and acquisitions on small business lending". *Journal of Financial Economics*, (50), pp. 187-229.
- Boot, A.W.A. (2000). "Relationship banking: what do we know?". *Journal of Financial Intermediation*, (9), pp. 7-25.
- Carpenter, R.E. and Petersen, B.C. (2002). "Is the growth of small firms constrained by internal finance?" *The Review of Economics and Statistics*, (84:2), pp. 298-309.
- Davis, S.J. and Haltiwanger, J. (1992). "Gross job creation, gross job destruction, and employment reallocation". *Quarterly Journal of Economics*, (107:3), pp. 819-863.
- European Commission. (2000). Observatory of European SMEs, sixth report.
- European Commission. (2000). Observatory of European SMEs, 2002, No.1.
- Eurostat (2001). "Enterprises in Europe", Eurostat' sixth report.
- Eurostat (2002). *SMEs in Europe; competitiveness, innovation and the knowledge-driven society; data 1996-2001*, 2002 edition, Eurostat, Luxembourg.
- Fazzari, S., Hubbard, R.G. and Petersen, B. (1988a). "Finance constraints and corporate investment". *Brookings Papers on Economic Activity*, (1), pp. 141-195.
- Fazzari, S., Hubbard, R.G. and Petersen, B. (1988b). "Investment, financing decisions, and tax policy". *American Economic Review*, (78), pp. 200-205.
- Fazzari, S.M., Hubbard, R.G. and Petersen, B.C. (2000). "Investment-cash flow sensitivities are useful: a comment on Kaplan and Zingales". *Quarterly Journal of Economics*, (115:2), pp. 695-713.
- Fendel, R. and Frenkel, M. (1998). "Do small and medium-sized enterprises stabilise employment? Theoretical considerations and evidence from Germany". *Zeitschrift für Wirtschafts- und Sozialwissenschaften*, (118), pp. 163-184.
- Frame W.C., Srinivasan A., and Woosley, L. (2001). "The effect of credit scoring on small-business lending". *Journal of Money, Credit, and Banking*, (33:3), pp. 813-825.
- Hayashi, F. (1982). "Tobin's marginal q and average q: a neoclassical interpretation". *Econometrica*, (50:1), pp. 213-224.
- Hinloopen, J. and Wagenvoort, J.L.M. (1997). "On the computation and efficiency of a HBP-GM estimator: some simulation results". *Computational Statistics and Data Analysis*, (25:1), pp. 1-15.
- Jappelli, T. and Pagano, M. (2002). "Information sharing, lending and defaults: cross-country evidence". *Journal of Banking and Finance*, (26), pp. 2017-2045.
- Kaplan, S.N. and Zingales, L. (1997). "Do investment-cash flow sensitivities provide useful measures of financing constraints?" *Quarterly Journal of Economics*, (112:1), pp. 169-215.
- Kaplan, S.N. and Zingales, L. (2000). "Investment-cash flow sensitivities are not valid measures of financing constraints", *Quarterly Journal of Economics*, (115:2), pp. 707-712.
- Maddala, G.S. (1983). *Limited-dependent and qualitative variables in econometrics*, Cambridge University Press, Cambridge, UK.

- Modigliani, F. and Miller, M.H. (1958). "The cost of capital, corporation finance and the theory of investment". *American Economic Review*, (48:3), pp. 261-297.
- Myers, S.C. (2001). "Capital structure". *Journal of Economic Perspectives*, (15:2), pp. 81-102.
- Nilsen, J.H. (2002). "Trade credit and the bank lending channel". *Journal of Money, Credit, and Banking*, (34:1), pp. 226-253.
- OECD (1997). "Small businesses, job creation and growth: facts, obstacles and best practices". DSTI/IND (21).
- Opler, T., Pinkowitz, L., Stulz, R. and Williamson, R. (1999). "The determinants and implications of corporate cash holdings". *Journal of Financial Economics*, (52), pp. 3-46.
- Stiglitz, J.E. and Weiss, A. (1981). "Credit rationing in markets with imperfect information". *American Economic Review*, (71:3), pp. 393-410.
- Sutton, J. (1997). "Gibrat's Legacy". *Journal of Economic Literature*, (35), pp. 40-59.
- UK Competition Commission (2002). "The supply of banking services by clearing banks to small and medium-sized enterprises.
- Wagenvoort, R. and Hurst, C. (1999). "How well do European loan markets work? Some insights from the financial structure of SMEs in three countries". *EIB Papers*, (4:2), pp. 64-86.
- Williamson, S.D. (1994). "Do informational frictions justify federal credit programs?". *Journal of Money, Credit, and Banking*, (26), pp. 523-544.