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## Firms' financing constraints: do perceptions match the actual situation?

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## WORKING PAPER SERIES

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### FIRMS' FINANCING CONSTRAINTS

### DO PERCEPTIONS MATCH THE ACTUAL SITUATION?

Annalisa Ferrando and Klaas Mulier



In 2013 all ECB  
publications  
feature a motif  
taken from  
the €5 banknote.



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## **Abstract**

This paper uses a non parametric matching procedure to match survey replies to balance sheet information. It draws on the SAFE survey on access to finance for a sample of 11886 firms in the euro area which are matched with their nearest neighbour in an extended dataset with balance sheet information on 2.3 million firms. We investigate the role of firm characteristics with respect to the experience of facing financing obstacles in the period 2009-2011. We distinguish between firms' perceived financing constraints and actual financing constraints. We find that more profitable firms are less likely to face actual financing constraints. Also firms with more working capital and lower leverage ratios are less likely to be actually financially constrained, however profitability measures seem to be more robust. Firms are more likely to perceive access to finance problematic when they have more debt with short term maturity. Finally, firm age, but not size, is important in explaining both the perceived and the actual financial constraints.

**Keywords:** SMEs, financial constraints, survey data, statistical matching of data

**JEL classification:** E22, G30, G10, O16, K40

## Non-technical summary

This paper investigates which firm characteristics (financial and non-financial) are correlated with the firm's self reported financing constraints in order to get a better understanding of the nature of financing constraints during the recent financial crisis.

We take the Survey on the Access to Finance of small and medium-sized Enterprises (SAFE) and use a nearest neighbour non-parametric matching procedure to match the firms in this dataset with financial accounts taken from the large AMADEUS dataset which contains balance sheet and profit & loss account information of firms. This way we obtain a unique dataset with direct information on the firm's financing constraints combined with financial and non-financial characteristics.

We derive two measures of financing constraints from the survey: perceived financing constraints and actual financing constraints. Perceived financing constraints are measured through firms' self-assessment on whether access to finance constitutes their most pressing problem. Actual financing constraints is a more objective measure of financing constraints which is related to the firms' actual applications for external financing. It is then investigated whether the firms that self-report to be financially constrained have different characteristics than financially unconstrained firms.

Our empirical results based on a bivariate probit model show that various measures related to the profitability of the firm are more significant and robust in predicting the actual financing constraints encountered by firms than liquidity or leverage ratios. Firms with higher return on equity, higher profit margins and higher coverage ratios are less likely to have their actual application for external finance rejected. Further, firms that finance a higher share of their assets with short term debt are more likely to perceive access to finance as problematic. This is due to the fact that these firms need to roll over a high share of their debt yearly and they expect that this might become very difficult or costly when market conditions turn for the worse. Finally, we show that firm age, but surprisingly not size, is negatively related with

perceived and actual access to external finance. We show that this can be due to the fact that small firms appear to select themselves out of the loan-application process due to ‘fear of rejection’.

The results indicate that firms should strive for the highest profitability possible and should ponder on the desired maturity structure of their debt. Still, policy makers should be aware that firms may also be discriminated on the basis of age. Further research is desirable to confirm the peculiar role that size might play for the self-selection out of the loan-application process.

# 1 Introduction

The financial positions of firms and the access to external finance of firms are crucial for the investment in and the development of an economy. This statement has become conventional wisdom in the finance literature. Most contributions to this literature have either used balance sheet data to show the link between (constrained) investment or growth and financial characteristics (Fazzari et al., 1988, 2000; Carpenter and Petersen, 2002), or survey data to show the link between perceived financing constraints and growth (Beck et al., 2006; Brown et al., 2011). Unfortunately, the first strand is lacking direct information on the financing constraints that firms face, while the second strand lacks balance sheet and profit and loss account data of the firms investigated. Therefore it has not yet been possible to relate financing constraints to the financial positions of firms. Yet, the existence of this link is crucial for the relevance of the policy recommendations made in the two strands of the literature stated above. A number of authors have tried to fill this gap by using survey data to construct an index of financing constraints and then applied this formula to a second dataset with balance sheet information, in order to relate this index to firm level investment or growth (Lamont et al., 2001; Coluzzi et al., 2012; Hadlock and Pierce, 2010).<sup>1</sup>

This paper attempts to fill this gap by taking the opposite approach, namely we match data from a large dataset containing balance sheet information with the ‘nearest neighbour’ data from a survey on financing constraints. This way we obtain a unique dataset containing direct information on the financing constraints that firms face linked with the financial characteristics of those firms. Moreover, the survey that we use for our analysis was conducted during the financial crisis, which makes financing constraints likely to be present and therefore this creates an excellent opportunity to examine the link between financial characteristics and financing constraints.

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<sup>1</sup>See Silva and Carreira (2012) for an overview on the literature related to measuring financial constraints.

We draw on the Survey on the Access to Finance of small and medium-sized Enterprises (SAFE)<sup>2</sup> for a sample of more than 10.000 firms in the euro area and try to match these firms with their balance sheet information in the Bureau van Dijk Amadeus database (containing approximately 2.3 million firms). The main challenge is that the identity of the firms in the SAFE survey -as with most surveys- is confidential, and thus we need to develop a statistical matching approach based on characteristics common in both datasets to overcome the identity problem. In order to maximize the use of the data available in the survey, the non-parametric Nearest Neighbour Distance Hot Deck (NNDHD) matching procedure as suggested by D’Orazio et al. (2006) is applied. Then, using this unique dataset, we investigate which financial and non-financial characteristics are correlated with financial constraints. This way we hope to get a better understanding of the nature of financial constraints.

From the survey results we measure financing constraints through firms’ self-assessment on whether access to finance constitutes their most pressing problem. We also consider a more objective measure of financing constraints which is related to the results of firms’ actual applications to external financing. To relate financing constraints to the financial positions of firms, we regress the two variables on a set of financial (profitability, liquidity, leverage) and non-financial (age, size) characteristics, which are commonly used in the literature to assess whether firms are financially constrained and control for the ownership of the firm, the year, and the country and sector in which the firm is located.

Our findings show that age and profitability are important for explaining access to external finance. Younger firms are more likely to perceive access to finance as highly problematic. Moreover, they are also more likely to face actual financing constraints. Firms with lower profit margins, lower return on equity or higher coverage ratios have a higher probability of facing actual financing constraints, but there is

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<sup>2</sup>The survey is conducted by the ECB and European Commission. See Ferrando and Griesshaber (2011) and Artola and Genre (2011) for a thorough analysis of the survey results.



no relation with the perceived problems of access to finance. On the contrary, the perceived financial constraints, but not the actual constraints, increase significantly when firms have more short term debt. Finally, we find some indications that firms with sufficient liquidity and firms with lower leverage ratios are less likely to be financially constrained. Although the latter findings are not robust when we include firm age and size in the regressions, the analysis indicates that information derived from "hard" data is useful to determine the probability that firms perceive and face actual financial constraints.

The remainder of the paper is organized as follows. Section 2 describes the data sources and the methodology used in the matching procedure. Section 3 introduces the measures of financial constraints as derived from the survey and from the financial accounts with a quick glance to the existing literature on financial constraints. The section also includes a first comparison of the characteristics of firms that are self-reporting financing constraints. Section 4 describes the empirical results while section 5 includes some robustness checks. Section 6 concludes.

## 2 Data and methodology

The two main data sources for our analysis are the ECB and European Commission survey on access to finance of small and medium-sized enterprises (SAFE) and the AMADEUS database gathered by Bureau van Dijk.

The SAFE has been carried out eight times between the summer of 2009 and March 2013. It contains firm-level information mainly related to major structural characteristics (size, sector, firm autonomy, turnover, firm age and ownership) as well as to firms' assessments of recent short-term developments regarding their financing needs and access to finance<sup>3</sup>. The sample contains only non-financial firms, excluding

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<sup>3</sup>A report containing the main results of the survey is published in the ECB website every six months. For more information regarding the survey as well as the reports on the individual waves see

those in agriculture, public administration and financial services. For the purposes of our analysis, we draw on the second, the third and the fifth wave of the survey<sup>4</sup>, which are covering the developments of the second half of 2009, and the second and third quarter of 2010 and 2011, respectively. This period is marked by the financial crisis, which has left deep scars in the financial markets. Moreover, the at that time emerging debt crisis also put serious pressure on the profitability of the banking sector, making the general conditions for firms to access external capital in the euro area very tough<sup>5</sup>. Pooling together the three waves allows us to have a panel with 13291 observations of which most firms are only present once, making it a highly unbalanced sample<sup>6</sup>. We consider firms from countries in the euro area, and due to data availability the final sample includes firms from Belgium, Finland, France, Germany, Greece, Italy, the Netherlands, Portugal and Spain.

Balance sheet information is derived from the complete AMADEUS database. This is a comprehensive, pan-European database containing financial information on over 10 million public and private companies. The information is collected by specialised national service providers and is homogenised applying uniform formats in order to allow accurate cross-country comparisons. We select non-financial corporations in the euro area in 2008, 2009 and 2010<sup>7</sup>. After performing some data filtering in order to clean the data (see the appendix for more details), we obtained an unbalanced panel of approximately 2.3 million firms and 3.2 million observations.

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<http://www.ecb.europa.eu/stats/money/surveys/sme/html/index.en.html>.

<sup>4</sup>Because we match with yearly balance sheet data, we use only one wave per year that corresponds best to the balance sheet data. For instance, the first and the second wave cover the same accounting year, so we choose to retain the second. The fourth wave of SAFE covers the last quarter of 2010 and the first quarter of 2011, and thus leaves the question to which accounting year that this wave corresponds.

<sup>5</sup>See the results of the ECB's bank lending survey in January 2010 and October 2010. <http://www.ecb.europa.eu/stats/money/surveys/lend/html/index.en.html>

<sup>6</sup>See Table 1 and Figure 1 in the appendix for more details on the composition of our panel.

<sup>7</sup>We match the survey data of a given year with balance sheet data of the year prior to the survey year. For example, we match the 2008 balance sheet data with the second half of 2009 survey data. The rationale is that these are the most recent balance sheet data that firms had available to convince financial intermediaries to provide them external finance.

115.000 firms are present in all years, 674.000 firms are present in two years, and 1.5 million firms are present only once.

## 2.1 Construction of the matched panel

We use the non-parametric Nearest Neighbour Distance Hot Deck (NNDHD) matching to match each firm in SAFE with its 'nearest neighbour balance sheet' in Amadeus.

The procedure applies as follows. First, we classify all firms in SAFE and in Amadeus in a priori defined groups so that firms from one dataset can only be matched with firms in the same group in the other dataset. The groups take into account the following characteristics, which are mainly derived from the structural characteristics of the SAFE: nationality, sector, turnover-class and year. Both in SAFE and Amadeus, we consider firms located in Belgium, Finland, France, Germany, Greece, Italy, the Netherlands, Portugal or Spain. In these countries we identify seven sectors: mining; construction; manufacturing, wholesale and retail trade; transport and storage; real estate; and other services to business and persons. Further, within each sector, firms are grouped according to their yearly turnover: turnover lower than 2 million euro; between 2 million euro and 10 million euro; between 10 and 50 million euro; and higher than 50 million euro. Finally, firm-year observations belong to 2009, 2010 or 2011. The specification of 9 countries, 7 sectors, 4 turnover-classes and 3 years leads to a maximum of 756 groups, and each firm-year observation in SAFE and in Amadeus belongs to one of these groups. It is important to note that this classification ensures us that, for instance, a Belgian manufacturing firm with 5 million euro turnover that responded to the SAFE survey in 2011 can only be matched with a firm in Amadeus that is a Belgian manufacturing firm with turnover between 2 and 10 million euro in 2010. Table 2 describes how rich the Amadeus dataset is to match with. For instance, a French firm in SAFE has on average 43126 possible matches available in Amadeus, but there is a group in France for which a firm in SAFE has only 42 possible matches in the same group in Amadeus and there is a group in France for which a firm in SAFE has 94929 possible

matches in the same group in Amadeus.

Table 2 HERE

In a second step, we apply the NNDHD matching procedure within the identified groups on the basis of the number of employees and the exact age of the firm, using the Gower distance function<sup>8</sup>. This procedure computes the distance  $d_{S,A}$  among the values in vector S (for SAFE) (for both variables, age and number of employees) and all n rows of A (for Amadeus) (the same 2 variables (age and employees) observed on n firms) averaged over all years T that the firm is present, and then matches the firm from the SAFE with the firm from Amadeus with the smallest distance:

$$d_{S,A} = \frac{1}{T} \sum_{t=1}^T \left[ \frac{1}{2} \frac{|X_S^{age} - X_A^{age}|}{Range^{age}} + \frac{1}{2} \frac{|X_S^{empl} - X_A^{empl}|}{Range^{empl}} \right] \quad (1)$$

This means that within a certain group, a firm in SAFE is matched with the firm from Amadeus that is the best match in terms of age and number of employees for all available years. If a firm in SAFE can be matched with several firms in Amadeus that have the same minimum distance, then one of these firms is chosen at random. In the sample, the number of available matches at minimum distance ranges from 1 to 1279 firms. In 31% of the matches, the minimum distance is zero, implying a perfect match in terms of group, age and number of employees.<sup>9</sup> Further, the Gower distance has the attractive feature that the distance is normalised between zero and one, allowing some interpretation of the distance obtained. 77% of our matches has a distance less than 0.01, indicating a close match.

One obvious drawback of the matching is that one can never be completely certain that the firm from SAFE would have the same financial characteristics as the firm from Amadeus that it is matched with. However, we believe that we can overcome this problem with the careful setup of the panel. Financial characteristics of firms

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<sup>8</sup>See D’Orazio et al. (2006) for programming details.

<sup>9</sup>Note that by construction there will always be a perfect match in terms of group.

are generally specific to the turnover class, the age of the firm, the sector that the firm operates in, and to a lesser extent the country of residence. On the contrary, the financial characteristics vary much less within these groups and the same holds for the variation in perceived problems of access to finance in the survey. Table 4 shows that the variance of the financial characteristics is smaller within a group than within the total sample in 78% of the cases.<sup>10</sup> By only allowing matching within the groups identified in the previous section, we avoid that firms in the survey would be matched with firms that generally have different financial characteristics. Table 3 further illustrates this importance. It can be seen in the second and third column that the experience of financial constraints, which we derive from the survey, decreases with the turnover class of the firm and depends on the year. Column four and five of Table 3 uses balance sheet information to show that financial characteristics also depend on the groups defined. For instance the debt burden, which can be seen as the interest rate that firms pay on their debt, decreases with size of the firm's turnover and also decreased during the crisis period, in line with the decrease of the ECB's main policy rate. Additionally, firms with high turnover appear to have lower cash holdings and during the crisis firms have tried to increase their cash balances as they try to take precautionary measures. Therefore, it will be important to restrict the matching to within the 756 groups.

Tables 3 and 4 HERE

Moreover, taking a closer look at the matched panel also provides some evidence that validates the matching strategy. In question Q2 of the survey firms are asked whether their profit margin has increased, remained unchanged or decreased in the past six months. The comparison of their answers to the actual profit margin after the matching shows in Table 5 that, indeed, those firms that signalled an increase in their profit margin display a higher profit margin than the other firms in the matched sample. In question Q2 firms are also asked whether their turnover has

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<sup>10</sup>See Tables 8 and 6 for a definition on the financial characteristics and financing constraints.

increased, remained unchanged or deteriorated during the past six months. After the matching we find that the sales growth of firms that indicated an increasing turnover is significantly higher than other firms. Additionally in question Q2 firms are asked whether their net interest expenses have increased, remained unchanged or decreased during the past six months. Table 5 reveals that firms, for which the interest expenses increased, pay significantly more interest on their debt than the other firms. Further, in question Q4(e) firms indicate if they have used trade credit in the past 6 months or not. Comparing the answer of the trade credit use in question Q4(e) to the actual trade credit (measured as a percentage of total assets or as a percentage of total sales) of the firm after matching, shows in Table 5 that firms that did not use trade credit in the past six months hold significantly less trade credit on their balance sheets.

Table 5 HERE

### **3 Assessing financing constraints**

#### **3.1 Measures derived from survey data**

Following Ferrando and Griesshaber (2011), the presence of major financing obstacles is measured via the following question (Q0 in the questionnaire): "What is currently the most pressing problem your firm is facing?". Firms could choose among a set of potential problems ranging from finding customers and the presence of competition to increased costs of production of labour and the presence of regulation. Firms that choose the "Access to Finance" from the provided options are then considered as facing major financing obstacles. It is important to note that the wording of the question in SAFE is very different from the wording of the surveys used in the preceding literature (Beck et al., 2006). SAFE asks respondents to pick the most

pressing problem from a set of seven different possibilities, whereas the other surveys typically ask firms to rank a given problem on a certain scale (e.g. 4, major obstacle to 1, no obstacle, see Beck et al. (2006)). Consequently, in SAFE we do not observe the actual levels of financing obstacles within a firm as well as whether access to finance is the second most pressing problem or the third most pressing, etc. (firms cannot signal more than one problem), whereas we consistently observe the degree of financing obstacles in the other surveys. In this way it could be that we underestimate the existence of firms that consider access to finance as a pressing (although not the most pressing) problem in our sample. Nevertheless, our measurement has a bright side as we avoid the danger of bias caused by possible tendencies of some firms to give generally more negative (or positive) evaluations. In the SAFE, firms are forced to put the existence of financing obstacles in relation to other potential problems. Therefore, their answer is more likely to reflect a serious problem or obstacle that the respective firm is facing.

However the reply may of course only be based on the general perception of the respondent and is not a priori based on its actual experience. An alternative way to identify firms facing financing constraints can be based on their actual experience in applying for either a loan, trade credit or other external financing tools. Indeed, respondents to the SAFE survey are being asked in questions Q7A and Q7B whether they have applied or not for a bank loan and whether they were successful in getting any type of financing, and what was the reason not to have applied for external finance. From these questions we generate our two main categorical variables of interest: *perceived financing constraint* (perceived FC) and *actual financing constraint* (actual FC)(See Table 6).

Table 6 HERE

Perceived FC takes the value 1 when a firm has chosen ‘access to finance’ as its most pressing problem, and 0 otherwise. Importantly, access to finance seems to be a persistent variable in our short panel. More than 51 percent of the firms that chose access to finance as most pressing problem signalled that it was still the main problem

during the next wave. Moreover, 92 percent of the firms that did not signal access to finance as most pressing problem in one wave also did not in the following wave. The second variable, actual FC, is also a categorical variable and takes the value 0 when a firm has successfully applied for a source of external finance<sup>11</sup> (i.e. no obstacle), and 1 when a firm has applied but the application has been rejected or when a firm received only a part of the finance it has requested. Actual FC also takes the value 1 when a firm had to refuse a loan because the costs were too high or the terms and conditions were too bad. Also for this variable we find persistence in the sample: 74 percent of the firms that faced actual financing constraints in a given wave encountered the same problems almost a year after, and around 79 percent of the firms without problems in one wave reported similarly in the following wave. Table 7 shows the percentage of firms that perceived access to finance as the most pressing problem or that actually encountered problems to access external financing sources as reported by the survey. Major heterogeneities are clearly related to the geographical environment. In general it can be noted that firms located in the southern European countries suffer more from financial constraints. Some differences can be noted at country level as a higher percentage of Dutch and Belgian firms encounter actual financing constraints relative to their perceived financing constraints. Note that actual financing constraints has much less observations. This is mainly because many firms indicated that they did not apply for external finance because they have sufficient internal funds at their disposal. As they did not demand external funds, we cannot discriminate whether they face external financing constraints or not, and they are therefore not taken into account. We also did not take firms into account that acknowledged that they did not apply for external finance because they feared a possible rejection. However, a sensitivity test where the firms that feared a possible rejection are included in the variable actual financing constraint will shed some interesting light on the role of firm size for financial constraints, but we will come back to this later.

Table 7 HERE

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<sup>11</sup>This includes bank loans, trade credit and other external financing sources. Other external financing sources include equity or debt issuance, leasing, factoring and loans from other lenders.



### **3.2 Determinants of financial constraints using firms' accounts and firms' characteristics**

The way financial constraints are measured is a very sensitive issue in the literature investigating the link between financial variables and firm behaviour. Theory offers only limited guidance in this domain, so that a clear-cut consensus has still to emerge. The theoretical model of Myers and Majluf (1984) shows that firms may give up valuable investment opportunities when internal sources of funds are not sufficient. Consequently, the higher sensitivity of investment or firms' growth to internal sources was taken as evidence for the presence of financing constraints (Fazzari et al., 1988, 2000; Carpenter and Petersen, 2002). However, after the seminal paper of Kaplan and Zingales (1997, 2000), several studies have criticised the empirical test based on the cash flow sensitivity. One of the arguments has been that even financially successful firms may rely systematically on internal sources of financing because of factors not related to the unavailability of low cost external funds, and consequently they may exhibit high investment-cash flow sensitivity. Additional critiques have been put forward by Ericson and Whited (2000); Altı (2003); Bond et al. (2004), all arguing that the cash flow already contains information about a firm's investment opportunities. A different way of testing the presence of financing constraints focuses on the role played by the cash flow sensitivity of cash holdings (Almeida et al., 2004).

Alternative strategies consist of simply classifying firms according to various proxies of informational asymmetries (as these represent the main source of financial market imperfections). Hence, variables such as size, age, dividend policy, membership in a group or conglomerate, existence of bond rating, and concentration of ownership are used to capture ways to cope with imperfect information, which hinders access to capital markets (see for instance Gertler (1988); Devereux and Schiantarelli (1990); Hoshi et al. (1991); Bond and Meghir (1994); Gilchrist and Himmelberg (1995); Schiantarelli (1995); Cleary (2006)).

In this paper we rely on a set of measures of financial constraints that take into

consideration the above-mentioned contributions to the literature. The set comprises profitability ratios, liquidity ratios, leverage ratios and variables that typically proxy the presence of asymmetric information. We are aware of the shortcomings in these measures. For instance, they often capture one dimension of access to financial markets: a firm may be liquid but nonetheless present a bad financial situation; on the other hand strong fundamentals may compensate for a temporary shortage of liquid assets. Similarly, a high leverage, while signalling potential dangers, suggests also that the firm has enjoyed, at least in the recent past, wide access to external financial funds. Hence, one could argue that highly leveraged firms are not always financially constrained. In the next section we discuss the financial indicators used in the empirical analysis and their expected relation with financial constraints.

### 3.2.1 Profitability

More profitable firms should have easier access to external finance as they generate more cash flow which increases the likelihood that they will be able to repay their loans. At the same time, more profitable firms have more internal funds at their disposal which might decrease their actual demand for external funds. It is therefore important to note that in this paper we control for this demand effect by excluding those firms that replied they were not searching for external finance because of sufficient internal funds from our dependent variable actual financing constraint. The effect that we measure is therefore the impact of profitability on the willingness of financial intermediaries to grant external finance to firms. First, the *return on equity*, measured as the ratio of profit/loss for the period scaled by total shareholder funds, indicates the firm's efficiency in generating value for its shareholders and can be considered as a general indicator of a firm's solvency. A second variable that we construct is the *coverage ratio* which measures the operating risk of the firm and is calculated as the ratio of operating profits (or loss) to interest paid. If it's greater than 1 it means that the firm generates sufficient operating profits to cover the interest expenses on its debt. (Guariglia and Mateut, 2006; Carbò-Valverde et al.,

2011) Finally, we test whether the *profit margin* is an important determinant of perceived or actual financing constraints. The profit margin is constructed as the ratio of net profits/losses for the period to total sales. We expect that firms that are able to generate more euro profits per euro sales will be less likely to perceive access to finance as problematic. Moreover, as high profit margins are sometimes related to market power (Petersen and Rajan, 1997), these firms can more easily increase their surplus when needed, and are therefore less likely to default and face actual financing constraints.

### 3.2.2 Liquidity

As argued by Holmström and Tirole (2000), firms need to manage their liquidity balances such that they can continue their investment and production plans even in the occurrence of a negative liquidity shock. By discontinuing its investments the firm lowers its expected future profits which increases its likelihood of default and thus increases the probability that banks will be unwilling to supply external finance. Generally, the importance of working capital and the value of cash in the presence of financial constraints have been highlighted by several authors (Fazzari and Petersen, 1993; Faulkender and Wang, 2006; Dasgupta and Sengupta, 2007). To test these theories, we first measure the firm's *working capital* as current assets less current liabilities, scaled by total assets. Secondly, we calculate the *working capital required* as the sum of the firm's inventories and accounts receivable less accounts payables, again scaled by total assets. Finally, by measuring the firms *cash position* as the amount of cash and cash equivalents scaled by total assets, we investigate the role of the firm's cash.

### 3.2.3 Leverage

The positive relation between leverage and default probability follows from the rationale that firms with higher debt-to-asset ratios need higher profits to be able to repay

their debt, and are therefore more likely to default. This relationship is also reflected by the firm's rating in case the firm has one (Molina, 2005). We first measure the firm's *leverage* by its debt-to-assets ratio, and expect a negative relation with the actual financing constraint that firms face. The expected relation between leverage and perceived financing constraint is twofold. On the one hand, a high leveraged firm might feel unconstrained as it holds a lot of debt on its balance sheet, but on the other hand, this might make it difficult or costly for the firm to find new debt.

As cash is commonly viewed as negative debt, most valuation models subtract the amount of cash from the level of outstanding debt to know the firm's 'true' leverage. The reasoning is that firms can use their cash to reduce their debt immediately. They might choose to do so when the cost of borrowing is significantly higher than the yield on cash, and increasing debt when a new investment project arises is not a constraint. However, Acharya et al. (2007) showed that even constrained firms might use excess cash flows to reduce their debt, rather than to transfer the cash to future periods. Therefore, we construct a new variable: *leverage cleaned*, which subtracts the firm's cash from its total outstanding debt, and scales that by total assets.

The maturity structure of the firm's outstanding debt can play a role in the firm's perceived access to finance. Firms that finance a high share of their assets with short term liabilities need to roll over a high share of their debt yearly, which might become very costly when market conditions turn for the worse. Indeed, Love et al. (2007) showed that firms with higher short term debt to asset ratios were more vulnerable to financial market imperfections during the East-Asian financial crisis. To test the importance of this in the euro area during the global financial crisis, we construct the variable: *short term loans*, which is the amount of debt (loans and marketable securities) maturing at the end of the year scaled by the firm's total assets.

### 3.2.4 Asymmetric information

Gertler (1988) was one of the first to argue that firm age is an important determinant of financial constraints. The rationale for this is that more mature firms are more

likely to have successful track records and may enter repeated relations with lenders, both mitigating the problem of information asymmetries and thereby decreasing the probability of being financially constrained. Additionally, the literature suggests that small firms, which are characterised by a small amount of collateral relative to their liabilities, tend to have more problems to access external finance (Schiantarelli, 1995). Hence, small-sized enterprises (Berger and Udell, 2005) and young enterprises (Rauh, 2006; Fee et al., 2009) face different and often greater financing problems than public, large and more mature firms. More recently, Hadlock and Pierce (2010) focus on the importance of the combination of firm size and age as predictors of potential asymmetric and contracting problems. In order to determine the relevance of the financial ratios derived in the above sections on financing constraints, it would be important to control for the age and size of the firm. Thus, we consider both the *log of age* and the *log of total assets*.

Table 8 shows the definitions of the above mentioned set of variables that we use in the regression analysis and Table 9 reports their respective descriptive statistics.

Table 8 and 9 HERE

### 3.3 What are financially constrained firms like?

Before turning to the empirical section, we perform a simple t-test on the equality of the means of the groups defined by our variables of interest. Do firms that signalled access to finance as main problem have other characteristics than firms that indicated another problem as most pressing problem? And what about firms that face actual financing constraints? Table 10 reveals that firms that signal access to finance to be their most pressing problem and firms that face actual financing constraints have similar characteristics. Namely, they seem to be significantly less profitable as measured by their return on equity, coverage ratio or profit margin. They also tend to be less liquid, more specifically they have significantly less working capital and less working capital required. Further, they finance a higher share of their assets with

short term loans and have a higher debt to asset ratios, even when debt is cleaned for cash holdings. Finally, they appear to be younger and smaller than unconstrained firms. Almost all of these findings are in line with our expectations and can hence, in our view, also be seen as a validation of the matching strategy.

Table 10 HERE

## 4 Empirical results

Our empirical analysis aims to investigate the existence of underlying factors that determine both firms' perception of financing constraints and firms' actual financing constraints. In particular we are interested to analyse the relative importance of financial characteristics (as derived from balance sheet and profit and loss accounts) versus non-financial characteristics (as derived from the survey). For this reason we model the probability of firms facing financing constraints as a linear function of the characteristics available from our two different data sources:

$$\begin{aligned} PerceivedFC_{i,t} = & \alpha_0 + \alpha_1 FinancialRatio_{i,t} + \sum_j \alpha_j FirmControls(j)_{i,t} + \\ & \sum_k \alpha_k Country_k + \sum_s \alpha_s Sector_s + \sum_t \alpha_t Year_t + \epsilon_{i,t} \end{aligned} \quad (2)$$

$$\begin{aligned} ActualFC_{i,t} = & \beta_0 + \beta_1 FinancialRatio_{i,t} + \sum_j \beta_j FirmControls(j)_{i,t} + \\ & \sum_k \beta_k Country_k + \sum_s \beta_s Sector_s + \sum_t \beta_t Year_t + \mu_{i,t} \end{aligned} \quad (3)$$

where *PerceivedFC* and *ActualFC* are the responses by firm *i* at time *t* that indicates access to finance as most pressing problem and the actual financing constraints faced, respectively. *FinancialRatio* is the set of ratios that summarises the financial

conditions of the firm, as elaborated in section 3.2.1 to section 3.2.3. *FirmControls* is a vector of major firm attributes, namely ownership structure, firm age and size.<sup>12</sup> *Country* is a vector of country dummies to control for country-specific impacts on firms' responses. *Sector* is a vector of sector dummies, controlling for sectoral specific effects of financial constraints and *Year* is a set of year dummies. Given that both dependent variables are dichotomous, we consider a probit model to estimate the two equations (as in Ferrando and Griesshaber (2011)). We assume that the disturbance parameters,  $\epsilon_{i,t}$  and  $\mu_{i,t}$ , have a normal distribution and use standard maximum likelihood estimation. Moreover, we use a bivariate probit model as it is likely that the two dependent variables -which are two different aspects of the problem of accessing finance- are correlated and determined from a similar set of explanatory variables. Formally, we consider that the two equations are simultaneously estimated under the assumption that:

$$COV(\mu_{i,k,t}, \epsilon_{i,k,t}) = \rho \neq 0$$

As explained in the literature (Poirer, 1980), the use of a bivariate probit estimation is more efficient than the use of two independent equations when the error terms of the two decisions are correlated. The results show that the assumption of a correlation in the errors is valid (See Tables 11-15) as  $\rho$  is statistically different from zero and equal to 0.6. As expected, firms that faced actual financing constraints between the last six months of 2009 until the third quarter of 2011 tend to report that access to finance was the most pressing problem.

Tables 11 to 13 HERE

Our estimation strategy is as follows. We consider the impact of the set of financial indicators as grouped in section 3.2. Hence we have a table with the estimation

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<sup>12</sup>In the estimations we always control for ownership, in a second set of regressions we also include firm age and firm size as controls.

results for the set of indicators related to profitability (Table 11), liquidity (Table 12), and leverage (Table 13). In a second step we consider two different sets of profitability/liquidity/leverage together (Tables 14 and 15). In each table we distinguish two panels. Panel A includes country, sector and year dummies as well as a control dummy for ownership. The latter takes the value 0 if a firm is owned by shareholders, other firms or business associates and the value 1 if the owner is a single person, a family, or when the firm has venture capital or business angel funding. In Panel B we also include firm age and firm size as additional controls.

Focusing first on the variables that measure the profitability of the firm, panel A of Table 11 shows that firms with a lower return on equity or a higher coverage ratio are more likely to face actual credit constraints. The profit margin of the firm seems to be important in explaining the likelihood of both the perceived access to finance and the actual financing constraint. Firms with higher profit margins are less likely to perceive access to finance as their most pressing problem; moreover they are also less likely to face actual financing constraints. Panel B indicates that the profit margin no longer appears to be significant for the perceived financing constraints once controlled for age and size. Further, panel B shows that all three profitability measures -the return on equity, the coverage ratio and the profit margin- are significantly related to the experience of actual financing constraints, even after controlling for size and age. This finding shows that the balance sheet channel might play an important role in transmission mechanism of monetary policy. Namely, a decreasing policy rate is associated with lower costs of funding (see for instance Table 3 the decline in the debt burden over the sample period), which should contribute positively to the profitability of firms and hence their net worth increases, leading to a lower probability of facing a constrained supply of credit.

Table 12 shows the results for the variables that capture the liquidity of the firm. Panel A and B reveal that firms with better liquidity positions as measured by working capital, are less likely to be constrained in their actual applications for external finance or to perceive access to finance problematic, even after controlling for



age and size. Surprisingly, the more narrow definition working capital requirement or the cash holdings of firms do not seem to contain information regarding the perceived and actual financing constraints.

The impact of leverage on financial constraints is shown in Table 13. Panel A shows that firms with higher leverage are more likely to perceive access to finance as most pressing problem as well as to face actual credit constraints. The same is found for the leverage cleaned variable, where debt is reduced by the cash holdings. However, once we control for age and size, panel B indicates that leverage is not significant anymore. In contrast to what we expected, the amount of short term debt seems to play no significant role in the perceived and actual financing constraints.

In a last set of tests, we jointly estimate a model with a significant profitability, liquidity and leverage measure. Tables 14 and 15 show that the conclusions drawn above generally hold. Firms with higher return on equity are less likely to face actual financing constraints and firms with more working capital are less likely to perceive access to finance problematic or face financing constraints. Leverage appears to be no longer significant once controlled for the profitability and liquidity of the firm.

Table 14 and 15 HERE

Further, firm age, but not firm size, is significant and negatively related to both our measures of financial constraints. Younger firms are not only the ones that perceive access to finance as their most pressing problem, they are also more likely to face actual financing constraints. This is in line with the recent findings of Berger and Udell (2005); Rauh (2006); Fee et al. (2009); Hadlock and Pierce (2010) and indicates that capital market imperfections play an important role. It is however remarkable that, in contrast to these authors, we do not find a strong significant impact of firm size.

For the regressions in Tables 14 and 15 we computed the marginal effects in order to evaluate the average effects of the financial and non-financial variables on the probability of firms of perceiving and having actual financing constraints. Table 16

(17) reports the marginal effects for the estimations of Table 14 (15). According to our findings, the impact of working capital and return on equity on the probability of having problems to access external finance is stronger than the impact of age. This indicates that financial characteristics are at least equally important in explaining financial constraints as non-financial characteristics.

Table 16 and 17 HERE

To investigate further the role played by size, we redefine our dependent variable related to the actual financing constraints by including those firms that ‘did not apply out of fear of rejection’ and set the variable *ActualFC*=1 in that case. In this case the variable size is strongly significant in all regressions and takes a negative sign, while the magnitude of the other variables remain largely unchanged (see Table 17).<sup>13</sup> This indicates that those firms that are selecting themselves out of the loan-application process are especially small firms.

Table 18 HERE

Finally, we take a look at our control variables (For brevity, the ownership dummy, country dummies, sector dummies and time dummies are not shown in the tables, but were always included in the regressions). The ownership dummy is significant and positively related to both perceived financing constraints and actual financing constraints. This stresses the importance of the role of ownership and the existence of internal capital markets for the financial constraints that firms belonging to groups (do not) face. Country dummies with SMEs located in Spain and Greece are facing significantly higher constraints than firms in Belgium (which is our reference country in the estimation). We control also for the sectors of SMEs but sectoral dummies are almost never significant. As for the time dummies, it is found that firms are more

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<sup>13</sup>Table 17 shows this for one regression, the other regressions are not shown here for brevity but are available upon request from the authors.

likely to face actual constraints in 2010 and 2011 relative to 2009. The time dummies show no significant differences across time concerning the perceived access to finance.

In sum, we find that financial characteristics can explain self-reported financial constraints by firms. This implies that firms should thoroughly consider their financial decisions. However, also firm age plays a large role for financial constraints. Small firms appear not to apply for external finance ‘out of fear of rejection’, although we find no evidence that they have different financial characteristics. Therefore, they are not less likely to obtain finance than other firms with the same age or financial characteristics and thus they should be encouraged to actually apply.

## 5 Robustness

Our matching strategy randomly picks a match when multiple matches are available at the same minimal Gower distance. This random feature is appealing as it does not create any unwanted dependency in our sample; however, it also implies that the characteristics of our matched sample may be partly specific to this randomness. Especially because approximately 37 percent of the matches involved a random draw between two or more corresponding firms.<sup>14</sup> And so, the estimated parameters and the inference based on our matched sample might be biased. Secondly, 13291 observations from the total euro area population might be a too small subsample, also leading to biased estimates. For these considerations, we bootstrap 200 subsamples with replacement from our full SAFE survey sample and redo the matching for every bootstrapped subsample. This leaves us with 200 ‘new’ samples from the total population, for which we then do the bivariate probit analysis. Tables 20 to 22 show the median parameter estimate found for these 200 bivariate probit regressions, and between brackets the 95 percentile confidence interval, given by the 2.5 and the

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<sup>14</sup>Table 19 in the Appendix shows that most multiple matches are available in those countries or sectors where most data is available in Amadeus (see Table 1).

97.5 percentile of that parameter estimate from those 200 estimates, to indicate the likelihood of the median parameter estimate.

Tables 20 to 22 HERE

It can be seen in Table 20 that our findings concerning profitability are quite robust. Especially after controlling for age and size, we find that firms with higher return on equity, with lower coverage ratio and with higher profit margins are less likely to face actual financing constraints. Again there seems to be no impact of profitability on the perceived financial problems. Looking at the effect of the liquidity ratios on our measures of financial constraints in Table 21, it can be seen that the results are less strong than what the analysis of the full matched sample suggested. Firms that lack working capital are more likely to face actual financing constraints and they are more likely to put access to finance as their main problem, however, this relation seems to be insignificant once controlled for the age and size of the firm. For the working capital required and the cash balances we find again no significant role. Further, Table 22 shows that firms with higher leverage ratios have a higher probability of being financially constrained. This finding does not hold when we take into account that cash may be viewed as negative debt and calculate the leverage cleaned for cash holdings, and both leverage measures are not significant when we control for firm age and size. Interestingly, the importance of the maturity structure of the debt seems to be more clear once controlled for the potential bias related to multiple matches. Firms that finance a high share of their assets with short term liabilities are more likely to have the perception that access to finance is difficult; presumably because they need to roll over a high share of their debt yearly during a financial crisis. This perception is still significant after controlling for size and age. The results from the bootstrapped panel regressions also indicate that age is an important determinant of financial constraints. Younger firms are significantly more likely to perceive and face actual financing constraints. Size does again not seem to be significant.

Table 23 HERE

In a final test, we jointly estimate a model with profit margin, working capital and short term loans. Table 23 shows that the conclusions drawn above mainly hold. Firms with higher profit margins are less likely to face actual financing constraints and firms that finance a higher share of their assets with short term loans are more likely to perceive access to finance problematic, taking into account the age and size of the firm.

## 6 Conclusion

The main aim of this paper was to investigate the role of financial and non-financial firm characteristics to get a better understanding of the nature of perceived and actual financing constraints during the recent financial crisis. Its novelty is related to the availability of a unique dataset containing direct information on financing constraints as reported by firms in the SAFE survey and the financial characteristics of those firms. To obtain this dataset we use a non parametric matching procedure to match 11886 firms from the SAFE survey dataset with their balance sheet information out of the Amadeus dataset with 2.3 million firms.

Perceived financial constraints are measured through firms' self-assessment on whether access to finance constitutes their most pressing problem. We also consider a more objective measure of financing constraints which is related to the firms' actual applications for external financing. It is then investigated whether the firms that self-report to be financially constrained have different characteristics than financially unconstrained firms.

Our empirical results based on a bivariate probit model show that various measures related to the profitability of the firm are more significant and robust in predicting the financing constraints encountered by firms than liquidity or leverage ratios.

The finding that more profitable firms are less likely to face actual external financing constraints can be seen as support for the balance sheet channel. Further, firms that finance a higher share of their assets with short term debt are more likely to perceive access to finance as problematic. This is due to the fact that these firms need to roll over a high share of their debt yearly and they expect that this might become very difficult or costly when market conditions turn for the worse. Finally, we show that firm age, but surprisingly not size, is negatively related with perceived and actual access to external finance. We have argued that this can be due to the fact that small firms appear to self-select them out of the loan-application process due to ‘fear of rejection’.

The results indicate that firms should strive for the highest profitability possible and should ponder on the desired maturity structure of their debt. Still, policy makers should be aware that firms may also be discriminated on the basis of age. Further research is desirable to confirm the peculiar role that size might play for the self-selection out of the loan-application process.

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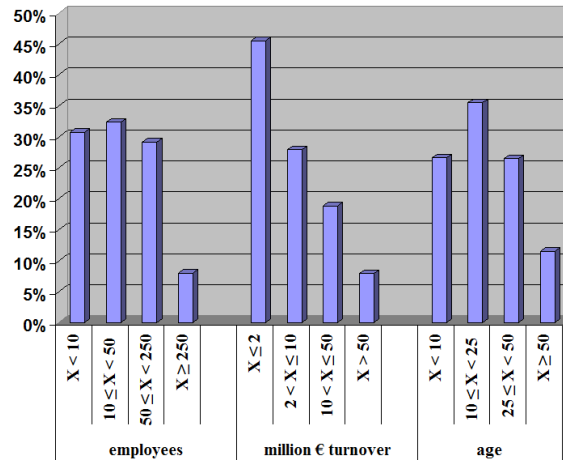
## 7 Appendix

**Table 1:** Description of the unbalanced panel

	Year 2009	Year 2010	Year 2011	# <i>obs</i> (total)
# <i>obs</i>	2,799			2,799
# <i>obs</i>		2,671		2,671
# <i>obs</i>			5,187	5,187
# <i>obs</i>	700	700		1,400
# <i>obs</i>		279	279	558
# <i>obs</i>	74		74	148
# <i>obs</i>	176	176	176	528
# <i>obs</i> (total)	3,749	3,826	5,716	13,291

Notes. The Table shows the structure of the unbalanced panel. For instance, the panel has 3749 observations in 2009 of which 2799 are present only in 2009 and 176 are present also in 2010 and 2011.

**Figure 1:** Firm distribution in SAFE (in percentage of the total sample)



**Table 2:** Available matches in Amadeus within each group

	mean	median	min	max	total
BE	1,909	1,480	10	4,232	65,920
DE	921	732	1	2,319	29,143
ES	33,308	34,107	2	67,663	440,784
FI	1,800	1,814	5	3,867	61,560
FR	43,126	41,729	42	94,929	884,855
GR	2,923	3,231	1	5,047	67,929
IT	37,841	39,359	20	70,352	972,321
NL	261	225	1	572	8,232
PT	51,028	45,704	4	88,524	705,609
mining	556	527	1	1,009	14,344
construction	14,013	15,464	3	26,356	206,594
manufacturing	32,649	34,107	17	70,352	840,508
retail and wholesale	53,052	54,884	77	94,925	1,202,486
transpot and storage	7,310	8,874	8	12,465	171,782
real estate	6,541	6,448	1	13,043	94,697
other services	42,623	45,704	21	72,708	705,942
$X \leq 2$ mill. euro	50,683	54,014	4	94,930	2,196,194
2 mill. euro $< X \leq 10$ mill. euro	18,348	16,026	1	39,625	688,373
10 mill. eruo $< X \leq 50$ mill. euro	7,560	6,052	1	16,884	267,317
$X > 50$ mill. euro	1,690	1,292	1	3,959	84,469
2008	35,337	32,095	3	85,398	1,083,822
2009	45,542	41,703	1	94,929	1,309,480
2010	36,519	39,359	1	88,232	843,051

Notes. The Table shows the number of observations in each group in Amadeus that is available for the matching. X stands for turnover of the firm.

**Table 3:** Financial constraints, financial characteristics and the importance of groups

	Perceived FC	Actual FC	Debt Burden <sub>t-1</sub>	Cash <sub>t-1</sub>
<b>Turnover Class</b>				
X ≤ 2 mill. euro	18.5%	45.2%	2.87%	0.125
2 mill. euro < X ≤ 10 mill. euro	17.1%	40.7%	2.33%	0.105
10 mill. euro < X ≤ 50 mill. euro	13.8%	36.8%	2.15%	0.081
X > 50 mill. euro	11.7%	34.3%	2.24%	0.059
<b>Year</b>				
2009	19.2%	37.8%	3.20%	0.111
2010	15.0%	42.4%	2.66%	0.115
2011	16.2%	43.0%	2.02%	0.125

Notes. The second and third column of the table show the percentage of firms that face financing constraints given their turnover class or given the year of observation as derived from the SAFE. The fourth and fifth column of the table show the debt burden and cash holdings of firms given their turnover class or given the presented year of observation (minus 1 year) as derived from the Amadeus database (pre-matching).

**Table 4:** Matching groups and variance of variables

	% groups where	
	# groups	variance within group < variance total sample
Return on equity	733	74%
Coverage ratio	733	62%
Profit margin	733	72%
Workcap	733	87%
Workcap requirement	733	87%
Cash	733	77%
Leverage	733	84%
Leverage cleaned	733	83%
Short term loans	733	75%
Total	733	78%

Notes. The first column shows the number of groups that are used for the NNDHD matching. The second column shows the percentage of groups for which the given variable has a smaller variance within the group than in the total sample. Calculations are done on the total Amadeus sample out of which is matched.

**Table 5:** Comparison of firms' qualitative answers on changes in turnover, profit margin, interest rates and use of trade credit

				Data source
Profit margin	Profit margin increased=0 0.008	Profit margin increased=1 0.015	T-test 0.12	safe amadeus
Sales growth	Turnover increased=0 -0.026	Turnover increased=1 0.027	T-test 0.05**	safe amadeus
Debt burden	Interest rate increased=0 2.3%	Interest rate increased=1 2.6%	T-test 0.01***	safe amadeus
Trade Credit to assets	Trade credit used=0 0.146	Trade credit used=1 0.167	T-test 0.02**	safe amadeus
Trade Credit to sales	0.112	0.158	0.00***	amadeus

Notes. The Table gives the mean values of the variables split by the bivariate outcome of the categorical variable and the p-value of the corresponding t-test on the equality of the means. Significance levels: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

**Table 6:** Construction of Variables (as denominated in SAFE)

Question	Answer	Variable	Value
Q0			
What is currently your most pressing problem?	Finding customers	Perceived FC	0
	Competition	Perceived FC	0
	Access to finance	Perceived FC	1
	Costs of production or labour	Perceived FC	0
	Availability skilled staff/managers	Perceived FC	0
	Regulation	Perceived FC	0
	Other	Perceived FC	0
	DK/NA	Perceived FC	missing
Q7a			
In the past 6 months which action did you take with respect to bank loans, trade credit or other external finance?	Didn't apply, sufficient internal funds	Actual FC	missing
	Didn't apply because other reasons	Actual FC	missing
	Didn't apply out of fear of rejection	Actual FC	missing
	Applied	Actual FC	go to Q7b
	DK/NA	Actual FC	missing
Q7b			
If you applied for bank loans, trade credit or other external finance in the past 6 months, what was the outcome?	Applied and got everything	Actual FC	0
	Applied but only got part of it	Actual FC	1
	Applied but refused, cost too high	Actual FC	1
	Applied but was rejected	Actual FC	1
	DK/NA	Actual FC	missing
D6			
Who are the owners of your firm?	Shareholders/quoted firm	ownershipdummy	0
	Other firms or business associates	ownershipdummy	0
	family or entrepreneurs	ownershipdummy	1
	Venture capital firm/business angels	ownershipdummy	1
	Natural person/one owner only	ownershipdummy	1
	Other	ownershipdummy	missing
	DK/NA	ownershipdummy	missing

**Table 7:** Country distribution, perceived FC and actual FC

	Perceived FC	<i>#obs</i>	Actual FC	<i>#obs</i>
BE	7.3%	740	21.3%	80
DE	13.6%	2,376	25.4%	311
ES	26.4%	2,336	39.3%	638
FI	6.7%	658	6.5%	46
FR	12.7%	2,385	19.1%	408
GR	33.8%	745	47.2%	178
IT	16.2%	2,413	29.5%	572
NL	12.1%	848	50.0%	66
PT	16.6%	790	32.1%	131
total	16.7%	13,291	31.1%	2,430

Notes. The Table shows the number of observations that belong to that country and the financing constraints in our sample.



**Table 8:** Construction of Variables (as denominated in Amadeus)

Variable	Definition
Return on equity	profit or loss of the period / total shareholder funds
Coverage ratio	operating profit or loss / interest payment
Profit margin	profit or loss of the period / total sales
Workcap	(current assets - current liabilities) / total assets
Workcap required	(accounts receivable + inventories - accounts payable) / total assets
Cash	cash and cash equivalent / total assets
Debt	current liabilities + non current liabilities
Leverage	debt / total assets
Leverage cleaned	(debt - cash and cash equivalent) / total assets
Short term loans	loans with maturity less than one year / total assets
Log(age)	$\log(1 + \text{age})$
Log(total assets)	$\log(1 + \text{total assets})$
Debt burden	interest payment / (debt - accounts payable)

Both consolidated and unconsolidated annual accounts are available in Amadeus and these are comparable across countries. Amadeus also provides qualitative information as number of employees and if a firm is listed on a stock market. In our sample we are careful to consider firms with unconsolidated accounts (mainly small and medium-sized ones) only when they do not present consolidated accounts in Amadeus. We construct seven non-financial sectors: 1) mining; 2) construction; 3) manufacturing; 4) retail and wholesale trade; 5) transport and storage; 6) real estate and 7) other services. We only use end of year data. Concerning our variables of interest, we apply a series of filters. We eliminate the observations of firms with errors in their financial statements (for instance when total assets are negative). We eliminate 1% of the extreme values taking into consideration differences across sectors and countries.

**Table 9:** Descriptive statistics

	mean	median	minimum	maximum	<i>#obs</i>
<b>Profitability</b>					
Return on equity	0.106	0.071	-2.444	2.177	13,291
Coverage ratio	7.355	2.344	-50.75	99.90	13,291
Profit margin	0.009	0.012	-0.874	0.343	13,291
<b>Liquidity</b>					
Workcap	0.161	0.155	-1.000	1.000	13,291
Workcap requirement	0.287	0.259	-0.788	1.000	13,291
Cash	0.113	0.051	0.000	0.950	13,291
<b>Leverage</b>					
Leverage	0.708	0.712	0.000	4.232	13,291
Leverage cleaned	0.595	0.621	-0.814	4.000	13,291
Short term loans	0.085	0.023	0.000	0.815	13,291
<b>Asymmetric info</b>					
Age	23.28	19.00	1.000	160.0	13,291
Log(assets)	7.884	7.760	1.098	18.51	13,291
Debt burden	2.50%	2.03%	0.00%	31.4%	13,291

Notes. The Table shows the mean, median, minimum and maximum for the variables of the matched sample.

**Table 10:** Firm characteristics by constraint-group: t-test on the equality of means

	Perceived FC =0	Perceived FC =1	T-test	Actual FC =0	Actual FC =1	T-test
<b>Profitability</b>						
Return on equity	0.108	0.094	0.08*	0.099	0.062	0.02**
Coverage ratio	10.14	8.725	0.01***	8.153	6.445	0.02**
Profit margin	0.010	0.002	0.00***	0.011	-0.000	0.00***
<b>Liquidity</b>						
Workcap	0.162	0.144	0.01***	0.160	0.123	0.00***
Workcap requirement	0.282	0.313	0.00***	0.288	0.312	0.01***
Cash	0.113	0.110	0.18	0.099	0.099	0.52
<b>Leverage</b>						
Leverage	0.706	0.719	0.04**	0.697	0.730	0.00***
Leverage cleaned	0.592	0.609	0.02**	0.598	0.632	0.01***
short term loans	0.083	0.095	0.00***	0.091	0.101	0.04**
<b>Asymmetric info</b>						
age	23.98	19.76	0.00***	24.67	20.88	0.00***
log(assets)	7.928	7.663	0.00***	8.323	8.073	0.00***
debt burden	2.5%	2.7%	0.00***	2.4%	2.5%	0.07*

Notes. The Table gives the mean values of the variables split by constraint-group and the p-value of the corresponding t-test on the equality of the means between the constrained observations and the unconstrained observations. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 11:** Bivariate probit regression: Profitability

<b>Panel A</b>	(A1)		(A2)		(A3)	
	Perceived FC	Actual FC	Perceived FC	Actual FC	Perceived FC	Actual FC
Return on equity	-0.009 (0.061)	-0.113* (0.062)				
Coverage ratio			-0.001 (0.001)	-0.003** (0.001)		
Profit margin					-0.527* (0.281)	-0.621** (0.285)
$\rho$	0.637*** (0.026)		0.626*** (0.039)		0.635*** (0.039)	
Control dummies	YES		YES		YES	
#obs	2,381		2,267		2,381	
<b>Panel B</b>	(B1)		(B2)		(B3)	
	Perceived FC	Actual FC	Perceived FC	Actual FC	Perceived FC	Actual FC
Return on equity	-0.036 (0.060)	-0.137** (0.061)				
Coverage ratio			-0.001 (0.001)	-0.003** (0.039)		
Profit margin					-0.437 (0.285)	-0.563** (0.285)
log(total assets)	-0.023 (0.016)	-0.006 (0.015)	-0.024 (0.016)	-0.003 (0.015)	-0.021 (0.016)	-0.004 (0.015)
log(age)	-0.144*** (0.036)	-0.135*** (0.035)	-0.123*** (0.036)	-0.124*** (0.036)	-0.143*** (0.036)	-0.127*** (0.035)
$\rho$	0.626*** (0.039)		0.618*** (0.040)		0.625*** (0.039)	
Control dummies	YES		YES		YES	
#obs	2,381		2,267		2,381	

Notes. The Table shows the results of the bivariate probit estimation for the matched panel. Heterscedasticity robust standard errors in parentheses. Control dummies: ownership dummy, country dummies, sector dummies and year dummies are included in all regressions. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 12:** Bivariate probit regression: Liquidity

<b>Panel A</b>	(A1)		(A2)		(A3)	
	Perceived FC	Actual FC	Perceived FC	Actual FC	Perceived FC	Actual FC
Workcap	-0.253*** (0.090)	-0.251*** (0.088)				
Workcap requirement			0.147 (0.112)	-0.088 (0.109)		
Cash					0.032 (0.215)	-0.134 (0.212)
$\rho$	0.633*** (0.039)		0.638*** (0.039)		0.636*** (0.039)	
Control dummies	YES		YES		YES	
#obs	2,381		2,381		2,381	
<b>Panel B</b>	(B1)		(B2)		(B3)	
	Perceived FC	Actual FC	Perceived FC	Actual FC	Perceived FC	Actual FC
Workcap	-0.193** (0.090)	-0.205** (0.061)				
Workcap requirement			0.169 (0.113)	-0.064 (0.110)		
Cash					-0.059 (0.219)	0.095 (0.216)
log(total assets)	-0.022 (0.016)	-0.005 (0.015)	-0.021 (0.016)	-0.007 (0.015)	-0.023 (0.016)	-0.005 (0.015)
log(age)	-0.134*** (0.036)	-0.120*** (0.035)	-0.148*** (0.036)	-0.127*** (0.035)	-0.143*** (0.036)	-0.129*** (0.035)
$\rho$	0.624*** (0.039)		0.628*** (0.039)		0.626*** (0.039)	
Control dummies	YES		YES		YES	
#obs	2,381		2,381		2,381	

Notes. The Table shows the results of the bivariate probit estimation for the matched panel. Heterscedasticity robust standard errors in parentheses. Control dummies: ownership dummy, country dummies, sector dummies and year dummies are included in all regressions. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 13:** Bivariate probit regression: Leverage

<b>Panel A</b>	(A1)		(A2)		(A3)	
	Perceived FC	Actual FC	Perceived FC	Actual FC	Perceived FC	Actual FC
Leverage	0.184** (0.092)	0.200** (0.090)				
Leverage cleaned			0.142* (0.081)	0.140* (0.079)		
Short term loans					0.302 (0.211)	0.106 (0.203)
$\rho$	0.634*** (0.039)		0.635*** (0.039)		0.636*** (0.039)	
Control dummies	YES		YES		YES	
#obs	2,381		2,381		2,381	
<b>Panel B</b>	(B1)		(B2)		(B3)	
	Perceived FC	Actual FC	Perceived FC	Actual FC	Perceived FC	Actual FC
Leverage	0.081 (0.094)	0.127 (0.091)				
Leverage cleaned			0.073 (0.082)	0.087 (0.079)		
Short term loans					0.319 (0.211)	0.120 (0.202)
log(total assets)	-0.021 (0.016)	-0.004 (0.015)	-0.022 (0.016)	-0.006 (0.015)	-0.023 (0.016)	-0.006 (0.015)
log(age)	-0.139*** (0.036)	-0.121*** (0.035)	-0.139*** (0.036)	-0.123*** (0.035)	-0.144*** (0.036)	-0.129*** (0.035)
$\rho$	0.626*** (0.039)		0.626*** (0.039)		0.626*** (0.039)	
Control dummies	YES		YES		YES	
#obs	2,381		2,381		2,381	

Notes. The Table shows the results of the bivariate probit estimation for the matched panel. Heterscedasticity robust standard errors in parentheses. Control dummies: ownership dummy, country dummies, sector dummies and year dummies are included in all regressions. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 14:** Bivariate probit regression: Return on equity, working capital and short term loans

	(1)		(2)	
	Perceived FC	Actual FC	Perceived FC	Actual FC
Return on equity	-0.009 (0.060)	-0.117* (0.062)	-0.035 (0.060)	-0.138** (0.061)
Workcap	-0.236** (0.129)	-0.267*** (0.092)	-0.167* (0.095)	-0.213** (0.092)
Short term loans	0.129 (0.220)	-0.105 (0.213)	0.192 (0.221)	-0.054 (0.213)
log(total assets)			-0.022 (0.016)	-0.006 (0.015)
log(age)			-0.138*** (0.036)	-0.125*** (0.035)
$\rho$	0.634*** (0.039)		0.625*** (0.039)	
Control dummies	YES		YES	
#obs	2,381		2,381	

Notes. The Table shows the results of the bivariate probit estimation for the matched panel. Heterscedasticity robust standard errors in parentheses. Control dummies: ownership dummy, country dummies, sector dummies and year dummies are included in all regressions. Significance levels: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

**Table 15:** Bivariate probit regression: Return on equity, working capital and leverage

	(1)		(2)	
	Perceived FC	Actual FC	Perceived FC	Actual FC
Return on equity	-0.012 (0.060)	-0.117* (0.062)	-0.036 (0.060)	-0.137** (0.061)
Workcap	-0.226** (0.113)	-0.205* (0.110)	-0.225** (0.114)	-0.200* (0.110)
Leverage	0.046 (0.116)	0.081 (0.112)	-0.057 (0.120)	0.009 (0.114)
log(total assets)			-0.023 (0.016)	-0.005 (0.015)
log(age)			-0.138*** (0.036)	-0.125*** (0.035)
$\rho$	0.633*** (0.039)		0.625*** (0.039)	
Control dummies	YES		YES	
#obs	2,381		2,381	

Notes. The Table shows the results of the bivariate probit estimation for the matched panel. Heterscedasticity robust standard errors in parentheses. Control dummies: ownership dummy, country dummies, sector dummies and year dummies are included in all regressions. Significance levels: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$



**Table 16:** Bivariate probit regression: Return on equity, working capital and short term loans, marginal effects

	(1)		(2)	
	Perceived FC	Actual FC	Perceived FC	Actual FC
Return on equity	-0.003 (0.021)	-0.043* (0.023)	-0.012 (0.021)	-0.050** (0.022)
Workcap	-0.082** (0.032)	-0.098*** (0.034)	-0.057* (0.032)	-0.078** (0.034)
Short term loans	0.045 (0.076)	-0.039 (0.078)	0.066 (0.076)	-0.020 (0.078)
log(total assets)			-0.008 (0.005)	-0.002 (0.006)
log(age)			-0.047*** (0.012)	-0.046*** (0.013)
Control dummies	YES		YES	
<i>#obs</i>	2,381		2,381	

Notes. The Table shows the marginal effects of the bivariate probit estimation for the matched panel. Heterscedasticity robust standard errors in parentheses. Control dummies: ownership dummy, country dummies, sector dummies and year dummies are included in all regressions. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 17:** Bivariate probit regression: Return on equity, working capital and leverage, marginal effects

	(1)		(2)	
	Perceived FC	Actual FC	Perceived FC	Actual FC
Return on equity	-0.004 (0.021)	-0.043* (0.023)	-0.012 (0.021)	-0.050** (0.022)
Workcap	-0.078** (0.039)	-0.075* (0.040)	-0.077** (0.039)	-0.073* (0.040)
Leverage	0.016 (0.040)	0.030 (0.041)	-0.020 (0.41)	0.003 (0.041)
log(total assets)			-0.008 (0.005)	-0.002 (0.006)
log(age)			-0.047*** (0.012)	-0.046*** (0.013)
Control dummies	YES		YES	
#obs	2,381		2,381	

Notes. The Table shows the marginal effects of the bivariate probit estimation for the matched panel. Heterscedasticity robust standard errors in parentheses. Control dummies: ownership dummy, country dummies, sector dummies and year dummies are included in all regressions. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 18:** Bivariate probit regression: Total, Actual FC including fear of rejection

	(1)		(2)	
	Perceived FC	Actual FC	Perceived FC	Actual FC
Return on equity	0.035 (0.049)	-0.094* (0.049)	0.010 (0.049)	-0.131*** (0.049)
Workcap	-0.241** (0.097)	-0.160* (0.095)	-0.246** (0.097)	-0.174* (0.095)
Leverage	0.026 (0.105)	0.135 (0.105)	-0.098 (0.108)	-0.031 (0.107)
log(total assets)			-0.032** (0.014)	-0.057*** (0.013)
log(age)			-0.134*** (0.030)	-0.153*** (0.030)
$\rho$	0.665*** (0.033)		0.546*** (0.033)	
Control dummies	YES		YES	
#obs	3,192		3,192	

Notes. The Table shows the results of the bivariate probit estimation for the matched panel. Heterscedasticity robust standard errors in parentheses. Control dummies: ownership dummy, country dummies, sector dummies and year dummies are included in all regressions. Significance levels: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

**Table 19:** Country and sectoral distribution, percentage matches with multiple donors at minimal distance

	<i>#obs</i>	<i>% multiple matches</i>
BE	740	18.11%
DE	2,376	5.38%
ES	2,336	42.21%
FI	658	35.25%
FR	2,385	52.91%
GR	745	41.20%
IT	2,413	56.69%
NL	848	9.31%
PT	790	60.63%
total	13,291	37.43%
mining	128	4.69%
construction	1,336	25.67%
manufacturing	3,456	29.63%
retail and wholesale	3,414	50.00%
transpot and storage	687	25.18%
real estate	102	29.41%
other services	4,168	40.59%
total	13,291	37.43%

Notes. The Table shows the number of observations that belong to the given sector or country in our sample and the percentage of those observations that had more than one possible match at minimal distance (i.e. the percentage of observations that involved a random draw).

**Table 20:** Robustness check with bootstrapped sample. Bivariate probit regression: Profitability

<b>Panel A</b>	(A1)		(A2)		(A3)	
	Perceived FC	Actual FC	Perceived FC	Actual FC	Perceived FC	Actual FC
Return on equity	0.016 [-0.096,0.131]	-0.067 [-0.199,0.074]				
Coverage ratio			-0.001 [-0.004,0.002]	-0.003** [-0.006,-0.000]		
Profit margin					-0.424 [-1.252,0.328]	-0.875*** [-1.513,-0.189]
Control dummies	YES		YES		YES	
<b>Panel A</b>	(A1)		(A2)		(A3)	
	Perceived FC	Actual FC	Perceived FC	Actual FC	Perceived FC	Actual FC
Return on equity	-0.016 [-0.130,0.105]	-0.095* [-0.232,0.043]				
Coverage ratio			-0.001 [-0.004,0.003]	-0.003* [-0.006,0.000]		
Profit margin					-0.333 [-1.158,0.443]	-0.814** [-1.444,-0.149]
log(total assets)	-0.021 [-0.059,0.012]	-0.004 [-0.038,0.023]	-0.022 [-0.059,0.010]	-0.002 [-0.038,0.026]	-0.019 [-0.054,0.015]	-0.003 [-0.034,0.026]
log(age)	-0.147*** [-0.211,-0.075]	-0.137*** [-0.210,-0.066]	-0.134*** [-0.223,-0.064]	-0.133*** [-0.242,-0.067]	-0.154*** [-0.217,-0.081]	-0.140*** [-0.217,-0.071]
Control dummies	YES		YES		YES	

Notes. The Table shows the median parameter estimate of the bivariate probit estimation on 200 bootstrapped samples. The 90 percent confidence interval corresponding to those 200 bootstrapped sample estimates is shown between squared brackets. Control dummies: ownership dummy, country dummies, sector dummies and year dummies are included in all regressions. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 21:** Robustness check with bootstrapped sample. Bivariate probit regression: Liquidity

	(A1)		(A2)		(A3)	
<b>Panel A</b>	Perceived FC	Actual FC	Perceived FC	Actual FC	Perceived FC	Actual FC
Workcap	-0.176*	-0.188***				
	[-0.340,0.019]	[-0.367,-0.018]				
Workcap requirement			0.061	-0.094		
			[-0.200,0.255]	[-0.329,0.125]		
Cash					0.057	0.096
					[-0.375,0.461]	[-0.345,0.476]
Control dummies	YES		YES		YES	
	(A1)		(A2)		(A3)	
<b>Panel A</b>	Perceived FC	Actual FC	Perceived FC	Actual FC	Perceived FC	Actual FC
Workcap	-0.109	-0.134				
	[-0.283,0.092]	[-0.302,0.053]				
Workcap requirement			0.081	-0.072		
			[-0.172,0.289]	[-0.291,0.141]		
Cash					-0.029	0.073
					[-0.452,0.442]	[-0.384,0.472]
log(total assets)	-0.022	-0.004	-0.020	-0.005	-0.022	-0.003
	[-0.060,0.011]	[-0.039,0.024]	[-0.058,0.012]	[-0.041,0.021]	[-0.057,0.011]	[-0.039,0.025]
log(age)	-0.138***	-0.124***	-0.148***	-0.132***	-0.147***	-0.135***
	[-0.204,-0.068]	[-0.201,-0.051]	[-0.213,-0.079]	[-0.208,-0.060]	[-0.211,-0.076]	[-0.206,-0.064]
Control dummies	YES		YES		YES	

Notes. The Table shows the median parameter estimate of the bivariate probit estimation on 200 bootstrapped samples. The 90 percent confidence interval corresponding to those 200 bootstrapped sample estimates is shown between squared brackets. Control dummies: ownership dummy, country dummies, sector dummies and year dummies are included in all regressions. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 22:** Robustness check with bootstrapped sample. Bivariate probit regression: Leverage

	(A1)		(A2)		(A3)	
<b>Panel A</b>	Perceived FC	Actual FC	Perceived FC	Actual FC	Perceived FC	Actual FC
Leverage	0.197 [-0.021,0.424]	0.287** [0.048,0.542]				
Leverage cleaned			0.081 [-0.061,0.237]	0.109 [-0.061,0.255]		
Short term loans					0.432* [-0.014,0.861]	0.172 [-0.263,0.548]
Control dummies	YES		YES		YES	
	(A1)		(A2)		(A3)	
<b>Panel A</b>	Perceived FC	Actual FC	Perceived FC	Actual FC	Perceived FC	Actual FC
Leverage	0.065 [-0.186,0.340]	0.190 [-0.065,0.501]				
Leverage cleaned			0.004 [-0.151,0.192]	0.048 [-0.107,0.221]		
Short term loans					0.427* [-0.012,0.845]	0.168 [-0.260,0.549]
log(total assets)	-0.024 [-0.060,0.008]	-0.005 [-0.042,0.023]	-0.021 [-0.057,0.012]	-0.004 [-0.037,0.023]	-0.022 [-0.057,0.012]	-0.004 [-0.038,0.023]
log(age)	-0.132*** [-0.207,-0.053]	-0.109*** [-0.185,-0.032]	-0.146*** [-0.212,-0.074]	-0.130*** [-0.205,-0.059]	-0.147*** [-0.209,-0.077]	-0.133*** [-0.207,-0.062]
Control dummies	YES		YES		YES	

Notes. The Table shows the median parameter estimate of the bivariate probit estimation on 200 bootstrapped samples. The 90 percent confidence interval corresponding to those 200 bootstrapped sample estimates is shown between squared brackets. Control dummies: ownership dummy, country dummies, sector dummies and year dummies are included in all regressions. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 23:** Robustness check with bootstrapped sample. Bivariate probit regression: Total

Panel A	(A1)		(A2)	
	Perceived FC	Actual FC	Perceived FC	Actual FC
Profit margin	-0.361 [-1.114,0.446]	-0.785** [-1.439,-0.073]	-0.319 [-1.082,0.528]	-0.769** [-1.423,-0.039]
Workcap	-0.094 [-0.303,0.089]	-0.189* [-0.357,0.020]	-0.023 [-0.227,0.178]	-0.126 [-0.291,0.109]
Short term loans	0.389 [-0.066,0.837]	0.044 [-0.371,0.496]	0.415* [-0.011,0.884]	0.085 [-0.336,0.515]
log(total assets)			-0.020 [-0.056,0.014]	-0.004 [-0.035,0.026]
log(age)			-0.150*** [-0.220,-0.075]	-0.131*** [-0.209,-0.059]
Control dummies	YES		YES	

Notes. The Table shows the median parameter estimate of the bivariate probit estimation on 200 bootstrapped samples. The 90 percent confidence interval corresponding to those 200 bootstrapped sample estimates is shown between squared brackets. Control dummies: ownership dummy, country dummies, sector dummies and year dummies are included in all regressions. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1