

## **POLICY PAPER**

# **Firms' Financing Constraints: Do Perceptions Match the Actual Situation?\***

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*Abstract:* This paper draws on the SAFE survey on access to finance for a sample of 11,886 firms in the Euro Area which are matched with their nearest neighbour in a balance sheet dataset with 2.3 million firms. We investigate the role of firm characteristics with respect to firms' perceived financing constraints and actual financing constraints in the period 2009-2011. Low-profit firms are more likely to face actual financing constraints. Low working capital and high leverage ratios explain actual financing constraints to a lesser extent. Further, 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.

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## I INTRODUCTION

The financial position 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 and financial characteristics (Fazzari *et al.*, 1988, 2000; Carpenter and Petersen, 2002), or survey data to show the link between financing constraints and growth (Beck *et al.*, 2006, Brown *et al.*, 2011). Unfortunately, the first strand lacks 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 characteristics 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 constructing an index of financing constraints using qualitative data 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.

We draw on the European Central Bank (ECB) and European Commission 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

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

<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.

matching approach based on characteristics common in both datasets to overcome the identity problem. In order to maximise 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 or not 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, 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 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 organised as follows. Section II describes the data sources and the methodology used in the matching procedure. Section III 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 IV describes the empirical results while Section V includes some robustness checks. Section VI concludes.

## II DATA AND METHODOLOGY

The two main data sources for our analysis are the 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 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, at that time the 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 13,291 observations of which most firms are only present once, making it a highly unbalanced sample (see Table 1).<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. 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

<sup>3</sup> A report containing the main results of the survey is published on the ECB website every six months. For more information regarding the survey as well as the reports on the individual waves see <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 also Figure 1 in the Appendix.

<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.

Table 1: *Description of the Unbalanced Panel*

#obs Year 2009	#obs Year 2010	#obs Year 2011	#obs Total	#firms Total
2,799			2,799	2,799
	2,671		2,671	2,671
		5,187	5,187	5,187
700	700		1,400	700
	279	279	558	279
74		74	148	74
176	176	176	528	176
3,749	3,826	5,716	13,291	11,886

*Note:* Table 1 shows the structure of the unbalanced panel. For instance, the panel has 3,749 observations in 2009 of which 2,799 are present only in 2009 and 176 are present also in 2010 and 2011.

2.3 million firms and 3.2 million observations. In all years, 115,000 firms are present, 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. See Ferrando and Mulier (2013) for more details on this first step.

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:

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

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

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 1,279 firms. In 31 per cent 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. Of our matches, 77 per cent have 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 vary much less within these groups and the same holds for the variation in financing constraints in the survey. Table 2 shows that the variance of the financial characteristics is smaller within a group than within the total sample in 78 per cent of the cases.<sup>10</sup> Table 3 further illustrates this

Table 2: *Matching Groups and Variance of Variables*

	# Groups	% Groups where 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.

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

<sup>10</sup> See Tables 4 and 6 for a definition of the financing constraints and the financial characteristics, respectively.

Table 3: *Financial Constraints, Financial Characteristics and the Importance of Groups*

	<i>Perceived FC %</i>	<i>Actual FC %</i>	<i>Debt Burden(t-1) %</i>	<i>Cash (t-1)</i>
<i>Turnover Class</i>				
X < 2 million Euro	18.50	45.20	2.87	0.125
2 million Euro < X < 10 million Euro	17.10	40.70	2.33	0.105
10 million Euro < X < 50 million Euro	13.80	36.80	2.15	0.081
X > 50 million Euro	11.70	34.30	2.24	0.059
<i>Year</i>				
2009	19.20	37.80	3.20	0.111
2010	15.00	42.40	2.66	0.115
2011	16.20	43.00	2.02	0.125

*Notes:* The second and third column of Table 3 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).

importance. The second and third columns show that both actual and perceived financial constraints decrease with the turnover class of the firm and depend 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. By matching firms only within the same group we avoid that firms would be matched with nearest neighbours that have very different financial characteristics.

Firms that reported an increase in their profit margins, turnover and interest rates in the SAFE, also show higher profit margins, sales growth and debt burden in Amadeus, as compared to firms that did not report an increase. Additionally those that indicated that they used trade credit recently, had higher trade credit to assets.

### III ASSESSING FINANCING CONSTRAINTS

#### 3.1 *Measures Derived From Survey Data*

Following Ferrando and Grieshaber (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 competition to increased costs of production of labour and 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 only 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 in the way we do with other surveys. For this reason, we could be underestimating the number of firms that consider access to finance as a pressing (although not the most pressing) problem. On the bright side, however, the SAFE forces firms to consider 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 4).

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 per cent of the firms that chose access to finance as most the pressing problem signalled that it was still the main problem during the next wave. Moreover, 92 per cent of the firms that did not signal access to finance as the most pressing problem in one wave also did not in the following wave.



Table 4: *Construction of Variables (As Denominated in SAFE)*

<i>Question</i>	<i>Answer</i>	<i>Variable</i>	<i>Value</i>
<i>Q0</i>			
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	Perceived FC	0
	or labour		
	Availability skilled staff/ managers	Perceived FC	0
	Regulation	Perceived FC	0
	Other	Perceived FC	0
	DK/NA	Perceived FC	missing
<i>Q7a</i>			
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 <i>Q7b</i>
	DK/NA	Actual FC	missing
<i>Q7b</i>			
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
<i>D6</i>			
Who are the owners of your firm?	Shareholders/quoted firm	ownership-dummy	0
	Other firms or business associates	ownership-dummy	0
	family or entrepreneurs	ownership-dummy	1
	Venture capital firm/ business angels	ownership-dummy	1
	Natural person/one owner only	ownership-dummy	1
	Other	ownership-dummy	missing
			missing
	DK/NA	ownership-dummy	missing

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 per cent of the firms that faced actual FC in a given wave encountered the same problems almost a year after, and around 79 per cent of the firms without problems in one wave reported similarly in the following wave. Table 5 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 FC relative to their perceived FC. Note that actual FC 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 or because they feared a possible rejection. However, a sensitivity test where the firms that feared a possible rejection are included in the variable actual FC will shed some interesting light on the role of firm size for financial constraints, but we will come back to this later.

Table 5: *Country Distribution, Perceived FC and Actual FC*

	<i>Perceived FC</i> %	<i>#obs</i>	<i>Actual FC</i> %	<i>#obs</i>
BE	7.30	740	21.30	80
DE	13.60	2,376	25.40	311
ES	26.40	2,336	39.30	638
FI	6.70	658	6.50	46
FR	12.70	2,385	19.10	408
GR	33.80	745	47.20	178
IT	16.20	2,413	29.50	572
NL	12.10	848	50.00	66
PT	16.60	790	32.10	131
Total	16.70	13,291	31.10	2,430

*Note:* Table 5 shows the number of observations that belong to that country and the financing constraints in our sample.

<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*

In this paper we rely on a set of measures comprising 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. 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 FC. 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 is 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 FC or actual FC. 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 FC.

### 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. Second, 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 firm's *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. For instance Lawless and McCann (2013) show that excessive debt is related to higher default on debt repayments. 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 FC that firms face. The expected relation between leverage and perceived FC 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 accessing external finance (Schiantarelli, 1996). 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 6 shows the definitions of the above mentioned set of variables that we use in the regression analysis and Table 7 reports their respective descriptive statistics.

### 3.3 What Are Financially Constrained Firms Like?

Table 8 compares the characteristics of firms that have actual and perceived financing constraints with those that do not, and tests the equality of the means of both groups. Overall, it shows that firms with actual and perceived financial constraints are similar to each other and tend to be less profitable, less liquid, more leveraged, younger and smaller than firms without financing constraints, which is in line with expectations.

Table 6: *Construction of Variables (As Denominated in Amadeus)*

<i>Variable</i>	<i>Definition</i>
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+ age)
Log(total assets)	log(1+ total assets)
Debt burden	interest payment/(debt-accounts payable)

*Notes:* 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 per cent of the extreme values taking into consideration differences across sectors and countries.

Table 7: *Descriptive Statistics*

	<i>Mean</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>	<i>#obs</i>
<i>Profitability</i>					
Return on equity	0.106	0.071	-2.444	2.177	13,291
Coverage ratio	7.355	2.344	-50.75	99.9	13,291
Profit margin	0.009	0.012	-0.874	0.343	13,291
<i>Liquidity</i>					
Workcap	0.161	0.155	-1	1	13,291
Workcap requirement	0.287	0.259	-0.788	1	13,291
Cash	0.113	0.051	0	0.95	13,291
<i>Leverage</i>					
Leverage	0.708	0.712	0	4.232	13,291
Leverage cleaned	0.595	0.621	-0.814	4	13,291
Short term loans	0.085	0.023	0	0.815	13,291

Table 7: *Descriptive Statistics (Contd.)*

	<i>Mean</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>	<i>#obs</i>
<i>Asymmetric Information</i>					
Age	23.28	19	1	160	13,291
Log(assets)	7.884	7.76	1.098	18.51	13,291
Debt burden	2.50%	2.03%	0.00%	31.40%	13,291

*Note:* Table 7 shows the mean, median, minimum and maximum for the variables of the matched sample.

Table 8: *Firm Characteristics by Constraint-group: t-test on the Equality of Means*

	<i>Perceived FC =0</i>	<i>Perceived FC =1</i>	<i>T-test</i>	<i>Actual FC=0</i>	<i>Actual FC=1</i>	<i>T-test</i>
<i>Profitability</i>						
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	0.01	0.002	0.00***	0.011	0	0.00***
<i>Liquidity</i>						
Workcap	0.162	0.144	0.01***	0.16	0.123	0.00***
Workcap requirement	0.282	0.313	0.00***	0.288	0.312	0.01***
Cash	0.113	0.11	0.18	0.099	0.099	0.52
<i>Leverage</i>						
Leverage	0.706	0.719	0.04**	0.697	0.73	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**
<i>Asymmetric information</i>						
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	2.50%	2.70%	0.00***	2.40%	2.50%	0.07*

*Notes:* Table 8 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: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

#### IV EMPIRICAL RESULTS

Our empirical analysis aims to investigate the underlying factors that determine both firms' perception of financing constraints and firms' actual financing constraints. In particular we are interested in analysing 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:

$$\begin{aligned}
 \textit{Perceived FC}_{i,t} &= \alpha_0 + \alpha_1 \textit{FinancialRatio}_{i,t-1} \\
 &+ \sum_j \alpha_j \textit{FirmControls (j)}_{i,t-1} \\
 &+ \sum_k \alpha_k \textit{Country}_k + \sum_s \alpha_s \textit{Sector}_s + \sum_t \alpha_t \textit{Year}_t + \varepsilon_{i,t} \\
 \\
 \textit{Actual FC}_{i,t} &= \beta_0 + \beta_1 \textit{FinancialRatio}_{i,t-1} \\
 &+ \sum_j \beta_j \textit{FirmControls (j)}_{i,t-1} \\
 &+ \sum_k \beta_k \textit{Country}_k + \sum_s \beta_s \textit{Sector}_s + \sum_t \beta_t \textit{Year}_t + \mu_{i,t}
 \end{aligned}$$

where *Perceived FC* and *Actual FC* are the responses by firm  $i$  at time  $t$  that indicate access to finance as a most pressing problem and the actual financing constraints faced, respectively. *FinancialRatio* is a ratio from the set 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,  $\varepsilon_{it}$  and  $\mu_{it}$  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:

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

<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.



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 9 to 11) 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.

Table 9: *Bivariate Probit Regression: Profitability*

<i>Panel A</i>	(A1)		(A2)		(A3)	
	<i>Perceived FC</i>	<i>Actual FC</i>	<i>Perceived FC</i>	<i>Actual FC</i>	<i>Perceived FC</i>	<i>Actual FC</i>
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
<i>Panel B</i>	(B1)		(B2)		(B3)	
	<i>Perceived FC</i>	<i>Actual FC</i>	<i>Perceived FC</i>	<i>Actual FC</i>	<i>Perceived FC</i>	<i>Actual FC</i>
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:* Table 9 shows the results of the bivariate probit estimation for the matched panel. Heteroscedasticity 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 10: *Bivariate Probit Regression: Liquidity*

<i>Panel A</i>	(A1)		(A2)		(A3)	
	<i>Perceived FC</i>	<i>Actual FC</i>	<i>Perceived FC</i>	<i>Actual FC</i>	<i>Perceived FC</i>	<i>Actual FC</i>
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	
<i>Panel B</i>	(B1)		(B2)		(B3)	
	<i>Perceived FC</i>	<i>Actual FC</i>	<i>Perceived FC</i>	<i>Actual FC</i>	<i>Perceived FC</i>	<i>Actual FC</i>
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:* Table 10 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: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Focusing first on the variables that measure the profitability of the firm, panel A of Table 9 shows that firms with a lower return on equity or a higher coverage ratio are more likely to face actual financing constraints. Firms with higher profit margins are less likely to face actual and perceived financing constraints. Panel B indicates that the profit margin no longer appears to be significant for the perceived FC once controlled for age and size, however, all three profitability measures – the return on equity, the coverage ratio and the

Table 11: *Bivariate Probit Regression: Leverage*

<i>Panel A</i>	(A1)		(A2)		(A3)	
	<i>Perceived FC</i>	<i>Actual FC</i>	<i>Perceived FC</i>	<i>Actual FC</i>	<i>Perceived FC</i>	<i>Actual FC</i>
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	
<i>Panel B</i>	(B1)		(B2)		(B3)	
	<i>Perceived FC</i>	<i>Actual FC</i>	<i>Perceived FC</i>	<i>Actual FC</i>	<i>Perceived FC</i>	<i>Actual FC</i>
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)	0.12 (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) (0.036)	-0.139*** (0.035)	-0.121*** (0.036)	-0.139*** (0.035)	-0.123*** (0.036)	-0.144*** (0.035)	-0.129***
$\rho$	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:* Table 11 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: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

profit margin – remain significantly related to having an actual FC, even after controlling for size and age. This finding is consistent with a potent balance sheet channel in the transmission of monetary policy (Bernanke and Gertler, 1995).

Table 10 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 FC.

The impact of leverage on financial constraints is shown in Table 11. Panel A shows that firms with higher leverage are more likely to perceive access to finance as the most pressing problem as well as to face actual FC. 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 FC.

In a last test, we jointly estimate a model with a significant profitability, liquidity and leverage measure and show the estimated marginal effects in Table 12. The results generally hold. Firms with higher return on equity are less likely to face actual FC and firms with more working capital are less likely to have actual and perceived FCs. Leverage appears to be no longer significant once controlled for the profitability and liquidity of the firm.

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

Table 12: *Bivariate Probit Regression: Return on Equity, Working Capital and Leverage, Marginal Effects*

	(1)		(2)	
	<i>Perceived FC</i>	<i>Actual FC</i>	<i>Perceived FC</i>	<i>Actual FC</i>
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)	0.03 (0.041)	-0.02 (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:* Table 12 shows the marginal effects of the bivariate probit estimation for the matched panel. Heteroscedasticity 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.

also more likely to face actual FC. 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. According to the marginal effect, 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.

To investigate further the role played by size, we redefine our dependent variable related to the actual FC by including those firms that “did not apply out of fear of rejection” and set the variable *Actual FC=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 13).<sup>13</sup> This indicates that those firms that are selecting themselves out of the loan-application process are especially small firms, with otherwise similar financial characteristics as rejected firms.

Table 13: *Bivariate Probit Regression: Perceived FC and Actual FC Including Fear of Rejection*

	(1)		(2)	
	<i>Perceived FC</i>	<i>Actual FC</i>	<i>Perceived FC</i>	<i>Actual FC</i>
Return on equity	0.035 (0.049)	-0.094* (0.049)	0.01 (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:* Table 13 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.

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

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, firm age also plays a large role for financial constraints. Small firms with weak financial characteristics appear not to apply for external finance out of fear of rejection. Even though we have found that size is not important in explaining financial constraints, these firms are rational not to apply for external finance due to their weaker financial characteristics as Ferrando and Mulier (2015) show that these ‘discouraged’ firms have a very low likelihood to obtain external finance.

Table 14: *Country and Sectoral Distribution, Percentage Matches With Multiple Donors at Minimal Distance*

	#obs	Multiple Matches %
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
Transport and Storage	687	25.18
Real Estate	102	29.41
Other Services	4,168	40.59
total	13,291	37.43

*Notes:* Table 14 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).

## V 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 per cent of the matches involved a random draw between two or more corresponding firms. And so, the estimated parameters and the inference based on our matched sample might be biased. Second, 13,291 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 15 to 17 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 97.5 percentile of that parameter estimate from those 200 estimates, to indicate the likelihood of the median parameter estimate.

It can be seen in Table 15 that our findings concerning profitability are quite robust and are very similar to the main results, especially after controlling for age and size. For liquidity, shown in Table 16, the results are less strong than the analysis of the full matched sample suggested. Firms that lack working capital are more likely to face actual FC 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 17 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 FC. Size does again not seem to be significant.

In a final test, we jointly estimate a model with profit margin, working capital and short-term loans. Table 18 shows that the conclusions drawn above mainly hold. Firms with higher profit margins are less likely to face actual FC

Table 15: Robustness Check with Bootstrapped Sample. Bivariate Probit Regression: Profitability

Panel A	(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	YES	YES	YES
Panel B	(B1)		(B2)		(B3)	
	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	YES	YES	YES

Notes: Table 15 shows the median parameter estimate of the bivariate probit estimation on 200 bootstrapped samples. The 90 per cent 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 16: Robustness Check with Bootstrapped Sample. Bivariate Probit Regression: Liquidity

	(A1)		(A2)		(A3)	
Panel A	Perceived FC	Actual FC	Perceived FC	Actual FC	Perceived FC	Actual FC
Workcap	-0.176* [-0.340, 0.019]	-0.188*** [-0.367, -0.018]				
Workcap requirement			0.061 [-0.200, 0.255]	-0.094 [-0.329, 0.125]		
Cash					0.057 [-0.375, 0.461]	0.096 [-0.345, 0.476]
Control dummies	YES	YES	YES	YES	YES	YES
	(B1)		(B2)		(B3)	
Panel B	Perceived FC	Actual FC	Perceived FC	Actual FC	Perceived FC	Actual FC
Workcap	-0.109 [-0.283, 0.092]	-0.134 [-0.302, 0.053]				
Workcap requirement			0.081 [-0.172, 0.289]	-0.072 [-0.291, 0.141]		
Cash					-0.029 [-0.452, 0.442]	0.073 [-0.384, 0.472]
log(total assets)	-0.022 [-0.060, 0.011]	-0.004 [-0.039, 0.024]	-0.02 [-0.058, 0.012]	-0.005 [-0.041, 0.021]	-0.022 [-0.057, 0.011]	-0.003 [-0.039, 0.025]
log(age)	-0.138*** [-0.204, -0.068]	-0.124*** [-0.201, -0.051]	-0.148*** [-0.213, -0.079]	-0.132*** [-0.208, -0.060]	-0.147*** [-0.211, -0.076]	-0.135*** [-0.206, -0.064]
Control dummies	YES	YES	YES	YES	YES	YES

Notes: Table 16 shows the median parameter estimate of the bivariate probit estimation on 200 bootstrapped samples. The 90 per cent 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 17: Robustness Check with Bootstrapped Sample. Bivariate Probit Regression: Leverage

	(A1)		(A2)		(A3)	
Panel A	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	YES	YES	YES
	(B1)		(B2)		(B3)	
Panel B	Perceived FC	Actual FC	Perceived FC	Actual FC	Perceived FC	Actual FC
Leverage	0.065 [-0.186, 0.340]	0.19 [-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	YES	YES	YES

Notes: Table 17 shows the median parameter estimate of the bivariate probit estimation on 200 bootstrapped samples. The 90 per cent 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 18: *Robustness Check with Bootstrapped Sample. Bivariate Probit Regression: Total*

	(1)		(2)	
	<i>Perceived FC</i>	<i>Actual FC</i>	<i>Perceived FC</i>	<i>Actual FC</i>
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)			-0.02 [-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:* Table 18 shows the median parameter estimate of the bivariate probit estimation on 200 bootstrapped samples. The 90 per cent 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: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

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.

## VI 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 11,886 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 firms' actual applications for external financing. We then

investigate 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 carefully consider on the desired maturity structure of their debt. Still, policymakers should be aware that firms may also be discriminated on the basis of age. Further research is desirable to confirm the role that size might play for the self-selection out of the loan-application process.

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APPENDIX

Figure 1: *Firm Distribution in SAFE*  
(In Percentage of the Total Sample)



