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CESIFO WORKING PAPER NO. 3650
CATEGORY 7: MONETARY POLICY AND INTERNATIONAL FINANCE
NOVEMBER 2011

CESifo *Working Paper No. 3650*

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Abstract

During the recent financial crisis, euro area firms, and especially Small and Medium-sized Enterprises, have been reporting acute problems of access to external finance. Using firm-level replies to the SME survey on access to finance, we use two indicators of financing constraints based on perceptions on the one side and on experienced financing constraints on the other and run probit and multinomial regressions model to determine which firms', sectoral or national characteristics drove perceptions and experienced financial constraints during the recent financial turmoil. We find that perceptions of financing crunch was broadly based across firms but those firms who really experienced a credit crunch tended to be small and young, confirming the fact that SMEs tend to suffer more when credit standards are tightened.

JEL-Code: E220, G300, L110, O160.

Keywords: financial crisis, financing constraints, credit rationing, small and medium-sized enterprises, survey data.

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Non technical summary

During the recent financial crisis and with the financial sector under severe strain, euro area banks have dramatically tightened credit standards on loans to non-financial corporations between mid-2007 to and end-2009. Euro area firms, and especially Small and Medium-sized Enterprises (SMEs) have reported acute problems of access to finance. Access to finance is widely perceived to be a crucial factor for firms to maintain their day-to-day business as well as to achieve long-term investment and growth goals. Constrained access to finance crucially may hinder growth, and, as the availability of sources of finance deteriorates, pose a major threat to the economy as a whole.

Using firm-level replies to the ECB-EU SME survey on access to finance between 2009 and 2010, we find two ways to identify firms facing financing obstacles: a first approach is to use directly the answer to one of the first questions of the survey questionnaire when firms are being asked what is the main problem and focusing on those firms who reply “access to finance” while the second approach is to focus on their actual experience in seeking external finance. Hence we construct two indicators of financing constraints: one based on perceptions and another, based on actually experienced financing constraints. The distinction between perceived and actually experienced financing constraints is important. Around half of respondents having experienced financing obstacles do not choose “access to finance” as their most pressing problem. At the same time, around 10% of firms choose “access to finance” as the most pressing problem, but have never actually faced any sort of limitation in accessing external sources of finance.

We then run a number of probit and multinomial regressions to determine which firms’, sectoral or national characteristics have driven both perceptions and experienced financial constraints during the recent financial turmoil. We find that perceptions of a financing crunch was broadly based across firms but those firms who really experienced a credit crunch tended to be small and young, confirming the fact that SMEs tend to suffer more when credit standards are tightened. Some countries of the euro area also appear to have suffered significantly more (e.g. Spain) while others were much better off (e.g. France) in terms of access to finance. Clearly, looking forward, the panel structure of the survey where individual firms can be followed over time will provide a new dimension for research to be pursued.

1. Introduction

During the recent financial crisis, euro area firms, and especially Small and Medium-sized Enterprises (SMEs), have been reporting acute problems of access to finance. With the financial sector under severe strain, euro area banks have dramatically tightened credit standards on loans to non-financial corporations from mid-2007 to end-2009[1]. In January 2009, Mr Andrea Benassi, UEAPME[2] Secretary General was stating: "*Loans have become more expensive and burdensome, while their availability has sharply decreased. SMEs are facing difficulties not only to finance their investments, but also their day-to-day operations, in a worryingly increasing number of cases*". At the time, however, little hard data could back up this strong argument and it was hard to quantitatively measure the magnitude of the problem. If anything, the spread between the average interest rates charged on small loans (possibly proxying loans to SMEs) and those charged on large loans (i.e. more than 1 million EUR) had widened significantly (see Annex I).

Access to finance is widely perceived to be a crucial factor for firms, and especially SMEs, to maintain their day-to-day business as well as to achieve long-term investment and growth goals. With generally limited access to capital markets, many euro area firms heavily rely on the banking sector for credit. Hence a well-functioning banking sector plays an important role in channelling resources to the best firms and investments projects. Constrained access to finance may crucially hinder growth, and, as the availability of sources of finance deteriorates, pose a major threat to the economy as a whole.

Recently, and partly because of the recent economic crisis, SME financing has risen in policymakers' agenda and empirical interest in this topic has led to a rich strand of papers. The purpose of this paper is to grasp the nature of the financial difficulties met by euro area firms throughout the financial crisis and to draw a portrait of euro area firms under financing constraints during the recent crisis. We add to the empirical literature in two main ways. First, we use survey data from the new EU-ECB SME Survey on access to finance, which proves to be particularly rich to understand how euro area firms assessed their access to external finance throughout the recent crisis. Second, we distinguish between self-reported individual firms' beliefs of financing constraints and actual experience. In particular, we develop two indicators of financing constraints: the first indicator is based on an *a priori* perception and an implicit ranking of problems faced by firms; the second one is based on firms' actual experience in getting access to external financing. This can be done by connecting replies from different parts of the questionnaire and can help checking the consistency and robustness of determinants of actual financial constraints. We then use linear probabilities models and panel data techniques to identify "structural" determinants of "true" financing obstacles.

We find that perceptions of financial crunch was broadly based across firms during the recent financial turmoil but those firms who really experienced credit restrictions tended to be small and young, confirming the fact that SMEs tend to suffer more when credit standards are tightened.

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[1] See Bank Lending Survey reports available on the ECB website: http://www.ecb.int/stats/money/surveys/lend/html/index.en.html.

[2] The European Association of Craft, Small and Medium-Sized Enterprises

The reminder of the paper is organised as follows. Section 2 briefly reviews the related literature on SMEs' access to finance. Section 3 provides a description of the data and introduces the empirical methodology followed. Section 4 describes our results and the last section concludes.

2. Related literature

Given their weight in the economy (i.e. about 60% of value added, 70% of employment and 99% of businesses in Europe), SMEs are often considered as a major driver of innovation and employment, and thus a potential base for future growth. Recent empirical studies have refined this view, suggesting that the entry of new firms – which are mostly small at entry – and the possibility for successful SMEs to grow unconstrained is actually the decisive factor for economic growth (e.g Beck *et al*, 2005; Aghion *et al.*, 2007). However, SMEs are generally more prone to being constrained and experiencing difficulties in accessing bank credit and more broadly, external finance. The body of literature investigating the existence and the determinants of financing constraints is already very large and based on two main theoretical considerations: asymmetric information and agency costs. Fazzari, Hubbard and Petersen (1988), - in their 1988 seminal paper testing the presence of financing constraints -, argued that in the presence of asymmetric information, internal and external capital are not perfect substitutes[3]. Hence firms' investment may depend on financial factors, such as the availability of internal finance, access to new debt or equity finance or the functioning of particular credit markets. A major stream of the empirical literature thus started from this assumption that external financing is more costly than relying on internal funds due to problems of asymmetric information and agency costs and explored the determinants of financing constraints for firms.

These problems are believed to be more significant for SMEs: first, their smaller size may affect the quality and the quantity of information available on their investment project and the quality of collateral. Smaller firms are often perceived to be more opaque than larger firms and monitoring costs weight more heavily on smaller-scale projects (see Devereux and Schiantarelli, 1989; Gilchrist and Himmelberg, 1991; Beck *et al.* 2005). Moreover, small firms are often young and have not had time to build up a track record and a reputation. Finally, SMEs are much more bank-dependant than larger enterprises. They do not normally issue traded securities that are continuously priced in public markets, which would provide relevant and more transparent information to potential lenders. For example, Whited and Wu (2006), showed, using US data, that financially constrained firms are small, have low analyst coverage and do not have a bond rating.

A number of relevant and recent papers have identified a number of determinants of access to finance: Atanasova and Wilson (2004) suggest that firm's total assets, taken as a proxy of available collateral, is an important determinant of bank loan availability. Beck *et al.* (2006) find that countries with higher levels of

[3] Kaplan and Zingales (1997, 2000) questioned the validity of Fazzary *et al.*'s findings that financially constrained firms tend to have high investment-cash flow sensitivity arguing that Fazzari *et al.* tends to classify firms incorrectly. This stream of the literature, using balance sheet information, needs to a priori classify firms between financially constrained and unconstrained firms (using proxies such as the size or the age of the firm) in order to check whether the sensitivity of investment/growth to cash-flow is higher for constrained than for unconstrained firms Kaplan and Zingales, after re-classification, find substantial differences in the degree of investment sensitivity to financial constraints between firms.

financial intermediary development, more liquid stock market, more efficient legal systems and higher GDP-per-capita report lower financing obstacles. Bougheas *et al.* (2006), using UK manufacturing firms from 1989 to 1999, find that several firm-specific characteristics such as size, collateral, riskiness, age and profitability were important determinants of access to credit. Evidence has also been found that quoted firms face less financing constraints and that foreign-owned firms have easier access to external financing, compared with nationally-owned firms (e.g. Harrison and McMillan, 2003). Colluzi *et al.* (2009) estimate the relative importance of a set of firms' characteristics in explaining the existence of financing obstacles. They found that being young or small increases significantly the probability of facing financing obstacles. Sectoral differences also appear to be significant with firms in manufacturing and construction facing more access to finance issues than in other sectors. Using survey data from 2005 and 2006, Canton *et al.* (2010) investigate the determinants of firms' perceived financing constraints, focusing on bank loans. They found that, at the European Union level, firms' age plays an important role in that older firms perceive external financing as being less difficult. Also, a tighter relationship with banks helps firms to perceive an increased availability of credit. Finally, they found significant country differences, partly explained by the degree of competition in the banking sector. More recently, Ferrando and Griesshaber (2011) use the new survey on access to finance of SMEs from the ECB and the European Commission to draw a first attempt at identifying determinants of financing constraints during the recent financial crisis. They find that age and ownership structure are crucial determinants of the probability to perceive financial constraints, but firm size and sector of economic activity do not matter. Our paper aims at refining this analysis by distinguishing between what firms believe and what they actually experience when seeking external finance. Moreover, since the analysis is very much conditional in nature, we believe empirical tests must include some form of interaction between some of the possible determinants of financing constraints. Hence we improve the empirical analysis further by consolidating the econometric model using multiplicative interaction models. This leads to a slightly different and possibly more robust conclusion.

3. Data and methodological approach

(a) Data characteristics

Our analysis is based on firm-level data taken from the ECB-European Commission Survey of access to finance of SMEs. The main purpose of the survey is to qualify firms' access to finance in the European Union, and most particularly in the euro area. The survey contains a large number of questions on the nature and the severity of obstacles to financing. It also contains some information on firms' characteristics such as type of ownership, employment, age, sector of activity, size of turnover. Compared with existing cross-country surveys within Europe (for instance, the Flash Eurobarometer) the ECB-EU SME survey displays two novel characteristics: first, its higher frequency ─ since it is run every six months; second, it also contains a small set of large companies so that some inferences on financing obstacles experienced by SMEs can be made with respect to large firms using the same database.

Overall, more than 5,000 firms are surveyed, with the number varying across countries. The sampling method is performed such as the resulting sample is representative across several dimensions, i.e. for each

of the biggest euro area countries (i.e. Germany, Spain, France and Italy), across firm size (i.e. micro, small, medium and large firms[4]) and main industries.

So far, only three surveys have been run, the first one in July 2009, the second survey round in December 2009 and the third round in September 2010, all referring to the six months preceding the month in which the survey was carried out. Hence all three waves have been carried out at exceptional times of deep financial turmoil and economic recession in the euro area. In 2009, euro area GDP growth contracted by more than 4% compared with the previous year, driving the euro area in a deep recession. At the same time, strained by the financial turmoil, euro area banks tightened their credit standards as never before.

[Table 1 around here]

Table 1 reports the composition of the samples for each available wave according to size, ownership and other firms' characteristics for the 5,000 firms responding to the survey questionnaire and some summary statistics. By construction, the samples are broadly similar, except for the age variable. In the second half of 2009, less than 60% of companies were more than 10 years old and 11%, less than two years old. By contrast, in the 2010 wave, almost 80% of firms were reportedly more than 10 years old and the younger age group had shrunk to 2%. A main driver of this change in sampling is probably the effect of the economic crisis and the low survival rate of younger firms. Assuming that older firms face lower financial constraints than younger ones, this change in the age distribution of the two samples could lead to a reading of improvement in access to finance when looking at raw tabulations; hence the need to carefully model the probability to being financially constrained according to different characteristics.

Looking at survey replies in details, more than 40% of the firms surveyed used either a bank loan or draw from their credit line or bank overdraft (or both) in the six months preceding each survey round. This makes bank-based sources of external financing more popular than any other sources (about 30% relied on trade credit; 35% on some form of leasing, factoring or hire-purchase – any other sources of external financing being much less used). Throughout the three waves, survey results pointed to a general deterioration in the availability of finance perceived by the euro area corporate sector.

(b) Alternative ways to define financial constraints: belief versus experience

Based on the questionnaire, there are two ways to identify firms facing financing constraints. A first approach in understanding the severity of access to finance issues is given by the answer to one of the first questions of the survey questionnaire. Indeed each surveyed firms is asked to identify the most pressing problem they are facing at the time of the survey. Each respondent is given a choice of six alternatives to select from: "finding customers", "competition", "access to finance", "costs of production (including labour costs)", "availability of skilled staff" and "regulation". The respondent is also given the final option to choose "other" when none of the previous six answers adequately describes its most urgent concern.

Our first approach is quite straightforward. We identify a firm as financially constrained whenever it chooses "access to finance" as its most pressing problem. Since the beginning of 2009, the most pressing problem reported by euro area firms has clearly been finding customers, reported by nearly 30% of

[4] Micro firms are defined as firms of less than 10 employees. Small firms have between 10 and 49 employees; medium firms, between 50 and 249 and large firms, more than 250 employees.

responding firms. In the 2009 surveys, “access to finance” came second in the implicit ranking of most pressing problems, with around 18% of euro area firms stressing it as a pressing issue. At the time of the following survey (in 2010), this percentage went down to 15% (see Figure 1a). Whether this decline actually reflected an improvement in access to finance cannot be a straight forward interpretation. Indeed, as noticed earlier, the 2010 sample counted less young firms than the 2009 samples. Assuming that younger firms are more prone to financing obstacles, as suggested by previous research papers, this apparent improvement could only be due to a statistical artefact.

[Figure 1 around here]

It is also interesting to report the breakdown of replies by firm size (see Figure 1b). Already, a pattern seems to emerge, with the importance of access to finance declining linearly with firm size: access to finance was being reported as the most pressing problem by 21% of micro firms, 19% of small firms, 17% of medium firms and 12% of large firms, in the second half of 2009.

One major drawback of focusing on this particular question is that respondents can choose only one reply and hence must implicitly rank the seriousness of the problems they are facing. In other words, we do not observe the actual levels of financing obstacles within a firm where “access to finance” may well be the second or third most pressing problem. Survey results may thus underestimate the existence of firms that consider access to finance as a pressing (although not ***the*** most pressing) problem. On the one hand, the phrasing of the question avoids the danger of bias caused by possible tendencies of some firms to generally give more negative (or positive) assessments. In the survey, firms are forced to put the existence of financing constraints in relation to other problems. Therefore, we could assume that their answer is more likely to reflect a (very) serious obstacle if chosen by the respondent. On the other hand, the reply may be based on the perception of the respondents and is not *a priori* based on their actual experience. It may also be a belief or a general perception.

Hence, we distinguish an alternative way to identify firms facing financing constraints, solely based on their actual experience in applying for a loan or any alternative source of external financing. Respondents to the survey are being asked whether they have applied or not for external financing and what their success was in accessing this source of funding. One may define an indicator of constrained access to finance by simply adding the replies of:

- those firms who did not seek external financing because they feared their application would be rejected; and
- those firms who actually applied for external financing but saw their application rejected; and
- those firms who only received a limited part (i.e. less than 75%) of what they applied for; and
- those firms who had to refuse the proposal for external financing because the associated costs were too high.

In our analysis, this indicator of constrained access to finance will take value 1 whenever a firm falls into any of the categories above and 0 whenever the respondent did not experience any particular problem in applying for external financing or did not need to seek external financing (see Annex II for a description

of main variables). About 25% of firms had experienced one form of constraint in accessing external finance according to this definition according to the surveys carried out in 2009 and 19% in the third survey wave. Once again, simple plots of this indicator by firm size or age suggests some relationship between financing constraints and size or age (see Figure 2).

[Figure 2 around here]

The distinction between perceived and actually experienced financing constraints is important. For example, in the second half of 2009, about 20% of firms felt constrained (981 firms exactly) and roughly the same number was actually constrained (i.e. 1027; see Table 2). Of those, only half (509) had chosen "Access to finance" as their main problem. At the same time, a puzzling 10% of firms (i.e. 327 out of 3149) reported access to finance as their most pressing problem, but never actually experienced any limitation in accessing external sources of financing. In all three available waves, these proportions remained broadly unchanged.

[Table 2 around here]

(c) Methodological approach

As a first step in our analysis, we want to check which indicator is the most relevant to understand what the main determinants of financing constraints are. Hence we run a regression analysis in which we relate our two indicators of financial obstacles (i.e. the indicator based on perceptions and the one based on experience) to firms' characteristics. Since the explained variable is a binary variable ─ experiencing/reporting credit constraints or not ─, we rely on a multivariate probit model, assuming that firms' financial obstacles can be described by the following equation:

$$y_i^* = \Phi(X_i'\beta) \quad where\ i = 1,...,N\ \ firms$$

$$y_i = \begin{cases} 1 = \text{exp}\, eriencing\ or\ reporting\ \ financing\ constra\,\text{int}\, s \\ 0 \end{cases}$$

Within this probit framework, it is possible to estimate probabilities of experiencing / reporting financing constraints conditional on a vector of explanatory variables i.e.:

$$\Pr(y_i = 1 \mid X_{i,}\hat{\beta}) = \Phi(X_i'\hat{\beta})$$

The regressors that might be driving the occurrence of a positive credit constraint indicator include the age of the firm (either in the form of a categorical or continuous variable), its size (i.e. categorical dummies based on the number of employees), sectoral and type-of-ownership dummy variables and main country of operation. The error term $\varepsilon_{i,k}$ is assumed to be normally distributed with zero mean and fixed variance[5].

In the survey, firms are actually asked for the year in which they were created, so that the variable "age" may simply be calculated by taking the difference between the year of the survey and the birth year. However, the distribution of the age variable is highly skewed with a third of the sample aged 8 years or less and 50% aged less than 15 years. Moreover, some clustering appears in the continuous variable that

[5] Results are robust to the alternative logit specification.

may just be linked to a well-known misreporting problem: a significant number of firms report having been created in round years, e.g. 1950 or 1900, which is probably more an approximation than the real year in which the firms was founded[6]. Therefore, we test our specification using the (log of the) continuous age variable, on the one side, and some categorical dummies, on the other side, which we split as follows: less than 5 years, between 5 and 9 years old, 10 to 19 years old, 20 to 49 years old and 50 years old and above. This categorisation allows testing for five rather homogenous groups in terms of number of observations. Moreover, this enables use to isolate those firms who are less than 5 years old, where the survival rate is lower. Indeed only about half of new European firms survive the first five years[7].

Ownership is defined as a binary dummy variable that takes value 1 if the company is one-person only or family-owned and 0 if the company is either listed, owned by other firms or business associates or venture capital firms or business angels. The idea behind this grouping is to get some meaningful categories as family-owned firms are the norm among SMEs and very few firms are actually either listed or venture capital firms.

The survey distinguishes several sectors of economic activity, from which we extract five grouping: mining and manufacturing are grouped together due to the low number of mining and utility firms, construction is grouped together with real estate, which comes as quite a natural decision; trade, transport and other services make up for the three remaining categories. “Other services” is a very wide category gathering a broad range of different activities such as accommodation and food services, information, communication, administrative, professional support, social work or entertainment, but excluding public services.

Finally, country is a vector of country dummies that allow us to control for unobserved country-specific factors that might drive firms’ responses. Since omitted country characteristics might cause error terms to be correlated for firms within countries, we allow for clustered error terms to obtain robust variance estimates (see Williams, 2000).

There are a number of missing variables in firms’ replies. These are simply ignored in the regressions we are running. In addition, “don’t know” responses are treated as missing values.

A note should be made that this analysis is by no means a test of the lending efficiency of banks in financing SMEs since the available data offers no way to appropriately judge the quality of the potential borrowers (e.g. credit history, debt levels, growth rate, etc).

[Table 3 around here]

Column 1 of Table 3 reports the results of the basic probit regression using experienced credit constraint as the dependent variable (specification (1)). A striking result is that firm size does not seem to matter. The likelihood to experience credit restrictions cannot be significantly explained by firm size and in particular, there is no significant difference between large and smaller firms. The company’s sector of

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6 Moreover, a number of responding firms do not report their year of creation but only provide an estimated age range as the starting point of their operation.

7 See Bartelsman *et al.* (2003).

activity does not matter either as sector-specific effects do not significantly influence the likelihood to experience problems of accessing external financing. Our ownership variable does not enter the specification either, suggesting that being one-person or family-owned does not make firms particularly more prone to experiencing problems of access to finance. Age appears to be a more promising predictor of experiencing problems in accessing external finance. A robust predictor is indeed youth: very young firms (those below 5 years) are significantly more likely to experience financing problems. Age entered as a continuous variable is significant and negative, as expected: the younger the firm, the more likely to experience access to finance problems. However the inclusion of age treated as a continuous variable modifies the significance of some regressors: in this case, having less than 10 employees and being a one-person only or family firm significantly helps to predict the likelihood of experiencing financial constraints (specification (2)).

This brings the attention of the high correlation existing between these three variables. Ownership and age are both significantly and highly correlated with firm size: the smaller the firm, the younger and the more likely to be one-person or family-owned. The correlation with size is above 0.30 at 1% level of significance for both variables. We believe that the empirical analysis should take into account the effect of these correlations. Hence, we generate some interaction terms between age and size and between age and ownership and include them into specification (3). Since we cannot interpret the coefficients of the interaction terms as unconditional or average effects (see Brambor *et al*, 2006; Greene, 1990, and Norton *et al*. 2004) we rely on model No.3 - which includes interaction terms- , to compute the average probability of predicted values for experiencing financing constraints by size, age or type of ownership. Standard errors can be computed using the delta method (see for example, Davidson and McKinnon, 2004) and are reported together with the average predicted probability in Figure 3. Partial effects may also be computed in order to check whether overall trends hold by firm size, for example (see Figure 3(e) and (f)).

[Figure 3 around here]

Our results clearly show that there seems to be a linear relationship between experiencing financing constraints and firm size or age: the smaller and the younger the firm, the more likely to experience financing constraints. However, all categories are not always significantly different from one another. Regarding firm size, our overall results suggests that small and micro firms, on the one side, and medium and large, on the other side, are not significantly different from one another. The only firm conclusion we can draw is that micro and small firms are more likely to experience financing constraints than medium and large. The same picture holds for age. Firms of less than 10 years of age are significantly more prone to financing constraints than mature firms (i.e. more than 20 years old), but, according to our model, very young firms (i.e. less than five years old) are not significantly different from firms aged 5 to 9.

Our sectoral control variables do not bring about any additional information. Different sectors of economic activity cannot explain much and all firms seem equally likely to encounter problems in accessing external finance. What actually seems to be driving most of the explanation when it comes to problems of accessing finance are country-specific effects (see Figure 3d), which comes out as strongly significant and very robust across all types of specifications. Country-specific effects show an interesting

hierarchy between countries, with Spain and Italy facing significantly more serious difficulties than Germany and, on the other side, French firms significantly better off than German firms.

The same exercise is also run for our second indicator of financing obstacles, namely the one based on perceptions, derived from the question on the most pressing problem for the firm. We can run a basic probabilistic model trying to differentiate between those firms who reported access to finance as their main problem compared with those who choose another reply. These results are presented in Table 3, Column (4) which is a probit model comparable to Model (3), using interactions in order to take into account the correlation between variables size, ownership and age. Models (3) and (4) are broadly comparable, with country-specific factors and youth being robust determinants of financing obstacles and some minor differences in the significance of some interaction terms. At this point, an important consideration to recall is that, given the formulation of the question, companies' replies to the question are not mutually exclusive and a firm may perceive problems of access to finance without reporting it as its most crucial issue. Hence, rather than modelling perceptions of financial constraints independently, we simultaneously model all replies using a multinomial regression model (model (5) in Table 3) and focus our analysis on coefficients applying to the probability of replying "access to finance is my main problem", compared with a base outcome set on the most popular reply (i.e. "finding customer"). This makes the regression coefficients somewhat tricky to interpret, but the analysis econometrically more robust. Model (5) specification provides interesting results. Once again, firm youth appears to be a significant determinant of perceiving constrained access to finance. Younger firms are significantly more likely to choose "access to finance" as their most pressing issue over "finding customers" than any other firms. Another interesting finding is the significance of country specifics which remains robust: compared with Germany, Spain is the country that seems to perceive most problems of access to finance, while French firms appear significantly better off. However, when it comes to choosing "access to finance" over "finding customers" as the most pressing issue facing the firm, Italy is no longer significantly worse off than Germany.

So far, we have treated perceived and experienced credit constraints independently and at first sight, there seems to be little difference between the two indicators that would help us choose between one or the other to be the most relevant for the analysis of financing constraints. However, as we have seen in Section 2, there is a non negligible proportion of firms that encounter real financing constraints, even though they do not report access to finance as their main problem. In order to enrich and wrap up the analysis, we construct a variable which will combine our two indicators in the following way. This categorical variable "Financing Obstacle":

- will take value 0 if the firm did not perceive any financing obstacles nor experienced it (e.g. 2,822 firms in the 2009H2 survey round according to Table 2)
- will take value 1 if the responding firm perceived financing obstacles, but did not actually experienced any (e.g. 327 firms in the 2009H2 survey round according to Table 2); and
- value 2 in case the firm actually experienced financing constraints , no matter its perception (e.g. 1027 firms in the 2009H2 survey round according to Table 2).

We then run a multinomial regression that models these qualitative categorical responses variables. The benefit of using such a model is that it allows us to calculate the odds for perceiving and experiencing financing obstacles relative to the most common outcome which is not perceiving nor experiencing financing obstacles. Table 4 presents the odds-ratios derived from this model, limiting the output to those coefficients that are significant at a 5% level or below. The full model is similar to that of columns 3 and 5 of Table 3.

[Table 4 around here]

According to our results, the odds of actually experiencing financing obstacles are 6.56 greater for very young firms (aged less than 5 years old), holding all other variables constant. Similarly, micro firms have a higher probability (2.09 higher) to experience financing constraints, all things being equal. Another interesting finding relates to the country aspect where the odds of experiencing financing obstacles are 4.27 greater in smaller euro area countries, holding all other variables constant.

To facilitate the reading of these odd-ratios, we then use this model to predict the probability of firms to fall in each of the three possible outcome categories. Two plots look particularly relevant. Figure 4(a) depicts the predicted probabilities of experiencing; only perceiving financing obstacles or not being financially constrained by firm size. Clearly, the model predictions suggest a clearly significant impact of firm size on the likelihood to experience financing obstacles (which is not so clear for firms only perceiving that financing obstacles): The smaller the firm, the more likely to have actually been through difficulties in obtaining external finance. The same conclusion does not hold for those firms who only perceived financing constraints but have not really experienced them, e.g for a medium-sized firm the probability to perceive financing constraints is higher than for a small firm. A similar relationship emerges when looking at firm age (Figure 4(b)). The older the firm, the less likely to have actually experience financing problems, while this is not true for firms who only perceived financing obstacles.

[Figure 4 around here]

This exercise makes us conclude that focusing on firms who perceive (but do not really experience) financing obstacles leads to a flawed, or at least misleading analysis, as the general belief of survey respondents appear to blur the overall picture. With this in mind, our analysis proves that, contrary to Ferrando and Griesshaber's (2011) findings, not only youth but also firm size actually matters significantly in determining the probability to experience financing constraints, while ownership type and sector of economic activity actually do not. The lack of significance of the sector of economic activity in which the firms operates remains conspicuous and at odds with several empirical papers (see for example, Coluzzi *et al*., 2009). This could well be due to the widespread nature of the economic slowdown, as suggested in Ferrando and Griesshaber (2011). The rest of the paper will focus on the sole indicator of "experienced financing constraints" and try to ascertain in a more robust fashion what their main determinants were in 2009 and 2010.

(d) Risk factors to experiencing financing obstacs: a panel estimation

The release of a new wave of data in October 2010 opened up new possibilities for our analysis. The third wave of the SME survey focused on SMEs' views during the period from March to September 2010.

Using this additional wave of results and merging it with previous survey results into a panel allows to control for unobserved time-invariant heterogeneity which is known to be the main reason behind the risk of obtaining biased results in cross-section studies (e.g. Moulton, 1986). In our specific case, incorporating information related to both cross-section and time series variables can substantially diminish the problems that arise when there is an omitted variable. Moreover, the panel nature of the data provides an increased number of data points generating additional degrees of freedom which, presumably, leads to more efficient estimation.

Our panel is, by construction, representative of the euro area across several dimensions i.e. firm size (i.e. about 90% of surveyed firms are SMEs), sectoral composition of the economy and country. About 16% of firms are less than 5 years old and more than 60% are more than 10 years old. The panel remains largely unbalanced, with only 378 firms having participated in all three surveys. Our specification is a static panel probit model, i.e. we do not allow for a specific role for dynamics. In fact, we assume the same relationship between the probability to experience financing obstacles and its determinants described in the previous section, but this time, with determinants that vary both across firms and time i.e.

$$y_{it}^{*} = X_{it}^{'}\beta + \varepsilon_{it} \quad where\ i = 1,...,N\ \ firms\ and\ t = 1,2,3$$

$$y_{it} = \begin{cases} 1 = \exp eriencing\ \ financing\ constra\text{int}s \\ 0 \end{cases}$$

As in the previous section, probabilities of experiencing financing constraints conditional on our vector of explanatory variables can be estimated in a similar fashion i.e.:

$$\Pr(y_{it} = 1 \mid X_{it,}\hat{\beta}) = \Phi(X_{it}^{'}\hat{\beta})$$

Table 5 shows how our set of structural variables help predict the likelihood of experiencing external financing constraints using the full panel of data. As in the previous section, the first and second column only differ on the type of variable used to measure firm age: a categorical variable in the first case and a continuous variable in the second. The third column specification includes interaction variables.

[Table 5 around here]

As discussed earlier, the parameters of a probit model – like those of any non-linear model – should not be interpreted as marginal effects and the estimated coeffficients do not simply quantify the influence of model covariates on the probability of suffering financial constraints. Instead, marginal effects are a non-linear combination of all regressors in the model. Hence we use model (3) to predict the probability of experiencing financing constraints based on the marginal effect of relevant determinants, all other variables being left unchanged (see Table 6). Panel analysis results broadly confirm the picture of euro area firms under financing constraints provided in the previous section of this paper. The marginal effect of firm size on the likelihood to experience financing constraints is linear and very similar to that suggested by the cross section analysis: the larger the firm the less likely to run into financing trouble. The probability for a micro firm to experience financing constraints reaches 23%, significantly higher from that of small (20%) and medium firms (17%). It should be stressed at this point, that the probability for

large firms is estimated with greater imprecision, reflecting the relatively smaller sample of large firms. Firm age also appears as a robust predictor of the likelihood to experience financing constraint, although, using the full panel, there is no longer a significant difference between very young firms (aged less than 5 years old) and firms aged between 5 and 10 years old. Clearly, however, firms below 10 years of age have a 25% chance of experiencing problems of access to finance, which significantly contrasts with only around 17% for firms of 20 years old and more. Sector remains insignificant with the notable exception of construction and real estate: firms operating in that sector of the economy tend to have a significantly higher propensity to run into financing trouble, which was not the case in the cross-section analysis of the second survey wave. This may be due to greater accuracy provided by the increased number of observations. Finally, as expected, country remains a strong determinant of problems of access to finance, with French firms having the smallest probability of being financially crunched (11%), significantly better off than German (15%), Italian (20%) and Spanish firms (34%).

[Table 6 around here]

Interaction terms also reveals interesting relationships (see Figure 5). For example, we find that while micro firms, on average, have a significantly higher probability to face financing obstacles (about 23%), this needs to be qualified. Indeed, older (above 20 years old) micro firms have significantly less chance to run into financing trouble (around 20% chance) than younger ones (i.e. less than 10 years old, with around 30% chance). The same is true for small firms, where younger firms appear significantly more prone to experiencing financing obstacles. The effect of age is less clear-cut for medium firms while the imprecision becomes important for large firms due to the small size of the available sample .

[Figure 5 around here]

(e) A country perspective

Last, but not least, we run estimations to know whether the results obtained so far for the overall panel also stand at a national level. Table 7 displays estimations for a basic specification for the euro area as a whole and separately, for each of the main four member countries for which a representative sample is available.[8] The significance of the estimated parameters varies somehow across countries.

[Table 7 around here]

Looking first at the effect of firm size, we find that in general, the probability to experience financing constraints is significantly explained by size. Tests of the non-existence of a size effect (i.e. testing that all size dummies are equal) are rejected in all countries except Germany, where firm size does not seem to matter much when predicting financing constraints. However the magnitude of the size effect varies substantially across countries. Partial tests on the equality of some coefficients show that in all countries –

[8] The specification is similar to column (3) in table 3. However the interactions between firm age and firm size are not included due to the small number of observations in some cells, that making the estimation procedure either impossible or giving very unstable results.

except for Spain – micro firms have a different coefficient to medium firms, in Italy micro firms parameter also differs from the one estimated for small firms. In Spain small and medium firms coefficient appear as significantly different. Moreover, surprisingly enough, in Italy, the predicted probability of being financially constrained turns out to be significantly lower for small and medium firms than for large companies (the reference group).

Once again, the impact of the different covariates on the dependent variable can be better understood by computing their marginal effects and predicting the probability to experience financing constraints, all other variables being constant (see Table 8). For example, German micro firms have a 20% risk of having a difficult access to finance, a risk decreasing with firm size as large firm have a 12% risk only[9]. Spanish firms are those with the highest risk of facing financial constraints, at 36% for both micro and small firms, nearly doubling the probability estimated for their German counterparts.

[Table 8 around here]

Being a one-person or a family business appears to significantly hamper access to finance only in Spain. However, even in this case, the effect is not strong and the difference between the risks of facing financing constraints depending on the type of ownership is insignificant (around 31-35%). Once controlling for other covariates, one-person only or family business are generally not facing higher financing constraints than other types of firms (i.e. owned by public shareholders, by other firms, by venture capital companies, etc).

Age remains a robust predictor of the unavailability of external funding for all countries. In all countries younger firms (and especially those of less than 5 years old) have a positive and significant coefficient with respect to oldest firms (reference group). Tests on the non-existence of an age effect (i.e. testing that all age dummies are equal) are strongly rejected for all countries. However, point estimates of the age dummies do not necessarily have a monotonic relationship with the dependent variable. For example, our estimates for Germany shows that the oldest age group (firms aged 50 years old and more) are not significantly different those aged between 10 and 20 years old but they are worse off than companies aged between 20 and 49 years old. This result is somehow difficult to explain[10]. Once again, Table 8 offers a clearer reading of the predicted probabilities of experiencing financing constraints depending on the age variable. As expected, in all countries, younger firms (i.e. less than 10 years old) have a higher probability to experience financing constraints than their elders. In Spain, these firms have about a 40% probability to face financing obstacles compared with around 30% for the rest of firms. Similarly, in Germany, firms below 10 years of age have a 20% chance of being denied external financing compared with less than 15% for other firms. In France, however, only the very young (i.e. less than 5 years old) have a much higher probability (17%) of facing financing obstacles than the rest of firms (between 8 and 12%).

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[9] In statistical terms, however, only micro firms appear significantly worse off than others.

[10] We have run Wald tests on the equality of coefficients for age dummies. The only two cases which are not rejected are the null hypothesis of age above 50 equal to age between 10 and 19, and age 5 to 9 equal; to less than 5.

Finally, our country analysis reveals interesting country differences regarding the impact of various sectors of economic activity. Testing for the overall significance of industrial sectors in country estimations, we found that sectors do not significantly explain financing constraints at all in Germany, but marginally do in France and strongly in both Italy and Spain. In particular, construction and real estate firms in Spain, and to a lesser extent in Italy, faced a much higher probability to experience financing constraints that any other firms (45% in Spain and 29% in Italy). This result does not come as a surprise given the uncertainties characterising construction and real estate developments since 2007. Also, French manufacturing firms have a relatively higher risk of experiencing financial constraints compared with the rest of the French economy, which is not seen in any other country.

4. Conclusion

During the recent financial crisis, euro area firms, and especially SMEs, have been reporting acute problems of access to external finance. Using firm-level replies to the SME survey on access to finance between 2009 and 2010, we construct two indicators of financing constraints: one based on perceptions and another, based on actually experienced financing constraints. We then explore what can determine these two states: firm size, firm age, type of ownership, sector of economic activity or country. We find that perceptions of financial crunch was broadly based across firms but those firms who really experienced a credit crunch tended to be small and young, confirming the fact that SMEs tend to suffer more when credit standards are tightened. Some countries of the euro area also appear to have suffered significantly more (Spain) while others were much better off (France) in terms of access to finance. Looking forward and as a second step in our project, the panel structure of the survey where individual firms can be followed over time will provide a new dimension for research to be pursued. The dynamic panel should indeed allow us to estimate transition probabilities across states by following (the determinants of) firms' performance in accessing finance along the different waves of the survey.

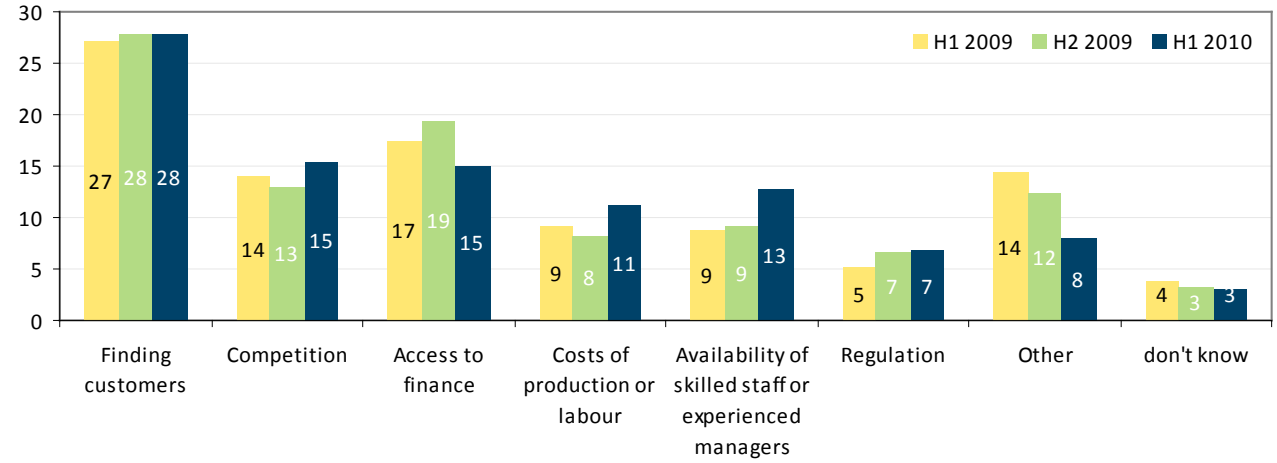
Table 1 – Composition of the three first waves of the survey on access to finance of SMEs

	WAVE 1 (2009H1)		WAVE 2 (2009H2)		WAVE 3 (2010H1)	
	Nber of observations	In % of the total	Nber of observations	In % of the total	Nber of observations	In % of total
SIZE						
- micro (1 to 9 employees)	2504	41.1%	1546	29.6%	1601	30.1%
- small (10 to 49 employees)	13934	31.7%	1621	30.5%	1673	31.5%
- medium (50 to 249 employees)	1204	19.8%	1619	30.4%	1630	30.7%
- large (+250 employees)	449	7.4%	534	10.0%	408	7.7%
SECTORAL ACTIVITY						
- manufacturing, utilities, mining	1145	18.8%	1256	23.6%	1573	29.6%
- construction and real estate	749	12.3%	697	13.1%	552	10.4%
- wholesale and retail trade	1587	26.0%	1255	23.6%	1351	25.4%
- transport	2161	35.5%	300	5.6%	267	5.0%
- other services			1812	34.1%	1569	29.5%
AGE OF THE FIRM						
- less than 5 years	1142	18.7%	1037	19.5%	725	14.7%
- between 5 and 9 years	933	15.3%	743	14.0%	692	14.1%
- between 10 and 19 years			921	17.3%	1203	24.5%
- between 20 and 49 years	3717	61.0%	1588	29.8%	1759	35.8%
- 50 years and more			610	11.5%	538	10.9%
- DK/NA	299	4.9%	420	7.9%	395	7.4%
COUNTRY						
- Germany	1003	16.5%	1001	18.8%	1000	18.8%
- Spain	1012	16.6%	1004	18.8%	1000	18.8%
- France	1000	16.4%	1001	18.8%	1003	18.8%
- Italy	1006	16.5%	1004	18.8%	1000	18.8%
- Other euro area countries	2070	34.0%	1310	24.8%	1309	24.8%
OWNERSHIP						
- Shareholders (listed company)	564	9.3%	559	10.5%	248	4.7%
- Family or entrepreneurs	3028	49.7%	2503	47.1%	2802	52.8%
- Other firm or business associates	807	13.2%	851	16.0%	756	14.2%
- Venture capital or business angel	80	1.3%	78	1.5%	86	1.6%
- A natural person (self-employed)	1348	22.1%	1192	22.4%	1287	24.2%
- Other, DK/NA	264	4.3%	137	2.6%	133	2.5%
TOTAL	6091	100%	5320	100.0 %-	5312	100.0 %-

Source: ECB-European Commission SME Survey on Access to Finance

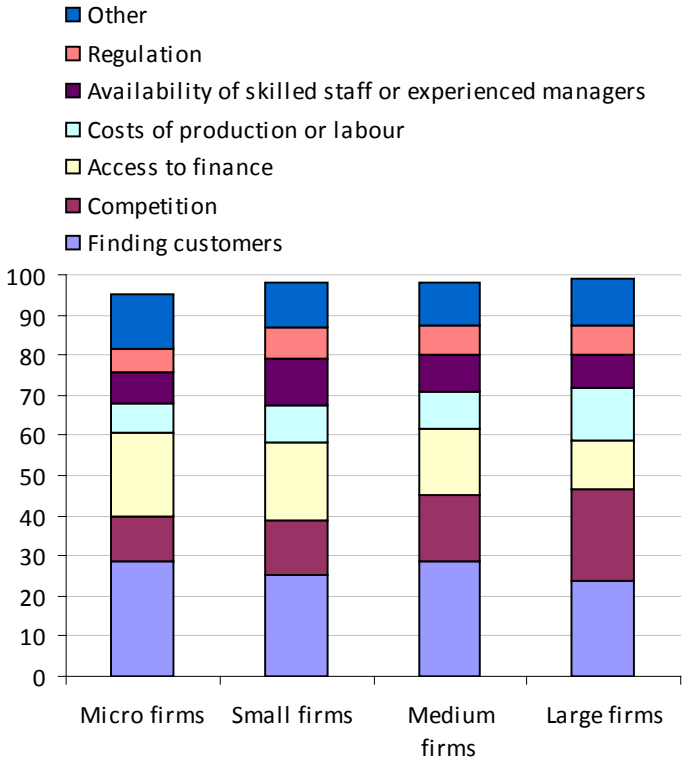
Figure 1

(a) Euro area firms' more pressing problems faced in the previous six months
(in percentage of all responding firms)



Source: EU-ECB SME survey on access to finance

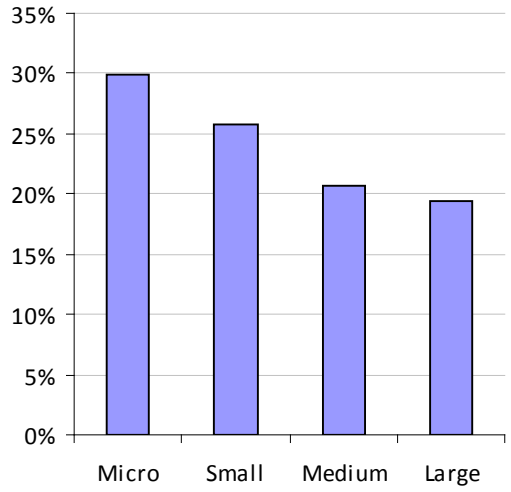
(b) Euro area firms' more pressing problems faced in the previous six months by firm size
(in percentage of all responding firms; second half of 2009)



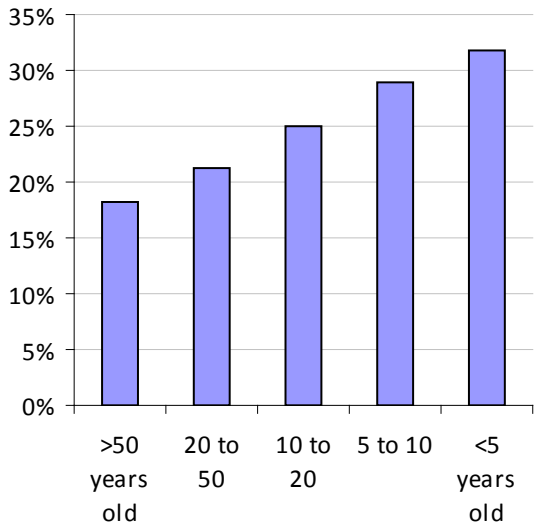
Source: EU-ECB SME survey on access to finance
Note: Percentages do not add up to 100 due to the omission of the "don't know" replies.

Figure 2

Euro area firms' experience of constrained access to finance by firm size
(in percentage of all responding firms; second half of 2009



Euro area firms' experience of constrained access to finance by firm age
(in percentage of all responding firms; second half of 2009



Source: EU-ECB SME survey on access to finance

Table 2

Alternative ways to define financial obstacles: perceptions versus reality
(in number of respondents)

	Perceptions: Reports that access to finance is the main problem		
Reality: Has experienced problems in accessing finance	… NO	. YES	Total
NO	2,822	*327*	3,149
YES	*518*	**509**	**1,027**
- no answer	599	145	1,144
Total	4,339	**981**	5,320

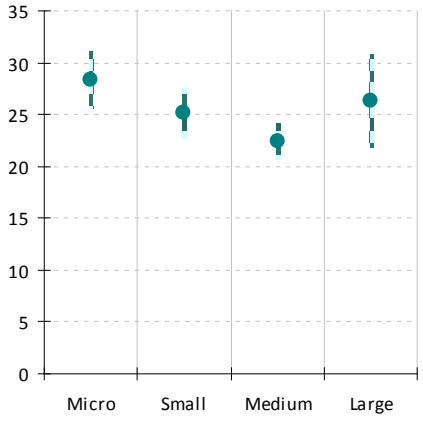
Table 3 – Determinants of experiencing financing obstacles

	Dependant variable: Experienced constrained access to finance 2009H2			Dependant variable: Perceived constrained access to finance 2009H2	
	(1)	(2)	(3)	(4)	(5)
Type of model:	probit	probit	probit	probit	multilogit model base outcome= finding customers
Micro firms	0.171	0.143 *	0.355	0.412	0.543
Small firms	0.101	0.085	0.042	0.214	0.329
Medium firms	0.001	-0.028	0.063	0.245	0.204
Ownership	0.097	0.112 *	0.136	0.152	0.222
Ownership*micro			-0.221***	-0.166	-0.283
Ownership*small			-0.055	-0.011	0.003
Ownership*medium			0.053	0.123	0.351
Age (continuous)		-0.102 ***			
Age from 20 to 49	0.028		-0.132	0.033	0.325 ***
Age from 10 to 19	0.131 *		0.427	0.411 ***	0.851 *
Age from 5 to 9	0.240 **		-0.047	-0.028	0.454
Age <5 years old	0.362 ***		1.077 **	0.956 **	2.303 **
Age [20 to 49] * micro firms			0.196	0.107	0.015
Age [10 to 19] * micro firms			-0.242	-0.379	-0.727
Age [5 to 9] * micro firms			0.305	0.149	-0.058
Age <5 * micro firms			-0.737	-0.761	-1.83
Age [20 to 49] * small firms			0.304	-0.089	-0.343
Age [10 to 19] * small firms			-0.185	-0.264 ***	-0.47
Age [5 to 9] * small firms			0.436	0.240	0.300
Age <5 * small firms			-0.616	-0.554	-1.45
Age [20 to 49] * medium			0.094	-0.245 ***	-0.551 **
Age [10 to 19] * medium			-0.514	-0.339 **	-0.662
Age [5 to 9] * medium			0.204	0.368	0.416
Age <5 * medium firms			-0.795	-0.730	-1.68
Construction and real estate	0.063	0.040	0.066	0.056	0.289
Wholesale and retail trade	-0.038	-0.054	-0.042	-0.002	0.083
Transport	0.171	0.115	0.168	0.0.69	0.237
Other services	0.025	0.009	0.026	-0.118	-0.127
Spain	0.802 ***	0.789 ***	0.798 ***	0.555 ***	0.390 ***
France	-0.228 ***	-0.279 ***	-0.230 ***	-0.309 ***	-0.841 ***
Italy	0.351 ***	0.333 ***	0.341 ***	0.134 ***	-0.020
Other euro area countries	0.277 ***	0.263 ***	0.277 ***	-0.186 ***	-0.399 ***
constant	-1. 28 ***	-0.83 ***	-1.31 ***	-1.36 ***	-1.08 ***
Pseudo R2	0.071	0.070	0.075	0.063	0.0584
Nber of observations	3986	3730	3986	5063	5063

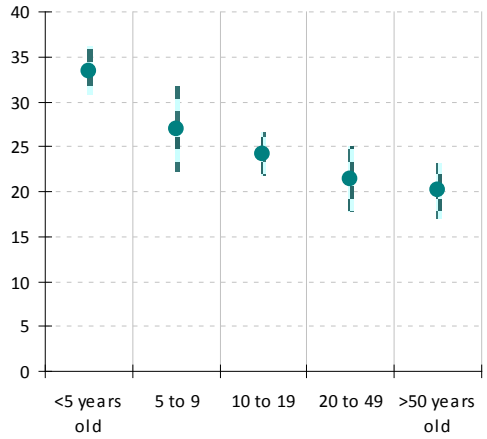
Note: * corresponds to p<0.1; ** to p<0.05 and *** p<0.01.

Figure 3

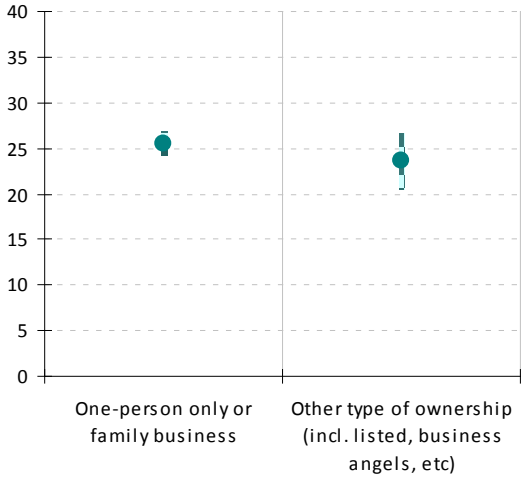
(a) Average predicted probability of experiencing financing constraints by firm size



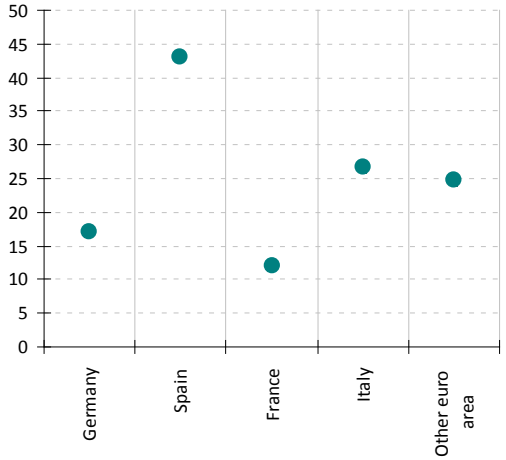
(b) Average predicted probability of experiencing financing constraints by age



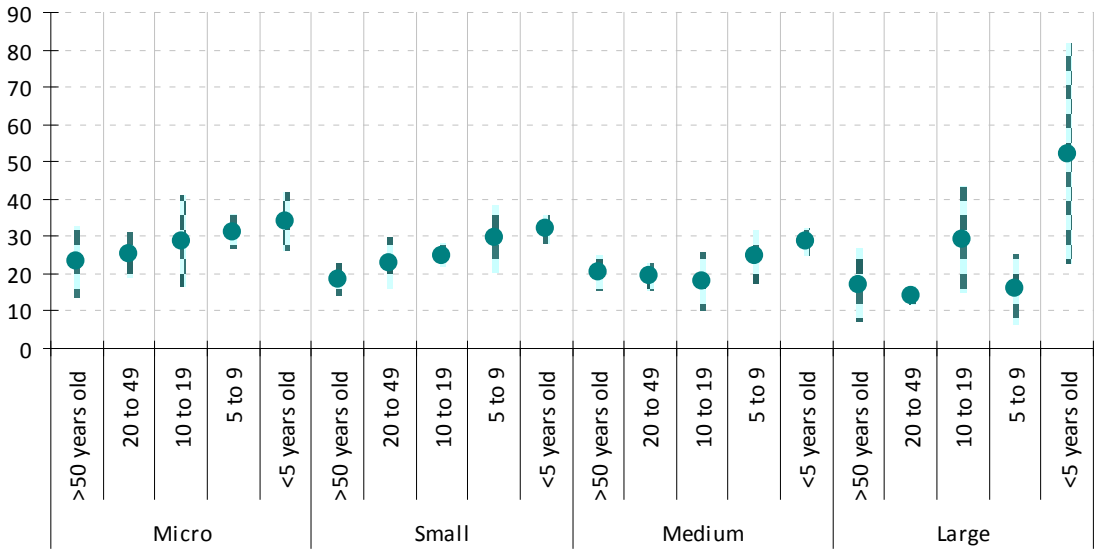
(c) Average predicted probability of experiencing financing constraints by type of ownership



(d) Average predicted probability of experiencing financing constraints by country



(e) Average predicted probability of experiencing financing constraints by firm age conditioned on firm size



(f) Average predicted probability of experiencing financing constraints by type of ownership conditioned on firm size

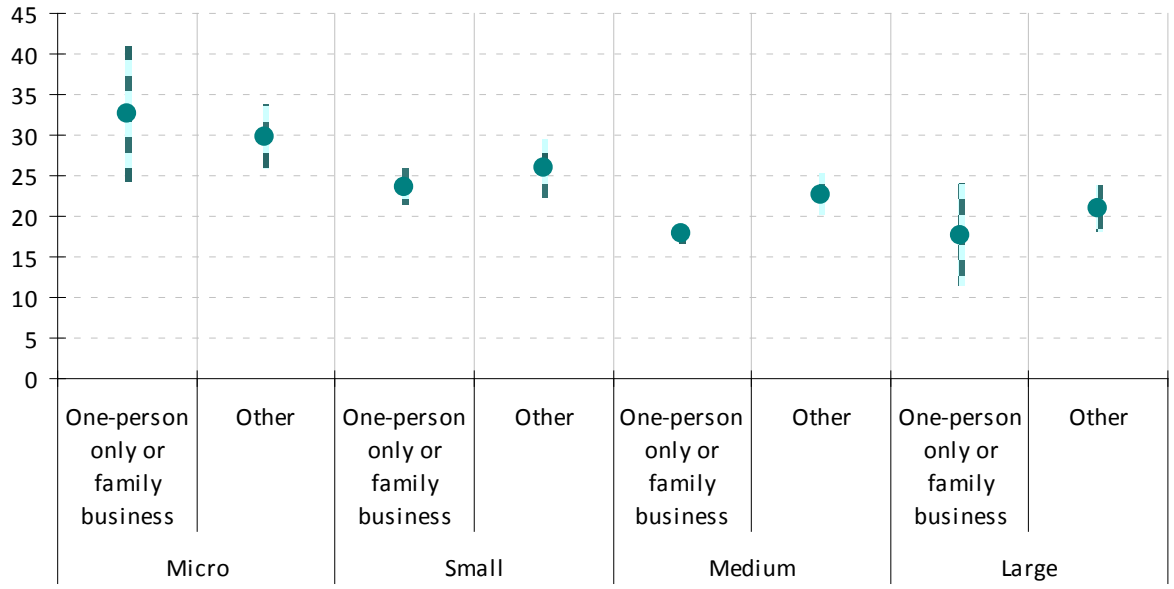


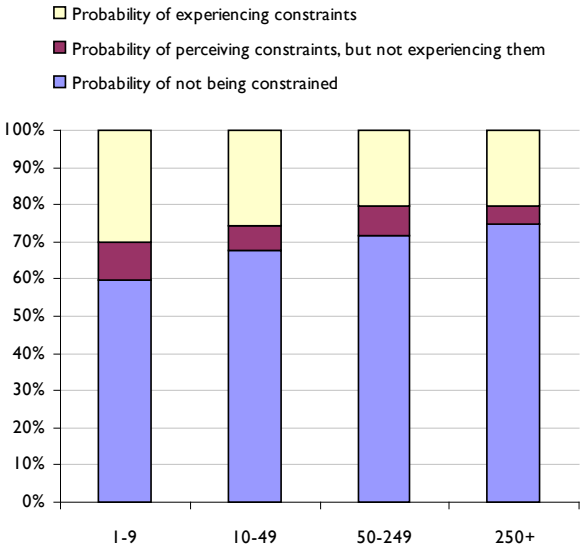
Table 4 – Factor change scale relative to baseline category "Not perceiving nor experiencing financing obstacles" (odd-ratios)

	Alternative	Odds-ratio (e^b)	P>|z|
SIZE			
Micro firms	Constrained	2.0873	0.000
Small firms	Constrained	1.1441	0.004
AGE			
10 to 19 years old	Perceived	3.7128	0.019
Less than 5 years old	Constrained	6.5609	0.000
INTERACTIONS			
Micro firms – Less than 5 years old	Constrained	3.8047	0.012
Medium firms – 20 to 49 years old	Perceived	0.2232	0.000
Medium firms – 10 to 19 years old	Perceived	0.3518	0.029
Medium firms – Less than 5 years old	Constrained	0.2480	0.000
SECTOR			
Other services	Constrained	1.1916	0.008
COUNTRY			
Italy	Perceived	0.7309	0.037
Other euro area countries	Perceived	2.3882	0.000
	Constrained	4.2735	0.000

Note: Constrained stands for category "Experienced financing obstacles" and Perceived stands for category "Only perceived financing obstacles"

Figure 4 – Model predictions of experiencing, perceiving or not financial obstacles

(a) by firm size



(b) by firm age

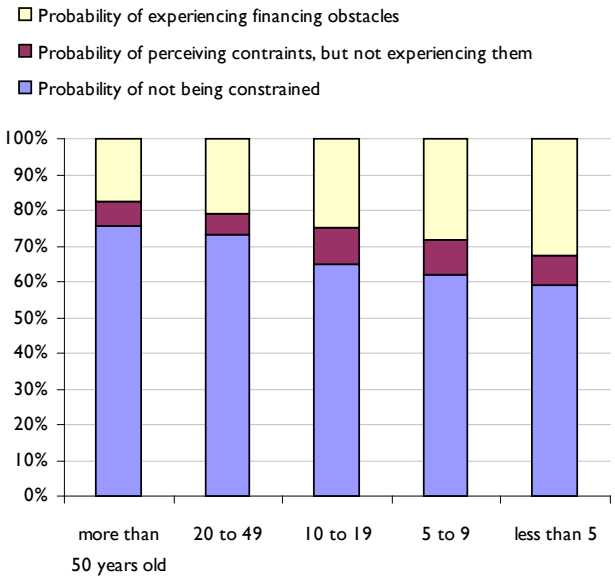


Table 5 – Determinants of experiencing financing obstacles

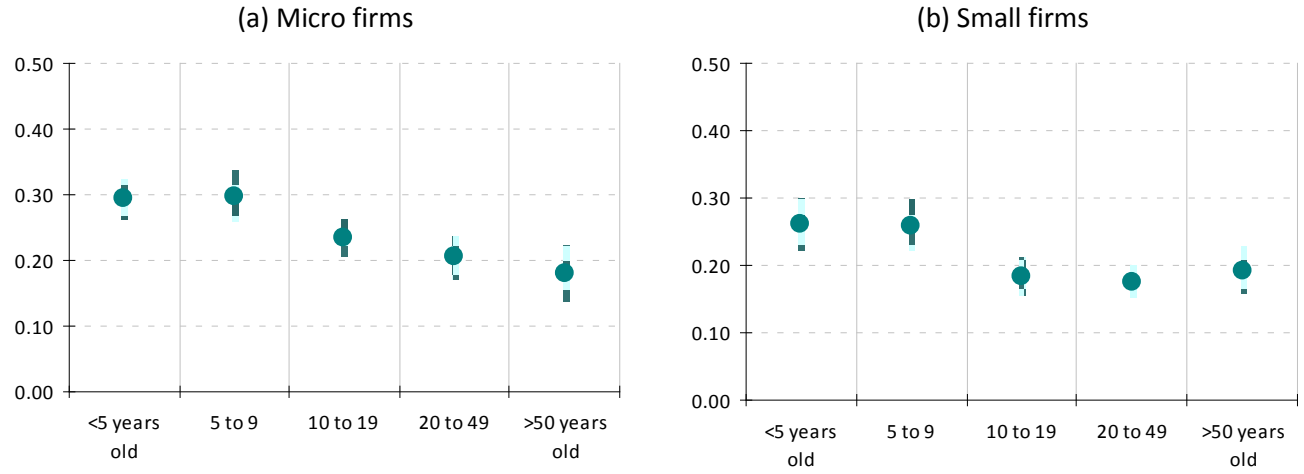
	Dependant variable: Experienced constrained access to finance Unbalanced panel of three survey rounds 2009H1, 2009H2 and 2010Q2-Q3		
	(1)	(2)	(3)
Micro firms	0.190 ***	0.196 ***	0.237 ***
Small firms	0.092 *	0.074	0.238 *
Medium firms	-0.033	-0.072	-0.005
Ownership	0.063 *	0.056 *	0.118
Ownership*micro			-0.146
Ownership*small			-0.081
Ownership*medium			0.016
Age (continuous)		-0.003 ***	
Age from 20 to 49	-0.007		-0.022
Age from 10 to 19	0.076 *		0.200
Age from 5 to 9	0.279 ***		0.238
Age <5 years old	0.306 ***		0.648 ***
Age from 20 to 49 * micro firms			0.119
Age from 10 to 19 * micro firms			0.001
Age from 5 to 9 * micro firms			0.162
Age <5 * micro firms			-0.264
Age from 20 to 49 * small firms			-0.044
Age from 10 to 19 * small firms			-0.233
Age from 5 to 9 * small firms			-0.007
Age <5 * small firms			-0.412 **
Age from 20 to 49 * medium firms			0.012
Age from 10 to 19 * medium firms			-0.139
Age from 5 to 9 * medium firms			-0.036
Age <5 * medium firms			-0.317
Construction and real estate	0.136 ***	0.162 ***	0.138 ***
Wholesale and retail trade	-0.001	0.011	0.000
Transport	0.100	0.084	0.102
Other services	-0.044	-0.027	-0.044
Spain	0.625 ***	0.597 ***	0.622 ***
France	-0.171 ***	-0.160 ***	-0.176 ***
Italy	0.198 ***	0.201 ***	0.195 ***
Other euro area countries	0.210 ***	0.199 ***	0.211 ***
constant	-1.280 ***	-1.082 ***	-1.341 ***
Nber of observations	12,609	12,084	12,609
Wald test [p-value]	0.000	0.000	0.000

Note: * corresponds to p<0.1; ** to p<0.05 and *** p<0.01.

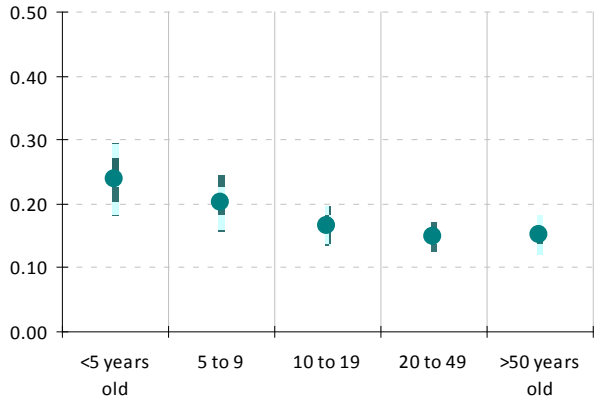
Table 6 – Predicted probability of experiencing financing constraints (based on model (3))

	P	Delta-method st. err.	z	P>z	[95% Conf. interval]	
TYPE OF OWNERSHIP						
One person or family business	0.21	0.00	48.44	0.000	0.20	0.22
Other	0.20	0.01	23.94	0.000	0.18	0.21
FIRM SIZE						
micro	0.23	0.01	29.54	0.000	0.22	0.25
small	0.20	0.01	31.31	0.000	0.19	0.22
medium	0.17	0.01	23.36	0.000	0.16	0.19
large	0.20	0.02	11.26	0.000	0.16	0.23
FIRM AGE						
>= 50 years old	0.17	0.01	18.70	0.000	0.15	0.19
20 to 49 years old	0.17	0.01	26.50	0.000	0.16	0.19
10 to 19 years old	0.19	0.01	25.74	0.000	0.18	0.21
5 to 9 years old	0.25	0.01	22.69	0.000	0.23	0.27
<5 years old	0.27	0.01	22.75	0.000	0.25	0.29
SECTOR OF ECONOMIC ACTIVITY						
Manufacturing	0.20	0.01	26.94	0.000	0.19	0.21
Construction and real estate	0.24	0.01	22.64	0.000	0.22	0.26
Retail trade	0.20	0.01	27.77	0.000	0.19	0.21
Transport	0.23	0.02	12.96	0.000	0.19	0.26
Other services	0.19	0.01	30.75	0.000	0.18	0.20
COUNTRY						
Germany	0.15	0.01	19.80	0.000	0.14	0.17
Spain	0.34	0.01	32.60	0.000	0.32	0.36
France	0.12	0.01	16.74	0.000	0.10	0.13
Italy	0.20	0.01	22.44	0.000	0.19	0.22
Other euro area	0.21	0.01	28.82	0.000	0.19	0.22

Figure 5 – Effect of interaction between firm size and age on the predicted probability to experience financing constraints



(c) Medium firms



(d) Large firms

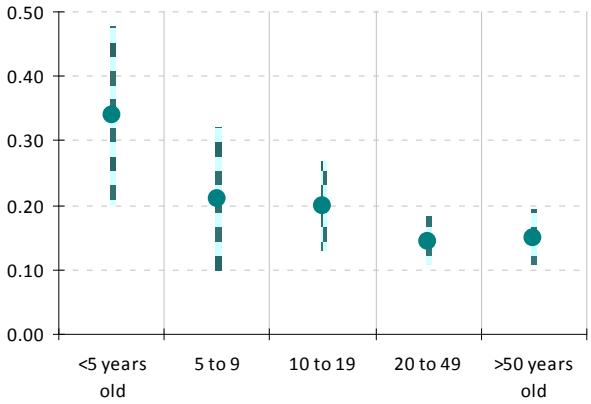


Table 7 – Panel estimation results by country

	Euro area	Germany	Spain	France	Italy
Micro firms	**0.292 *** **	0.408	**0.476 ** **	**0.442 * **	0.052
Small firms	0.132	0.013	**0.475 *** **	0.177	**-0.384 * **
Medium firms	-0.060	-0.132	0.249	-0.062	**-0.341 * **
Ownership	0.104	-0.027	**0.393 * **	-0.096	-0.054
Family * micro firms	-0.136	-0.064	-0.360	0.046	-0.144
Family * small firms	-0.067	0.091	-0.346	0.186	0.209
Family * medium firms	0.031	0.218	-0.218	0.246	0.093
Age from 20 to 49	-0.006	**-0.239 ** **	**0.171 * **	-0.149	0.016
Age from 10 to 19	**0.077 * **	0.000	**0.198 * **	-0.010	-0.044
Age from 5 to 9	**0.280 *** **	**0.220 ** **	**0.526 *** **	0.052	**0.319 ** **
Age <5 years old	**0.308 *** **	**0.265 ** **	**0.362 *** **	**0.277 ** **	**0.375 *** **
Construc. & real estate	**0.136 *** **	0.049	**0.305 *** **	**-0.270 ** **	**0.370 *** **
Wholesale/retail trade	-0.002	-0.031	-0.068	**-0.233 ** **	**0.010**
Transport	0.099	0.052	0.119	-0.254	**0.339 ** **
Other services	-0.044	-0.014	-0.094	**-0.199 ** **	**0.149 ** **
constant	-1.298 ***	-1.189 ***	-1.105 ***	-1.281 ***	-0.837 ***
Nber of observations	12,609	2,427	2,324	2,419	2,132
Wald test [p-value]	0.000	0.000	0.000	0.000	0.000

Note: * corresponds to p<0.1; ** to p<0.05 and *** p<0.01.

Table 8 – Predicted probability of experiencing financing constraints by country

	GERMANY		FRANCE		ITALY		SPAIN	
	Pr.	*Std. err (*)*	Pr.	*Std. err (*)*	Pr.	*Std. err (*)*	Pr.	*Std. err (*)*
TYPE OF OWNERSHIP								
One person or family business	0.15	*0.01*	0.12	*0.01*	0.21	*0.01*	0.35	*0.01*
Other	0.15	*0.02*	0.11	*0.01*	0.21	*0.02*	0.31	*0.02*
FIRM SIZE								
micro	0.20	*0.02*	0.16	*0.02*	**0.24**	*0.02*	0.36	*0.02*
small	0.14	*0.01*	0.12	*0.01*	0.19	*0.02*	0.36	*0.02*
medium	0.13	*0.01*	0.08	*0.01*	0.18	*0.02*	0.31	*0.02*
large	0.12	*0.03*	0.07	*0.02*	0.26	*0.05*	0.28	*0.04*
FIRM AGE								
>= 50 years old	0.15	*0.02*	0.11	*0.02*	**0.17**	*0.02*	0.26	*0.03*
20 to 49 years old	0.10	*0.01*	0.08	*0.01*	0.17	*0.02*	0.31	*0.02*
10 to 19 years old	0.15	*0.01*	0.11	*0.02*	0.16	*0.02*	0.32	*0.02*
5 to 9 years old	0.20	*0.02*	0.12	*0.02*	0.26	*0.02*	0.45	*0.03*
<5 years old	0.21	*0.02*	0.17	*0.02*	0.28	*0.02*	0.38	*0.03*
SECTOR OF ECONOMIC ACTIVITY								
Manufacturing	0.15	*0.02*	0.15	*0.02*	0.18	*0.01*	0.33	*0.02*
Construction and real estate	0.16	*0.02*	0.10	*0.02*	0.29	*0.03*	0.45	*0.03*
Retail trade	0.15	*0.02*	0.11	*0.01*	0.18	*0.02*	0.31	*0.02*
Transport	0.16	*0.03*	0.10	*0.03*	0.28	*0.05*	0.38	*0.05*
Other services	0.15	*0.01*	0.11	*0.01*	0.22	*0.02*	0.30	*0.02*

(*) delta method

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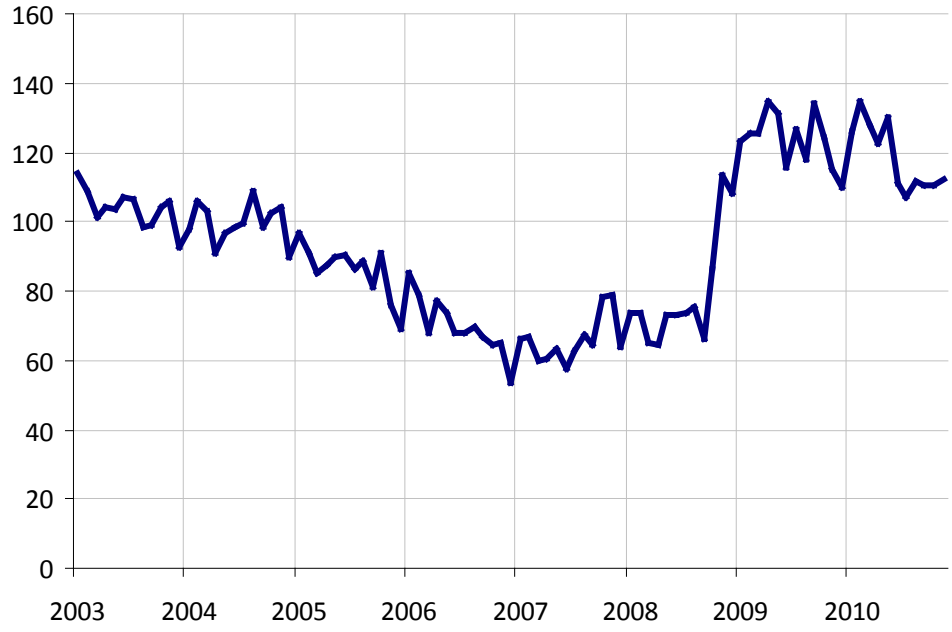
Annex I – Spread between interest rates charged in small loans (i.e. less than 1 EUR million) and large loans (i.e. less than EUR million)

(in basis points)



Annex II – Description of main variables

Variable	Based on the question:	Value taken by the variable
DEPENDANT VARIABLES		
Perceived financing constraints	TO ALL FIRMS: Question Q0 of SME survey questionnaire: "what is currently the most pressing problem your firm is facing?" [1] Finding customers [2] Competition [3] Access to finance [4] Cost of production or labour [5] Availability of skilled staff or experienced managers [6] Regulation [7] Other	Dichotomous variable: 1 = Access to finance is the most pressing problem [=3] 0 = Access to finance is not the most pressing problem [≠3]
Experienced financing constraints	Ways of financing: - Bank overdraft, credit line or credit card overdraft - Bank loan (new or renewal; excl. overdrafts and credit lines) - Trade credit - Other external financing (e.g. debt securities issuance, equity, etc.) TO ALL FIRMS: Question 7A. For each of the above ways of financing and over the past 6 months, could you indicate whether you: [1] applied [2] did not apply because of possible rejection [3] did not apply because of sufficient internal funds [4] did not apply for other reasons [5] don't know / not applicable Question 7B. If you applied and tried to negotiate for this type of financing over the past 6 months, did you: [1] applied and got everything [2] applied and got most of it (i.e. more than 75%] [3] applied and got only a limited part of it [less than 75%] [4] Applied but refused because the cost was too high [5] Applied but was rejected [6] Don't know	Dichotomous variable: 1 = replied [2] to Q7A or [3], [4] or [5] to Q7B 0 = did not replied to [2] to Q7A or [3], [4] or [5] to Q7B

Financing obstacle	Based on Q0, Q7A and Q7B (see above)	0 = [Perceived financing constraints = 0] AND [Experienced financing constraints = 0] 1 = [Perceived financing constraints = 1] AND [Experienced financing constraints = 0] 2 = [Experienced financing constraints = 1]
INDEPENDENT VARIABLES		
Firm ownership	QD6. "Who are the owners of your firm?"	0 = Public shareholders, other firms, venture capital and other 1 = Family or one-owner only firm
Firm age (reference group used in the estimation: more than 50 years old)	QD5. "In which year was your firm registered?" Firm age = Year of survey – year of founding (also used in log)	1 = Less than 5 years old 2 = Aged between 5 and 9 years old 3 = Aged between 10 and 19 years old 4 = Aged between 20 and 49 years old 5 = Aged more than 50 years old
Firm size (reference group used in the estimation: large firms)	QD1. "How many persons does your company currently employ in full-time or part-time in [YOUR COUNTRY] at all locations?""	1 = Micro firm (less than 10 employees) 2 = Small firms (between 10 and 49 employees) 3 = Medium firms (between 50 and 249 employees) 4 = Large firms (more than 250 employees)
Sector (reference group used in the estimation: mining and manufacturing)	QD3 "What is the main activity of your company?" [1] Mining [2] Construction [3] Manufacturing (incl. utilities) [4] Wholesale and retail trade [5] Transport and communications [6] Real estate [7] Other services to businesses and persons (Agriculture, financial and public services are excluded)	1 = Mining and manufacturing [1+3] 2 = Construction and real estate [2+6] 3 = Retail and wholesale trade [6] 4 = Transport and communications [5] 5 = Other services [7]
Country dummies (reference country used in the estimation: Germany	Assigned by the interviewer	4 = Germany 5 = Spain 7 = France 10= Italy 99 = Other euro area country

Annex 3 – Full panel composition

The table on the right shows the distribution of firms across survey rounds I, II and III. For example, there were 5312 companiers participating in round III, of those 3544 participated in round 3 *only*, 1399 participated both in round II and round III, and 378 in all three survey rounds.

Number of firms participating in:		
- Only survey round I	5,125	36.6%
- Only survey round II	2,964	21.2%
- Only survey round III	3,544	25.3%
- Survey rounds I and II	588	4.2%
- Survey rounds II and III	1,390	9.9%
- All survey rounds	378	2.7%
TOTAL	13,989	100.0%

Table – Composition of the full panel

	Nb. of observations	In % of total
SIZE		
- micro (1 to 9 employees)	5652	33.8
- small (10 to 49 employees)	5229	31.3
- medium (50 to 249 employees)	4453	26.6
- large (+250 employees)	1389	8.3
SECTORAL ACTIVITY		
- manufacturing, utilities, mining	4155	24.9
- construction and real estate	2101	12.6
- wholesale and retail trade	4274	25.6
- transport	768	4.6
- other services	5425	32.4
AGE OF THE FIRM		
- less than 5 years	2693	16.1
- between 5 and 9 years	2232	13.3
- between 10 and 19 years	3745	22.4
- between 20 and 49 years	4986	39.8
- 50 years and more	2627	15.7
- DN/NA	440	2.6
COUNTRY		
- Germany	3004	18.0
- Spain	3016	18.0
- France	3004	18.0
- Italy	3010	18.0
- Other euro area countries	4689	28.0
OWNERSHIP		
- Shareholders (listed company)	1287	7.7
- Family or entrepreneurs	8217	49.1
- Other firm or business associates	2330	13.9
- Venture capital or business angel	226	1.4
- A natural person (self-employed)	3827	22.9
- Other, DK/NA	836	5.0
TOTAL	16723	100

Source: ECB-European Commission SME Survey on Access to Finance

Note that if all firms 13.989 firms were observed in all three rounds, we should have 41967 observations (= 13.989*3). What we really have are 16723 observations, because as seen in the previous table the number of companies cooperating in more than one round are not many.