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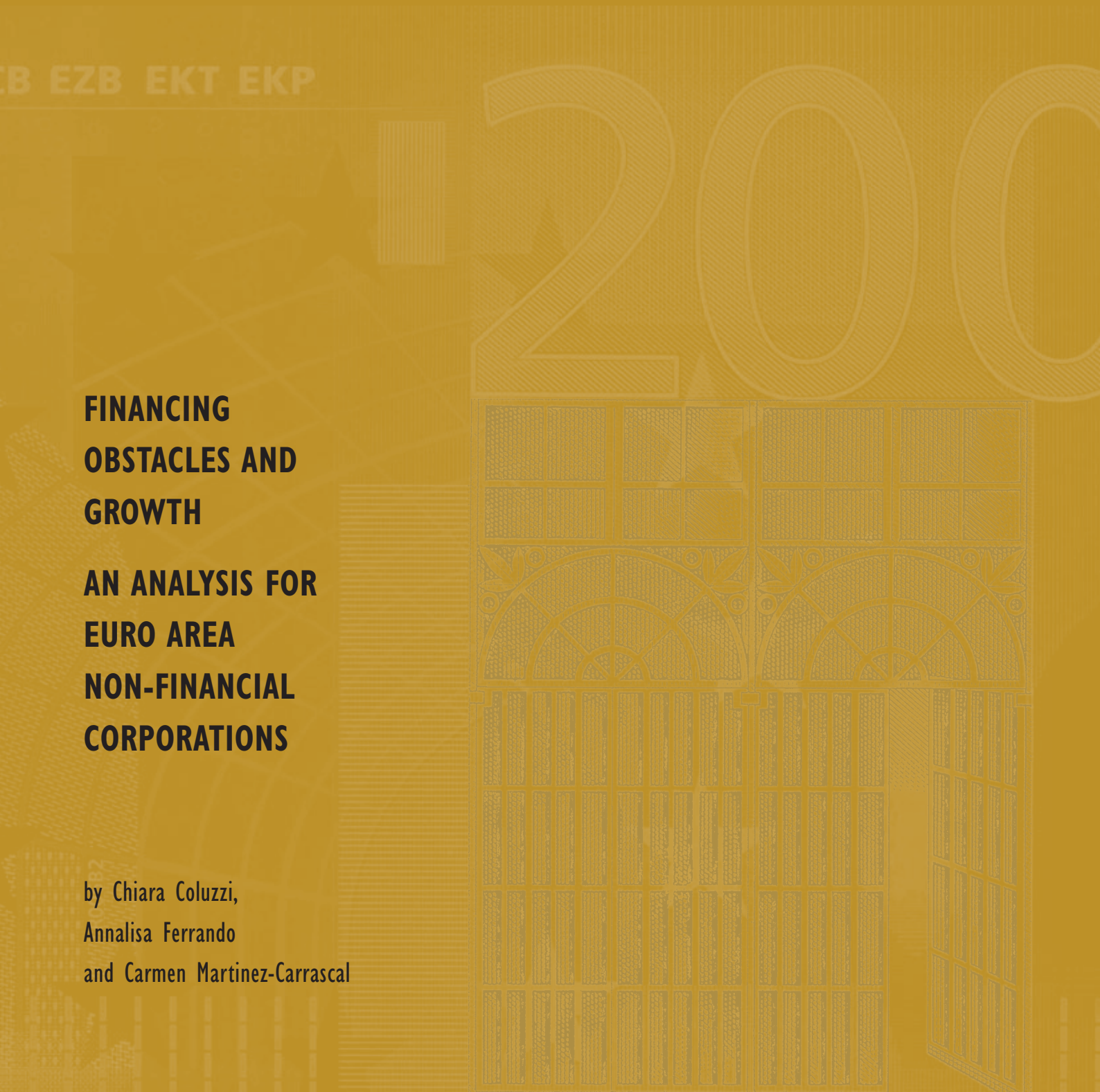

FINANCING OBSTACLES AND GROWTH

AN ANALYSIS FOR EURO AREA NON-FINANCIAL CORPORATIONS

by Chiara Coluzzi,
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CONTENTS

Abstract

This paper investigates whether financial obstacles, and, more generally, financial pressure faced by firms, significantly affect firm growth. For this purpose, we use an unbalanced panel of about 1,000,000 observations for around 155,000 non-financial corporations in five euro area countries. In addition to the balance sheet information in this panel, we also rely on firm-level survey data. In this way we are able to work out a direct measure of the firms' probability of facing financing obstacles. Our results indicate that, though based on few variables, this measure appears to be relevant in explaining firm growth in four out of the five countries considered. Other firm-level variables related to the financial pressure faced by firms, such as cash flow (debt burden) are found to exert a positive (negative) impact on firm growth, while the results for leverage are less clear-cut.

JEL Classification: C23, E22, G32, L11, L25.

Keywords: Financing Constraints, Firm Growth, Panel Data

Non-technical summary

Studying firm growth can provide insights into the dynamics of the competitive process, strategic behaviour, the evolution of market structure, and even the growth of the aggregate economy. This study aims at providing a contribution to the understanding of the main factors affecting firm growth, focussing on the role of financial factors and, more specifically, financing constraints. We analyse if, once controlling for other growth determinants, financing obstacles and, more generally, alternative proxies of financial pressure faced by firms hampers their growth. The analysis consists in three steps.

First, we exploit survey information to obtain a direct indicator of financing constraints faced by firms from five major euro area countries (France, Germany, Italy, Portugal and Spain). This indicator of financing obstacles is based on direct information on the firms' situation and on their access to finance as derived from the World Business Environment Survey. We use a probit model to estimate the relative importance of some firms' characteristics (such as age, size, sector, sales) in explaining the existence of financing obstacles. We find, for instance, that firms that might be more opaque from the point of view of the lender face more financing constraints. More specifically, being young or small increases the probability of facing financing obstacles by 16 and 13 percentage points (pp), respectively. At the same time, we find significant sectoral differences, which could be linked to the differences in the asset structure of their balance sheets: belonging to the manufacturing or to the construction sector increases this probability by 18pp and 26pp, respectively. Finally, we find that a good economic performance has a negative impact on the likelihood of suffering these restrictions (1% sales increase reduces the probability of feeling constrained by nearly 4 pp).

In a second step, the estimated coefficients of the probit model are applied to balance sheet data of a larger panel set of non-financial corporations in order to compute a measure of the predicted probability of encountering (or feeling to have) financing obstacles, which varies over time.

As a final step, we directly evaluated the impact of this measure on firm growth using a dynamic growth model. After controlling for growth opportunities, as well as time and sectoral effects and other firm-level variables, we analyze the impact on growth of this measure of financing obstacles. Our results indicate that, although based on few variables, this measure appears to be relevant in explaining firm growth in four out of the five countries analyzed. The results do not offer evidence in favour of the existence of differences in the marginal impact of financial obstacles on growth for firms of different size, but given that the value of the indicator depends negatively on the firm size, the overall impact will be, other things equal, larger for smaller firms.

Other firm-level variables related with the financial pressure faced by firms (and that will presumably affect firms access to finance) are found to exert an impact on firm growth. More specifically, cash flow has a positive impact on firm growth, while debt burden is found to hamper it. For leverage, the results are less clear-cut. The availability of internal funds, proxied by cash flow, is found to be important for firm growth in all the countries analysed, and the link appears to be particularly strong in those countries for which the sample includes a higher percentage of smaller firms, which are those found to be more affected by financial obstacles.

Finally, our procedure allows testing the implications of both the stochastic and the deterministic approaches to firm growth. After controlling for growth opportunities, we found that some implications of the Law of Proportionate Effects (LPE) -which states that firm growth is independent of initial size and past growth rates- are rejected in some countries. In general, consistently with previous findings, we find that smaller and younger firms grow faster.

1. Introduction

Studying firm growth can provide insights into the dynamics of the competitive process, strategic behaviour, the evolution of market structure, and, perhaps, even the growth of the aggregate economy (Carpenter and Petersen, 2002). However, there are just a few studies that examine the finance-growth nexus at the firm level. As surveyed by Wachtel (2003), Levine (2005) and Papaioannou (2007), usually they assess the effect of well-developed financial markets in relaxing firm's financing constraints and do not address directly the role of financing constraints on growth. Even when financing constraints are investigated, the focus is on firms' investment choices and it is only indirectly proved that they affect investment decisions and then firm growth (Hubbard, 1998).

This study aims at providing a useful contribution to the understanding of the main factors affecting firm growth, and insights on the importance of enhancing firms' funding opportunities. Its main contribution is the direct measurement of the impact of firms' financial position and access to finance on growth. In doing this, it also contributes to the literature on both stochastic and deterministic approaches to explain the determinants of firm size. With respect to the former, we refer to the Law of Proportionate Effects (LPE) (Gibrat, 1931), that states that firm growth is independent of initial size and past growth rates. Both Sutton (1997) and Hart (2000) survey the empirical tests of LPE and the earlier literature trying to explain the departure from this law. This departure was also explained in terms of financing constraints (Cooley and Quadrini, 2001; Cabral and Mata, 2003; Albuquerque and Hopenhayn, 2004; Clementi and Hopenhayn, 2006). Asymmetric information problems and financing constraints are also considered in the deterministic approach, as reviewed by Schiantarelli (1996), Hubbard (1998) and Stein (2003). Through the estimation of an augmented version of the standard LPE equation we jointly test the implications of both strands of literature.

The novelty of this research is to make use of the survey data advantages to overcome balance sheet data shortcomings and vice versa. On the one hand, surveys might be affected by self-reporting bias, but, on the other hand, they provide qualitative and direct information on the firms' situation that cannot be derived from balance sheet data. The latter offer relevant information on the firms' financial position itself –rather than on the *feeling* about their access to finance-, but both cash flow (as in Fazzari, Hubbard and Petersen, 1988) and other balance sheet based indexes (as in Kaplan and Zingales, 1997b, and Whited and Wu, 2006) also present some limitations as proxies for financing constraints. Hence, in this paper we combine both survey and balance sheet data, and we construct a direct indicator of financing obstacles reported by firms from firm-level survey data contained in the World Business Environment Survey,(WBES), carried out by the World Bank, which can be used to exploit the richness of information of a larger balance sheet panel dataset.

This paper aims to investigate the impact of financing obstacles on firm growth. We partly follow the approach of Beck, Demirgüç-Kunt and Maksimovic (2005) and Beck, Demirgüç-Kunt, Laeven and Maksimovic (2006), who exploit the firm-level information contained in the WBES to investigate the effect of financial, legal, and corruption problems on firm growth rates. We exploit the information contained in this survey and complement it with information on firms' financial position using balance sheet information; in this way, we analyse the impact that financial obstacles have on firms' growth. Likewise, given the role that firms' financial health has on their access to finance, we assess the impact of complementary indicators of financial pressure faced by firms (namely, profitability, leverage and debt burden) on firm growth.

A major difference with earlier literature is that the dataset here used includes mainly non-listed and small and medium-sized firms. In particular, it contains around 1 million firm-year observations, 95% of them being small or medium-sized firms (SMEs), in five euro area countries (namely France, Germany, Italy, Portugal and Spain). This represents an advantage with respect to most previous studies, since these are the firms expected to be more affected by financing constraints, and are the backbone of the EU's non-financial business economy.[1]

[1] Small and medium-sized companies represent 99.8 % of all EU-27 enterprises in 2005, employing about 67% of the workforce and generating more than half (57.6%) of its value added (Eurostat SBS, 2005).

After controlling for growth opportunities, as well as time and sectoral effects and other firm-level variables, we analyze which is the impact on firm growth of encountering financing obstacles. Our results indicate that they have a negative impact on firm growth in four out of the five analyzed countries. Other firm-level variables related with the financial pressure faced by firms, such as cash flow and debt burden, are found to exert a significant impact on firm growth dynamics, while the results for leverage are less clear-cut.

The rest of the paper is organized as follows: after reviewing the existing literature in section 2, we present the datasets and summary statistics in section 3. Section 4 states the steps of the analysis and the empirical model, while in section 5 the estimation results are discussed. Section 6 concludes.

2. Review of Literature

As reviewed by Hart (2001), there is a vast literature on the theories of firm growth. In particular, we can distinguish between a stochastic and a deterministic approach to explain the determinants of firm size. The former argues that in a world with no differences ex ante in profits, size and market power across firms, all changes in size are due to chance. The latter assumes, on the contrary, that growth rate of firms differs because of observable industry and firm specific characteristics.

This paper draws from both approaches to investigate the relationship between financing obstacles and firm growth. With respect to the stochastic approach, we relate to the so called Law of Proportionate Effects. Put forward by Gibrat in 1931[2], LPE states that factors that influence firm growth, such as growth of demand, innovation, etc., are distributed across firms in a manner which cannot be predicted from information about firm's current size or its previous growth performance. In the past decades, LPE has been extensively tested for many different countries with mixed empirical results.[3] In fact, it comes out that LPE may hold in particular points in time, for some sectors and/or size classes, but evidence of faster growth of smaller firms suggests that size is often linked to some systematic factors.[4] Age also seems to play a role, for instance because it implies learning (Jovanovich, 1982). Evans (1987a and 1987b) and Dunne, Roberts and Samuelson (1988 and 1989) investigate both size and age effects on growth and find two statistical regularities in their analyses. First, firms' probability of surviving is increasing in size, but, conditional on survival, small firms grow faster.[5] Second, given size, young firms grow faster, but they have a smaller probability of survival.

LPE test is also complicated by two econometric issues. The first concerns the heteroskedasticity arising if this law is not confirmed, i.e. if small firms grow faster than their larger counterparts, the variance of growth should tend to decrease with size. The second issue was put forward by Chesher (1979) and relates to the inconsistency of ordinary least squares estimators if growth is serially correlated. In the present paper both issues are controlled for.

More recently, a number of theoretical papers explain the departure from the LPE in terms of financing constraints. Cooley and Quadrini (2001) show how a combination of persistent shocks and financial frictions can account for the simultaneous dependence of firm dynamics on size and age. Cabral and Mata (2003) explain the empirical right-skewed firm size distribution with the fact that firms cease to be financially constrained. The authors develop a two period-model of a competitive industry. In the first period the firm may be financially constrained, thus size is the minimum between the optimal size and the size affordable by the entrepreneur; in the second, when the firm is no longer affected by financing constraints, size is at its optimal level. In addition, both Albuquerque and Hopenhayn (2004), who

[2] Gibrat observed that the size of firms followed the lognormal distribution very closely, from which he concluded that the firms' rate of growth ought to be a random process.

[3] Sutton (1997) provides a review of the theoretical and empirical literature. Among others, see also Mansfield (1962), Hall (1987), Evans (1987a, 1987b) and Goddard, McKillop and Wilson (2002) for USA, Hart and Oulton (1996), Kumar (1985) and Dunne and Hughes (1994) for UK, Goddard, Wilson and Blandon (2002) for Japan, Mata (1994) and Oliveira and Fortunato (2006a) for Portugal, Wagner (1992) and Harhoff, Stahl, Woywode (1998) for Germany, Solinas (1995) and Lotti, Santarelli and Vivarelli (2003) for Italy. Tschoegl (1983), instead, performs a multi-national study.

[4] For instance, government small business policies or the need to reach the minimum efficient scale might explain faster growth of smaller firms.

[5] This result might be affected by a sample selection bias, i.e. as slow growing firms are more likely to exit, small fast growing firms may be over-represented. Lotti, Santarelli and Vivarelli (2003) offer a survey of papers addressing this issue and providing evidence of small firms growing faster.

study lending and firm dynamics in a model with limited enforcement, and Clementi and Hopenhayn (2006), who model the relationship between borrower and lender in the asymmetric information framework, reach very similar conclusions for firm dynamics. In particular, their models are consistent with the empirical findings that as age and size increase, mean and variance of growth decrease, and firm survival increases.

From a purely deterministic point of view, the impact of financing constraints on the real activity of firms is a well known issue, as reviewed by Schiantarelli (1996), Hubbard (1998) and Stein (2003). The main idea is that imperfections in capital markets produce a wedge between the cost of internal and external finance. In particular, asymmetric information between lender and borrower is the main source of this wedge (Meyers and Majluf, 1984). Nevertheless, both theory and empirical evidence focus on the effect of financing constraints on firms' investment decisions, while fewer papers concentrate directly on firm growth. Carpenter and Petersen (2002) address the issue using a panel of small manufacturing US enterprises. They find that the growth of most firms in their sample is constrained by internal finance. Wagenvoort (2003) replicates the model for Europe, adding to the empirical analysis the impact of leverage and firm size, and finds that growth-cash flow sensitivities are decreasing in firm size. Oliveira and Fortunato (2006b) provide evidence that, in Portugal, smaller and younger firms have higher growth-cash flow sensitivities. Applying the same method used here for Belgian and Slovenian firms, Hutchinson and Xavier (2006) find that young firms and firms with long-term debt are most constrained and that micro and SMEs can face great difficulties in accessing external sources of finance. Fagiolo and Luzzi (2006) show on Italian data that the stronger liquidity constraints are, the more size negatively affects firm growth.

Overall, the body of this literature implies the need for an a priori classification[6] between financially constrained and unconstrained firms in order to check if the sensitivity of investment/growth to cash flow is higher for constrained than for unconstrained firms.[7] We depart from this debate by making use of survey data to obtain a direct measure of financing obstacles, hence avoiding the need of splitting the sample according to any arbitrary a priori classification. In this respect, we partly follow the approach of Beck, Demirgüç-Kunt and Maksimovic (2005) and Beck, Demirgüç-Kunt, Laeven and Maksimovic (2006) that exploit the firm-level information contained in the WBES to investigate the effect of financial, legal, and corruption problems on firm growth rates.[8] Additionally, we complement the survey data with information on firms' financial position using balance sheet information, and we assess the impact of different measures of firms' financial health (namely, cash flow, leverage and debt burden) on firm growth, in line with previous studies which have analyzed the impact of alternative financial indicators on firm growth rates or, more generally, on firm performance.[9] With respect to the econometric methods, we apply dynamic panel data techniques as in Oliveira and Fortunato (2006b) and Hutchinson and Xavier (2006).

A large amount of research provides evidence that financial development has a significantly positive effect on economic growth.[10] The literature has recently been moving from purely cross-country based analysis to a more micro oriented approach, as a way to alleviate some of the limitation of the cross-country analysis, such as reverse causality and multi-collinearity. Seminal papers, in this respect, are Rajan and Zingales (1998) and Demirgüç-Kunt and Maksimovic (1998) based on industry and firm-level data respectively. These papers assume that a well-developed

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[6] The splitting criteria focus on firms characteristics that are related to information costs. For instance, small and young firms should face more binding financing obstacles due to the more severe information asymmetries their creditworthiness analysis involves (Devereux and Schiantarelli, 1990; Gilchrist and Himmelberg, 1995). Foreign owned firms and firms belonging to a group (*keiretsu* in Hoshi, Kashyap and Scharfstein, 1991) should suffer less from financing constraints, as they have alternative source of finance. An investment grade rating for corporate bonds also reduces financing constraints (Whited, 1992).

[7] Although many researchers argue that the correlation is due to financing constraints (see the seminal paper by Fazzari, Hubbard and Petersen, 1988 and 2000), others say that cash flow is simply a proxy for investment opportunities (Kaplan and Zingales, 1997a, 1997b and 2000).

[8] Survey data are also used, for instance, by Becchetti and Trovato (2002). They test Gibrat's Law on different waves of a survey on Italian manufacturing firms. They include in the regression a dummy variable which takes value one if the firm reports to be credit constrained. Their analysis rejects LPE and shows that the inclusion of variables measuring the availability of external finance (subsidies, leverage and financing constraints) significantly affects firm growth.

[9] See amongst others Carpenter and Petersen (2002), Lang, Ofek and Stulz (1996), Nickell and Nicolitsas (1999) or Hernando and Martínez-Carrascal (2008).

[10] See Wachtel (2003), Levine (2005) and Papaioannu (2007) for comprehensive surveys of this literature, showing the development from country level studies to studies that began to exploit industry and firm level data.

financial system removes or reduces the barriers to external financing for firms. The former argues that industries that are more dependent on external financing should do better in countries with better financial systems. Similarly, the latter claims that the proportion of firms that grow rapidly enough to require external financing is related to the development of the financial sector. Likewise, further empirical work suggests that higher degree of financial development allows countries to faster adopt new production technologies (see Aghion et al, 2005) and stimulates Schumpeterian "creative destruction" process through enhanced firm entry (see Beck et al, 2004). However, only recently the availability of large firm level panel dataset is permitting to investigate the issue of the relationship between firm growth and the availability of finance. We contribute to this line of research focusing on more homogeneous countries (such as countries in the euro area). Guiso, Jappelli, Padula and Pagano (2004) and Ferrando, Köhler-Ulbrich and Pál (2007) focus on eurozone countries and find some evidence supporting the hypothesis that the lack of financial development constrains more severely the growth of SMEs, which tend also to be more financially constrained than large firms. Aghion, Fally and Scarpetta (2007), using harmonized firm-level data on entry and post-entry growth in 16 countries, find that finance matters most for the entry of small firms, especially in sectors that are more dependent upon external finance, and that financial development improves post-entry growth of firms. Inklaar and Koetter (2008), instead, exploit firm-level information to measure the dependence of industries on external finance and the efficiency of intermediaries within the EU-25. They find that the relative efficiency of banks in providing financial services is an important dimension of financial development. The difference with respect to these studies is that we measure directly the probability of having financing obstacles.

This paper also complements the literature about financial distress and corporate performance. Among others, Opler and Titman (2004) find that firms with high leverage are more likely to experience performance losses in industry downturns than other firms. Similarly, Bernanke, Gertler and Gilchrist (1996) observe that high leverage reduces the firms' ability to growth through a liquidity effect. In particular, the economy is characterized by a *financial accelerator*. This implies that during recessions borrowers facing high agency costs should receive a relatively lower share of credit, and hence account for a proportionally greater part of the decline in economic activity. By contrast, Lang, Ofek and Stulz (1996) recognize that the relationship between financial distress and firm growth and performance may be sometimes ambiguous. On the one hand, leverage does not reduce growth for firms known to have good investment opportunities; on the other hand, leverage is negatively related to growth for firms whose growth opportunities are either not recognized by capital markets or are not sufficiently valuable to overcome the effects of their debt overhang.

3. Data and Summary Statistics

Data come from two sources, WBES and AMADEUS, which are respectively a firm-level survey about constraints to firm growth and performance and a panel dataset collecting balance sheet information. The aim of the paper is to exploit the survey data advantages to overcome the balance sheet data shortcomings and vice versa as mentioned in the introduction. Accordingly, we incorporate the information included in both survey and balance sheet data to construct a measure of financing constraints and to analyze the impact of this indicator and, more generally, of firms' financial position on their growth patterns.

3.1 Measuring financing obstacles using survey data

Our measure of financing obstacles is based on the information derived from the WBES which was carried out by the World Bank between 1999-2000 to identify obstacles to firm performance and growth around the world. A fundamental property of WBES is that data are at the firm-level.[11]

We use information over about 500 firms across five euro area countries: France, Germany, Italy, Spain and Portugal.[12] We exclude firms in the agriculture sector or whose government owned share is above 50%, thus we end up

[11] See Appendix for more details on the survey. Data and documentation are available at http://info.worldbank.org/governance/wbes/index.html#wbes.

with 482 firms. Around 80% of the sample consists in small and medium enterprises, 20% in large firms, and 11% are young firms. About 30% are in manufacturing, 64% in services, and the remaining 6.5% in the construction industry. Only 11% of the firms are listed and even less are owned by business groups, while 27% are foreign owned (see Table 3.1 that also shows the composition of the sample across countries).

Table 3.1 Country-level sample composition

	France	Germany	Italy	Portugal	Spain	Total
N	97	96	94	97	98	482
Small	36.1%	26.0%	24.5%	39.2%	32.7%	31.7%
Medium	42.3%	60.4%	51.1%	37.1%	56.1%	49.4%
Large	21.6%	13.5%	24.5%	23.7%	11.2%	18.9%
Young	19.8%	11.6%	10.6%	4.2%	11.6%	11.4%
Manufacturing	37.1%	20.8%	27.3%	25.8%	35.7%	29.4%
Services	58.8%	64.6%	68.2%	70.1%	59.2%	64.1%
Construction	4.1%	14.6%	4.5%	4.1%	5.1%	6.5%
Listed	12.5%	4.2%	16.0%	20.6%	0.0%	10.7%
Group	14.4%	10.5%	0.0%	5.3%	9.8%	8.0%
Foreign	22.9%	30.2%	29.3%	25.5%	28.9%	27.3%

Note: The table reports the sample composition in the different countries. Small firms employ 5-50 employees, medium firms 51-500 and large firms over 500 employees. Young is a dummy variable that takes value 1 for new firms (up to 5 years). Listed firms are firms quoted on a stock exchange. Group indicates firms controlled by a company group. Foreign indicates firms with foreign ownership. Source: WBES and own calculations.

The survey includes both specific and generic questions about financing obstacles. For all these questions firms are requested to give a rating from 1, no obstacle, to 4, major obstacle. In our analysis, we consider a financing obstacle as binding if rated as moderate or major (rating 3 or 4), and not binding otherwise (rating 1 or 2). Table A1 in the appendix reports summary statistics on all the dummy variables computed from the financing obstacles. Amongst the specific factors reported to be the most frequent obstacles to firm growth and performance (high interest rates, collateral requirements and paperwork), we focus on the collateral requirements indicator, and we call it *FinObst*.[13] Indeed, the importance of collateral requirements is well known among scholars: financial market imperfections are likely to be especially binding on enterprises that lack collateral, thus limiting their financing opportunities and leading to slower growth. Firms' access to debt depending on collateral has been modeled, among others, by Bernanke, Gertler, and Gilchrist (1996). More recently, Clementi and Hopenhayn (2006) base optimal lending contract design on the relative value of collateral and projects to be financed. Berger and Udell (2006) argue that lending technologies are the key conduit through which government policies and national financial structures affect credit availability. In this framework, collateral arises in many different technologies as a crucial point.

Table 3.2 shows the composition of FinObst across the sample according to the different countries. In particular, Germany is the country with highest percentage of firms reporting financing obstacles. Italy follows with 51.8%, then Spain and France with about 30% of firms. In Portugal, only 13% of firms in the sample report financing obstacles.[14]

[12] The WBES has been totally or partially exploited by a number of papers for different purposes. Related to our paper, see Beck, Demirgüç-Kunt, Laeven and Maksimovic (2006) who use the whole dataset of 80 countries to analyse the determinants of financing obstacles. See also Beck, Demirgüç-Kunt and Maksimovic (2004, 2005) and Beck, Demirgüç-Kunt and Levine (2006).

[13] In order to select a measure of financing obstacles, we performed a preliminary analysis to measure the contribution of each specific financing obstacle to the more general measure. Collateral requirements were found to be the major determinants of the general financing obstacle. In any case, given that high interest rates could be a good proxy for financing obstacles, we performed our econometric analysis also using this indicator. However, collateral requirements confirmed to be the best choice for our purposes.

[14] When comparing the country results, it is worth to remember the caveat included in the *User agreement for WBES Dataset* stating that "Given inherent error margins associated with any single survey results, it is inappropriate to use the results from this survey for precise country rankings in any particular dimension of the investment climate or governance".

Overall, about 12% of the firms in our sample report collateral as a major obstacle, 25.4% rate it as a moderate obstacle, 25% respond that collateral is a minor obstacle, while 38% report that it is not an obstacle to firm growth. Hence, in terms of our dummy variable, we have 37% of the firms indicating the existence of financing obstacles. Around 88% of those are SMEs, 15% have less than 6 years, only 8% belong to a group, just a few more are listed, and 31% are foreign owned. About 34% are in manufacturing, 55% in services, and 11% in the construction industry.

Table 3.2 Firms reporting financing obstacles across countries

	France	Germany	Italy	Portugal	Spain	Total
Small	50.0%	31.0%	29.5%	58.3%	48.3%	38.46%
Medium	26.9%	62.1%	50.0%	41.7%	44.8%	49.1%
Large	23.1%	6.9%	20.5%	0.0%	6.9%	12.4%
Young	19.2%	13.8%	11.4%	16.7%	17.2%	14.97%
Manufacturing	38.5%	25.9%	34.1%	16.7%	51.7%	33.93%
Services	53.8%	56.9%	56.8%	66.7%	41.4%	54.76%
Construction	7.7%	17.2%	6.8%	16.7%	6.9%	11.31%
Listed	3.8%	1.7%	11.4%	0.0%	0.0%	4.24%
Group	15.4%	10.3%	0.0%	0.0%	6.9%	7.23%
Foreign	7.7%	32.8%	20.5%	8.3%	20.7%	21.89%
Total	30.2%	61.1%	51.8%	13.0%	30.5%	37.3%

Note: The table reports the country-level sample composition for firms reporting financing obstacles. Small firms employ 5-50 employees, medium firms 51-500 and large firms over 500 employees. Young is a dummy variable that takes value 1 for new firms (up to 5 years). Listed firms are firms quoted on a stock exchange. Group indicates firms controlled by a company group. Foreign indicates firms with foreign ownership. Source: WBES and own calculations.

In order to gain some intuition on the relationship between financing obstacles and firm growth, Table 3.3 reports summary statistics of two common measures for the growth rate of firms. These are the percentage change in firm sales/number of employees over the past three years.[15] Both measures exhibit, on average, higher percentage rates of growth for firms reporting no financing obstacles, being the intergroup difference in means significantly different from zero for the change in sales (but not for the change in the number of employees).

Table 3.3 Firm growth rate and financing obstacles

Growth of sales	N	Mean	SD	Median	Min	Max
Yes	147	9.48	18.40	10	-50	100
No	228	13.64	20.58	10	-20	100
Total	375	12.01	19.84	10	-50	100
Growth of employees	N	Mean	SD	Median	Min	Max
Yes	154	6.84	26.23	0	-100	100
No	252	8.09	21.18	0	-50	100
Total	406	7.62	23.20	0	-100	100

Note: Growth of sales and growth of employees are directly reported by the respondents as the percentage change in firm sales/number of employees over the past three years. The category "Yes" ("No") includes those firms which report collateral requirements as a moderate-major (no-minor) obstacle for their activity. Source: WBES and own calculations.

[15] Later on, we will measure the growth rate of firms in terms of changes in total assets. Unfortunately, the WBES does not include this information. For the same period and countries the growth of sales in Amadeus is about 15%. It is not possible to compare the growth of employees, instead, as a large number of firms in the Amadeus sample do not report this information.

This simple evidence suggests the existence of a negative relationship between financing difficulties and firm sales growth. This is also confirmed by the results obtained in Beck, Demirgüç-Kunt, and Maksimovic (2005). After controlling for firm characteristics and country development, they find that (different proxies for) financing obstacles have a negative and sufficiently large effect on sales growth.[16]

3.2 Adding information from balance sheet data

Balance sheet information is derived from the AMADEUS Bureau van Dijk database. This is a comprehensive, pan-European database containing financial information on over 10 million public and private companies. Consistently with the WBES sample, we select non-financial corporations in France, Germany, Italy, Spain and Portugal between 1995 (1996 for France) and 2005. After having performed some filtering in order to clean the data (see the Appendix), we obtain an unbalanced panel of 155,440 firms and 1,018,027 observations. As shown in Panel A of Table 3.4, in spite of the large number of observation, the coverage differs a lot across countries. Nevertheless, apart from Germany, the percentage of SMEs is very high: over 90% for France, Italy and Portugal, and about 85% for Spain. Another advantage of AMADEUS is the wide incidence of non-listed firms, these are 99.5% of the sample. For the size class definitions, we use the classification adopted by the European Commission that relies on the number of employees and on a joint condition on either total assets or turnover. In addition, the thresholds for assets and turnover which define different size classes are adjusted over time, using the gross value added deflator.[17]

Table 3.4 Country-level Sample composition and sample medians

		Panel A				
	Total	France	Germany	Italy	Spain	Portugal
Number of obs	1,018,027	318,802	9,127	305,400	360,496	24,202
Number of firms	155,440	68,930	1,172	34,582	42,807	7,949
Small	67.7%	64.7%	8.9%	66.0%	74.6%	48.9%
Medium	25.8%	26.7%	23.9%	29.5%	21.2%	36.1%
Large	6.5%	8.6%	67.2%	4.5%	4.2%	15.0%
Young	6.3%	6.8%	9.8%	3.4%	8.3%	4.4%
Manufacturing	10.2%	28.8%	20.2%	52.3%	36.8%	43.5%
Services	39.0%	22.4%	39.6%	9.5%	15.9%	9.1%
Construction	16.0%	9.8%	4.6%	7.4%	13.0%	10.4%
Other sectors	34.8%	39.0%	35.6%	30.8%	34.4%	37.0%
Listed	0.5%	0.7%	17.1%	0.2%	0.3%	1.7%
		Panel B				
Sample medians						
Growth	Growth of assets	0.023	0.010	0.025	0.037	0.025
ln(A)	Size (ln(Assets))	3.424	6.884	3.893	3.183	4.165
ΔS/S	growth of sales	0.027	0.020	0.018	0.034	0.020
CF	Cash flow	0.078	0.072	0.049	0.078	0.073
Lev	Debt over assets	0.716	0.696	0.812	0.690	0.681
DB	Debt burden	0.113	0.156	0.248	0.196	-
Sample period		1996-2005	1995-2005	1995-2005	1995-2005	1995-2005

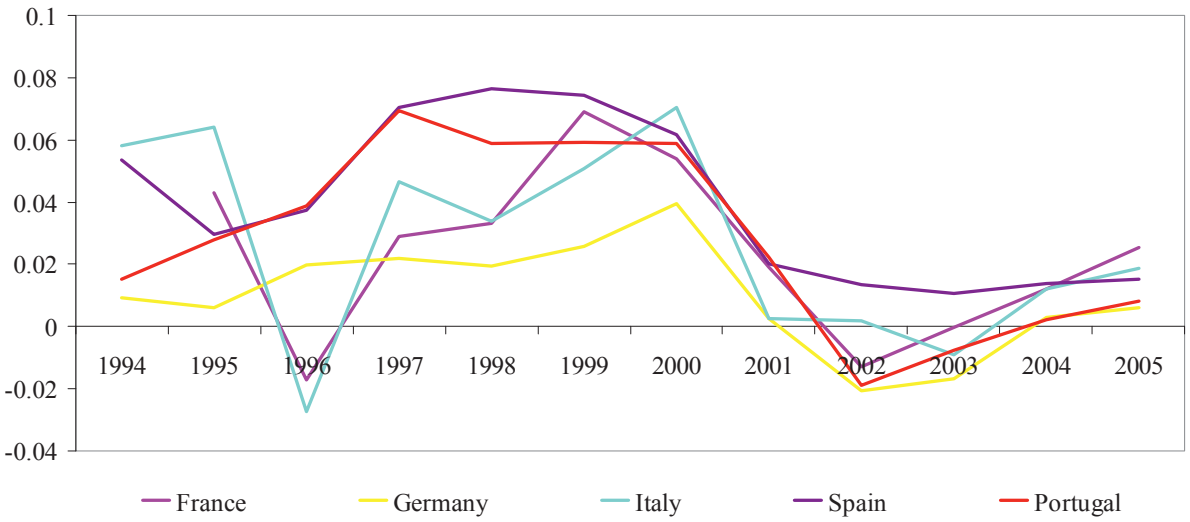
Note: Panel A breaks down the sample composition at country level and Panel B reports sample medians. We excluded micro firms and firms with less than six consecutive years of information. Young is a dummy variable that takes value 1 for new firms (up to 5 years). Listed firms are firms quoted on a stock exchange. Growth is the real growth rate of total assets, Size is defined as the logarithm of total assets, (ΔS/S) is the growth rate of sales, CF is cash flow over assets, Lev is debt over assets DB is interest payments on debt over EBITDA. Source: AMADEUS Bureau van Djik Electronic Publishing and own calculations.

[16] Additional results, based on the WBES, on firms' access to finance and growth are in Demirgüç-Kunt, Beck and Honohan (2008).
[17] This classification differs somewhat from the one used in the WBES, where classes are defined only in terms of employees, but the number of employees itself is not available for many of the firms. In any case, the closest criteria are for small firms. Since, in what follows, size is considered through the inclusion of a size dummy for small firms, as well as with logarithm of total assets, we do not think the difference in size criteria is going to affect the results.

Following Carpenter and Petersen (2002), we measure firm growth as the difference between the natural logarithm of real total assets for two subsequent years.[18] To gain some intuition on the relationship between firm growth and its financial position, we select three financial indicators: cash flow, leverage and debt burden. The first indicator is computed as the sum of the per-period profit/losses and depreciation, scaled on the total assets at the beginning of the period. The second is the ratio between total debt and total assets. The third one measures financial pressure as the ratio between interest paid and EBITDA. From Panel B we find that, except for Italy, median leverage and cash flow ratios are quite homogeneous across countries, while for the debt burden the dispersion in the median ratios is somewhat larger (see also table A.2 in the Appendix). Italy is the country in which the median firm presents a weaker financial position (it shows the lowest median cash flow and the highest leverage and debt burden). For Portugal we did not compute debt burden because we have a very few firms reporting information on interest paid.

Figure 3.1 shows the pattern of the median growth across countries. The median firm growth rate showed an increasing trend in the second half of the nineties and peaked, in the context of strong economic growth, around 1998-2000. The growth rate declined afterwards, in an environment of weaker economic activity. The convergence of firms' growth rate is clear, especially after the introduction of the single currency in 2000. This might be partly linked to more synchronized cycles across countries after the start of the Stage Three of Economic and Monetary Union.

Figure 3.1. Median firm growth rate across countries



Note: The figure displays median annual growth rates of firms. Firm growth rate is measured as the difference between the natural logarithm of real total assets for two subsequent years. Source: AMADEUS Bureau van Djik Electronic Publishing and own calculations.

4. The model: a three step approach

As showed before, there are different strands of literature investigating the relationship between financing constraints and firm growth. This literature, however, mainly relies on indirect measures of financing constraints based on balance sheet data. In contrast, we exploit the information from the WBES survey to obtain a direct indicator of financing obstacles faced by firms and we complement the analysis with balance sheet data derived from the AMADEUS database.

Our analysis consists in three steps. First, we estimate the determinants of financing obstacles, proxied by FinObst, in the WBES to work out an indicator of financing obstacles. Second, the estimated coefficients are applied into

[18] It can be argued that annual growth rates are noisy, and that measurement over longer periods might yield more meaningful growth data. However, aggregating or averaging growth over time would result in a too low number of observations per company. Therefore we use annual growth rates and we include lagged annual growth rates in the estimation (see also Goddard, Wilson and Blandon, 2002).

AMADEUS in order to compute the predicted probability of a firm facing financing obstacles (FO). Finally, the indicator FO is used as a regressor in a dynamic model for firm growth.

In the first step of the analysis, we rely on survey data to analyse which type of firms' characteristics make it more likely for firms to feel the existence of financing obstacles. As in Beck, Demirgüç-Kunt, Laeven and Maksimovic (2006), we assume that the firm's underlying response can be described by the following equation:

$$FinObst_{i,k} = \sum_{k} \theta_k \ country_k + \sum_{j} \phi_j (FirmCharacteristic_j)_{i,k} + \varepsilon_{i,k} \quad (1)$$

where FinObst is the answer reported by firm *i* in country *k*, and FirmCharacteristics is a vector of firm attributes. These attributes include the dummy variables small, young and group. We control for firms' demand by including the natural logarithm of sales. Moreover, we control for industry specific effects through sectoral dummies. Balance sheet information on variables such as leverage or debt burden are not available in the survey, hence cannot be included in this first step of the analysis, but will be considered afterwards. Given that the dependent variable is dichotomous, we use a probit model to estimate equation (1). We assume that the disturbance parameter, $\varepsilon_{i,k}$, has normal distribution and use standard maximum likelihood estimation. Since omitted country characteristics might cause error terms to be correlated for firms within countries, we should allow for clustered error terms as in Beck, Demirgüç-Kunt, Laeven and Maksimovic (2006). Differently from them, this paper deals with a sub-sample of WBES with only 5 countries out of 80. Thus we have large clusters, i.e. a small number of clusters with respect to the total sample size. Therefore, we can directly keep into account country effects through the inclusion of country dummies.[19]

As a second step, the estimated vector of coefficients, (θ_k, ϕ_j), is used into AMADEUS to compute the linear prediction of FinObst for each firm-year observation in each country. Finally, we derive the predicted probability of having financing obstacles, FO. As equation (1) is estimated using a probit model, FO is simply the cumulative standard normal distribution evaluated at the linear prediction of the model.

The last step consists in the estimation of a model for firm growth. We ground on both the stochastic and the deterministic approaches and we choose to test an augmented version of LPE. In the univariate case Gibrat's law is usually estimated as:

$$growth_{i,t} = \alpha_i + \delta_t + (\beta - 1) size_{i,t-1} + \mu_{i,t}, \quad (2)$$
$$\mu_{i,t} = \rho \mu_{i,t-1} + \varepsilon_{i,t}$$

where α_i and δ_t allow for individual and time effects, respectively. The unobserved time-invariant firm specific effects, α_i, allows for heterogeneity across firms, and ρ captures persistence of chance, as suggested by Chester(1979), or serial correlation in the disturbance term $\mu_{i,t}$. Finally, $\varepsilon_{i,t}$ is a random disturbance, assumed to be normal, independent and identically distributed (IID) with $E(\varepsilon_{i,t}) = 0$ and $var(\varepsilon_{i,t}) = \sigma^2_{\varepsilon} > 0$. .According to Tschoegl (1983), departures from LPE arise if $\beta \neq 1$, i.e. size reverts to the mean ($\beta < 1$) or it is explosive ($\beta > 1$); $\rho \neq 0$, i.e. growth is persistent, or the growth rates are heteroskedastic.

Goddard, Wilson and Blandon (2002) rearrange model (2) for the purposes of panel estimation as:

$$growth_{i,t} = \alpha_i (1 - \rho) + \delta_t + \rho growth_{i,t-1} + (\beta_0 - 1) size_{i,t-1} + \eta_{i,t} \quad (3)$$

where $\eta_{i,t} = \varepsilon_{i,t} + \rho(1-\beta) size_{i,t-2}$ thus under the null hypothesis $\beta = 1$ we have that $\eta_{i,t} = \varepsilon_{i,t}$. We assume an augmented version of (3). For augmented we mean that economic meaning is added to the simple LPE regression, through the inclusion of variables that deterministically affect growth. The final equation to be estimated is:

[19] Large clusters imply that the intercepts and the slope coefficients can be estimated consistently as the number of observations in each cluster approaches infinity. We end up with the so called cluster dummy variables probit model. This is an example of nonlinear cluster-specific fixed effect (CSFE) model, hence we are assuming that the intercept might be correlated with regressors (see Cameron and Trivedi, 2005; Wooldridge, 2003, and Pendergast et al., 1996). When estimating the model as a simple logit, we virtually obtain the same marginal impacts as in the probit model.

$$growth_{i,t} = \alpha_i(1-\rho) + \delta_t + \rho growth_{i,t-1} + (\beta_0 - 1)size_{i,t-1} + \sum_{j=1}^{k} \beta_j x_{j,i,t-l} + \eta_{i,t} \quad (4)$$

where *x* is a vector of explicative variables lagged *l* times. Alternatively, equation (4) can be interpreted as the Carpenter and Petersen (2002) model augmented by size and past growth rates. We include in *x* the dummy young, and one period lagged values for cash flow, leverage, debt burden and FO. The annual growth rate of sales is introduced as a proxy for growth opportunities.[20] Except the latter and the dummy young, all right-hand side variables are lagged one period to reduce possible endogeneity problems.

We estimate the dynamic model (4) through the GMM-system estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998), which has recently been used to test augmented versions of LPE.[21] As emphasized in Bond, Hoeffler and Temple (2001), this estimation procedure has important advantages over other estimation methods in the context of empirical growth models. Indeed, this estimator controls for the presence of unobserved firm-specific effects – e.g. the efficiency level- that can be correlated with the firm growth rate and with the explanatory variables and hence avoids the bias that arises in this context. Likewise, by using instrumental variable methods, the GMM estimator allows to estimate parameters consistently in models that include endogenous right-hand side variables. This favours the use of a GMM-estimator over simple cross-section regressions or other estimation methods for dynamic panel data.

In addition, the high persistence of the series that is typically present in empirical growth models favours the use of a GMM-system estimator rather than the GMM first-difference estimator. As discussed in Blundell and Bond (1998), when the time series are highly persistent, the first-difference GMM estimator may be subject to a downward bias. They show that in autoregressive-distributed lag models, first-differences of the variables can be used in level equations as instruments, provided that they are mean stationary, and that dramatic reductions in the bias and gains in precision can be obtained by using these alternative equations.

If the underlying model residuals are white noise, then first-order serial correlation should be expected in the first-differenced residuals for which we present the test of Arellano and Bond (1991), labelled M_1. At the same time, no second order correlation in the first differenced residuals should be observed. We present the test of Arellano and Bond (1991), labelled M_2, to test for this hypothesis, which indicates the key condition for the validity of this method. We also report the results of the Sargan test of overidentifying restrictions as test for instruments validity, although Blundell, Bond and Windmeijer (2000) report Monte-Carlo evidence showing that this test tends to over-reject, especially when the data are persistent and the number of time-series observations large.

5. Firm growth determinants

The summary statistics reported in Table 3.3 suggest that financing obstacles negatively affect growth. In this section we apply our three step analysis to see whether financing obstacles affect growth after controlling for firm's characteristics and firm's financial position.

5.1 Steps 1 and 2: the determinants of financing obstacles

In the first step, we rely on the dummy variables probit model to study the determinants of financing obstacles in our sample. The results from the estimation of equation (1) are reported in Table 5.1. Since the goal is to apply the estimated coefficients to a different dataset, we restrict the choice of the independent variables to those included in both

[20] Ideally, we would have included the usual Tobin´s Q measure as a proxy for growth opportunities, but it is not possible to construct this variable with this database since most of the firms in the sample are non-quoted. In any case, using this variable also presents some limitations, since it is importantly affected by measurement errors. Therefore, some authors (for instance Gomes, 2001) suggest using changes in profit or sales. Also, Lang, Ofek and Stulz (1996) use the growth of sales as a regressor in their growth equation. Wagenwoort (2003), instead, solves the same issue modelling Q-values of quoted companies in a different dataset and using the econometric model to obtain Q-values of unquoted companies.

[21] See for instance Oliveira and Fortunato (2006b) for Portugal, and Hutchinson and Xavier (2006) for Belgium and Slovenia.

datasets. This might constrain the analysis, but, in any case, evidence on previous studies indicates that the variables used here are the most relevant, amongst those included in the WBES survey, in order to predict financing obstacles.[22]

Table 5.1 Financing Obstacles and firms characteristics

	(1)	(2)	(3)	(4)
Small	0.243	0.239	0.327**	0.150
	0.17	*0.17*	*0.16*	*0.15*
Young	0.432*	0.496**	0.407*	0.552**
	0.23	*0.23*	*0.23*	*0.22*
Ln(sales)	-0.090**	-0.083**	-0.100**	-0.115***
	0.04	*0.04*	*0.04*	*0.03*
Group	0.128		0.077	0.13
	0.29		*0.28*	*0.26*
Listed	-0.634**	-0.623**		
	0.26	*0.26*		
Manufacturing	0.463***	0.451***	0.479***	0.450***
	0.16	*0.16*	*0.16*	*0.15*
Construction	0.713**	0.633**	0.686**	0.723***
	0.29	*0.29*	*0.29*	*0.26*
France	-0.359	-0.359	-0.413	
	0.26	*0.26*	*0.26*	
Germany	0.374*	0.339	0.377*	
	0.22	*0.22*	*0.22*	
Italy	0.560*	0.509	0.508	
	0.33	*0.33*	*0.33*	
Portugal	-0.819**	-0.861***	-0.875***	
	0.32	*0.32*	*0.31*	
Spain	-0.722***	-0.775***	-0.668***	
	0.20	*0.19*	*0.20*	
Stock market capitalization/GDP				-0.041***
				0.01
Constant				1.710
				0.66
N	378	393	382	382
Log pseudolikelihood	-210.70	-217.99	-215.63	-241.00
% correctly classified	70.37	70.23	70.68	66.26

Note: The underlying model is equation (1). The dependent variable is FinObst. Small firms employ 5-50 employees. Young is a dummy variable that takes value 1 for new firms (up to 5 years). Listed firms are firms quoted on a stock exchange. Group indicates firms controlled by a company group. Standard errors (in italics) are robust and *, **, *** indicate significance at the 10%, 5%, and 1% level, respectively. The percentage of correctly classified firms is the weighted average of the percentage of correct prediction (the cut off is 0.5) for each outcome, FinObst = 1 and FinObst = 0, with the weights being the fractions of zero and one outcomes, respectively. Source: WBES database and own calculations.

The results from the probit model are in line with the expectations. Firms' characteristics linked to the degree of opacity of the company from the point of view of the lender result in differences in financial obstacles faced by firms: in all

[22] Beck, Demirgüç-Kunt, and Maksimovic (2006), who use a larger set of variables in the WBES, find that age, size and ownership predict financing obstacles better than the other firms' attributes.

specifications a positive (and significant) link is found between being young and facing financing constraints[23]; likewise, quoted firms -see columns 1 and 2- or larger firms -see column 3-, which are more likely to enter into contract which are publicly visible, are found to face lower restrictions. Both modelling alternatives (including or not a dummy for listed companies) lead to similar results in terms of the adjustment of the model, but small and listed dummies are never significant at the same time. The dummy group, instead, is never significant. Likewise, firms in the manufacturing and in the construction sector face (or have the feeling of facing) more financing obstacles than those in the service sector. These three specifications outperform those which include a proxy for overall financial development at a country level instead of country dummies. For example, column (4) shows the results obtained when the total market share capitalization to GDP ratio in each country is included instead of country dummies in specification (3).[24] As can be seen, the performance of the model in (4) is worse, indicating than country characteristics other than the size of the financial markets, for example, institutional or legal factors are important in order to determine the hurdles than firms face in accessing external finance. This finding seems quite reasonable given the group of countries here analysed, which present a substantial (and not too heterogeneous) degree of financial development.

The percentage of correctly classified firms is around 70% in all the specification, the highest figure corresponding to the third specification. More specifically, according to this specification, being young increases the probability of facing financing obstacles by 16 pp[25], while small size increases this probability by about 13 pp.[26] Likewise, in line with the expectations, having higher firm performance in terms of sales reduces the probability of feeling constrained: 1 pp sales increase reduces this probability by nearly 4 pp. Finally, it is also remarkable the difference across sectors: being in the manufacturing or in the construction sector increases this probability by 18 and 26 pp, respectively. These large sectoral differences might be linked to factors such as differences in the level of assets that can be easily used as collateral. Indeed, according to the AMADEUS database, the percentage of tangible assets is higher in the service sector than in the manufacturing sector and, even more dramatically, in the construction sector.

We select the third model specification to work out our measure of financing obstacle, which is the model predicted probability of having financing obstacles .[27] First, we collect the coefficients of the variables.[28] Second, for all the observations in AMADEUS we compute the linear prediction of the probit model. The predicted probability of having financing obstacles, which we call *FO*, is then the cumulative standard normal distribution evaluated at the linear prediction of the model. As Table 5.2 summarizes, Italian firms are those who have the highest estimated probability of facing financing obstacles. In addition, the minimum figure is 0.43, which is close to the average value in Germany.[29] FO, instead, is on average around 0.3 in France and Spain, and 0.2 in Portugal. In particular, for Portugal the WBES

[23] We also estimated the model using log of age instead the dummy young. We obtained a negative and significant relationship confirming that younger firms suffer more from financing obstacles. In addition, when we allow for a different impact of medium or large companies, both dummies are non-significant.
[24] Other proxies for financial development where considered, such as debt, bonds or total market to GDP ratios; the results were worse than those presented here. Neither the combination of a few country dummies and this ratio outperform the models which only include country dummies.
[25] Marginal impacts are evaluated at the sample mean. Bootstrap analysis with 5,000 random resampling confirms the estimation results.
[26] An anonymous referee pointed out that the estimated coefficients for the size dummy in the different estimation results might be biased due to reverse causality and suggested to estimate a bivariate probit in which the size indicator depends on the financial obstacles indicator. Although with the expected (positive) sign, the significance of the coefficient obtained for FinObst in the size equation was rather limited (p-value = 23%). As an alternative way to check the impact of this potential endogeneity, we instrumented the variable "small"; the estimated coefficient obtained is somewhat lower (0.24, with a p-value equal to 0.099); hence, the possibility of some upward bias in the value of this coefficient cannot be ruled out, but in any case, the estimated coefficient using instrumental variables is in line with that obtained in specifications (1) and (2). In addition, the adjustment of the model using instrumental variables was somewhat worse than the one in (3).
[27] Specification tests suggest to choose either specification (2) or specification (3). The latter one is then selected since it guarantees a higher percentage of correctly classified firms. In any case, the financial obstacle indices, computed in Amadeus for the three different specifications, are highly correlated between each other: the correlations are above 95%.
[28] We also use the coefficients of the dummies for France and Italy since they are close to the significance threshold of 10%. The coefficient on group, instead, is set equal to zero.
[29] In the WBES, Germany recorded a percentage of companies reporting financing obstacles above that for Italy. The lower predicted probability of financing obstacles estimated here for the German firms in comparison to the Italian firms is linked to factors such as the higher percentage of large and listed companies, which, according to the results shown above, are negatively related to financial difficulties.

registered the lowest percentage of firms reporting financing obstacles and, in line with this, the lowest coefficient among the country dummies in the probit model.

Table 5.2 FO estimates. Summary statistics

	France	Germany	Italy	Portugal	Spain	Total
Mean	0.36	0.46	0.72	0.21	0.33	0.45
SD	0.14	0.13	0.11	0.10	0.13	0.22
Median	0.33	0.43	0.70	0.19	0.28	0.42
Min	0.12	0.24	0.43	0.05	0.24	0.05
Max	0.73	0.89	0.92	0.54	0.89	0.92

Note: FO is the predicted probability of having financing obstacles. The estimated probabilities of facing financing obstacles are calculated on the basis of the coefficients derived from a probit model estimated on the WBES database. Source: AMADEUS database and own calculations.

Table 5.3 investigates the growth rate of firms with high or low values of FO. The firm grouping is defined with respect to the percentile of FO in which firms fall: above the last decile (high), or below the first decile (low). In France, Germany, and Italy firm growth rate is higher for enterprises with lower predicted probability of having financing obstacles. However, this is not the case in Spain, while for Portugal, the difference is not statistically different from zero.

Table 5.3 FO and firm growth

	France		Germany		Italy		Portugal		Spain	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
High FO	0.04	0.21	0.01	0.22	0.03	0.22	0.06	0.21	0.09	0.26
Low FO	0.05	0.18	0.05	0.15	0.06	0.19	0.05	0.19	0.07	0.20
p-value	0.00		0.00		0.00		0.38		0.00	

Note: The table reports summary statistics for firm growth rate belonging to the first (Low) or last decile (High) of FO (which is the predicted probability of having financing obstacles) and the p-value associated to the null hypothesis of no difference in the mean growth rate in these two groups. Source: AMADEUS database and own calculations.

5.2 Step 3: the determinants of firm growth

We turn now to the model for firm growth, which is estimated through a GMM- system. In the following regressions we always control for year and sectoral effects. All right-hand side variables except the growth rate of sales are lagged one period to reduce possible endogeneity problems, and lagged values of the regressors are used as instruments.[30]

In Table 5.4, we consider four specifications of the augmented LPE model, equation (4). In Panel A we add to the standard LPE equation the dummy young and firms profitability, in Panel B we also consider leverage and the financial obstacles (FO) indicator, in Panel C we include an additional measure of financial pressure, interest payments on debt over results, and in Panel D we add an interaction term between FO and a dummy for SMEs.

In all the specifications, the estimated coefficient of past firm growth (the autoregressive parameter in equation (4)) is negative and significant, thus rejecting the LPE hypothesis of growth not depending on past performances.[31] The negative sign means that a period of above average growth tends to be followed by one of below average growth.

[30] We use the program DPD98 for Gauss (Arellano and Bond, 1998). The instruments used are not common across countries because of specification problems in some countries. Hence, the results are not strictly comparable across countries. Summary statistics along with correlation coefficients among regressors are reported in the Appendix.

[31] Hart (2000) argues that the relative importance of systematic and stochastic factors in the growth of companies may be indicated by the degree of serial correlation of growth. He suggests that systematic factors should produce persistent company growth and hence a high degree of serial correlation.

Goddard, Wilson and Blandon (2002) argue that a negative autocorrelation coefficient might also support that annual growth rates are noisy. Likewise, the implication of the LPE that the initial size also should not affect growth does not seem supported by the results: for Portugal and Spain, we find always a negative and significant coefficient for our size measure, i.e. the natural logarithm of real total assets, indicating that small firms grow faster; for France the results also point in this direction (the estimated coefficient is negative in all the specifications, although non-significant in the first one). In Italy this variable is found to be significant only in Panel C and D, while in Germany the coefficient is positive when significant. The results also indicate that young firms grow faster in all the countries except Germany. We could expect that older companies, with their larger accumulations of past output, to be further along the learning and experience curves ("learning by doing" argument), and hence to be able to grow more quickly as a result of these dynamic economies of scale. However, young firms usually are small firms and then they might growth faster, for instance to reach their Minimum Efficient Scale. Our evidence of smaller and younger firms growing significantly faster in four out of five countries is consistent with Evans (1987a and 1987b) and Dunne, Roberts and Samuelson (1988 and 1989), and is also in line with Aghion et al (2006), who show that there exist a significant correlation between entry and productivity. The difference between growth for more and less mature firms seems specially marked in Italy, Portugal and Spain.

As expected, growth opportunities, proxied by growth of sales, have a positive and significant impact on firm growth for all the analysed countries. The results also show that, after controlling for growth opportunities, firm growth is still conditioned by the flow of generated internal funds (the cash flow ratio) in all the considered countries, something that might be supporting the hypothesis of the existence of financing constraints. In fact, the link between cash flow and growth seems stronger in those countries for which the sample includes a higher percentage of smaller firms, which, according to the analysis presented in the previous section, are those more affected by financial obstacles. Indeed, the marginal impact of cash flow on growth in France, Italy and Spain ranges between 0.4 and 0.6, while in Germany, where around 70% of the companies in the sample are large, this impact is much lower (around 0.2).[32]

As can be seen, the cash flow variable remains significant also when the financing obstacles indicator is included in the specification (see panel B). When including FO, in three out of the five countries under analysis the magnitude of the cash flow variable decreases, but in Italy the coefficient becomes higher (and also in Germany, but just slightly).[33] The fact that this variable remains significant, when the financing obstacles indicator is included in the specification, might signal that the simple measure of financing obstacles used here could not fully capture financing constraints faced by firms. However, it might also reflect the fact that cash flow might be correlated with investment opportunities, which are linked to the growth of assets.

As for leverage, the results are mixed, in line with the previous evidence in the literature, which is not conclusive regarding the impact of leverage on growth.[34] We might expect that higher leverage implies higher financial pressure, then difficult access to additional external funds and, as a result, a negative impact on firm growth. The results found for Germany and Portugal are in line with this hypothesis. However, for Italy and Spain, we find positive and significant coefficients, which might be the outcome of companies with better growth opportunities being more successful in attracting external funds. In France, the coefficient on leverage has a much lower (positive) magnitude and it is significant

[32] In the estimation we already controlled for growth opportunities through the inclusion of the growth rate of sales, so differences in the sensitivity of growth to cash flow variations across countries should not be linked to differences in the role of cash flow as a proxy for future profitability. In any case, we checked if in countries with larger percentage of smaller firms there is a higher predictive power of cash flow for future sales growth or for future profitability, and the results did not point in this direction. Neither within each country is cash flow a better proxy for future profitability or future sales growth for smaller firms.

[33] If the comparison is done between the results in Panel A and the results adding just the financial obstacles indicator (as in Table A.4 in Appendix) the differences in the magnitude for the cash flow coefficient are lower than those obtained when comparing the results in Panel A and B.

[34] For example, mixed evidence on the relationship between leverage and growth is found by Opler and Titman (1994), who show that growth is lower for firms in the three highest deciles of leverage, but especially so within distressed industries. Also Lang, Ofek and Stulz (1996) find that the negative relationship between growth and leverage exists only for firms with low Tobin's thus for firms with lower investment opportunities. When they split their sample by size, they find that leverage has a positive effect on growth for large, highly levered firms that are not in distressed industries. Hesmati (2001) adopts various proxies for firm growth and finds that leverage negatively affects the growth rate of assets, positively affects the growth rate of sales, while it has no impact on employment.

only at 10% level. A simple regression analysis seems to indicate that indeed these two opposite effects are important to determine the sign and magnitude of the impact of leverage on growth: we find a positive relationship between growth opportunities and the increase of debt, but, on the other hand, this tends to be stronger only with moderate levels of leverage, probably reflecting that high leverage firms are likely to have more difficulties in raising additional external funds.[35]

Finally, firm's predicted probability of having financing obstacles, FO, has the expected negative sign. Thus, although it is a function of a few qualitative determinants of financing obstacles, this measure seems to capture the negative impact of financing obstacles on firm growth. This is not the case in Germany, where the coefficient is non-significant. Spanish firms are found to be the ones with highest growth sensitivity to this indicator, followed by Portugal, Italy and France.

In Panel C, we add another measure of financial pressure to gain a better interpretation of the relationship between firms' financial position and growth. The coefficients of debt burden are negative, but for Germany and Italy the coefficient is not significant. In the latter country, however, the lower significance is linked to the fact that the standard error associated to the estimation of the coefficient is rather large. The magnitude of this coefficient is, in fact, very close to those obtained for France and Spain, where this variable is found to have a negative significant impact on growth. For Portugal the estimation was not carried out because the information required for calculating the debt burden ratio is available for very few firms in the AMADEUS database.

Finally, we present in Panel D the results obtained when we add to the specification presented in Panel C (Panel B for Portugal) an interaction term between the FO variable and a dummy variable taking value 1 if the firm is small or medium-sized and 0 otherwise. As can be seen, the variable FO and the interaction term are never significant altogether. Indeed, although the sign of the interaction term is always negative, it is significant only in the French case. In any case, although in the remaining four countries the marginal impact of FO is not statistically different for firms of different size, the overall impact will be more contractive for smaller than for larger firms, since the value of the indicator is negatively linked to the size of the firm. In this specification, the debt burden indicator is significant in the all the countries which have information on this variable.

In all estimation results we find the expected first order autocorrelation in our first-difference residuals while there is no evidence of second-order autocorrelation, the key requirement for our instrumentation strategy. The Sargan test statistics are, in most cases insignificant at conventional 5% level.[36]

Overall, results indicate that the measure of financing obstacles derived from survey data appears to be relevant in explaining firm growth in four out of five countries. The contractive impact is found to be stronger for Spain, Portugal and Italy, and weaker in France. The evidence in favour of a higher marginal impact for smaller firms is not generalised across countries and hence is not conclusive. Likewise, variables linked to the level of financial pressure faced by firms, which are relevant for determining the access to external finance, are also found to have a role in explaining growth dynamics. More specifically, cash flow has a positive impact on firms' growth, while debt burden is found to hamper it; for the leverage indicator results are less clear-cut. The flow of internal funds, proxied by cash flow, is found to be important for firm growth in all the analysed countries, and the link seems particularly strong in those countries for which the sample includes a higher percentage of smaller firms, which are those which, according to the analysis carried out in the previous section, are found to be more affected by financing obstacles.

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[35] In addition, to further check for the role of growth opportunities, we added to the Panel B specification an interaction term between leverage and a dummy for low growth opportunities (i.e. firms in the first 5% of the sales growth distribution). We found that for France, Germany and Spain a negative coefficient, while for Italy and Portugal this variable has the negative sign but it is not significant. Following Opler and Titman (1994) findings, we estimated the equation introducing an interaction term between leverage and small size, and we obtained a negative sign in Italy, Portugal and Spain. In Germany, instead, it turned out that leverage has positive impact on growth for small firms. Finally, in France, this variable was not significantly different from zero.

[36] The p-value associated to the Sargan test in Panel A for Spain is quite low, 2.2%, but the M_2 statistic indicate that the key condition for instruments validity holds. Blundell, Bond and Windmeijer (2000), through Monte-Carlo simulations evidence a tendency to over-rejection for this test.

Table 5.4 GMM-system results

Panel A

	France		Germany		Italy		Portugal		Spain	
	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE
Const	-0.023	0.040	-0.115*	0.070	-0.007	0.015	0.100	0.073	0.061***	0.021
$Growth_{it-1}$	-0.179***	0.011	-0.056*	0.031	-0.328***	0.108	-0.074***	0.022	-0.148***	0.034
$Size_{t-1}$	-0.013	0.010	0.015	0.010	-0.002	0.004	-0.023*	0.014	-0.025***	0.005
Young	0.016***	0.005	-0.004	0.015	0.032***	0.009	0.039***	0.013	0.035***	0.007
$(\Delta S/S)_{it}$	0.237***	0.066	0.177**	0.073	0.696***	0.080	0.219***	0.068	0.213***	0.070
CF_{it-1}	0.649***	0.060	0.204**	0.096	0.403***	0.104	0.343***	0.059	0.588***	0.041
N	282,522		7,955		270,818		21,266		317,689	
M1	0		0.00		0		0		0	
M2	0.97		0.63		0.44		0.20		0.43	
Sargan	0.05		0.21		0.06		0.18		0.02	

Panel B

	France		Germany		Italy		Portugal		Spain	
	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE
Const	0.034	0.05	-0.292	0.23	0.098	0.120	0.276***	0.07	0.075	0.08
$Growth_{it-1}$	-0.185***	0.01	-0.062**	0.03	-0.351***	0.096	-0.043**	0.02	-0.130***	0.02
$Size_{t-1}$	-0.026***	0.01	0.033*	0.02	-0.016	0.010	-0.033***	0.01	-0.034***	0.01
Young	0.035**	0.01	-0.074	0.05	0.067***	0.021	0.089***	0.02	0.098***	0.02
$(\Delta S/S)_{it}$	0.306***	0.05	0.184***	0.07	0.599***	0.067	0.129**	0.05	0.172***	0.05
CF_{it-1}	0.610***	0.06	0.208**	0.10	0.611***	0.126	0.285***	0.06	0.602***	0.04
Lev_{it-1}	0.034*	0.02	-0.181***	0.06	0.106***	0.030	-0.122***	0.04	0.130***	0.05
FO_{it-1}	-0.125*	0.08	0.414	0.29	-0.216*	0.119	-0.265***	0.09	-0.337***	0.09
N	282,522		7,955		270,818		21,266		317,689	
M1	0		0		0		0		0	
M2	0.48		0.67		0.95		0.23		0.17	
Sargan	0.05		0.12		0.06		0.05		0.05	

Table 5.4 (*continued*)

Panel C

	France		Germany		Italy		Spain	
	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE
Const	0.059	0.06	-0.262	0.22	0.146	0.122	0.124*	0.064
$Growth_{it-1}$	-0.174***	0.01	-0.064**	0.03	-0.345***	0.093	-0.124***	0.017
$Size_{t-1}$	-0.025***	0.01	0.030*	0.02	-0.018*	0.010	-0.036***	0.007
Young	0.038**	0.02	-0.068	0.05	0.070***	0.021	0.099***	0.017
$(\Delta S/S)_{it}$	0.288***	0.05	0.182***	0.06	0.571***	0.067	0.175***	0.046
CF_{it-1}	0.411***	0.10	0.172***	0.05	0.428**	0.192	0.492***	0.063
Lev_{it-1}	0.047**	0.02	-0.161***	0.05	0.110***	0.029	0.120***	0.037
DB_{it-1}	-0.030**	0.01	-0.008	0.01	-0.032	0.024	-0.031**	0.013
FO_{it-1}	-0.133*	0.08	0.385	0.28	-0.228*	0.118	-0.341***	0.083
N	282,522		7,955		270,818		317,689	
M1	0		0		0		0	
M2	0.61		0.69		0.77		0.15	
Sargan	0.10		0.09		0.11		0.08	

Table 5.4 (*continued*)

Panel D

	France		Germany		Italy		Portugal		Spain	
	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE
Const	0.087*	0.047	-0.206	0.203	0.157	0.117	0.292***	0.07	0.112*	0.063
$Growth_{it-1}$	-0.174***	0.011	-0.061**	0.029	-0.275***	0.085	-0.044**	0.02	-0.123***	0.017
$Size_{t-1}$	-0.027***	0.007	0.020	0.016	-0.018*	0.010	-0.036***	0.01	-0.035***	0.007
Young	0.047***	0.014	-0.075	0.047	0.065***	0.020	0.090***	0.02	0.097***	0.017
$(\Delta S/S)_{it}$	0.295***	0.053	0.179***	0.062	0.548***	0.065	0.136***	0.05	0.188***	0.045
CF_{it-1}	0.415***	0.102	0.185*	0.103	0.288	0.181	0.287***	0.06	0.490***	0.063
Lev_{it-1}	0.040*	0.021	-0.161***	0.052	0.110***	0.028	-0.119***	0.04	0.130***	0.036
DB_{it-1}	-0.030**	0.012	-0.008*	0.005	-0.047**	0.022			-0.033***	0.013
FO_{it-1}	-0.004	0.148	0.446	0.278	-0.209*	0.122	-0.213**	0.12	-0.283***	0.097
$FO*SME_{it-1}$	-0.183**	0.088	-0.106	0.106	-0.009	0.040	-0.072	0.08	-0.053	0.046
Number of obs	282,522		7,955		270,818		21,266		317,689	
M1	0		0		0		0		0	
M2	0.66		0.57		0.76		0.15		0.07	
Sargan	0.07		0.05		0.12		0.08		0.16	

Note: Panel A-D reports different specifications of the model in equation (4). All equations include time and sectoral dummies. Estimated coefficients and asymptotic robust standard errors are reported. Estimation by GMM-SYSTEM estimator using the robust one-step method. The estimation period is 1996-2005 for France, and 1995-2005 for the remaining countries. M1 (M2) is the p-value of the test for first (second) order serial correlations of the residuals; Sargan is the p-value of the test of over-identifying restrictions. Growth is the growth rate of total assets, Size is defined as the logarithm of total assets, Young is a dummy variable that takes value 1 for new firms (up to 5 years), (ΔS/S) is the growth rate of sales, CF is cash flow over assets, Lev is debt over assets DB is interest payments on debt over EBITDA and FO is the indicator of financial obstacles. Instruments: in first-differences equation, following lagged values of the regressors: France: Growth (t-3), Size (t-5), Young (t-3, t-4), (ΔS/S) (t-5),CF (t-3), Lev (t-4 , t-5); Germany: Growth (t-2), Size (t-3), Young (t-2, t-3), (ΔS/S) (t-2),CF (t-2), Lev (t-3), DB (t-2 to t-4),FO(t-5), FO*SME(t-4 to t-5); Italy: Growth (t-5), Young (t-2); Portugal Growth (t-3), Size (t-3), Young (t-2 to t-5), (ΔS/S) (t-4),CF (t-3), FO(t-3 to t-5), FO*SME (t-3 to t-5); Spain: Growth (t-5), Size (t-2), Young (t-3), (ΔS/S) (t-6),CF (t-4), Lev (t-3). In levels equations, first differences of the regressors dated as follows: France Growth (t-3), (ΔS/S) (t-2), Lev (t-4), DB (t-5), FO(t-3), FO*SME(t-1); Germany: Growth (t-1), Size (t-2), (ΔS/S) (t-1),CF (t-1),Lev (t-1), DB (t-2), FO*SME(t-4); Italy: Growth (t-4), Size (t-5), (ΔS/S) (t-5), CF (t-3), Lev (t-5), DB (t-5), FO(t-4), FO*SME(t-2); Portugal: Growth (t-1), (ΔS/S) (t-3),CF (t-1),Lev (t-1), FO(t-1); Spain: Growth (t-2), (ΔS/S) (t-3),CF (t-2), DB (t-2),FO(t-1), FO*SME(t-1). *, **, *** indicate significance at the 10%, 5%, and 1% level, respectively.

6. Concluding remarks

This paper analysed the nexus between financing obstacles and firm growth in five major euro area countries. The study was carried out combining the information of both a firm-level survey and a large panel dataset (with around 1,000,000 observations for 155,000 corporations) where small and medium-sized firms, which are those expected to be more affected by financing constraints, prevail.

We developed a three step procedure. First, using survey data, we investigated the determinants of financing obstacles. We used as a proxy the perceived severity of collateral requirements as obstacles to firm growth and performance. We found that being young increases the probability of facing financing obstacles by 16 percentage points, while being small increases it by about 13 pp, in line with the more opaque nature of these type firms from the point of view of the lender. Results also indicate sectoral divergences with firms in the construction sector being more affected by this type of obstacles. Likewise, results indicate that 1% increase in firm performance in terms of sales, instead, reduces the probability of feeling constrained by nearly 4 pp. Then, combining different sources of information, we worked out a measure of the predicted probability of having (or feeling to have) financing obstacles and, as a final step, we directly evaluated its impact on firm growth using additional information derived from balance sheet data. We also evaluated firms' growth response to other variables potentially linked to the existence of financial obstacles and to the access to external finance, such as cash flow, leverage or the debt burden level. Differently from most of the earlier literature on the nexus between financial factors and growth, we adopted a firm-level approach and estimated a dynamic model for firm growth through a GMM-system estimator.

Our results indicate that, although based on few variables, our measure of financing obstacles appears to be relevant in explaining firm growth in four out of the five analyzed countries. Likewise, the results do not offer evidence in favour of the existence of differences in the marginal impact of financial obstacles on growth for firms of different size, but given that the value of the indicator depends negatively on the firm size, the overall impact will be, other things equal, larger for smaller firms.

Other firm-level variables related with the financial pressure faced by firms (and hence will presumably affect firms access to finance) are found to exert an impact on firms' growth. More specifically, cash flow has a positive impact on firms' growth, while debt burden is found to hamper it. For leverage, the results are less clear-cut. The availability of internal funds, proxied by cash flow, is found to be important for firms' growth in all the analysed countries, and the link appears to be particularly strong in those countries for which the sample includes a higher percentage of smaller firms, which are those found to be more affected by financing obstacles in the previous analysis. Likewise, we find that the LPE implications were rejected in most of the specifications; in general, consistently with previous literature, we find that smaller and younger firms grow faster.

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Appendix

WBES database

The goal of the World Business Environment Survey (WBES) is "first to understand conditions and main obstacles firms face for doing business in the different countries, and second, to advise governments to change policies to remove obstacles and promote growth". Thus, it includes many questions on the nature of financing and legal obstacles to growth as well as questions on corruption issues. General information is more limited, but includes data on size class, sales, industry, and ownership. In particular, WBES database is size-stratified and has good coverage of small and medium-size firms. The survey was administered in such a way that the sectoral composition in terms of manufacturing (including agro-processing) versus services (including commerce) is determined by relative contribution to GDP, subject to a 15% minimum for each category.[37]

To assess the importance of financing obstacles, the firms were asked to rate how problematic specific financing issues are for the operation and growth of their business. These are (1) collateral requirements of banks and financial institutions; (2) bank paperwork and bureaucracy; (3) high interest rates; (4) need for special connections with banks and financial institutions; (5) banks lacking money to lend; (6) access to foreign banks; (7) access to non-bank equity; (8) access to specialized export finance; (9) access to financing for leasing equipment; (10) inadequate credit and financial information on customers; (11) access to long-term loans; and (11) corruption of bank officials. Firms were also asked a more generic question about the severity of financing obstacles. For all these questions the rating ranges from 1, no obstacle, to 4, major obstacle.

Researchers are usually worried about the possibility of bias in data based on self-reporting by firms. The WEBS is less prone to standard arguments against surveys because its purpose is to evaluate the business environment, not the firm performance. As pointed out by Beck, Demirgüç-Kunt, and Maksimovic (2005), firms were asked just few specific questions about their performance *at the end* of the interview, and the majority of questions refers to business conditions and government policies. This implies that there is not a big extent in justifying performance when answering the earlier questions about the business environment. However, if a financially constrained firm exaggerates the severity of its financing obstacle, and rate it as "major" while in effect it is only "moderate", this could bias the ordinal nature of the answers. Thus, differently from previous studies, instead of exploiting the ordinal nature of the answers, we will consider a financing obstacle as binding if rated as moderate or major (rating 3 or 4), and not binding otherwise (rating 1 or 2). Although the possibility of data bias due to self-reporting can never be totally eliminated, the above arguments allow us to believe that this is not going to influence significantly our study. Table A.1 reports summary statistics on all the dummy variables computed from the financing obstacles indicators.

[37] Other criteria for the survey administration at country level are that at least 15% of firms should be foreign owned and at least 15% should export some significant share of their output.

Table A.1 Summary statistics

	N	Mean	SD	Median
General financing obstacle	472	0.43	0.49	0
Collateral requirements	453	0.37	0.48	0
High interest rates	458	0.49	0.50	0
Access to long-term loans	445	0.24	0.43	0
Bank paperwork/bureaucracy	463	0.44	0.50	0
Need special connection	453	0.28	0.45	0
Banks' lack of money to lend	444	0.18	0.38	0
Access to foreign banks	403	0.12	0.32	0
Access to non-bank equity	396	0.19	0.39	0
Access to export finance	353	0.17	0.37	0
Access to leasing finance	422	0.28	0.45	0
Inadequate credit/financial information	435	0.29	0.45	0
Corruption of bank officials	421	0.07	0.26	0

Note: The reported figures are computed as dummy variables taking value one if the financing obstacle is moderate-major and zero otherwise. The underlying variables are the answers to the question: "can you tell me how problematic is … for the operation and growth of your business?" Answers vary between 1 (no obstacle), 2 (minor obstacle), 3 (moderate obstacle), and 4 (major obstacle).

AMADEUS database

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, if the firm belongs to a group, and if it is listed on a stock market. Consistently with the WBES we exclude firms in the agriculture, forestry, fishing and mining sectors. We also leave out micro firms, as the WBES do not cover them.[38].

The original dataset contains financial information for the period 1990-2005; we drop the first three years because of poor coverage[39] and we loose another year of observations to compute variable as first differences of the balance sheet items. We use only end of year data. Moreover, for holding firms we exploit the consolidated annual accounts, whenever available, as these are considered to be most suitable for providing information about the financial situation of a company with subsidiaries. This implies that mergers and acquisitions of lines of business belonging to any parent firm may show up in the consolidated budget of the parent firm. Since we do not want our results to be affected by growth in assets derived from merger and acquisitions activities but rather by growth determined by the activity of the firm, we delete from the sample firms that exhibit an annual percentage growth rate of total assets larger than one in absolute value. We assume that in this way we are able to purge the majority of firms participating in merger or acquisitions. We consider only firms with at least six consecutive years of observations.

38 Firms with less than 5 employees are not surveyed.

39 For the same reason we drop an additional year in France, where the final sample covers the years 1995-2005.

Table A.2 Summary statistics

France	Mean	SD	Median	Min	Max
Growth	0.036	0.187	0.023	-0.621	0.748
Size	3.661	1.401	3.424	0.653	8.271
Young	0.068	0.252	0.000	0.000	1.000
(ΔS/S)	0.034	0.192	0.027	-0.961	1.139
CF	0.089	0.098	0.078	-0.320	0.503
Lev	0.703	0.231	0.716	0.063	1.776
DB	0.452	0.996	0.113	-4.474	4.833
Germany	Mean	SD	Median	Min	Max
Growth	0.023	0.170	0.010	-0.673	0.870
Size	6.848	1.811	6.884	1.701	11.153
Young	0.098	0.297	0.000	0.000	1.000
(ΔS/S)	0.031	0.224	0.020	-1.383	1.388
CF	0.081	0.082	0.072	-0.345	0.911
Lev	0.676	0.193	0.696	0.082	1.397
DB	0.387	0.831	0.156	-3.226	4.714
Italy	Mean	SD	Median	Min	Max
Growth	0.038	0.184	0.025	-0.623	0.699
Size	4.050	0.997	3.893	1.352	7.534
Young	0.034	0.182	0.000	0.000	1.000
(ΔS/S)	0.021	0.230	0.018	-1.468	1.164
CF	0.064	0.069	0.049	-0.193	0.401
Lev	0.772	0.174	0.812	0.182	1.141
DB	0.501	0.831	0.248	-3.224	4.688
Portugal	Mean	SD	Median	Min	Max
Growth	0.045	0.183	0.025	-0.613	0.796
Size	4.405	1.285	4.165	1.446	8.445
Young	0.044	0.205	0.000	0.000	1.000
(ΔS/S)	0.027	0.237	0.020	-1.538	1.498
CF	0.087	0.077	0.073	-0.143	0.427
Lev	0.656	0.186	0.681	0.081	1.253
Spain	Mean	SD	Median	Min	Max
Growth	0.060	0.212	0.037	-0.630	0.819
Size	3.301	1.285	3.183	-0.309	7.030
Young	0.083	0.275	0.000	0.000	1.000
(ΔS/S)	0.047	0.265	0.034	-1.352	1.708
CF	0.093	0.086	0.078	-0.237	0.491
Lev	0.662	0.218	0.690	0.076	1.482
DB	0.369	0.628	0.196	-3.446	4.677

Source: AMADEUS Bureau van Djik Electronic Publishing and own calculations.

Table A.3 Correlation coefficients

France	$Growth_{it-1}$	$Size_{t-1}$	Young	$(\Delta S/S)_{it}$	CF_{it-1}	Lev_{it-1}	DB_{it-1}
$Growth_{it-1}$	1						
$Size_{t-1}$	0.0517*	1					
Young	0.0476*	-0.0492*	1				
$(\Delta S/S)_{it}$	0.2137*	-0.0086*	0.0983*	1			
CF_{it-1}	0.2481*	-0.1105*	-0.0007	0.0262*	1		
Lev_{it-1}	0.0299*	-0.0759*	0.1112*	0.0340*	-0.2934*	1	
DB_{it-1}	-0.1338*	0.0502*	0.0360*	-0.0236*	-0.5431*	0.2821*	1
FO_{it-1}	-0.001	-0.5399*	0.2405*	0.0380*	0.0457*	-0.0484*	-0.0291*
Germany							
$Growth_{it-1}$	1						
$Size_{t-1}$	0.0786*	1					
Young	0.0454*	-0.0442*	1				
$(\Delta S/S)_{it}$	0.1845*	0.0174	0.0894*	1			
CF_{it-1}	0.2404*	-0.0486*	0.0248*	0.0519*	1		
Lev_{it-1}	0.0328*	-0.0268*	-0.0305*	-0.0108	-0.1833*	1	
DB_{it-1}	-0.1041*	-0.0079	0.0139	-0.0337*	-0.4717*	0.1441*	1
FO_{it-1}	-0.0335*	-0.6474*	0.3027*	0.0201	-0.006	0.0430*	0.0529*
Italy							
$Growth_{it-1}$	1						
$Size_{t-1}$	0.1041*	1					
Young	0.0612*	-0.0138*	1				
$(\Delta S/S)_{it}$	0.2392*	0.0198*	0.0693*	1			
CF_{it-1}	0.2408*	0.0136*	-0.0037	0.0270*	1		
Lev_{it-1}	0.0960*	-0.1000*	0.0789*	0.0432*	-0.4247*	1	
DB_{it-1}	-0.1158*	0.0146*	0.0137*	-0.0280*	-0.5135*	0.2409*	1
FO_{it-1}	-0.0294*	-0.4908*	0.1445*	0.0171*	0.0021	-0.0152*	-0.0043*
Portugal							
$Growth_{it-1}$	1						
$Size_{t-1}$	0.0382*	1					
Young	0.0847*	0.0138*	1				
$(\Delta S/S)_{it}$	0.2386*	0.0288*	0.1308*	1			
CF_{it-1}	0.2547*	-0.0406*	0.0125	0.0470*	1		
Lev_{it-1}	0.1460*	-0.0367*	0.0875*	0.0518*	-0.3119*	1	
FO_{it-1}	0.0217*	-0.4877*	0.1474*	0.0433*	0.0357*	-0.0241*	
Spain							
$Growth_{it-1}$	1						
$Size_{t-1}$	0.0781*	1					
Young	0.0982*	-0.0771*	1				
$(\Delta S/S)_{it}$	0.2105*	0.0184*	0.1308*	1			
CF_{it-1}	0.2712*	-0.0522*	0.0269*	-0.0124*	1		
Lev_{it-1}	0.1411*	-0.0960*	0.1429*	0.0754*	-0.3290*	1	
DB_{it-1}	-0.0836*	0.0095*	0.0371*	0.0311*	-0.4929*	0.2768*	1
FO_{it-1}	0.0411*	-0.5148*	0.2812*	0.0582*	0.0211*	0.0881*	0.0125*

Source: AMADEUS Bureau van Djik Electronic Publishing and own calculations * indicates significance at the 5%.

Table A.4 Firm growth determinants

	France		Germany		Italy		Portugal		Spain	
	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE
Const	0.040	0.05	-0.399*	0.221	0.239**	0.119	0.105	0.075	0.255***	0.041
$Growth_{it-1}$	-0.180***	0.01	-0.062**	0.030	-0.291***	0.099	-0.048**	0.019	-0.114***	0.03
$Size_{t-1}$	-0.020*	0.01	0.032*	0.017	-0.020*	0.011	-0.018	0.013	-0.050***	0.01
Young	0.040***	0.02	-0.072	0.051	0.073***	0.022	0.075***	0.017	0.126***	0.02
$(\Delta S/S)_{it}$	0.258***	0.06	0.177*	0.071	0.653***	0.074	0.136**	0.054	0.154***	0.057
CF_{it-1}	0.643***	0.06	0.213*	0.096	0.399***	0.101	0.302***	0.059	0.568***	0.041
FO_{it-1}	-0.132*	0.08	0.414	0.291	-0.276**	0.124	-0.192*	0.096	-0.473***	0.087
N	282,522		7,955		270,818		21,266		317,689	
M1	0		0		0		0		0	
M2	0.90		0.65		0.42		0.24		0.27	
Sargan	0.06		0.27		0.01		0.10		0.01	

Note: The table reports results for the estimation of the model in equation (4). Estimated coefficients and asymptotic robust standard errors are reported. Estimation by GMM-SYSTEM estimator using the robust one-step method. The estimation period is 1996-2005 for France, and 1995-2005 for the remaining countries. M1 (M2) is the p-value of the test for first (second) order serial correlations of the residuals; Sargan is the p-value of the test of over-identifying restrictions. Growth is the growth rate of total assets, Size is defined as the logarithm of total assets, Young is a dummy variable that takes value 1 for new firms (up to 5 years), (ΔS/S) is the growth rate of sales, CF is cash flow over assets, Lev is debt over assets DB is interest payments on debt over EBITDA and FO is the indicator of financial obstacles. Instruments are the same as in Table 5.4. *, **, *** indicate significance at the 10%, 5%, and 1% level, respectively.

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