Certification of public-sector lending of SMEs towards banks

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Abstract

We investigate the circumstances in which public funding in SMEs is effective in certifying recipient firms towards commercial banks. Based on a sample of 546 Spanish SMEs that received participative loans from ENISA (a Spanish public-sector institution) and a control group of 960 matched twins, we demonstrate that participative loans certify the target companies and increase their access to external long-term debt. The effect is stronger for smaller companies operating in high tech sectors, who arguably suffer information asymmetries more acutely. Companies whose quality was previously certified by venture capitalists benefit less from certification from ENISA.

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1 Introduction

Bank loans are traditionally the most familiar source of financing for SMEs (Beck, Demirgüç-kunt, & Martinez, 2008). However, SMEs typically face more serious difficulties in accessing external finance from financial institutions with respect to their larger counterparts (Beck et al., 2008; Cressy, 2002), mainly because of information opacity (Berger & Udell, 1998). SMEs' business plans and market strategies are rarely mentioned in the press or publicly disclosed. Often SMEs do not have audited financial statements that can be used to convey information about the SME's prospects. Bank officials therefore have scarce information to assess whether prospective clients will be willing and able to pay back their loans. This information asymmetry between commercial banks and prospective clients generates adverse selection problems for SMEs (Berger & Udell, 1998; Binks & Ennew, 1996; Chittenden, Hall, & Hutchinson, 1996; Cosh & Hughes, 1994; Michaelas, Chittenden, & Poutziouris, 1999). Moreover, the access of SMEs to public financing sources is hampered by the high access costs generated by public-market due diligence and venture capital is only accessible for a limited percentage of companies. As a result, SMEs are typically subject to financial constraints, which even worsen during the economic crisis (De Vries & Block, 2010; Infelise, 2014; Ivashina & Scharfstein, 2010; N. Lee, Sameen, & Cowling, 2015).

The difficulty which SMEs have to access external financing attracted substantial interest from policymakers because SMEs account for the majority of companies in any economy and represent a significant share of employment.[2] Public authorities' concern led to the creation of schemes to allocate public-sector funding to SMEs, using a wide variety of instruments (Infelise, 2014; Zúñiga Vicente, Alonso-Borrego, Forcadell, & Galàn, 2014).

[2] In Europe-27, SMEs represented 99.8% of the companies operating in 2011, and accounted for 67.4% of workforce (Infelise, 2014).

Public-sector funding has been found to have a positive direct impact on the target company's investments. Most notably, there is vast empirical evidence supporting the additionality of R&D grants (David, Hall, & Toole, 2000; Zúñiga Vicente et al., 2014) and subsidized loans (Huergo & Moreno, 2014; Huergo, Trenado, & Ubierna, 2013) with respect to R&D investments.

A limited number of contributions also evaluated the effect of subsidies on SMEs' ability to access external sources of funding, such as commercial banks and venture capital firms (Lerner, 1999; Meuleman & De Maeseneire, 2012). Specifically, selective subsidies convey a signal of the quality of the target company towards private investors, thus improving the company's ability to raise funds from external sources. As the signal is sent by the interaction with a reputable third party (i.e., the government), this information asymmetry reduction process is referred to as *certification*.

Current literature reserved little attention to the study of the conditions under which the certification towards external investors is more effective. Meuleman and De Maeseneire (2012) found that start-ups, which are characterized by higher information asymmetries, benefit more from the receipt of R&D subsidies in terms of access to external equity, and that subsidies that target more innovative projects are more effective in improving the access to long-term debt. In this work we aim to go one step further and analyze in a more systematic way under which conditions the certification effect towards commercial banks is stronger. By doing so, we aim to improve the understanding of the mechanisms behind the certification effect.

Moreover, the certification hypothesis has never been tested for public-sector loans. This is rather surprising since a recent mapping of the public initiatives to support access to finance in SMEs in Europe has revealed that loans are very widely used (Infelise, 2014). Additionally, there

are reasons to believe that the certification effect of loans is higher than that of conventional subsidies (Huergo & Moreno, 2014). We aim to contribute to the literature by focusing on public loans, and in particular on a type of public loan that until now has been neglected: non-subsidized participative loans.[3]

The scope of analysis is 546 companies receiving long-term non-subsidized participative loans from a Spanish institution funded by the Spanish Ministry of Industry and Tourism,[4] over the period 2005-2010. Tracking the evolution of these companies and of a matched sample of companies that did not receive loans from that institution from their foundation till 2012, we find that the former have significantly higher chances of raising additional long-term debt. After accounting for alternative explanations, we link this effect to public-sector certification towards external financiers. We also study the conditions under which the certification effect is stronger. We find that companies that are typically less interesting for commercial banks, because of higher information asymmetries (i.e., smaller, high-technology companies), experience an even greater increase in the access to long-term debt. Moreover, the effect is weaker for companies that could rely on the certification of other actors, such as venture capitalists.

The rest of the paper is structured as follows. In Section 2 we describe the theoretical base and develop our hypotheses. In Section 3 we present the data and the methodology used to test our hypotheses. Results and robustness checks are shown in section 4. Finally, in section 5 we discuss our findings and highlight the conclusions of our work.

[3] While participative loans are typically used in Spain, their application can also be found in other countries, such as France (European Commission, 2001) or Italy (Agliata, Ferrone, & Tuccillo, 2014).

[4] Spain is a particularly interesting framework for our analysis. First, the country ranks high with respect to the amount of public resources committed as a percentage of the national GDP, or national SMEs' sector value added (Infelise, 2014). Second, the study of different forms of public support to innovative companies in Spain has received substantial recent attention from scholars (Huergo & Moreno, 2014; Huergo et al., 2013; Santamaría, Barge-Gil, & Modrego, 2010), but mostly focusing on subsidized loans targeted on R&D projects. Third, Spain is a precursor in the use of non-subsidized participative loans (Infelise, 2014).

2 Theoretical base and hypotheses development

2.1 *Information asymmetry, signaling theory and certification*

Information asymmetry arises when not all company stakeholders have the same access to information about the company, and generates adverse selection problems (Eisenhardt, 1989). The costs of adverse selection for the investors are associated with the selection of low quality companies. They can be reduced by improving the screening process, which is based on the search for new information available in the market. There are cases, however, where the access to private information is very limited. One way to deal with this problem is signaling (Akerlof, 1970; Spence, 1974). To overcome an information gap the informed party signals its value to the uninformed party. This action allows high-quality agents to be differentiated from the low-quality ones. Hence, only high-quality agents take advantage of the benefits of signaling.

Focusing on the labor market, Spence (1974, p.1) defines signals as “activities or attributes of individuals in a market which by design or accident, alter the beliefs of, or convey information to, other individuals in the market". He analyzes how high-quality job applicants try to differentiate themselves from low-quality ones with the costly signal of reputed higher education. As Connelly, Certo, Ireland, and Reutzel (2010) point out, the efficacy of the signal requires the presence of two characteristics, namely observability and cost. Outsiders should be able to notice the signal and, at the same time, the signaler faces a cost that others agents could not absorb. Moreover, the cost of the signal is higher for bad signalers than it is for good signalers.

The signaling theory has been used to address a wide variety of issues and for a diverse universe of signalers (for a complete review, see Connelly et al., 2010). In some cases, the signaler sends a unique signal, such as the percentage of equity retained by the entrepreneur

(Leland & Pyle, 1977), the level of debt (Ross, 1977), or the level of underpricing at initial public offerings (Welch, 1989), among many others, whereas in others the signaler sends multiple signals (Balboa & Martí, 2007).

The signaling theory is the base for a strand in the finance literature that focuses on third parties' direct involvement in the signal sent to 'certify' the quality of the signaler (Kleer, 2010). When a reputable high-status third party decides to associate with a company, risking its own reputational capital, the company is certified and the company's quality is signaled towards external actors (Wade, Porac, Pollock, & Graffin, 2006). Most of the seminal references on certification focus on initial public offerings and identify third parties such as a prestigious accounting firm (Titman & Trueman, 1986), a highly-ranked underwriter (Carter & Manaster, 1990), or a venture capital investor (Coakley, Hadass, & Wood, 2009; Lee & Wahal, 2004; Megginson & Weiss, 1991). More recently, the certification theory (Lerner, 2002) has been developed and tested in the case of other forms of finance, such as debt, venture capital and private equity financing (e.g., Balboa & Martí, 2007; Feldman & Kelley, 2006; Meuleman & De Maeseneire, 2012).

2.2 *The government as certifying body*

The certification theory has often been used to study how governmental intervention can ease the access to external finance of SMEs', which as noted previously are typically affected by high levels of information asymmetry (Berger & Udell, 1998; Gregory, Rutherford, Oswald, & Gardiner, 2005). Regarding the allocation of direct subsidies, Lerner (1999) finds evidence of the certification effect to venture capital investors of R&D grants awarded under the Small Business Innovation Research program (SBIR) in the USA. When the agency's assessment is linked with the commercialization potential, Feldman and Kelley (2006) affirm that private investors may

consider award-winning projects as more valuable than others, thus allowing them to raise additional funding from other sources. Colombo, Grilli and Murtinu (2011) also agree that government subsidies may convey a certification signal, but only when there are strict selection criteria. Finally, Meuleman and De Maeseneire (2012) find evidence of the certification effect of government R&D grants, which increase long-term debt and, in the case of start-up SMEs, also help in raising external equity. In sum, the existing literature confirms that selective subsidies convey a signal of the quality of the target company towards private investors, thus improving the company's ability to raise funds from external sources.

Government support is also channeled via direct loans to SMEs (Infelise, 2014). A well-developed literature has studied the signaling effect of the announcement of new bank loans towards financial markets (James, 1987; Lummer & McConnell, 1989), finding a positive effect especially for small companies (Slovin, Johnson, & Glascock, 1992). This literature suggests that screening and monitoring services associated with bank loans convey a signal of quality of the company.

Nevertheless, to the best of our knowledge, there is no empirical evidence on the certification effect of government loans. Huergo et al. (2013) however point out that the additionality of loans is not expected to be the same as that of conventional subsidies. As the company must pay back the loan, in contrast with what is common in conventional subsidies, loans impose self-discipline and a higher commitment on the company. Moreover, the government agency may be more selective in the award of loans with respect to conventional subsidies, because it is in its interest to select recipients that will actually be able to repay the debt. Hence, one may argue that loans are expected to generate a higher certification effect than conventional subsidies.

This line of reasoning is particularly evident for non-subsidized participative loans. Participative loans reward the lender in two ways: a pre-determined interest rate, which could be fixed or variable, and a share of the company's profits. Therefore, these loans lie between conventional loans and equity. Hence, the return on the investment of the lender can be potentially very high because it includes a share of the earnings of the borrower. Therefore, it is in the interest of the lender to be extremely selective in the award of loans because the higher the potential of the selected SMEs, the higher the return for the agency itself. External investors may therefore interpret the receipt of a non-subsidized participative loan as a proof of the SMEs quality, and be more willing to invest in it.

We posit that receipt of participative loans increases SMEs' chances of receiving long-term financing from commercial banks, thanks to a certification effect. Typically, banks are quite reluctant to provide funding to SMEs because of the high information opacity (Berger & Udell, 1998). However, Meuleman and De Maeseneire (2012) have shown that commercial banks are sensitive to signals of company quality (in their case the signal corresponds to R&D subsidies). Participative loans may convey an especially effective signal for commercial banks, as recipient firms commit themselves to the repayment of the loan, similarly to what happens in the case of subsidized loans (Huergo & Moreno, 2014), thus increasing their trustworthiness as borrowers. Following our discussion, we argue that SMEs that receive a participative loan from a government-supported institution experience a decrease in their information opacity, which in turn increases the SME's ability to raise long-term debt from other external sources thanks to a certification effect.

Beyond certification, participative loans exert a positive effect on the company's long-term debt granted by commercial banks for other reasons. First, award-receiving companies have

a higher liquidity at their disposal, which can be used to buy tangible fixed assets that can be subsequently pledged as collateral. If this is the case, commercial banks would be more willing to lend money to award-receiving companies because they have higher tangibility, and not necessarily because of a certification effect. Second, a participative loan may also decrease the risk of default of the recipient company, and in turn increase its creditworthiness. Again, if banks perceive an increase in the creditworthiness of awarded companies, they would be more likely to lend money to SMEs, and this would have little to do with reduction in the information asymmetries or certification.

2.3 *Hypotheses development*

Overall, participative loans can improve a company's access to external long-term debt in many ways. Our focus is however on certification and on the conditions under which the certification effect is stronger. Since the certification is a way to reduce uncertainty about the quality of SMEs when direct indicators of quality are absent (Pollock, Chen, Jackson, & Hambrick, 2010), we predict that the receipt of participative loans will be a more effective signal towards commercial banks for SMEs that are more strongly affected by information opacity. In particular, we focus on different characteristics that can moderate the effectiveness of certification: the SMEs' size and age, the technological level of the industry in which they operate and the receipt of venture capital investment.

SME's size: Smaller companies are typically more strongly affected by information opacity, as they are less well-known and often unable to provide audited financial statements (Bernanke, Gertler, & Gilchrist, 1996). Because of the fixed costs associated with screening, contracting, monitoring and servicing loans, banks capture scale economies in dealing with large companies, while costs of information collection are exacerbated in relatively small businesses

(Binks & Ennew, 1996). These circumstances increase the cost of debt for smaller lenders (Avery, Bostic, & Samolyk, 1998), as proved by a large empirical evidence (Canepa & Stoneman, 2008; Hao & Jaffe, 1993; Magri, 2009). The certification of participative loans issued by the government lowers the cost of information collection that banks need to face. Therefore, we expect it to be more valuable for smaller companies.

Hypothesis 1: The certification effect of participative loans granted by a government-supported institution is stronger in SMEs that were smaller at the moment the loan was granted .

SME's age: Information asymmetries are also particularly important for the youngest companies, who lack a track record and are characterized by a scarce visibility in the market (Berger & Udell, 1998; Carpenter & Petersen, 2002; Hall, 2002). Moreover, younger SMEs are affected by higher levels of uncertainty (Sørensen & Stuart, 2000; Stuart, Hoang, & Hybels, 1999), related to both the product development and the commercialization phases (Murray, 1999). Therefore, very young companies do not represent an ideal borrower for banks. We expect that the receipt of participative loans granted by the government is particularly valuable for younger companies, because it can increase their visibility towards commercial banks and their trustworthiness as borrowers. As for commercial banks, they may find it fruitful to initiate bank relationships with newly-borne SMEs, since they may spread the fixed costs of producing information about the company over multiple products sold to the borrower in the future (Petersen & Rajan, 1994). We argue that third party certification may accelerate this process in recently-established high-growth and high-technology SMEs. Similarly, Meuleman and De Maeseneire (2012) find that the receipt of R&D subsidies is a particularly effective certification mechanism towards external equity providers for start ups. In our hypothesis 2, we posit:

Hypothesis 2: The certification effect of participative loans granted by a government-supported institution is stronger in SMEs that were recently established at the moment of the grant of the loan.

Industry technological level: The industry of operation of SMEs may also strongly affect the level of information asymmetry faced by the companies. In particular, more high-technology companies have more sophisticated products, whose potential is particularly difficult to evaluate from the point of view of commercial banks. Moreover, high-technology SMEs' assets tend to be highly intangible and can hardly be pledge as collateral. However, pledging (as collateral) of assets that do not lose much value over time and are relatively easy to liquidate (e.g., equipment and real estate) provides greater assurance of repayment for commercial banks because they lead to higher recovery rates (Grunert, Jens & Weber, 2009). Commercial banks are reluctant to finance SMEs with a low value of such collateral (Ang, 1991; Chittenden, Hall, & Hutchinson, 1996). Lastly, companies in more high-technology sectors may be more reluctant to share information about themselves, because of appropriability concerns (Teece, 1986). This could exacerbate information opacity. These companies may benefit more from the certification effect due to participative loans.

Hypothesis 3: The certification effect of participative loans granted by a government-supported institution is stronger in SMEs that belong to high-technology *sectors.*

Venture Capital: A widely shared view in the entrepreneurial finance literature is that Venture Capitalist investors' superior screening capabilities (Chan, 1983) make these investors able to more effectively address information asymmetries than traditional financial intermediaries (e.g., Gorman and Sahlman, 1989; Sahlman, 1990; Gompers and Lerner, 2001; Denis, 2004). The potential agency conflicts associated with information asymmetries between Venture Capitalists

managers and target entrepreneurial companies' managers are mitigated by using ad-hoc contracts as well as monitoring and staging mechanisms (Gompers, 1995; Kaplan & Strömberg, 2001). An external actor may therefore interpret the backing of venture capital as a signal of the company's quality. There is empirical evidence of this certification in the context of IPOs (Lee & Wahal, 2004). Moreover, VC investors complement their financial resources with a complex bundle of value-adding activities – including financial, administrative, marketing, strategic and managerial support (Gorman & Sahlman, 1989; Sahlman, 1990) – that have an overall positive effect on the performance of companies in their portfolios (for a survey, see Da Rin, Hellmann, & Puri, 2011). All in all, we expect commercial banks to be more willing to lend to companies whose value has been signaled and possibly improved by the presence of a venture capital investor. However, for these companies, the receipt of participative loans may be less decisive in improving the access of SMEs to external finance. Companies whose value has already been certified by a venture capital may benefit less from a further certification from the government, because of a redundancy of information on the company quality (Pollock et al., 2010). For companies that already benefited from this signal, we predict that the signaling effect of participative loans will not be as effective, and that the resulting increase on the long-term debt will be lower.

Hypothesis 4: The certification effect of participative loans granted by a government-supported institution is weaker in Venture Capital-backed SMEs.

3 Data and methodology

3.1 *Data description and sample selection*

The study focuses on the universe of participative loans granted to SMEs by *Empresa Nacional de Innovación* (Hereinafter, ENISA) between 2005 and 2010. ENISA is a public institution supported by the Spanish Ministry of Industry, Energy and Tourism. It was established in 1982 to commit money to high-technology companies, basically in the form of minority equity stakes. It followed the ordinary pattern of venture capital firms, aimed at temporarily supporting high-technology SMEs due to the lack of private-sector-funded venture capitalists interested in this type of companies. As the Spanish venture capital market matured, ENISA switched from equity to a quasi-equity long-term financial instrument called participative loan since 1995.

ENISA provides participative long-term loans to finance projects, with maturities ranging from 4 to 9 years, and the possibility to delay the first repayment of principal from 1 to up to 7 years. The explicit interest rate applied is floating and collateral is not required. The borrower must raise an additional equity amount from other sources (e.g., existing shareholders, business angels or venture capital firms), which ranges from 15% to 100% of the amount of the loan granted.

To be eligible to obtain ENISA loans, the applicant must be an SME (according to the official EU definition) established in Spain that does not belong to the real estate or financial services sectors. Applicants must go through a screening process in which ENISA analyzes the innovativeness of the business model and its competitive advantage, as well as the technical and economic feasibility of the project. ENISA has several programs to differentiate among high-

technology companies (EBT program), high-growth companies (PYME program) and, since 2010, a new program for recently established companies (JOVENES program).[5]

Our scope of analysis is the universe of loans granted by ENISA between 2005 and 2010 through the programs EBT, PYME and JOVENES, tracing the evolution of recipient companies until 2012, whenever possible. We created a dataset by merging two sources of data. ENISA provided the full list of loans granted by those programs in the period analyzed, which included the name of the company, the amount received, the date of completion, the maturity of the loan, the year of the first repayment of principal, the amounts repaid until 2013, the amounts not paid on schedule and the program in which the loan was included. In table 1 we report the universe of loans granted by ENISA in the programs mentioned over the period 2005-2010, totaling 867 loans in 694 companies amounting to 212 million euro.

[5] Occasionally, ENISA also funds innovative projects in some medium and large sized companies directly. However, these cases were not considered in our study.

Table 1: Universe of ENISA loans and recipient companies belonging to the programs EBT, PYME and JOVENES

Panel A. Amount of loans granted by Enisa to companies receiving the first loan between 2005 and 2010 (in 1000 Euros)

Program	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**Total**
EBT	5,600	12,943	10,030	16,092	17,285	17,805	*79,755*
PYME	3,920	6,975	11,378	15,013	22,840	65,460	*125,585*
JOVENES	0	0	0	0	0	6,597	*6,597*
Total	*9,520*	*19,918*	*21,408*	*31,105*	*40,125*	*89,862*	*211,937*

Panel B. Number of loans granted by Enisa to companies receiving the first loan between 2005 and 2010

Program	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**Total**
EBT	22	46	40	65	70	67	*310*
PYME	12	20	31	47	76	211	*397*
JOVENES	0	0	0	0	0	160	*160*
Total	*34*	*66*	*71*	*112*	*146*	*438*	*867*

Panel C. Number of companies receiving loans between 2005 and 2010

Program	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**Total**
EBT	22	34	26	42	54	46	*224*
PYME	12	16	23	35	62	163	*311*
JOVENES	0	0	0	0	0	159	*159*
Total	*34*	*50*	*49*	*77*	*116*	*368*	*694*

Source: Enisa.

We then extracted from Orbis information on the founding date, activity sector (NACE Rev. 2), geographical location and accounting data of the recipient companies for the 1992-2012 period. We were able to identify and find complete accounting data on 546 companies that received 677 loans from ENISA, representing 79% of the population. Most of the companies for which accounting data is missing belong to the program JOVENES. Since most of those companies were newly born and the program was launched in 2010 the initial accounts are not yet available in commercial databases for a significant number of those companies. We found data on 61 out of 159 companies receiving those loans (38% coverage). A few other companies were not matched in Orbis either through their company codes, or through their names, most probably because of changes in these identifiers. Our sample has a good coverage of EBT and PYME loans. We have data on 199 companies out of the 224 companies that received EBT loans (89% coverage) and of 294 companies out of the 311 that obtained PYME loans (95% coverage).

Table 2 reports the distribution of the 546 ENISA-backed companies included in the sample over regions, industries and foundation periods.

Table 2: Distribution of ENISA-backed companies by industry, region and foundation period

	No	%		No	%
Industry			**Region**		
Chemicals, pharma and materials	31	5.68	Andalucia	35	6.41
Computers, electronics, equipment	50	9.16	Aragon	18	3.30
Other low tech manufacturing	32	5.86	Asturias	9	1.65
Other high tech manufacturing	22	4.03	Baleares	6	1.10
Trade	50	9.16	Canarias	1	0.18
ICT	46	8.42	Cantabria	5	0.92
Professional services	65	11.90	Castilla La Mancha	11	2.01
Personal services	35	6.41	Castilla Leon	10	1.83
Software	104	19.05	Cataluña	165	30.22
R&D and engineering	54	9.89	Comunidad Valenciana	39	7.14
Other low tech services	30	5.49	Extremadura	16	2.93
Other high tech services	27	4.95	Galicia	17	3.11
Total	*546*	*100.00*	Madrid	140	25.64
Foundation period			Murcia	12	2.20
Founded before 2001	134	24.54	Navarra	16	2.93
Founded in 2001 - 2004	129	23.63	Pais Vasco	44	8.06
Founded in 2005 - 2007	248	45.42	Rioja	2	0.37
Founded after 2007	35	6.41	*Total*	*546*	*100.00*
Total	*546*	*100.00*			

Source: Based on data extracted from Orbis.

3.2 *Control group definition*

In order to test our hypotheses we also define a control group of companies that did not receive a loan from ENISA. We first extracted from Orbis the full list of companies operating in Spain in the same industries (i.e., same NACE rev2 code) as ENISA-backed companies and with fewer than 250 employees in the period 2005-2010. About 90,000 companies were extracted that way. Out of this sample, we selected randomly about 2,700 companies that had the same distribution as ENISA-backed companies in terms of foundation period, industry and geographical location. We also include companies that either received venture capital financing (2,394 companies, source: Webcapitalriesgo) or other forms of public support, namely subsidized

loans granted by CDTI[6] or ACCIO[7] (208 companies, source: Webcapitalriesgo). Companies that either received venture capital or other forms of public support are included because they were selected as recipients of external funds, and therefore they may be an especially adequate counterfactual for ENISA-backed companies. Finally, we also include a list of companies that applied for an ENISA loan but were rejected. ENISA rejected applications from around 700 companies between 2005 and 2010. We found accounting data only for 154 of them. The final number of non ENISA-backed companies is 5,263. We used the Orbis database to collect accounting data on all these companies for the 1992-2012 period.

We use propensity score matching to extract an appropriate control group for ENISA-backed companies. In particular, we match the 546 ENISA-backed companies, in the year in which they receive their first loan from ENISA, with all the company-year observations from the group of 5,263 companies that do not receive loans from ENISA. The propensity score of entrepreneurial companies to receive a loan from ENISA in a given year is computed using as matching variables the activity sector, the entrepreneurial company's age ($Age_{i,t}$), the size in the previous year, expressed in terms of number of employees ($Employees_{i,t-1}$), the long-term leverage in the previous year ($LTleverage_{i,t-1}$) and two years before ($LTleverage_{i,t-2}$), measured as long-term debt divided by total assets, and the level of intangibles in the previous year ($Intangibles_{i,t-1}$) expressed as book value of intangible assets divided by total assets and winsorized at 1% level. We also include a dummy equal to 1 for companies that received a first round of investment from venture capitalists ($VentureCapital_{i,t}$), along with regional, time and industry dummies. We use the propensity score to choose, for every ENISA-backed company in

[6] *Centro para el Desarrollo Tecnológico e Industrial*, dependent on the Spanish Ministry of Industry, Energy and Tourism.
[7] *Agencia para la Competitividad de la Empresa*, dependent on the regional government of Catalonia.

the year of the ENISA loan, the three most similar company-year observations (nearest neighbors) in the group of companies that did not receive ENISA loans.[8] Companies that never received an ENISA loan and that were matched with the ENISA-backed companies for at least one year constitute our control group. They are 960 "twins" of the 546 ENISA-backed companies. Because of the matching procedure, the distribution of ENISA-backed companies is not significantly different from the distribution of control group companies (chi-square tests on the differences in the distribution for industry and regions are $\chi^2(11) = 9.90$ and $\chi^2(16) = 7.84$, respectively). The balancing of the matching with respect to the characteristics of the companies measured by continuous variables was also tested using T-tests and standardized percentage bias (Rosenbaum & Rubin, 1985). ENISA-backed companies and their matched samples were not different at the time of the matching for average age ($Age_{i,t}$), size ($Employees_{i,t-1}$), leverage ($LTleverage_{i,t-1}$ and $LTleverage_{i,t-2}$), intangibles ($Intangibles_{i,t-1}$) and presence of venture capital investors ($VentureCapital_{i,t}$) as shown in Table 3.

Table 3: Balancing of the matching procedure

Variable	Mean in ENISA-backed sample	Mean in Matched sample	T-test
$Age_{i,t}$	7.002	7.327	-0.59
$Employees_{i,t-1}$	18.979	22.713	-1.61
$LTleverage_{i,t-1}$	0.224	0.226	-0.20
$LTleverage_{i,t-2}$	0.162	0.167	-0.34
$Intangibles_{i,t-1}$	0.220	0.216	0.20
$VentureCapital_{i,t}$	0.339	0.321	0.61

3.3 *Variables*

Our main dependent variable is $logLTdebt_{i,t}$. This continuous variable equals the logarithm of the amount of long-term debt registered by the company. For companies that received a participative loan from ENISA, we reduce it by the amount that the company still

[8] We also replicated our analysis using a 1:1 and 1:5 matching algorithm, obtaining results similar to those reported here.

owes to ENISA in every year. The amount owed to ENISA is computed using the information on the principal received, the time of the first payment of the principal, the maturity of the loan and the information on the amount still due at the end of 2013. This amount is typically registered in a company balance sheet as long-term debt. As we aim to capture the effect of the participative loans on the access to other external debt providers, it is of fundamental importance to deduct this amount from the book value of the long-term debt. We control in all our models for the similar variable one year before ($logLTdebt_{i,t-1}$). Therefore, we actually model growth of long-term debt.[9]

Our main independent variable is a dummy variable ($ENISA_{i,t}$) that is equal to 1 in the year in which a company received its first loan from ENISA and in all the following years, and 0 otherwise. [10]

We include a wide set of control variables commonly used in the literature on capital structure. First, we include tangible fixed assets ($Tangibles_{i,t-1}$), defined as the book value of tangible fixed assets divided by total assets to control for scale effects, winsorized at 1% and lagged by one year. Tangible fixed assets preserve most of their value in a context of liquidation of a company (Wald, 1999) and can be pledged as collateral (Myers & Majluf, 1984). Therefore, tangible fixed assets constitute a key variable in the literature of capital structure (e.g., Frank & Goyal, 2003; Hovakimian, Hovakimian, & Tehranian, 2004; MacKie-Mason, 2008; Titman & Wessels, 1988). Second, we include total assets growth ($TotalAssetsGrowth_{i,t-1}$), computed as the difference between the logarithm of the book value of total assets in t, and the logarithm of the

[9] We decided to use this model instead of a more traditional model based on long-term leverage (long-term debt divided by total assets) as dependent variable, because the latter is by definition constrained to be between 0 and 100% and depends on the level of equity. We aim instead at capturing the variation in the company ability to collect external debt, without consideration of how much equity the company has.

[10] We are well aware that $ENISA_{i,t}$ may be endogenous in our equation. If companies that are selected for ENISA participative loans are of higher quality, they are also more likely to have high long-term debt growth. We discuss and correct the potential endogeneity of ENISA treatment in section 5.

book value of total assets in t-1, again lagged by one year. This variable aims at accounting for the growth opportunities of the company (López-Gracia & Sogorb-Mira, 2008; Titman & Wessels, 1988). Third, we also include the size of the company, computed as the number of employees, lagged by one year ($Employees_{i,t-1}$). Since large companies are better diversified, company size is negatively related to the probability of default, and a positive relationship between size and debt levels should be expected (Fama & French, 2002; Frank & Goyal, 2003; Rajan & Zingales, 1995; Titman & Wessels, 1988). Fourth, since companies that pay higher taxes could benefit more from tax shields, the literature highlights a relationship between corporate taxes paid and debt (e.g., Graham, 1996; Michaelas et al., 1999). Therefore, we include the variable $NonDebtTaxSchield_{i,t-1}$, defined as depreciation over total assets (Titman & Wessels, 1988), winsorized at 1% and lagged by one year. Fifth, we add a measure of the profitability of the company ($Profitability_{i,t-1}$), computed as the earnings before interest, taxes, depreciation and amortization over total assets, again winsorized at 1% and lagged by one year. This variable has been found to affect companies' level of debt (Titman & Wessels, 1988). In particular, Sogorb-Mira (2005) finds evidence of a negative relationship between profitability and the debt ratio in the case of SMEs. We also control for age expressed in years ($Age_{i,t}$), and year fixed effects with sets of dummy variables.

The presence of Venture Capital investors is captured by a dummy equal to 1 in the year in which a company received its first venture capital round and in all the following years, and 0 otherwise ($VentureCapital_{i,t}$). Similarly, we control for the receipt of subsidized loans with a dummy equal to 1 in the year in which a company received its first loan from either CDTI or ACCIO and in all the following years, and 0 otherwise ($SubLoans_{i,t}$).

We consider additional independent variables when testing our hypotheses. In particular, to test hypothesis 1, predicting a stronger certification effect for smaller companies, we include a dummy equal to 1 if the company received the first loan from ENISA when it had less than 50 employees ($SmallAtTimeOfLoan_{i,t}$), and can therefore be considered small according to EU classification. Similarly, to test hypothesis 2 on the stronger certification effect for younger companies we include a dummy equal to 1 if the company received the first loan from ENISA when it was less than 3 years old ($YoungAtTimeOfLoan_{i,t}$). These variables are equal to 0 for companies that never received a loan from ENISA. Hypothesis 3 predicts a stronger certification effect for companies operating in high-technology industries. Starting from the companies NACE Rev. 2 codes, we identify high-technology manufacturing and knowledge intensive services using the Eurostat classification[11] and assign a dummy equal to 1 to the companies operating in those sectors ($HighTech_i$). We then interact this dummy with $ENISA_{i,t}$. Lastly, to test hypothesis 4 on the non additionality of ENISA and Venture Capital certification effects, we add the interaction between $ENISA_{i,t}$ with $VentureCapital_{i,t}$.

Variables are summarized in Table 4, while a correlation matrix is presented in Table 5.

[11] The classification is described at : http://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an3.pdf (Retrieved in May 2015).

Table 4: Variable description

Variable	N. of companies	N. of obs.	Mean	Median	Std. Dev.	Min	Max
$logLTdebt_{i,t}$	1,506	10,168	4.988	5.603	2.869	0.000	13.533
$logLTdebt_{i,t-1}$	1,506	10,168	4.665	5.303	2.941	0.000	13.533
$ENISA_{i,t}$	1,506	10,168	0.169	0.000	0.375	0.000	1.000
$Tangibles_{i,t}$	1,506	10,168	0.202	0.119	0.217	0.000	0.931
$TotalAssetsGrowth_{i,t-1}$	1,506	10,168	0.575	0.149	1.436	-4.407	13.392
$Employees_{i,t-1}$	1,506	10,168	26.069	13.000	37.254	0.000	406.000
$NonDebtTaxSchield_{i,t-1}$	1,506	10,168	0.050	0.035	0.052	0.000	0.251
$Profitability_{i,t-1}$	1,506	10,168	0.030	0.065	0.371	-11.849	3.640
$Age_{i,t}$	1,506	10,168	9.863	7.000	8.920	-7.000	59.000
$VentureCapital_{i,t}$	1,506	10,168	0.262	0.000	0.440	0.000	1.000
$SubLoans_{i,t}$	1,506	10,168	0.049	0.000	0.216	0.000	1.000

$logLTdebt_{i,t}$: Natural logarithm of the amount of long-term debt. $ENISA_{i,t}$: Dummy variable equal to 1 in the year in which a company received its first loan from ENISA and in all the following years, and 0 otherwise. $Tangibles_{i,t-1}$: book value of tangible fixed assets divided by total assets, lagged by one year. $TotalAssetsGrowth_{i,t-1}$: Difference between the logarithm of the book value of total assets in t, and the logarithm of the book value of total assets in t-1, lagged by one year. $Employees_{i,t-1}$: number of employees, lagged by one year. $NonDebtTaxSchield_{i,t-1}$: Depreciation over total assets, lagged by one year. $Profitability_{i,t-1}$: Earnings before interest, taxes, depreciation and amortization over total assets, lagged by one year. $Age_{i,t}$: Years since the firm was established at the time of matching. $VentureCapital_{i,t}$: Dummy equal to 1 in the year in which a company received its first venture capital round and in all the following years, and 0 otherwise. $SubLoans_{i,t}$: dummy equal to 1 in the year in which a company received its first subsidized loan from either CDTI or ACCIO and in all the following years, and 0 otherwise.

Table 5: Pairwise correlation matrix of variables

The correlation matrix is based on 10,168observations. Significance: * p < 0.10; ** p< 0.05; *** p<0.01.

Variable	1	2	3	4	5	6	7	8
1 $ENISA_{i,t}$	1.000							
2 $Tangibles_{i,t}$	-0.023	1.000						
3 $TotalAssetsGrowth_{i,t-1}$	-0.056 ***	0.346 ***	1.000					
4 $Employees_{i,t-1}$	-0.059 ***	0.074 ***	0.075 ***	1.000				
5 $NonDebtTaxSchield_{i,t-1}$	0.009	-0.147 ***	-0.303 ***	-0.048 ***	1.000			
6 $Profitability_{i,t-1}$	-0.100 ***	0.067 ***	0.111 ***	0.015	-0.066 ***	1		
7 $Age_{i,t}$	0.078 ***	0.037 ***	-0.006	0.076 ***	-0.192 ***	0.051 ***	1	
8 $VentureCapital_{i,t}$	0.138 ***	0.142 ***	-0.028 ***	0.034 ***	-0.019 *	-0.085 ***	0.082 ***	1
9 $SubLoans_{i,t}$	0.145 ***	-0.110 ***	-0.138 ***	-0.087 ***	0.043 ***	-0.066 ***	0.064 ***	-0.033 ***

As our dataset contains longitudinal data, we will estimate our models using Generalized Least Square (GLS) with fixed effects. This model helps us when dealing with any unobserved heterogeneity at company level left in the model.

4 Results

In Table 6 we present the regression results of our model. In column I we only include control variables. In column II and all the following columns we add the main independent

variable, i.e., $ENISA_{i,t}$. The variable $ENISA_{i,t}$, has a positive and significant (at least at the 1% level) coefficient in all of the models in which it is included. As expected, companies that received a participative loan from ENISA register an increase in their long-term debt growth from external sources.

In columns III, IV, V and VI we present the results that test our hypotheses 1, 2, 3 and 4, respectively.

Table 6: Analysis of companies' long-term debt growth: hypotheses testing.

The table reports the estimated coefficients and, in brackets, the standard error of the coefficients of Generalized Least Squares fixed effects models whose dependent variable is $logLTdebt_{i,t,}$. The description of variables is available in Table 4. Year dummies are included in the model but omitted in the table.
Significance: * p < 0.10; ** p< 0.05; *** p<0.01.

	I	II	III	IV	V	VI
$logLTdebt_{i,t-1}$	0.434 ***	0.433 ***	0.432 ***	0.433 ***	0.430 ***	0.432 ***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Tangiblesi,t	0.257 *	0.258 *	0.266 *	0.260 *	0.318 **	0.253 *
	(0.137)	(0.137)	(0.137)	(0.137)	(0.137)	(0.137)
$TotalAssetsGrowth_{i,t-1}$	0.029 **	0.029 **	0.031 **	0.028 **	0.030 **	0.028 **
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Employeesi,t-1	0.01 ***	0.01 ***	0.007 ***	0.007 ***	0.007 ***	0.007 ***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$NonDebtTaxSchield_{i,t-1}$	-1.350 ***	-1.386 ***	-1.414 ***	-1.400 ***	-1.438 ***	-1.365 ***
	(0.428)	(0.428)	(0.428)	(0.428)	(0.428)	(0.428)
$Profitability_{i,t-1}$	0.150 ***	0.149 ***	0.148 ***	0.151 ***	0.145 ***	0.150 ***
	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)
Agei,t	0.063	0.060	0.061	0.059	0.063	0.059
	(0.054)	(0.054)	(0.054)	(0.054)	(0.054)	(0.054)
$VentureCapital_{i,t}$	0.585 ***	0.566 ***	0.563 ***	0.564 ***	0.568 ***	0.622 ***
	(0.087)	(0.087)	(0.087)	(0.087)	(0.087)	(0.093)
SubLoansi,t	1.487 ***	1.457 ***	1.438 ***	1.479 ***	1.432 ***	1.430 ***
	(0.253)	(0.253)	(0.253)	(0.254)	(0.253)	(0.253)
$ENISA_{i,t}$		0.179 **	-0.101	0.192 ***	-0.197 *	0.262 ***
		(0.069)	(0.145)	(0.070)	(0.106)	(0.084)
$SmallAtTimeOfLoan_{i,t}$			0.345 **			
			(0.157)			
$YoungAtTimeOfLoan_{i,t}$				-0.269		
				(0.239)		
$ENISA_{i,t}*HighTech_i$					0.598 ***	
					(0.127)	
$ENISA_{i,t}*VentureCapital_{i,t}$						-0.228 *
						(0.131)
Constant	2.316 ***	2.328 ***	2.304 ***	2.341 ***	2.269 ***	2.336 ***
	(0.829)	(0.829)	(0.829)	(0.829)	(0.828)	(0.829)
n	10168	10168	10168	10168	10168	10168
N	1506	1,506	1506	1506	1506	1506
R^2	0.599	0.605	0.603	0.605	0.599	0.606

In column III, the coefficient of $SmallAtTimeOfLoan_{i,t}$ is positive and significant at the 5% level, confirming that for small companies (fewer than 50 employees) the increase in long-term debt is stronger, supporting hypothesis 1. According to column IV, companies that received the participative loan when they were less that 3 years old do not benefit from a stronger certification effect than other companies, as the coefficient of $YoungAtTimeOfLoan_{i,t}$ is not significant. This result does not support hypothesis 2. In column V we find a positive and significant coefficient

(at the 1% confidence level) for the interaction $ENISA_{i,t}$*$HighTech_i$, indicating that high-technology companies registered a higher increase in their long-term debt after the receipt of the ENISA loan, as predicted by hypothesis 3.[12] Hypothesis 4 is also confirmed: companies that already received a venture capital investment benefit less from ENISA loans in terms of certification towards commercial banks: the interaction between $ENISA_{i,t}$ and $VentureCapital_{i,t}$ has a negative coefficient, significant at 1% level, in column VI.

4.1 *Robustness checks and additional evidence*

In what follows we test the robustness of these results by considering some alternative explanations, and by changing the model specification.

Selection effects: First, we consider the possibility that companies that received a loan from ENISA may be different from the others because of some unobserved characteristics that may also make them more inclined to have higher long-term leverage. If this is true, then ENISA-backed companies may have higher long-term leverages not because of a "treatment" effect of ENISA, but solely because of selection effects. This alternative explanation for our results, driven by the potential endogeneity of ENISA, cannot be completely excluded with a matching procedure, which consists of picking "twins" of ENISA-backed companies based only on observable characteristics, and may create a possible bias in the estimated coefficients. In order to tackle this possibility we use a formalized methodology to control for ENISA endogeneity, which

[12] Alternatively, we substituted the $HighTech_i$ dummy with some continuous variables measuring the extent to which the sector is R&D intensive and the extent to which companies are concerned by the appropriability of their technology. The former variable is an elaboration of the results of the Business R&D and Innovation Survey administered by the National Science Foundation to US companies in 2011. The extent to which a sector is R&D intensive is measured as the aggregate R&D expenses as a share of sales in each industry. The latter variable is an elaboration of the results of the Community Innovation Survey of 2006 to Spanish companies. The extent to which companies in a sector are concerned by the appropriability of their technology is measured by the percentage of companies that in each sector protected their industrial property by means of patents, copyright, registration of design or trademark. Results based on these two variables are similar to those reported here and available from the authors upon request.

is based on a two-step approach with instrumental variables (see Eckhardt, Delmar & Toole, 2006 for a similar approach). In the first step, we run a Cox survival model (Cox, 1972) on our sample of ENISA-backed companies and matched twins to model companies´ likelihood of receiving a loan from ENISA, on the basis of company's age ($Age_{i,t}$), size ($Employees_{i,t-1}$), total asset growth ($TotalAssetGrowht_{i,t-1}$), tangibles ($Tangibles_{i,t-1}$), non-debt tax shield ($NonDebtTaxSchield_{i,t-1}$), profitability ($Profitability_{i,t-1}$), presence of venture capitalists ($VentureCapital_{i,t}$) and subsidized loans ($SubLoans_{i,t}$), regional, sectoral and time dummies. We also include $ENISA\_availability_t$ as the regressor representing the total amount of loans granted by ENISA in each year, expressed in million Euros (cfr. Table 1). This variable is correlated with the company's probability of receiving a loan from ENISA, but it does not influence ENISA-backed companies' long-term leverage. Similarly, we include the variable $EquityGrowth_{i,t-1}$, equal to the difference between the logarithm of the book value of equity in t and the logarithm of the book value of equity in t-1, lagged by one year. This variable is an important determinant of the company´s chances of receiving ENISA participative loans, since, as previously noted, the borrower must raise an additional equity amount from other sources. However, the variable is not significant in our main model of long-term debt growth. $ENISA\_availability_t$ and $EquityGrowth_{i,t-1}$ can therefore be used as instrumental variables. The results of the first step Cox regression are reported in Column I of Table 7. They clearly show that ENISA loans are not granted in a random way. Companies are more likely to receive a participative loan if they have fewer tangible assets ($Tangibles_{i,t}$ negative and significant at 10%), faster growth ($TotalAssetsGrowth_{i,t-1}$ positive and significant at 1% level), are smaller ($Employees_{i,t-1}$ negative and significant at 10% level), have higher debt shields ($NonDebtTaxSchield_{i,t-1}$ positive and significant at 5% level) and are more profitable ($Profitability_{i,t-1}$ positive and significant at 1% level). Companies that already received Venture Capital or subsidized public loans are also more likely to receive ENISA

(*VentureCapital*$_{i,t}$ and *SubLoans*$_{i,t}$ and have positive and significant coefficients, at 1% and 5%, respectively). With respect to our instrumental variables, the higher the availability of ENISA loans in a certain year, the higher is the probability of receiving it, as the positive and significant (at the 1% level) coefficient of *ENISA_availability*$_t$ shows. Similarly, *EquityGrowth*$_{i,t-1}$ is positive and significant at the 1% level, indicating that companies that registered higher growth in equity are more likely to receive ENISA. We use the results of the Cox regression to predict the cumulative hazard function and use it to compute a correction variable, λ_{ENISA}, based on Lee's (1983) generalization of the Inverse Mills Ratio (Heckman, 1979). We then add λ_{ENISA} in the model in the second stage to explain the long-term debt growth, in order to account for the risk of being selected by ENISA in every year. λ_{ENISA} is significant in all the models in which it is included, indicating that there are some unobservable factors that co-determine the receipt of ENISA and the increase in the long-term debt growth. However, even after controlling for λ_{ENISA}, *ENISA*$_{i,t}$ is still significant in column II, suggesting that the increase in the long-term debt growth of companies that received ENISA is also due to a treatment effect of ENISA. Results relative to our hypotheses 1 (column III) and 3 (column V) are confirmed: smaller and high tech companies registered a higher increase in the long-term debt. Hypothesis 2 on the smaller companies is still not confirmed (column IV), and we also lose significance with respect to hypothesis 4 on the non-additionality of ENISA and Venture Capitalists signals (column VI).

Table 7: Analysis of companies' long-term debt growth: robustness check for endogeneity

In Column I the table reports the estimated coefficients and, in brackets, the standard error of a Cox event history model (Cox, 1972) in which the event of interest is the receipt of ENISA participative loans ($ENISA_{i,t}$), the time is defined by $Age_{i,t}$, observations after the receipt of the first loan or after the liquidation of the company are excluded from the analysis and Efron's (1977) correction for ties have been used. Industry, countries and year fixed dummies are included but omitted in the table. In all other columns the table reports the estimated coefficients and, in brackets, the standard error of Fixed Effects Generalized Least Squares models, whose dependent variable is $logLTdebt_{i,t,}$. The description of variables is available in Table 4. Year dummies are included but omitted in the table.
Significance: * p < 0.10; ** p< 0.05; *** p<0.01.

	I (First step)	II	III	IV	V	VI
logLTdebti,t-1		0.469 ***	0.468 ***	0.469 ***	0.467 ***	0.469 ***
		(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Tangiblesi,t	-0.500 *	0.310 **	0.320 **	0.309 **	0.359 **	0.307 **
	(0.289)	(0.144)	(0.144)	(0.144)	(0.144)	(0.144)
$TotalAssetsGrowth_{i,t-1}$	0.191 ***	0.089 ***	0.090 ***	0.089 ***	0.090 ***	0.088 ***
	(0.066)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)
Employeesi,t-1	-0.002 *	0.008 ***	0.008 ***	0.008 ***	0.008 ***	0.008 ***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$NonDebtTaxSchield_{i,t-1}$	2.034 **	-1.302 ***	-1.339 ***	-1.300 ***	-1.322 ***	-1.284 ***
	(0.980)	(0.454)	(0.454)	(0.454)	(0.454)	(0.454)
$Profitability_{i,t-1}$	-0.107 ***	0.157 ***	0.157 ***	0.157 ***	0.156 ***	0.158 ***
	(0.040)	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)
Agei,t		0.038	0.039	0.038	0.042	0.037
		(0.053)	(0.053)	(0.053)	(0.053)	(0.053)
$VentureCapital_{i,t}$	0.441 ***	0.494 ***	0.490 ***	0.494 ***	0.499 ***	0.546 ***
	(0.120)	(0.091)	(0.091)	(0.091)	(0.091)	(0.096)
$SubLoans_{i,t}$	0.379 **	0.915 ***	0.895 ***	0.914 ***	0.908 ***	0.893 ***
	(0.192)	(0.313)	(0.313)	(0.313)	(0.313)	(0.313)
$ENISA_{i,t}$		0.142 **	-0.136	0.142 **	-0.159	0.216 **
		(0.071)	(0.142)	(0.071)	(0.107)	(0.085)
$ENISA\_availability_t$	0.016 ***					
	(0.002)					
$EquityGrowth_{i,t-1}$	0.203 ***					
	(0.054)					
λ_{ENISA}		0.153 *	0.159 *	0.153 *	0.142 *	0.158 *
		(0.085)	(0.085)	(0.085)	(0.085)	(0.085)
$SmallAtTimeOfLoan_{i,t}$			0.350 **			
			(0.154)			
$YoungAtTimeOfLoan_{i,t}$				0.048		
				(0.365)		
$ENISA_{i,t}*HighTech_i$					0.488 ***	
					(0.129)	
$ENISA_{i,t}*$						-0.213
$VentureCapital_{i,t}$						(0.134)
Constant		2.189 ***	2.165 ***	2.187 ***	2.138 ***	2.196 ***
		(0.824)	(0.824)	(0.824)	(0.823)	(0.824)
n	4778	9587	9587	9587	9587	9587
N	1254	1472	1472	1472	1472	1472
R^2		0.661	0.660	0.661	0.656	0.662

Increased tangibility: A further alternative explanation for our results is that treated companies can use the loans to acquire tangible assets that can be subsequently pledged as collateral. If this is the case, commercial banks would be more willing to lend money to ENISA-backed companies because they have higher tangibility, and not necessarily because of a certification effect. In order to rule out this alternative explanation, we augment our main model with the interaction variable $ENISA_{i,t}$* $Tangibles_{i,t-1}$. Results reported in Table 8 show a negative and significant coefficient for this interaction variable. This result indicates that the long-term debt growth of companies that received an ENISA participative loan is less sensitive to the tangibility of the company's assets. In other terms, the presence of collateral is less fundamental in the eye of commercial banks for ENISA-backed companies to receive a bank loan. This result is consistent with a certification effect, and cannot be explained with a simple increase in the tangibility of companies after the receipt of a loan from ENISA. Moreover, the table shows that results to our hypotheses 1 (column II), 3 (column IV) and 4 (column V) are robust to this model specification.

Table 8: Analysis of companies' long-term debt growth: robustness check for increased tangibility.

The table reports the estimated coefficients and, in brackets, the standard error of the coefficients of Generalized Least Squares fixed effects models whose dependent variable is $logLTdebt_{i,t,}$. The description of variables is available in Table 4. Year dummies are included in the model but omitted in the table.
Significance: * p < 0.10; ** p< 0.05; *** p<0.01.

	I		II		III		IV		V	
$logLTdebt_{i,t-1}$	0.430	***	0.429	***	0.430	***	0.429	***	0.430	***
	(0.009)		(0.009)		(0.009)		(0.009)		(0.009)	
$Tangibles_{i,t-1}$	0.462	***	0.461	***	0.465	***	0.451	***	0.459	***
	(0.143)		(0.143)		(0.143)		(0.143)		(0.143)	
$TotalAssetsGrowth_{i,t-1}$	0.030	**	0.031	**	0.028	**	0.030	**	0.029	**
	(0.013)		(0.013)		(0.013)		(0.013)		(0.013)	
$Employees_{i,t-1}$	0.007	***	0.007	***	0.007	***	0.007	***	0.007	***
	(0.001)		(0.001)		(0.001)		(0.001)		(0.001)	
$NonDebtTaxSchield_{i,t-1}$	-1.477	***	-1.495	***	-1.492	***	-1.490	***	-1.455	***
	(0.428)		(0.428)		(0.428)		(0.428)		(0.428)	
$Profitability_{i,t-1}$	0.149	***	0.148	***	0.150	***	0.146	***	0.150	***
	(0.048)		(0.048)		(0.048)		(0.048)		(0.048)	
Agei,t	0.066		0.067		0.065		0.066		0.065	
	(0.054)		(0.054)		(0.054)		(0.054)		(0.054)	
$VentureCapital_{i,t}$	0.581	***	0.578	***	0.579	***	0.578	***	0.641	***
	(0.087)		(0.087)		(0.087)		(0.087)		(0.093)	
SubLoansi,t	1.427	***	1.414	***	1.451	***	1.418	***	1.398	***
	(0.253)		(0.253)		(0.253)		(0.253)		(0.253)	
$ENISA_{i,t}$	0.418	***	0.191		0.432	***	0.088		0.509	***
	(0.085)		(0.158)		(0.086)		(0.136)		(0.098)	
$ENISA_{i,t}*Tangibles_{i,t-1}$	-1.355	***	-1.305	***	-1.358	***	-1.000	***	-1.368	***
	(0.280)		(0.281)		(0.280)		(0.302)		(0.280)	
$SmallAtTimeOfLoan_{i,t}$			0.269	*						
			(0.158)							
$YoungAtTimeOfLoan_{i,t}$					-0.280					
					(0.238)					
$ENISA_{i,t}*HighTech_{i}$							0.425	***		
							(0.137)			
$ENISA_{i,t}*VentureCapital_{i,t}$									-0.244	*
									(0.131)	
Constant	2.221	***	2.206	***	2.235	***	2.207	***	2.228	***
	(0.828)		(0.828)		(0.828)		(0.828)		(0.828)	
n	10168		10168		10168		10168		10168	
N	1506		1506		1506		1506		1506	
R^2	0.591		0.59		0.59		0.59		0.592	

Lower risk of default: Finally, a loan granted by ENISA may decrease the risk of default of the recipient company, and in turn increase its creditworthiness. Again, if banks perceive an increase in the creditworthiness of ENISA-backed companies, these would register an increase in the long-term debt growth that has little to do with reduction in the information asymmetries surrounding their value or certification from ENISA. We tested the impact of ENISA loans on the

survival probability of companies. The results shown in Column I of Table 9 indicate, however, that the receipt of a participative loan from ENISA has a positive effect on the probability of default of the awarded companies. This surprising result indicates that ENISA-backed companies are not more likely to survive than other companies, and therefore their creditworthiness as borrowers is not necessarily higher. Moreover, similarly to what we did for the probability of receiving ENISA, we used the results of the Cox regression to predict the cumulative hazard function and use it to compute a correction variable, $\lambda_{failure}$. By including it in our models of long-term debt growth, we control for company risk of default in any given year. Results on our hypotheses 1, 3 and 4 are unchallenged by this change in the model, as shown in Table 9.

Table 9: Analysis of companies' long-term debt growth: robustness check for risk of default

In Columns I the table reports the estimated coefficients and, in brackets, the standard error of a Cox event history model (Cox, 1972) in which the event of interest is the liquidation of the company, the time is defined by $Age_{i,t}$, observations after liquidation of the company are excluded from the analysis and Efron's (1977) correction for ties have been used. Industry, countries and year fixed dummies are included but omitted in the table. In all other columns, the table reports the estimated coefficients and, in brackets, the standard error of Fixed Effects Generalized Least Squares models, whose dependent variable is $logLTdebt_{i,t,}$. The description of variables is available in Table 4. Year dummies are included but omitted in the table.
Significance: * p < 0.10; ** p< 0.05; *** p<0.01.

	I (First step)	II	III	IV	V	VI
$logLTdebt_{i,t-1}$		0.433 ***	0.432 ***	0.433 ***	0.430 ***	0.432 ***
		(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
$Tangibles_{i,t}$	0.277	0.256 *	0.265 *	0.258 *	0.316 **	0.252 *
	(0.572)	(0.137)	(0.137)	(0.137)	(0.137)	(0.137)
$TotalAssetsGrowth_{i,t-1}$	-0.189	0.029 **	0.031 **	0.027 **	0.029 **	0.028 **
	(0.213)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
$Employees_{i,t-1}$	0.001	0.007 ***	0.007 ***	0.007 ***	0.007 ***	0.007 ***
	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$NonDebtTaxSchield_{i,t-1}$	5.397 ***	-1.381 ***	-1.409 ***	-1.387 ***	-1.435 ***	-1.361 ***
	(2.080)	(0.428)	(0.428)	(0.428)	(0.428)	(0.428)
$Profitability_{i,t-1}$	-0.385 ***	0.149 ***	0.148 ***	0.152 ***	0.145 ***	0.150 ***
	(0.135)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)
$Age_{i,t}$		0.060	0.061	0.059	0.063	0.059
		(0.054)	(0.054)	(0.054)	(0.054)	(0.054)
$VentureCapital_{i,t}$	0.722 ***	0.566 ***	0.563 ***	0.564 ***	0.568 ***	0.622 ***
	(0.255)	(0.087)	(0.087)	(0.088)	(0.087)	(0.093)
$SubLoans_{i,t}$	-0.427	1.458 ***	1.439 ***	1.494 ***	1.433 ***	1.431 ***
	(0.546)	(0.253)	(0.253)	(0.254)	(0.253)	(0.253)
$ENISA_{i,t}$	0.423 *	0.176 **	-0.100	0.196 ***	-0.197 *	0.258 ***
	(0.252)	(0.070)	(0.145)	(0.071)	(0.106)	(0.085)
$\lambda_{failure}$		0.066	0.057	0.064	0.037	0.057
		(0.103)	(0.103)	(0.103)	(0.103)	(0.103)
$SmallAtTimeOfLoan_{i,t}$			0.342 **			
			(0.157)			
$YoungAtTimeOfLoan_{i,t}$				-0.423		
				(0.305)		
$ENISA_{i,t}*HighTech_i$					0.595 ***	
					(0.127)	
$ENISA_{i,t}*$ $VentureCapital_{i,t}$						-0.224 *
						(0.131)
Constant		2.328 ***	2.305 ***	2.352 ***	2.269 ***	2.336 ***
		(0.829)	(0.829)	(0.829)	(0.828)	(0.829)
n	10153	10168	10168	10168	10168	10168
N	1505	1506	1506	1506	1506	1506
R^2		0.605	0.603	0.602	0.599	0.606

5 Discussion and conclusion

In this paper we test whether governmental intervention based on participative loans facilitates the access of funded SMEs to long-term debt, thanks to a certification effect. We find

that SMEs receiving participative loans significantly increase their long-term financial debt, well beyond the value of the loan itself. Furthermore, most of the observations after the loans were granted belong to a period characterized by a lack of liquidity (i.e., the financial crisis), which was especially hard for SMEs (Ivashina & Scharfstein, 2010). The effect is stronger for smaller companies and companies operating in high-technology sectors, which are characterized by higher information asymmetries, while it is lower for Venture Capital backed companies, whose quality was arguably already signaled to the market. We interpret this result as evidence of the certification effect of governmental participative loans to commercial banks.

Overall, our results, robust to several alternative explanations, indicate that the receipt of a governmental participative loan conveys a reduction in the information asymmetries that typically affect SMEs and facilitates their access to long-term financial debt. These results enrich our understanding of the certification effect of public support mechanisms, thus complementing the evidence on public subsidies (Feldman & Kelley, 2006; Kleer, 2010; Meuleman & De Maeseneire, 2012; Takalo & Tanayama, 2010).

ENISA clearly represents a success story that could be an inspiration for policy makers outside Spain whose objective is to facilitate SMEs´access to long-term finance. This study shows that ENISA is considered as a reputable certifying agency by private institutions, which value and trust the screening and selection skills of ENISA. ENISA has developed its reputation as a capable screener, especially in the high–technology sector, by being active in the venture capital industry for more than 10 years before turning its interest to other quasi-equity instruments. One important caveat for policy makers is therefore to build the reputation of the certifying agency, for instance, by relying on a recognized experience and success of an existing institution. Second, the study supports the use of participative loans by governmental agencies. For future research it would be interesting to test whether the peculiarities of participative loans

may result in a higher certification effect of SMEs towards banks than subsidies. Because of the quasi-equity nature of participative loans, the return on the investment of the lender directly depends on the growth potential of the awarded SME. As a consequence, the incentive to screen very promising SMEs is particularly strong. These circumstances increase the power of participative loans as a signal of the SME's quality. Moreover, as for other loans, participative loans impose a self discipline on the borrowers, which need to pay back at least the principal of the loan. Again, this increases the awarded-receiving SMEs' trustworthiness as borrowers in the eye of commercial banks. Last, but not least, this instrument has a lower cost than subsidies in terms of government spending.

To sum up, participative loans are interesting for several reasons. First, they are characterized by a lower burden in terms of government spending, which is a concern nowadays to reduce public-sector deficits. Second, the institution granting the loans does not face as much risk as in the case of pure equity investments, and receives a reward when the recipient company reaches the break-even point. Third, the company has access to a long-term source of financing with a minimum cost that increases only when it is generating profits, and the owners do not face dilution at a very early stage. Fourth, the potential universe of companies that could take advantage of this instrument is significantly larger than that of venture capital funding.

As regards the contributions, we should highlight additions to two important streams of research. On the one hand, we provide further evidence on public-authorities' certification on private-sector agents. In particular, this study complements the evidence of Meulemann and De Maiseneire (2012) on the certification effect of R&D subsidies towards banks. First, we focus for the first time on non-subsidized loans. Second, we extend the geographic perspective of Meulemann and De Maiseneire (2012), which is based on Belgian companies, to a large sample

of Spanish companies. Third, our approach allows us not only to test whether there is an impact on the long-term debt of the company, but also under which conditions the impact is stronger. On the other hand, this work contributes to the existing evidence on the impact of policy measures undertaken by public authorities to fill the long-term funding gap of SMEs (Hyytinen & Toivanen, 2005). As shown by Infelise (2014), different European countries have tried to solve this market failure using different mechanisms. While an organic comparison of the effectiveness of these mechanisms is still missing in the literature, this study contributes by proving the additionality of participative loans.

Understanding whether the mechanism of non-subsidized loans is effective in facilitating SMEs' access to external finance is therefore of key importance to develop meaningful policy implications that may also be applied to other countries. One important limitation of our study is the impossibility to formally test one idea that emerges from this work, i.e. that participative loans convey a stronger signal than other types of government intervention. A study that compares the certification effect of conventional subsidies, subsidized loans and participative loans would be especially useful to develop interesting policy implications, and is at the very top of our research agenda.[13] Similarly, future research could test whether the certification is effective towards other private institutions, such as venture capitalists or private equity investors. Finally, it would be interesting to expand the geographical focus of this paper to test the generalizability of our results to other countries with different institutional characteristics.

[13] While for this paper we use information on the presence of public subsidized loans, the amount granted by these loans and other loan characteristics are still unavailable to the authors. Furthermore, the authors do not know how representative of their respective universes is their sample of CDTI and ACCIO loans.

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