PARTICIPATIVE LOANS AS AN ALTERNATIVE POLICY INSTRUMENT FOR PROMOTING SMEs' GROWTH

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Abstract

We study sales and employment growth of companies that receive a government-sponsored participative loan (PL), a hybrid form of financing between debt and equity. We analyze a sample of 512 firms that received a PL from a Spanish government agency between 2005 and 2011. Using both propensity-score and panel-data estimation, we find evidence that PLs significantly boost the growth of sales and employees of beneficiaries. In the two years after the grant, a 1 million Euro PL loan generates between 1.1 and 1.9 million Euro in additional sales and between 12.1 and 14.8 additional jobs. The effect on growth is significant and stable, and PLs add 16.2% to annual sales growth and 9.8% to employment growth to beneficiaries. The effect of PLs on growth is larger than what indicated by the literature for both government-sponsored debt (guaranteed loans) and equity (governmental venture capital) programs.

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1. Introduction

Government authorities are concerned about the funding gap that hinders SMEs from exploiting their growth opportunities (Cressy, 2002). SMEs experience more difficulties than large firms in accessing external finance from financial institutions (Beck, Demirgüç-Kunt, and Martinez, 2008) because of higher information asymmetries and lower collateral (Binks, Ennew, and Reed 1992; Carpenter and Petersen 2002). In addition, the access of SMEs to public equity is hampered by high access costs and by the scarcity of venture capital (VC), which is only accessible for a very limited percentage of firms (Sahlman 1990).

In this context, government authorities create schemes to increase the availability of long-term finance for SMEs. These schemes usually focus on the provision of subsidized loans, loan guarantees, or government-supported equity through VC. More recently, policymakers have directed their attention towards hybrid instruments, which combine debt and equity features. These instruments represent an appealing form of finance for firms that are approaching a turning point in their life cycle, when the risks and opportunities of the business are increasing. At that point, a capital injection is needed but access to external financing is still limited and owners are not willing to accept dilution of control (OECD, 2015). This is especially the case for SMEs that have significant growth opportunities.

An increasing number of works study the effectiveness of government-backed loan financing and of government-affiliated VC programs. Most, but not all, studies about the effectiveness of subsidized loans and loan guarantees find that these schemes have a positive effect on the growth and performance of beneficiaries (e.g., Brown and Earle 2016; Kang and Heshmati 2008; Meager, Bates and Cowling 2003; Oh et al. 2009; Riding and Haines 2001).

Results on government-sponsored VC funds obtained less encouraging results, and shows that their effect is negligible (or even negative) with the possible exception of co-investments with private VC funds (Alperovych, Hübner, and Lobet 2015; Bertoni and Tykvová 2015; Cumming, Grilli, and Murtinu 2014; Grilli and Murtinu 2014).

The empirical evidence about hybrid instruments is instead still very limited. Because of their unique characteristics, which are somewhere between those of debt and equity, specific analysis is needed to ascertain the extent to which they actually support the growth of beneficiaries. So far, the evidence seems to point out that hybrid instruments may overcome some of the drawbacks associated to both loans and pure equity (Martí and Quas 2017), but more work needs to be done. The present paper aims at filling this gap in the literature.

In this work, we study the effectiveness of participative loans (PLs), a recent hybrid policy instrument, in fostering SMEs' growth. Like straight loans, PLs have pre-determined maturity and interest payments but, like equity, the lender benefits from variable payments that are contingent upon the profits of the beneficiary firm. In this way, PLs are interesting for entrepreneurial finance because the borrower does not face internal capital dilution nor a high cost of funds in the initial years, whereas the institution granting the PL does not afford the cost of managing and selling portfolio equity stakes but obtains extra income from successful firms.

We focus on PLs granted by *Empresa Nacional de Innovación* (ENISA), a government agency funded by the Spanish Ministry of Industry, Energy, and Tourism. Spain is a precursor in the use of PLs (Infelise 2014), which are also present, among others, in France (French ISODEV agency) and Italy (Agliata, Ferrone, and Tuccillo 2014). In order to be eligible to obtain a PL from ENISA, the applicant must be an SME (according to the official EU definition) and not operate in real estate or financial services. Applicants must go through a thorough screening process, and the approximately half of the proposals are rejected by ENISA.

Our sample is composed of 512 firms that received a PL from ENISA between 2005 and 2011. We analyze sales and employment growth in these firms following their performance until 2014, whenever possible. We employ three main empirical methodologies that are inspired by recent works assessing the effectiveness of debt and equity schemes to finance SMEs. First, we calculate the average treatment effect on treated (ATT) of PLs on beneficiaries along the lines of Asdrubali and Signore (2015). We also extend the analysis by Asdrubali and Signore (2015), who only use propensity-score matching, by estimating the ATT using a Heckman treatment effect model. Second, we estimate the employment creation per million Euro of PL, along the lines of Brown and Earle (2016). In addition, we also estimate the absolute growth in sales per million Euro of PL. Third, we estimate a dynamic panel-data model on sales and employment growth using GMM, along the lines Grilli and Murtinu (2014).

This work contributes to the literature on entrepreneurial finance at least in two ways. First, the extant literature mostly focuses on loan guarantee programs (Asdrubali and Signore 2015; Brash and Gallagher 2008; Brown and Earle 2016; Kang and Heshmati 2008; Oh et al. 2009; Riding and Haines 2001), and subsidized loans (Huergo and Moreno 2014; Huergo, Trenado, and Ubierna 2013; Meager, Bates, and Cowling 2003), whereas we study a new instrument (i.e., non-subsidized PLs) in promoting SMEs' growth. In this way we fill the gap related to the need to explore non-bank sources to finance SMEs' growth highlighted by

Fraser, Bhaumik, and Wright (2015). Second, we contribute to the existing evidence on the impact of policy measures undertaken by public authorities to fill the funding gap in SMEs (Hyytinen and Toivanen 2005).

The rest of the paper is structured as follows. In Section 2 we present the theoretical background and develop our hypotheses. In Section 3 we present the data and the methodology used to test our hypotheses. We show our results in section 4. Finally, in section 5 we discuss our findings and conclude our work.

2. Background and hypotheses

2.1 Debt and equity schemes for SMEs and their effects on growth

The existence of frictions such as information asymmetry, agency costs and transaction costs (Fama and Jensen 1983; Jensen and Meckling 1976; Myers and Majluf 1984) affects a firms' capacity to access external sources of funds. SMEs are most affected by information asymmetry problems when accessing external sources of funds to finance their investment projects (Berger and Udell 1998; Brav 2009). As a result, the lack of external finance hinders SMEs' ability to grow (Gompers 1995; Michaelas, Chittenden, and Poutziouris 1999).

Government authorities, who are deeply concerned on this issue, have implemented a wide variety of schemes to channel long-term finance to SMEs, including debt- and equity-related instruments. The literature already includes evidence on the effects of many of these policy measures. Regarding loan guarantee schemes, Riding and Haines (2001) find positive job creation amongst Canadian guarantee program users. Using firm level data of Korean credit guarantee programs, Kang and Heshmati (2008) and Oh et al. (2009) examine the determinants of guarantee use and the ex-post performance of loan guarantee beneficiaries. Although the two studies employ different empirical approaches, both find that the use of credit guarantees positively affects the growth of sales and reduces the failure rate of firms. Using data from the US Small Business Administration (SBA) loan guarantee program, Brash and Gallagher (2008) find that recipient firms have higher sales and employment after receiving the loan.

Asdrubali and Signore (2015) examine the economic impact at final beneficiary level of the SME Guarantee Facility program under the EU Multiannual Programme for enterprise and entrepreneurship (MAP) framework in Central, Eastern and South-Eastern European (CESEE) countries in the period 2005-2012. Using propensity scores and difference-in-differences estimations, they find that the EU SME Guarantee Facility in the CESEE region had, on average, a significant positive effect on firms' employment.

Brown and Earle (2016) analyze linked databases on all SBA loans and lenders and on all US employers to estimate the effects of financial access on employment growth. They find that for each million USD of loans committed there is an increase of 3 to 3.5 jobs.

In contrast to these studies, Meager et al. (2003) do not find a significant effect on growth of the UK low-interest start-up loans through the Prince's Trust. Meza (2002) argues that there is a surplus of funds being channeled to over-optimistic low-quality borrowers, which could explain this outcome.

Turning to equity, the most prominent equity-based scheme in support of entrepreneurial companies is governmental VC, which has been widely used in Europe to promote the development of local VC markets (Leleux and Surlemont 2003). The interest of policymakers for government VC schemes derives from the effectiveness of private VC firms in boosting their portfolio companies in terms of R&D productivity (Kortum and Lerner 2000), time-to-market (Hellmann and Puri 2000), sales growth (Engel and Keilbach 2007), independence of investments from internal cash flows (Bertoni, Colombo, and Croce 2010;

Bertoni, Ferrer, and Martí 2013; Engel and Stiebale 2014), and productivity (Chemmanur, Krishnan, and Nandy 2011; Croce and Martí 2016; Croce, Martí, and Murtinu 2013). Nevertheless, the existing evidence about the direct effect of governmental VC programs has shown negligible (Bertoni and Tykvová 2015; Grilli and Murtinu 2014), or even negative (Alperovych et al. 2015) effects on several performance measures.

2.2 The use of participative loans: characteristics and its effect on growth

PLs are hybrid instruments that share characteristics with both loans and shares. The interest payments have two components. The first component is independent from the performance of the company and usually determined as the Euribor interest rate plus a spread. The second component is performance-contingent, and is based on the company's return on equity (ROE) in the relevant year. This second component is usually capped. Both interest components are tax deductible. The contract may include a grace period in the repayment of principal. In addition, PLs are deeply subordinated (just above common equity) and are 'basketed' as equity for financial analysis purposes. No collateral is required for PLs but the institution granting the loans usually requires the borrower to carry out a capital increase to prove shareholders' commitment.

Compared to guaranteed loans, PLs give firms more flexibility and reduced interest payments before they reach the breakeven point, which eases the burden of debt financing during the growth phase. Compared to government VC, PLs entail little or no dilution and target a much larger universe of firms.

As a policy instrument, PLs show some advantages. The cost of the program is significantly lower than that of subsidized loans or loan guarantee schemes because of the additional payment received, which is contingent on the success (i.e., firms reaching the breakeven point) of the funded firm. In this way, the extra income received from successful firms helps in balancing the losses coming from unsuccessful ones.

Furthermore, in the case of loan guarantee schemes, commercial banks acting as agents do not have the skills to screen entrepreneurial ventures, and may not even have any incentive for completing a very strict selection process if the percentage covered by the guarantee is large enough. In contrast, government agencies awarding PLs may have an advantage in the screening process because they centralize applications from a large number of applicants, and their valuations are independent, and technically sophisticated (Meuleman and De Maeseneire 2012). So they may have a better understanding of the state of the art in specific industries. Moreover, since the return on the investment in PLs includes a share of the profits of the borrower, it is in the interest of the lender to be extremely selective in the award of loans.

PLs may also reduce potential moral hazard problems because the lender often requires the borrower to balance the amount of the PL with a predefined capital increase. This capital increase is a proof of shareholder commitment to the firm's investments, and contributes to aligning the interests of shareholders and lenders (Tirole, 2006).

But PLs also show some advantages when compared with equity-based programs (i.e., governmental VC programs). Even though the institutions granting the PLs need a specialized team to screen applications, they do not need professional VC-type managers to monitor and provide value added to funded firms. Furthermore, since PLs have a reimbursement timetable of the principal, as in any loan, the maturity is fixed and there is not uncertainty about when the relationship will end.

In sum, the characteristics of PLs may suffer less than other policy schemes from the limitation discussed by de Meza (2002) about funding to performing but over-optimistic entrepreneurs. Institutions granting the PLs may be better equipped for assessing the quality of the companies and PLs may better align the interests of lenders and the borrowers, without being directly involvement in management issues and divestment problems.

Hence, if the funding is allocated to SMEs, which are financially constrained (Berger and Udell 1998; Brav 2009), the external finance provided will help in reducing the dependency of investments on internal sources of finance (Carpenter and Petersen 2002), and thus enhance growth, as expected in any other scheme based on different policy instruments. Since sales growth is a more objective measure than profitability in the case of young entrepreneurial SMEs (Mainprize and Hindle 2007; Norrman and Bager-Sjögren 2010), and in the extant literature (e.g., Grilli and Murtinu 2014) sales growth and employment growth are the most widely used references, our hypotheses are as follows:

H1: Firms receiving participative loans (i.e., ENISA-backed firms) show higher sales growth than non-awarded matched firms (i.e., non-ENISA-backed firms) after the granting of the loan.

H2: Firms receiving participative loans (i.e., ENISA-backed firms) show higher employment growth than non-awarded matched firms (i.e., non-ENISA-backed firms) after the granting of the loan.

3. Data and methodology

3.1 Research setting

ENISA was established in 1982 to provide equity finance to high-technology firms. As the Spanish VC market matured by the second half of the 90s, and more private VC players entered the market, ENISA gradually switched from equity to PLs. Since 2005 ENISA has sharply increased the number of PLs granted to SMEs through two programs targeted at different categories of SMEs: high-technology firms (*EBT program*) and high-growth SMEs (*PYME program*).[1]

Applicants must go through a screening process similar to that of a credit scoring model, which takes into account the industry, location and stage of development of the firm, the personal characteristics of the team, the innovativeness of the business model, and its competitive advantage, as well as the technical and the economic feasibility of the project. The evaluation process usually lasts from four to six weeks. The rate of success of applicants in obtaining funding is around 50%. Awarded firms are granted the amount required, albeit sometimes the requested amount is split into two rounds. The maturities of the PLs range from 4 to 9 years, and the grace period ranges from 1 to up to 7 years.

In the period from 2005 to 2011, 293 firms received PLs amounting to 99.3 million EUR from the EBT program, and 466 firms were granted 175.2 million EUR from the PYME program. Under a strict non-disclosure agreement, ENISA provided us full information about each loan including: the name of the firm that received the loan, as well as its location and activity sector, the principal of the loan, the date in which it was granted, the grace period (if any), the maturity, the status as of October 2015, and the amount reimbursed by that time.

3.2 Sample description

[1] A third program, JOVENES, was launched in 2010 but is too recent to be included in our analysis.

We are able to obtain accounting data around the loan event for a sample of 512 beneficiaries, representing 67.5% of the population of treated companies. Beneficiaries in this sample are representative of the initial population of treated firms and we cannot reject the null hypothesis that their distribution across industries ($\chi2(8)$=1.88) and NUTS2 regions ($\chi2(16)$=2.31) is the same as that of the population of treated companies.

In order to control for the counterfactual, we also collect accounting data for randomly extracted control group of 9,050 non-treated firms. The distribution of both treated and control-group companies is reported in Table 1.

[Table 1 around here]

Treated companies are most common in ICT (23.44%), Manufacturing (21.48%) and Other Services (21.48%). These sectors are also the three most important sectors for control group companies (17.7%, 20.50% and 33.55%, respectively). The least common sector for treated companies in our sample is Primary & Utilities, which represents only 0.78% of treated companies, compared to 6.19% of control group companies. Slightly more than half the treated companies in our sample are located in Cataluña (32.23%) or Madrid (25.98%), which are also the two largest regions in terms of non-treated firms (23.52% and 20.71% respectively). Finally, we observe that, reflecting the growing activity of ENISA during the period, the number of treated companies in our sample grows from 49 that received a loan in 2005-2007 to 316 that received one between 2010 and 2011.

We report descriptive statistics about the main variables used in our study and their correlations in Table 2. Companies in our sample have a mean *Ln(Sales)* of 11.6526 (which corresponds to approximately EUR 115 thousand) and *Ln(Employees)* of 1.2540 (which corresponds to 3.50 employees). Companies in our sample have an average annual growth in sales of 8.73% and average growth in employees of 4.78%. The annual amount of ENISA loan is EUR 0.0053 million for all firm-year observations. If we only look at loan-years for treated firms, the variable has an average of EUR 282 thousand, with a distribution between EUR 27,000 and EUR 1.5 million. Correlations are reported in Panel B of Table 2. We observe that largest correlations in our sample are between *Ln(Sales)* and *Ln(Employees)* (0.6079) and between *Sales growth* and *Employees growth* (0.4184), which means that – unsurprisingly – companies that are large or grow more rapidly in terms of one measure, also tend to be large and grow in terms of the other.

[Table 2 around here]

3.3 Methodology

We test our hypotheses by adapting three empirical approaches used in the literature that studies debt and equity instruments in support of SMEs. This empirical strategy allows us to get a comprehensive view over the phenomenon and to obtain results that can be compared to those obtained by other studies. First, along the lines of Asdrubali and Signore (2015), we use dif-in-dif to estimate the average treatment effect on treated (ATT) of ENISA loans. Each treated company is matched to three control group companies (with replacement) in the year before the PL is obtained. Matching is performed using nearest-neighbor propensity-score matching. Propensity scores are calculated separately for each loan year (2005-2011) in our sample using a probit model including the following characteristics in the previous year: sales, employees, age, industry and region. The outcome is computed as the difference between sales or employees at time *T* (the year before the treatment, i.e., the year in which treated and non-treated firms are matched) and time *T+n*, with *n=1,…,5*. The ATT is the difference between the outcome for treated and non-treated companies. In Table 3, we show *Ln(Sales)* and *Ln(Employees)* of treated and matched companies at the time of matching (*T*) and 3 years later (*T+3*). At time *T*, the average *Ln(Sales)* is 11.638 for treated companies and

11.319 for matched companies, with a difference (0.319) that is not statistically significant from 0 at customary confidence levels (p-value>10%). At time *T+3*, the average *Ln(Sales)* is 13.306 for treated companies and 12.401 for matched companies, with a difference (0.905) that is different from 0 with a p-value<0.1%. Similar evidence is obtained with respect to employees. At time *T*, the average *Ln(Employees)* is 1.958 for treated companies and 1.920 for matched companies, with a difference (0.038) that is not statistically significant from 0 at customary confidence levels (p-value>10%). At time *T+3*, the average *Ln(Employees)* is 2.571 for treated companies and 1.943 for matched companies, with a difference (0.628) that is different from 0 with a p-value<0.1%. Overall, these results support the fact that propensity score matching is effective in identifying matched companies that are similar to treated companies and give preliminary evidence suggesting that ENISA loans boost sales and employment growth.[2]

[Table 3 about here]

We extend the methodology used by Asdrubali and Signore (2015) by controlling for possible selection bias. The main shortcoming of the propensity-score matching approach is that its validity relies on the strong ignorability assumption, which translates in the fact that treated and control group companies should only differ for observable characteristics (i.e., sales, employees, region, industry and age), and that no unobservable characteristics affecting the outcome differ systematically between the two groups. This assumption is generally violated when selection is based on non-observable information (e.g., firms that have better expectations about future growth could be more prone to look for ENISA loans in the first

[2] Note that dif-in-dif cannot be directly calculated from Table 3 because not all firms for which we are able to perform matching at time *T* have available accounting data at time *T+3*. *Dif-in-dif* results that take into account changes in sample compositions are shown in Table 4.

place). Violation of the strong ignorability assumption may bias the estimation of the ATT in a way that is equivalent to the omission of a variable in an OLS estimation (Li and Prabhala 2007). To overcome this potential bias, we also estimate the ATT using a two-step model along the lines of Heckman (1979). We add to the first step two instruments that measure the relative frequency of ENISA loans in the province (NUTS3) and industry (2-digit NACE code) in the previous year. These instruments are theoretically valid because there is no reason to believe that unobserved information about a given company may depend on the frequency of ENISA loans given to firms in the same province or in the same industry in the previous year. The instruments are also empirically quite strong because in the first-step estimations, their parameters are positive as expected and we can reject the null hypotheses that these parameters are jointly equal to 0 with a p-value<1%.

Secondly, we adapt this basic methodology to calculate absolute growth as a function of the amount of the loan, along the lines of Brown and Earle (2016). We begin by using the same propensity-score matching as in the previous analysis to estimate an OLS model in which the dependent variable is the absolute increase (instead of growth) in sales and employees. Brown and Earle (2016), who only consider employment growth, measure it as the difference in average employment from three years before to three years after the loan. Due to data limitations, we have 6 years data around the event for a very small subset of companies, hence we measure growth using a more parsimonious (but also more noisy) as the absolute growth in sales and employment between T and $T+n$. The variable of interest for us is *Loan amount*, which is the total amount of PLs obtained by the company over the same period. We also control for firm's *Ln(Age)* and $Ln(Age)^2$ and for regional, industry and year fixed effects. Next, in order to control for unobserved heterogeneity, we use the frequencies of

ENISA loans by province and industry as instruments and estimate a 2-stage least squared model on the whole sample.

Thirdly, we estimate of a series of augmented Gibrat-law panel-data models (Evans 1987) that are derived from the following model specification used by Grilli and Murtinu (2014).This model is a standard specification in the industrial organization literature on firm growth (e.g., Sutton 1997), which allows us to test whether the growth rates of ENISA-backed firms persistently increase after the first round of PL with respect to non-ENISA-backed firms. The dependent variable is the annual growth in sales or employees, and control variables include the logarithm of sales or employees in the previous year, *Ln(Age)* and $Ln(Age)^2$ and regional, industry and year fixed effects. We also include the dummy variable $Enisa_{t-1}$, which switches from 0 to 1 in the year in which the company receives a PL from ENISA. As customary, the ENISA variable is lagged one year as a first initial step to reduce potential reverse causality concerns. Using OLS and fixed-effects to estimate dynamic panel-data models such as the Gibrat law may result in biased estimates of the parameters (Arellano and Bond 1991; Arellano and Bover 1995; Blundell and Bond 1998). Moreover, these methods do not (OLS) or only partially (fixed-effects) control for unobserved heterogeneity. We address these problems by using the system generalized method of moments (GMM-SYS) approach (Blundell and Bond 1998). Specifically, we implement GMM-SYS estimation procedure with moment conditions for endogenous variables (i.e., lagged size and *ENISA*) starting from *t-2* for first-differenced instruments in level equations and *t-3* for level instruments in first-differenced equations. We also include the finite-sample correction for the two-step covariance matrix developed by Windmeijer (2005).

4. Results

4.1 ATT of ENISA loans on sales and employment growth

Table 4 reports that the ATT of ENISA loans estimated using propensity-score matching is positive and statistically significant (p-value<0.1%) for both sales and employment for all the time windows considered (*T+1* to *T+5*). At *T+1* the treatment effect is 20.39% for sales growth and 21.22% for employment growth. The treatment effect is not concentrated in the first year after the loan but increases quite steadily over time, reaching at 69.14% for sales growth and 62.60% for employment growth in *T+5*.

[Table 4 about here]

Results in Table 5 illustrate that the Heckman treatment effect analysis is consistent with the propensity score-matching analysis. The treatment effect estimated using this method – which controls for unobserved heterogeneity – is again positive and statistically significant (p-value<0.1%) for both sales and employment for all the time windows considered (*T+1* to *T+5*). The treatment effect has the same order of magnitude as the ATT estimated using propensity-score matching and increases over time, confirming that the effect is long-lasting. The remaining control variables in the analysis have the expected signs: growth is faster in smaller firms. Age has a non-linear effect, with growth slowing down at a decreasing rate as the firm matures.

[Table 5 about here]

4.2 Absolute growth and size of PLs

We report the analysis on the absolute growth in the first three years after the loan in Table 6. Generally speaking, the results indicate that, as expected, a larger PL results in a larger absolute effect on growth. Results are stable and consistent between propensity-score matching (PSM) and two-stage least squared (2SLS) for sales and employment absolute growth in *T+1* and *T+2*, but become unstable from *T+3*, possibly because of the reduction in the number of usable observations. Our results indicate that EUR 1 million in PL generates between EUR 0.67 million (2SLS, p-value<1%) and EUR 1.2 million (PSM, p-value<0.1%) in additional sales in T+1 and between EUR 1.09 million (PSM, p-value<1%) and EUR 1.96 million (2SLS, p-value<0.1%) of additional sales in *T+2*. The estimated impact for *T+3* ranges between EUR 0.61 million (PSM, p-value>10%) and EUR 3.60 million (2SLS, p-value<1%).

A similar pattern is obtained in terms of employment. Our results indicate that EUR 1 million in PL generates between 8.37 (2SLS, p-value<0.1%) and 13.92 (PSM, p-value<0.1%) additional jobs in T+1 and between 12.15 (PSM, p-value<0.1%) and 14.83 (2SLS, p-value<0.1%) additional jobs in *T+2*. The estimated impact for *T+3* ranges between 8.88 (PSM, p-value<10%) and 25.74 (2SLS, p-value<1%).

[Table 6 around here]

4.3 Dynamic panel data models on growth

Table 7 reports the results of the OLS, fixed effects, and GMM estimation of dynamic panel data models on sales and employment growth. The ENISA coefficient is significant at the 1% confidence level or better in each of the three specifications for both dependent variables. Based on GMM estimates, the annual additional growth of an ENISA backed company is 16.12% (p-value<0.1%) for sales and 9.81% (p-value<1%) for employment. These results are broadly consistent with those obtained with the ATT analysis illustrated in Section 4.2. Hence, since we also show that the GMM estimates are similar to those obtained using OLS and fixed-effects, these results further reassure the robustness and internal consistency of our analysis. Regarding control variables, the results of the GMM model are also consistent with those illustrated in Table 5. Growth tends to be faster for smaller companies and slows down (at a declining rate) as the company matures.

[Table 7 about here]

5. Discussion and conclusions

There is a general consensus among governments that there is a gap in the availability of long-term finance for SMEs, which justifies the existence of special policy measures aimed at addressing this issue. The usual approaches followed include subsidized loans, loan guarantees, and direct equity investments (i.e., governmental VC). There is mixed evidence on the effect of loans or loan guarantees, and a negative assessment of governmental VC. As a result, all of these schemes do not clearly compensate for the public spending committed. In this work we focus on a hybrid policy instrument, called PL, which exhibit some differences when compared with loans or to equity financing. Compared with loans, there is a tough screening process, borrowers do not face high interest payments before reaching the breakeven point, and lenders receive an additional interest payment only when the firm obtains profits. Furthermore, the alignment of interests between borrower and lender is attained by a capital increase requested by the latter in parallel. Compared with equity, the lender does not need to provide management assistance, or to devote time to divest the amount invested, whereas the borrower does not face any internal capital dilution that would emerge from a capital increase.

We focus on a sample of 512 firms that received a PL from ENISA, which is a government agency dependent of the Spanish Ministry of Industry, Energy, and Tourism, between 2005 and 2011, and a control group of 9,050 firms to perform our matching in our different models. We find that firms receiving PLs experience significantly higher growth in both sales and employment than their matched twins, which increases from the first until the fifth year analyzed (i.e., ATT approach). Propensity-score matching estimates indicate that by the fifth year after the PL, beneficiaries have grown by 69.14% more in sales and 62.50% more in employees than matched companies. This is a much larger treatment effect than the one found by Asdrubali and Signore (2015) on guaranteed loans in Central, Eastern and South-Eastern European Countries, which is 19.6% for sales and 17.3% for employment.

Our 2SLS analysis on the absolute growth in sales and employment illustrates that 1 million Euro of PLs results, 3 years after the loan, in 3.7 million Euro in additional sales and 25.7 additional jobs. This is substantially larger than what found by Brown and Earle (2016) for guaranteed loans in the US, for which they find an increase in average employment 3 years after the loan of 3 to 3.5 employees.

Finally, our dynamic panel-data analysis confirms that PLs boost annual growth by 16.2% for sales and 9.8% for employment, and these results are highly statistically significant (p-value<1%). This evidence can be compared to results obtained by Grilli and Murtinu (2014) on governmental VC. Contrarily to what we find for PLs, the authors do not find any evidence of an additional effect of governmental VC on growth of either sales or employment.

Overall, these results suggest that PLs, which are a hybrid instrument between debt and equity, have been extremely effective in boosting growth. Their effect is significant and larger than what the literature suggests for bot debt (guaranteed loans) and equity (governmental VC) forms of government support.

This work contributes to the literature on entrepreneurial finance in two ways. First, we provide initial evidence on the positive impact of hybrid instruments on growth, which also show some advantages when compared to other policy instruments. Second, we complement the existing evidence of the impact on SMEs' growth of other policy instruments, such as subsidized loans, loan guarantee schemes and governmental VC (Hyytinen and Toivanen 2005).

This work also has interesting policy implications. Policy makers are increasingly directing their attention towards hybrid instruments (OECD 2015) to design appropriate schemes to support SMEs (Colombo, Cumming, and Vismara 2014). As a policy instrument, PLs are characterized by a lower relative cost for government agencies than that of subsidized loans, loan guarantee schemes (i.e., PLs are not subsidized and the government agency receives extra income from successful firms), and governmental VC (i.e., the government agency does not face the cost of adding value to investee firms nor the risks and delays related to VC divestments). Furthermore, the institution granting the PLs does not face as much risk as in the case of pure equity investments. In addition, the potential universe of firms that could take advantage from this instrument is significantly larger than that of VC funding.

This work presents some limitations that open avenues for future research. While we describe the potential a priori advantages of PLs over R&D subsidies and government VC, future research may provide empirical evidence on whether PLs do actually outperform, or rather complement, other types of government intervention. Our results seem to suggest the complementary role played by PLs with respect to VC in that the former seems to be more useful for larger low-technology firms in our sample whereas VC is more suitable for small high-technology firms, where the value added required by the investee firm is much more necessary, and the financial constraints faced are higher. Future contributions should also test the impact of PLs on other performance measures such as total factor productivity, which is commonly used as a proxy for firm's innovative activity and reflects how effectively firms use production inputs to produce output respective to other firms that operate in the same industry.

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Tables and Figures

Table 1: Distribution of the observations by industries, regions and years

	ENISA-backed		Control group	
	No	%	No	%
Industry				
ICT	120	23.44	1602	17.70
Other Services	110	21.48	3036	33.55
Manufacturing	110	21.48	1855	20.50
Pharma & R&D	70	13.67	851	9.40
Commerce	49	9.57	793	8.76
Services	35	6.84	71	0.78
Hotel &Leisure	9	1.76	217	2.40
Transport	5	0.98	65	0.72
Primary & Utilities	4	0.78	560	6.19
Region				
Cataluña	165	32.23	2129	23.52
Madrid	133	25.98	1874	20.71
Andalucia	44	8.59	1746	19.29
Pais Vasco	36	7.03	683	7.55
Comunidad Valenciana	33	6.45	505	5.58
Aragon	19	3.71	351	3.88
Galicia	7	1.37	414	4.57
Rest of Spain	75	14.65	1348	14.89
Loan year				
2005-2007	49	9.57		
2008-2009	147	28.71		
2010-2011	316	61.72		
Total	512	100	9050	100

This table shows the distribution of ENISA-backed and control group companies by industries, regions and – for ENISA-backed only – loan years.

Table 2: descriptive statistics and correlation

Panel A: descriptive statistics

Variable	Obs	Mean	Std. Dev.
Ln(Sales)	48749	11.6526	2.7042
Ln(Employees)	48749	1.2540	1.0246
Sales growth	37708	0.0873	0.7027
Employees growth	38830	0.0478	0.3241
ENISA	48749	0.0501	0.2182
Loan amount	38553	0.0053	0.0458
Ln(Age)	48749	0.0204	0.6432

Panel B: Correlation matrix

	Ln(Sales)	Ln(Employees)	Sales growth	Employees growth	ENISA	Loan amount
Ln(Employees)	0.6079	1.0000				
Sales growth	0.2696	0.1331	1.0000			
Employees growth	0.1607	0.2536	0.4184	1.0000		
ENISA	0.1068	0.2746	0.0528	0.0407	1.0000	
Loan amount	0.0245	0.1249	0.0373	0.0450	0.0823	1.0000
Ln(Age)	0.1810	0.1671	-0.3066	-0.2533	0.1473	0.0193

Legend: the tables report the descriptive statistics of (Panel A) and correlation between (Panel B) the variables used in this study. *Ln(Sales)* is the natural logarithm of firm's sales (in Euro). *Ln(Employees)* is the natural logarithm of the number of firm's employees. *Sales growth* is the increase of *Ln(Sales)* from the previous year. *Employees growth* is the increase of *Ln(Employees)* from the previous year. *ENISA* is a dummy variable equal to 1 after a firm receives a PL from ENISA. *Loan amount* is the amount (in million Euro) of PL loans from ENISA received by a firm in a given year. *Ln(Age)* is the natural logarithm of the age (in years) of a firm.

Table 3: Sales and employees of treated and matched firms at matching and 3 year later

		Treated	Matched	Difference
Ln(Sales)	At matching (T)	11.638*** (0.193)	11.319*** (0.219)	0.319 (0.292)
	3 year later (T+3)	13.306*** (0.106)	12.401*** (0.122)	0.905*** (0.162)
Ln(Employees)	At matching (T)	1.958*** (0.059)	1.920*** (0.063)	0.038 (0.087)
	3 year later (T+3)	2.571*** (0.052)	1.943*** (0.065)	0.628*** (0.083)

Legend: the table reports the average sales and employees of treated firms and firms matched using propensity score at time of matching (*T*) and 3 years later (*T+3*). *Ln(Sales)* is the natural logarithm of firm's sales (in Euro). *Ln(Employees)* is the natural logarithm of the number of firm's employees. *Difference* is the difference of the relevant variable between treated and matched firms. Standard errors in round brackets. ***: p-value<0.1%

Table 4: Average treatment effect on treated

	T+1	T+2	T+3	T+4	T+5
Ln(Sales)	0.2039***	0.4035***	0.5134***	0.6328***	0.6914***
	(0.0473)	(0.0702)	(0.0882)	(0.1288)	(0.1964)
Observations	1690	1485	1326	792	434
No. treated	510	440	391	240	129
Ln(Employees)	0.2122***	0.3783***	0.4591***	0.4752***	0.6260***
	(0.0193)	(0.0299)	(0.0404)	(0.0605)	(0.0839)
Observations	1710	1509	1331	812	426
No. treated	511	439	391	240	128

Legend: the table reports the average treatment effect on treated calculating using dif-in-dif between treated firms and firms matched using propensity score. Dif-in-dif is calculated between the time of matching (*T*) and each of the following 5 years (*T+1* to *T+5*). *Ln(Sales)* is the natural logarithm of firm's sales (in Euro). *Ln(Employees)* is the natural logarithm of the number of firm's employees. Robust standard errors in round brackets. ***: p-value<0.1%.

Table 5: Heckman treatment effect

Panel A: Sales

	T+1	T+2	T+3	T+4	T+5
Ln(Sales)	-0.0725***	-0.1461***	-0.1910***	-0.2427***	-0.3030***
	(0.0021)	(0.0029)	(0.0036)	(0.0045)	(0.0056)
Ln(Age)	-0.1586***	-0.1875***	-0.2044***	-0.2084***	-0.1924***
	(0.0090)	(0.0144)	(0.0209)	(0.0317)	(0.0517)
Ln(Age)^2	0.2167***	0.2530***	0.2442***	0.2385***	0.2211***
	(0.0091)	(0.0139)	(0.0192)	(0.0269)	(0.0399)
ENISA	0.2728***	0.5167***	0.7754***	0.9546***	1.1089***
	(0.0558)	(0.0770)	(0.0958)	(0.1128)	(0.1685)
Fixed effects					
Year	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes
Observations	34227	26202	20048	14862	10472

Panel B: Employees

	T+1	T+2	T+3	T+4	T+5
Ln(Employees)	-0.0649***	-0.1194***	-0.1844***	-0.2310***	-0.2703***
	(0.0020)	(0.0031)	(0.0046)	(0.0061)	(0.0079)
Ln(Age)	-0.0644***	-0.0973***	-0.1121***	-0.1135***	-0.0883**
	(0.0044)	(0.0071)	(0.0112)	(0.0173)	(0.0269)
Ln(Age)^2	0.0629***	0.0739***	0.0721***	0.0748***	0.0839***
	(0.0043)	(0.0069)	(0.0102)	(0.0143)	(0.0204)
ENISA	0.1853***	0.3849***	0.5431***	0.6250***	0.7941***
	(0.0293)	(0.0354)	(0.0551)	(0.0731)	(0.1472)
Fixed effects					
Year	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes
N	35076	26905	20645	15330	10821

Legend: the table reports the treatment effect on sales (Panel A) and employees (Panel B) calculated using the Heckman method with maximum likelihood. The effect is calculated between the time of matching (*T*) and each of the following 5 years (*T+1* to *T+5*). *Ln(Sales)* is the natural logarithm of firm's sales (in Euro). *Ln(Employees)* is the natural logarithm of the number of firm's employees. *ENISA* is a dummy variable equal to 1 after a firm receives a PL from ENISA. *Ln(Age)* is the natural logarithm of the age (in years) of a firm. Robust standard errors in round brackets. The exclusion restrictions of the Heckman method are based on the lagged frequencies of ENISA loans in the province and industry of the focal firm. **: p-value<1%, ***: p-value<0.1%.

Table 6: Loan amount and growth in sales and employees

Panel A: Sales

	Propensity-score mathing			2-stage least squares		
	T+1	T+2	T+3	T+1	T+2	T+3
Loan amount	1.2402***	1.0867**	0.6050	0.6677**	1.9551***	3.6933**
	(0.3140)	(0.4025)	(0.6595)	(0.2078)	(0.4714)	(1.1434)
Ln(Age)	-0.1749***	-0.3614**	0.1339	-0.1282***	-0.2053***	0.2033
	(0.0307)	(0.1100)	(0.4094)	(0.0065)	(0.0226)	(0.2088)
$Ln(Age)^2$	0.1613**	0.3108*	0.0188	0.1163***	0.0455	-0.8635*
	(0.0516)	(0.1281)	(0.4196)	(0.0124)	(0.0646)	(0.4365)
Fixed effects						
Year	Yes	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1469	962	516	25249	13014	5477

Panel B: Employees

	Propensity-score mathing			2-stage least squares		
	T+1	T+2	T+3	T+1	T+2	T+3
Loan amount	13.9203***	12.1481***	8.8768†	8.3719***	14.8348***	25.7402**
	(2.6157)	(3.1109)	(4.6288)	(1.9786)	(4.0190)	(8.2221)
Ln(Age)	-2.0496***	-1.8657*	1.0258	-1.0907***	-1.5488***	1.2865
	(0.2754)	(0.9066)	(2.7997)	(0.0565)	(0.1784)	(1.4170)
$Ln(Age)^2$	1.6738***	0.7305	0.6214	0.6955***	0.1289	-5.5996†
	(0.4148)	(0.9800)	(2.4504)	(0.1049)	(0.4969)	(2.9442)
Fixed effects						
Year	Yes	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1479	933	497	25249	13014	5477

Legend: the table reports the effect of loans on absolute growth of sales (Panel A) and employees (Panel B) calculated using the propensity score matching and 2-stage least squared methods. Heckman method with maximum likelihood. The effect is calculated between the time of matching (*T*) and each of the following 3 years (*T+1* to *T+3*). *Loan amount* is the amount (in million Euro) of PL loans from ENISA received by a firm in a given year. *Ln(Age)* is the natural logarithm of the age (in years) of a firm. Robust standard errors in round brackets. The instrumental variables for the 2-stage least squared method are the lagged frequencies of ENISA loans in the province and industry of the focal firm. †: p-value<10%, *: p-value<5%, **: p-value<1%, ***: p-value<0.1%.

Table 7: Multivariate analysis

	Sales			Employees		
	OLS	Fixed effects	GMM	OLS	Fixed effects	GMM
$Ln(Sales)_{t-1}$	-0.0680***	-0.1396***	-0.1217**			
	(0.0035)	(0.0070)	(0.0402)			
$Ln(Employees)_{t-1}$				-0.0458***	-0.2537***	-0.0653*
				(0.0041)	(0.0087)	(0.0283)
$ENISA_{t-1}$	0.1853***	0.1533***	0.1612***	0.0667***	0.0600***	0.0981**
	(0.0250)	(0.0366)	(0.0231)	(0.0124)	(0.0156)	(0.0300)
$Ln(Age_t)$	-0.4747***	0.4311*	-0.3162*	-0.2004***	0.0649	-0.1571***
	(0.0242)	(0.1815)	(0.1445)	(0.0119)	(0.0942)	(0.0456)
$Ln(Age_t)^2$	0.3459***	0.7434***	0.2764**	0.1437***	0.1550**	0.1342***
	(0.0255)	(0.1251)	(0.0914)	(0.0120)	(0.0601)	(0.0326)
Fixed effects						
Year	Yes	No	Yes	Yes	No	Yes
Region	Yes	No	Yes	Yes	No	Yes
Industry	Yes	No	Yes	Yes	No	Yes
Observations	8943	8943	8943	8850	8850	8850
AR1			-1.0879			-14.44 ***
AR2			-0.8907			-1.6432
Hansen			141.6272			150.3017
			[150]			[150]

Legend: the table reports the estimates of dynamic panel-data models on *Sales growth* (first three columns) and *Employees growth* (next 3 columns) using OLS, fixed effects and two-step system GMM with finite sample correction. *Sales growth* is the increase of *Ln(Sales)* from the previous year. *Employees growth* is the increase of *Ln(Employees)* from the previous year. *Ln(Sales)* is the natural logarithm of firm's sales (in Euro). *Ln(Employees)* is the natural logarithm of the number of firm's employees. *ENISA* is a dummy variable equal to 1 after a firm receives a PL from ENISA. *Ln(Age)* is the natural logarithm of the age (in years) of a firm. Robust standard errors in round brackets. Degrees of freedom are in squared brackets. †: p-value<10%, *: p-value<5%, **: p-value<1%, ***: p-value<0.1%.