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## Public guarantees, private banks' incentives, and corporate outcomes: Evidence from the COVID-19 crisis

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Public guarantees, private banks'  
incentives, and corporate outcomes:  
evidence from the COVID-19 crisis

No 2913

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**Abstract:** We show that public guaranteed loans (PGL) increase credit availability improving real effects, but private banks' incentives imply that weaker banks shift riskier corporate loans to taxpayers. We exploit credit register data during the COVID-19 shock in Spain, and a stylized model guides the empirics. Unlike non-PGL, banks provide more PGL to riskier firms in which banks have higher pre-crisis shares of firm total credit. Importantly, these effects are stronger for weaker banks. Results using firm(-bank) fixed effects and loan volume versus price information suggest a credit supply-driven mechanism. Moreover, exploiting exogenous variation across similar firms with differing PGL access, we confirm these findings, and we additionally show that PGL increases banks' overall lending and credit share, with positive effects for firm survival and investment.

*JEL Codes:* G01; G21; G38; E62; H81

*Keywords:* Banking; Private incentives; COVID-19; Public guarantees; Risk-shifting

### *Non-technical summary*

The COVID-19 pandemic and ensuing lockdowns halted large parts of the economy. This prompted large-scale government interventions to keep firms afloat, including public guaranteed loan schemes. In most cases, these public guaranteed loan schemes were implemented through private lenders. While the guarantees are usually administered by government agencies on behalf of the government, the lending decisions are delegated to the bank and, therefore, their allocation may depend on private banks' incentives. The lending decisions that these profit-oriented banks make when extending public guaranteed loans may differ from the decisions the government would have made when allocating the loans directly. In particular, the objective of the banks is to maximize the profits for the bank while the social objectives of the government are to preserve credit flows to the real economy and to prevent inefficient corporate bankruptcies.

In this paper, we analyze the potential merits of such government interventions in terms of the availability of corporate credit, as well as the potential social costs associated with the delegation of guaranteed lending to privately-owned banks. Exploiting credit register data during the COVID-19 shock, we find that banks provide more public guaranteed loans to riskier firms in which banks have higher pre-crisis shares of firm total credit. Importantly, these effects are stronger for weaker, riskier banks. Results obtained after controlling for characteristics that vary across firms and firm-bank pairs suggest that credit flows are partly driven by credit supply factors. This is confirmed by a complementary analysis that contrasts shifts in lending volumes with price changes. Moreover, we confirm these findings by exploiting variation across very similar firms with different coverage levels of loan guarantees, and we additionally show that the introduction

of the public guaranteed loan program increases banks' lending, with associated positive effects for firm survival and investment. The overall results suggest that public guaranteed loans cause an increase in the availability of credit, with positive effects for firm survival and firm investment. However, private banks' incentives imply that riskier corporate loans are shifted to taxpayers, especially by weaker (and riskier) banks.

Our results contribute to our understanding of the effectiveness and desirability of the use of public guarantees in supporting the flow of credit to the real economy during crisis times. We show that public guaranteed lending programs can benefit the economy by supporting corporate investment and reducing corporate bankruptcies, but our results also imply that private lenders tend to shift risks onto taxpayers by exploiting such programs to extend loans to weak and risky firms. The design of such programs should address these perverse incentives of private lenders with a view to make optimal use of taxpayer money.

## 1. Introduction

The COVID-19 pandemic and ensuing lockdowns halted large parts of the economy, causing a liquidity squeeze and dash for cash by firms (Eichenbaum et al., 2020; Guerrieri et al., 2020; Ding et al., 2020; Li et al., 2020; and Acharya et al., 2020). This prompted large-scale government interventions to keep firms afloat, including paycheck protection programs and public guaranteed loan schemes (Humphries et al., 2020; Chodorow-Reich et al., 2021; Baudino, 2020; Falagiarda et al., 2020). In most cases, these public guaranteed loan schemes were implemented through third parties, i.e., the granting of public guaranteed loan (PGL) decisions were delegated to (private) banks.

In this paper, we analyze the potential merits of such government interventions in terms of corporate credit availability, and associated real effects, and at the same time, the potential costs associated with the delegation to privately-owned (non-government) banks arising from the possible divergence between *private (bank)* incentives and *social* incentives. Public guaranteed loan schemes offer credit protection on part of the loan in exchange for a fee, which banks pay to an administering agency, and typically come with eligibility criteria and lending requirements. While the guarantees are usually administered by government agencies on behalf of the government, the lending decisions are delegated to the bank and, hence, their allocation may depend on *private banks' incentives*.

Exploiting credit register data during the COVID-19 shock, we find that — unlike non-PGL— banks provide more PGL to riskier firms in which banks have higher pre-crisis shares of firm total credit. Importantly, these effects are stronger for weaker, riskier banks. Results using firm(-bank) fixed effects and loan volume versus price information suggest a credit supply-driven mechanism. Moreover, exploiting exogenous variation across very similar firms with differing PGL access, we corroborate our previous findings, and we additionally show that PGL increases banks' overall lending and credit share, with associated positive effects for firm survival and investment. Therefore, the overall results suggest that public guaranteed loans cause positive credit availability and corporate real effects, but private banks' incentives imply that riskier corporate loans are shifted to taxpayers, especially by weaker (riskier) banks.

We rationalize and guide the results using a stylized model in which (private) bank incentives from existing bank-firm credit exposures shape the granting of loans. In the model, an exogenous negative shock to firm profitability (such as from COVID-19) decreases firms' credit worthiness and reduces bank lending incentives. For a large enough shock, lending (non-PGL) can be impaired. We show that a subsidized PGL system can increase bank lending incentives, with banks having more incentives to use PGL the larger is the pre-existing credit exposure to the firm. This is because PGLs increase the repayment probability of pre-existing loans. A key testable prediction generated by the model is, therefore, that the pre-existing bank's share in the total credit of the firm is a key determinant of PGL granting decisions. Moreover, the model helps to understand that these effects are stronger for riskier firms, as the value of the public guarantee is higher for such firms, while these risk-taking effects for weaker banks are less clear-cut. Moreover, the model also predicts that PGL boosts the availability of corporate credit resulting in positive real effects.

We conduct our analysis using Spanish loan-level data over the period December 2019 to June 2021. Spain during COVID-19 offers an excellent setting for identification.

First, in contrast to many other PGL schemes, the Spanish scheme provided only a partial guarantee of up to 80% of the value of the loan, with residual credit risk being absorbed by the granting (private) bank. This gives rise to an important role for private banks' incentives in lending decisions depending on firm and bank riskiness, as banks have some skin in the game despite a large part of the loan is publicly guaranteed. This contrasts with many other public guaranteed loan schemes, including the US Paycheck Protection Program (PPP) that much of the existing literature has focused on, which provided full guarantees resulting in banks not taking any residual credit risk. In such other schemes there is a much more limited role for differential bank's incentives, including the decision between granting PGL vs. non-PGL.

Second, the Spanish PGL setting offered differential PGL access, even to firms which are otherwise similar, allowing for identification of the overall lending (and real) effects of PGL. Specifically, we exploit the fact that firms with defaulted

loans as of December 2019 were not eligible for PGL, while firms with defaults only as of January or February 2020 were eligible for PGL. The COVID shock in Spain, including lockdowns, occurred in mid-March 2020 and the lending decisions of PGL under the new PGL scheme took place only afterwards (starting in April 2020), with firms being eligible for PGL only when they had no prior loan defaults as of the end of 2019. This implies a completely differential PGL eligibility between firms with defaulted loans as of December 2019 and firms with defaulted loans in January/ February 2020, even if, as we show, other firm characteristics are otherwise very similar across these two groups of firms. Further, for firms with access to PGL, we can analyze similar firms with public guarantees with a coverage of 80% of the loan vs. lower public coverage amounts.

Third, the Spanish credit register has rich data at the loan-level for the universe of borrowing firms with detailed data on bank-borrower credit exposures (different from the US credit register which covers only large banks and loans above 1 million dollars in size). Importantly, the Spanish dataset allows us to uniquely identify loans with COVID-19 related public guarantees, rather than generic public loan guarantees, which is a key difference with the European Anacredit database. Moreover, compared to other schemes, the Spanish scheme was one of the largest PGL programs in terms of take-up amounts relative to GDP (Falagiarda et al., 2020), but nevertheless there also was substantial non-PGL being granted.

We find that during the COVID-19 crisis, which negatively affected the real economy, ex-ante riskier firms participate more in PGL, a plausibly intended consequence of the PGL scheme. PGL are more likely to be granted to firms which are ex-ante riskier (measured in terms of credit risk or by belonging to sectors that are more negatively affected by COVID-19 such as tourism, transport, and hospitality) or smaller. In terms of bank characteristics, PGL are more likely to be granted by weaker (riskier) banks, in terms of higher NPL ratios. For non-PGL, just the opposite happens in terms of firm and bank risk characteristics, i.e., non-PGL are more likely provided to safer firms and granted by stronger banks during the COVID-19 crisis.

The first set of main results of this paper are as follows. We find that firms are more likely to obtain PGL from those banks with whom they have larger pre-



crisis credit exposures, measured as the share of the firm's total credit outstanding with the bank before the COVID-19.<sup>1</sup> This finding is consistent with the role of private banks' incentives in exploiting the public guaranteed scheme to address possible defaults on pre-crisis debt. Interestingly, differently from pre-COVID bank-firm exposure, we do not find that banks are more prone to grant PGL to firms with which they have a longer relationship. These results are consistent with private banks' incentives arising from credit exposures (as the model suggests) as opposed to pure informational advantages linked to the duration of lending relationships. Further, non-PGL are also associated positively with banks to whom firms have larger pre-existing credit exposures, but the economic effects are substantially much lower (an order of magnitude) than for PGL.

We also find that PGL are more likely to be granted to riskier firms, but importantly these effects are increasing in the credit exposure between the firm and the bank prior to the shock, consistent with the relevance of bank's incentives in granting PGL. Crucially, this effect is stronger for weaker (riskier) banks, in terms of higher ex-ante NPLs. That is, weaker (riskier) banks provide more credit via PGL to riskier firms in which banks have a higher pre-crisis share of the firm's total credit.<sup>2</sup> We obtain the opposite effects for non-PGL: for higher firm-bank pre-COVID exposures, stronger banks provide more non-PGL to ex-ante riskier firms during the COVID period. All these results are consistent with weaker (riskier) banks shifting lending to riskier firms from private banks to taxpayers due to their private incentives.<sup>3</sup>

To disentangle the relevance of credit supply vs. demand factors driving our results, we analyze loan volume and pricing of both PGL and non-PGL credit. We find that PGL have larger credit volumes and lower loan interest rates than non-

<sup>1</sup> While pre-crisis credit exposures are potentially endogenous to (un)observables, they are exogenous to the COVID-19 shock. Crucially, as our estimates do not decrease when we control for firm and bank observables as well as firm and bank fixed effects (capturing unobservables) while the R2 dramatically jumps, the Oster (2017)'test (following Altonji et al. 2005) suggests that our results are robust to self-selection and omitted variables problems.

<sup>2</sup> Results stem from higher bank share of firm's total credit, not necessarily from being the main bank of the firm.

<sup>3</sup> The economic effects are also significant. An interquartile range increase in the firm's prior share of total credit with the bank increases the probability of obtaining a PGL by that bank by 24%, while this increase is of only 4.0% for non-PGL. Furthermore, if the bank has a high fraction of pre-crisis nonperforming loans, effects to riskier firms (interquartile range increase) increase to approximately 32%.

PGL. Moreover, the higher the pre-COVID bank share of the firm total credit, the stronger the effects of PGL on increasing credit volumes and decreasing loan interest rates. These opposite effects on higher loan volume and lower loan interest rates are enhanced for riskier firms, and especially this riskier lending for weaker (riskier) banks. These opposite volume and pricing results are therefore not consistent with a borrower (demand)-driven channel, but instead are consistent with a credit supply(lender)-driven channel. Moreover, these results control for firm fixed effects, or firm-bank fixed effects, and thus for unobserved borrower (and borrower-lender) fundamentals. Altogether, all these results suggest that a credit supply mechanism is at play.

Second, we analyze the implications of PGL existence for credit. We find that banks that grant a PGL to a firm increase their overall credit exposure to the firm; by contrast, there is a reduction in non-PGL, suggesting a substitution between PGL and non-PGL credit. To tackle the endogeneity decision to grant a PGL, we exploit two complementary sources of exogenous variation in PGL access across firms: (i) firms with versus without access to PGL; and (ii) firms with differential access to PGL.

The first variation we exploit is the exclusion criteria in the PGL program of firms having loans defaulted as of December 2019 not being eligible for the PGL. While firms could access the PGL if they had delinquent loans as of January or February 2020 (before the COVID outbreak in Spain), they could not access the program if they had delinquent loans in December 2019. Reducing the sample to only firms with loans defaulted between December 2019 and February 2020, we find that firms in these two groups (excluded vs. not excluded for the PGL scheme) are very similar in observables, but crucially one group of firms is excluded from PGL, while the other group is eligible for PGL. We find that, different from non-PGL, banks with a higher pre-crisis credit share in a firm's total credit provide more PGL to the firm if the firm has defaulted loans only as of January or February 2020 (as compared to excluded firms with loans defaulted as of December 2019), and these effects are stronger for weaker (riskier) banks. Furthermore, firms with defaulted loans in January or February 2020 only (i.e., PGL eligible firms) experience a relative higher increase in lending during the COVID crisis compared to firms with defaults as of December 2019 (i.e., firms excluded from the PGL

scheme). These lending effects are stronger for weaker (riskier) banks, in terms of NPL ratio. Moreover, we document real effects for those eligible companies. Firms with defaults in the first two months of 2020 and not in December 2019 increase overall credit by 10.8 pp, increase the likelihood of firm survival by 10.9%, and increase corporate investment by 24.3 pp.

As a second source of variation, we exploit firms with differential access to PGL arising from different coverage levels of the public guarantee. For the group of eligible firms, firms have differential access to PGL because the public guaranteed loan amount varies by firm size: the coverage level is 80% of the loan amount for small and medium sized firms versus 70-60% for larger firms. In this case, different from the previous source of exogenous firm variation, firm observables are different across the two groups of firms, and hence, we use a matching estimator when we analyze the implications of PGL. Before using the matching estimator, we find that, different from non-PGL, firms with access to PGL with an 80% guarantee coverage level indeed obtain more PGL than those with a lower coverage level, and banks with a higher pre-crisis credit share in a firm with a possible 80%-coverage PGL provide more PGL to the firm, especially to riskier firms. These effects are stronger for weaker (riskier) banks. Importantly, exploiting variation across similar firms with differential PGL access using the matching estimator, we find that PGL increases lending, especially to riskier firms and by weaker (riskier) banks. Consistent with this variation in exposure to PGL being much smaller than the one previously analyzed, we find weaker real effects: firms with higher coverage levels increase their investment by 12.1 pp more compared to those with lower coverage levels.

***Contribution to the literature.*** Our paper contributes to an emerging literature on the effects and implications of government loan guarantees during the COVID-19 crisis. This literature has found conflicting results, with the effectiveness of guarantee programs in reaching the most vulnerable firms varying across papers. For the United States, several papers have studied the U.S. pay protection program (PPP), which provided SBA-guaranteed loans to businesses to keep workers employed during the crisis. Granja et al. (2020) using loan-level data on PPP loans find that some funds flowed to geographic areas that were less affected by the crisis and that many firms used the funds for other than intended purposes. Using survey

data, Humphries et al. (2020) find that PPP loans accrued more to larger firms instead of the intended vulnerable smaller firms, reducing its effectiveness. Chodorow-Reich et al. (2021) using loan-level data find that smaller firms received PPP loans on less favorable terms. Several other papers have studied credit guarantee schemes in Europe. Altavilla et al. (2022) using the European Anacredit dataset find that public loan guarantees were predominantly extended to smaller firms and led to a substitution of guaranteed for non-guaranteed loans. Core and De Marco (2021) using Italian loan level data find that public guaranteed loans were disproportionately disbursed by larger and more technologically advanced banks.

What sets our paper apart is that we analyze the role of private banks' incentives in the decision to lend via public guaranteed as opposed to non-guaranteed loans. We can do this because, unlike the U.S. PPP and many of the credit schemes in Europe, the Spanish credit guarantee scheme offered only a partial government guarantee, thus leaving skin in the game for the lender. Additionally, the Spanish credit register covers all the business loans in the system, covering both PGL and non-PGL. In terms of bank incentives, we both focus on the role of the ex-ante credit exposure between the bank and each firm and the balance sheet strength of the bank. Moreover, different from the above papers, we exploit exogenous variation in differential PGL access (in terms of guarantee coverage as well as PGL eligibility criteria) to identify the causal effects of PGL on bank lending and real effects.

We provide several novel results. We show that banks' private incentives shape the allocation of public guaranteed loans, resulting in weaker (riskier) banks shifting riskier corporate loans to taxpayers – with banks' incentives depending on the ex-ante share of the bank in each firm and the balance sheet strength of the bank. Moreover, exploiting exogenous variation across very similar firms with different PGL eligibility, we find that PGL increases overall lending and associated corporate real effects.

More generally, our paper contributes to the literature on the role of government interventions in credit markets. In the presence of frictions between borrowers and lenders, government intervention can result in a more efficient allocation of resources, even if the government has no informational advantage over

the lenders (Mankiw, 1986; Philippon and Schnabl, 2013; and Philippon, 2021). The reason is that without government intervention, credit rationing can occur, and government interventions could correct this market failure. Public loan guarantees are an important government intervention tool. Their introduction can reduce the credit rationing that would otherwise occur when firms are hit by a negative shock. Consistent with this view, Bachas et al. (2021) find that more generous loan guarantees under the U.S Small Business Administration (SBA) boost bank lending volumes. Related work has studied the implications of government-sponsored credit by studying the role of government-sponsored enterprises (GSEs) in U.S. mortgage markets.<sup>4</sup> We contribute to this literature by focusing on the role of banks' private incentives in granting publicly guaranteed loans and showing that PGL accrue to more vulnerable firms after a negative exogenous unexpected temporary shock, thus providing evidence of these government interventions supporting credit availability. Importantly, we also contribute by showing that the allocation of partial loan guarantees depends on pre-existing credit exposures at the firm-bank level (especially to riskier firms) and especially by weaker (riskier) banks, consistent with the notion that government support measures interact with private bank incentives.

The literature on government interventions in credit markets has also highlighted how the introduction of government guarantees can, in some cases, distort the allocation of credit in a negative way by inducing excessive risk taking. The reason is that public guarantees, by affecting the valuation of bank investors and making them less subject to the negative consequences of declines in output (Merton, 1977), can increase the risk-taking incentives of banks (Holmström and Tirole, 1997; Hellman et al., 2000; Freixas and Rochet, 2008).<sup>5</sup> We contribute to

<sup>4</sup> Loutskina and Strahan (2009) show that the secondary market activities of GSEs have boosted the securitization of mortgage loans, making mortgage markets more liquid. Elenev et al. (2016) develop a model where guaranteed mortgages are underpriced and enjoy favorable capital requirements to show that an increase in the price of the guarantee would result in fewer but safer mortgages, benefitting financial stability. Similarly, Jeske et al. (2013) develop a model with heterogeneous households to show that a reduction in the interest rate subsidy associated with the government bailout guarantee for GSEs would increase inequality by discouraging home ownership for poor households. Hurst et al. (2016) find that interest rates on mortgage loans securitized by GSEs are insensitive to regional variation in default risk, in contrast to non-GSE loans that are securitized in the private market.

<sup>5</sup> Wilcox and Yasuda (2019) analyze the impact of the introduction of loan guarantees for small business loans in Japan and find that they increase the risk taking of banks. Carletti et al. (2023)

this literature by showing that the allocation of government guaranteed credit is shaped by banks' private incentives, notably pre-existing bank-firm credit exposures and weaker (riskier) banks shifting riskier credit to taxpayers, consistent with the view that these weaker (riskier) banks are more subject to moral hazard issues.

Our paper also relates to the literature on the value of lending relationships. The theoretical models in Sharpe (1990) and Rajan (1992) imply that lending relationships emerge to overcome informational asymmetries, bringing benefits to firms in terms of preferential access to credit, but they can also bring costs in the form of enhanced bargaining power of banks and associated hold-up problems. Berger and Udell (1995) using survey data from the U.S. Small Business Administration find that small firms with longer relationships enjoy more favorable lending terms, while Petersen and Rajan (1994) using the same dataset find that benefits accrue primarily in terms of the quantity as opposed to the price of credit. This literature has also shown that the value of relationship lending becomes pertinent during episodes of financial distress (Bae et al., 2002; Dahiya et al., 2003; Carvalho et al., 2015; Bolton et al., 2016; Schwert, 2017). We contribute to this literature by showing that lending relationships are valuable in securing public loan guarantees during an exogenous economic downturn, especially for riskier and more negatively impacted firms. This effect derives from the credit exposure (share) of the firm to the bank, not from being the main bank of the firm or from the duration of the lending relationship nor from granular exposure for the bank.

The paper continues as follows. Section 2 provides institutional details on the Spanish public guaranteed loan scheme. Section 3 presents a simple model to develop our testable hypotheses. Section 4 describes the data. Section 5 describes the empirical strategy. Section 6 presents the empirical results. Section 7 concludes.

## **2. The Spanish Public Guaranteed Loan Scheme**

The Spanish public guaranteed loan scheme was announced and implemented in mid-March 2020, immediately following the outbreak of COVID-19 in the

show that, in the presence of endogenous deposit runs, public loan guarantees can improve the underwriting standards for well capitalized banks but worsen them for weakly capitalized banks.

country. The government-sponsored program was set in place under the Royal Decree Law 8/2020 of March 17, with the aim to enable firms to draw on the funds needed to deal with the fall-out of the crisis brought about by the sudden emergence of COVID-19.<sup>6</sup> The public guarantee was intended to support the provision of public guaranteed credit up to 100 billion euros. Both companies and self-employed workers could access these guarantees through their banks, either by taking out new loans or by renewing existing ones. The public guarantee covered up to 80% of the amount lent for SMEs and self-employed; and for the rest of the companies, 70%, in the case of new loans, and 60% of the amount lent for the renewal of existing loans.

The PGL cover a broad range of financing needs, including salary payments, vendor invoices pending settlement, rental of premises, and liquidity needs arising from the expiration of financial or tax obligations. Demand for PGL was high from inception of the program, with 75% of all PGL granted between April 2020 and June 2021 (89% in terms of total amount granted). The guarantees are provided by the ICO (Institute of Official Credit) to the banks that grant the funding.<sup>7</sup> In exchange for issuing the government guarantee, the bank pays ICO a fee. Figure 1 offers an overview of the financial commitments and flows of the loan guarantee scheme among the various parties involved.

There are several exclusion criteria for participation in the public guarantee scheme.<sup>8</sup> Loans intended for the restructuring of existing loans, as well as the cancellation or early repayment of pre-existing debts, are excluded from participation in the scheme. In addition, firms that had loans in arrears according to Spanish Credit Register (CIR) as of December 31, 2019, are excluded from these loans. Regarding the loan terms, the maximum eligible amount is 1.5 million euros, the maximum loan maturity is 5 years (subsequently extended to 8 years with the

<sup>6</sup> See “Real Decreto-ley 8/2020, de 17 de marzo, de medidas urgentes extraordinarias para hacer frente al impacto económico y social del COVID-19”, available in Spanish at: <https://www.boe.es/eli/es/rdl/2020/03/17/8/con> and <https://www.boe.es/buscar/pdf/2020/BOE-A-2020-3824-consolidado.pdf>.

<sup>7</sup> ICO is a state-owned bank, with an independent legal status, linked to Spain’s Ministry of Economy. It finances itself on the capital markets. The debt commitments and financial obligations it enters with third parties benefit from the explicit, irrevocable, unconditional and direct guarantee of the Spanish state.

<sup>8</sup> See ICO website for further details on the guarantee scheme: [https://www.ico.es/en-US/web/ico\\_en/ico/press\\_room/press\\_release/the-government-launches-the-guarantee-line-to-guarantee-the-liquidity-of-the-self-employed-and-companies](https://www.ico.es/en-US/web/ico_en/ico/press_room/press_release/the-government-launches-the-guarantee-line-to-guarantee-the-liquidity-of-the-self-employed-and-companies).

Royal Decree 34/2020, 2020; and to 10 with Royal Decree 5/2021) and the debtor's payment grace period is up to 12 months (subsequently extended to 24 months).

The cost of the guarantee amounts to between 20 and 120 basis points of the loan volume and is paid by the lending bank through the payment of a fee to ICO. Moreover, banks commit to maintaining the conditions of the new loans and renewals under the public guaranteed loan scheme at the same level as applied before the COVID-19 crisis. With respect to loan interest rates, banks have an obligation to ensure that the costs of the new loans benefiting from these public guarantees will remain in line with the costs charged before the start of the pandemic. This implies that the interest rate on loans that are renewed cannot be increased even if borrower risk has increased. The lending entities also commit to maintaining, at least until 30 September 2020, the limits of the revolving credit lines granted to all clients and, particularly, to those clients whose loans are guaranteed.

### **3. Hypotheses and Stylized Model**

We provide a stylized theoretical model to explain under which circumstances the introduction of public loan guarantees affects the equilibrium of the loan market and how it does so. We focus on identifying how both bank and firm characteristics, such as the exposure of a bank to a firm, the riskiness of the firm and of the bank affect the granting of PGL. The model generates the empirical prediction that banks prefer to grant guaranteed credit to existing clients to prevent defaults in their existing loan portfolios, as in Bolton et al. (2016). The main effect of public loan guarantees is that they act as a credit enhancement, thus providing an incentive for banks, particularly weaker ones with less skin in the game, to lend to riskier firms (that experienced a larger capital tightening) improving the chances of survival of such firms. We use this simple model to develop testable hypotheses to guide our empirical analysis.

Consider a one period risk neutral economy populated by a firm and two lenders, which we refer to as banks from now on. At date 0, the firm has pre-existing senior zero-coupon debt of face value  $D$ . This debt is held by two different banks where  $0 < x_i < 1$  is the proportion held by bank  $i$ . At date 1, if the firm succeeds, which happens with probability  $p$ , it produces  $R > D$ . When the firm fails it produces 0 and, given limited liability, does not repay its debt.



At an interim date, the firm receives an unexpected liquidity shock due to the pandemic. To continue operations, the firm needs an indivisible junior loan of quantity  $L$ . If such loan is not granted, we assume that the firm fails with probability 1.<sup>9</sup>

#### 4.1 Private market: Existence

We first analyze under which conditions a private market for such liquidity (pandemic) loan would exist. The maximum payment that the bank that grants the loan can receive from the liquidity-pandemic loan is given by the pledgeable income of the firm  $Y=R-D$ .<sup>10</sup> This allows us to determine that a bank will have incentives to grant the loan as long as the expected income that the bank receives from the firm, which includes the expected repayment of previous debt as well as the expected repayment of the liquidity loan, is larger than the loan disbursement.<sup>11</sup>

Bank  $i$  has incentives to grant a (private) loan as long as

$$-L + p[Dx_i + Y] \geq 0,$$

which can be rewritten as  $Dx_i \geq \frac{L}{p} - Y$ .

This condition states that a non-PGL (private loan) is more probable to exist the higher the exposure of bank  $i$  to the firm,  $x_i$ . Such condition is more probable to hold when  $p$  is larger (safer firms) and  $Y$  is larger. This states that the private market is more prone to exist for safer firms and those that have higher expected returns. On the other hand, when the firm is riskier and has lower expected returns (for instance, because it is more negatively affected by the pandemic), it is more

<sup>9</sup> While the assumption of the loan being indivisible is made for simplicity, this assumption could be micro founded by assuming that the loan has some costs of observing the liquidity need that each bank must bear.

<sup>10</sup>  $Y$  could be lower if we assume that the firm has some moral hazard problem at the firm level that limits full pledgeability of returns as in Holmström and Tirole (1997). This can be a relevant aspect to determine the overall social value of a granted loan as if  $Y$  would not be fully pledgeable, positive NPV loans would not be granted in absence of a PGL.

<sup>11</sup> The exact pricing of the loan is going to depend on whether both banks have incentives to grant a loan or not and the bargaining power between the loan and firm. For now, we assume that the bank can extract all of the pledgeable income of the firm  $Y$ . Moreover, in this formulation, we implicitly assume that the bank assumes that if it does not grant the loan the other bank would not grant it either, i.e. that the firm can only approach one bank. In Appendix B, we extend this basic setup to incorporate the strategic decision of banks, i.e., that firms can approach all banks, and show that the main conclusions do not vary.

probable that the bank does not have an incentive to extend the loan. In such case the private market would not exist, resulting in the failure of the firm.

#### 4.2 Public guaranteed loans: Existence

We now turn to analyze how loan granting decisions are affected by the introduction of a public guaranteed loan scheme, which is a key aspect of our paper. We assume that the government introduces the possibility of banks granting PGL. In a PGL, by paying a fee  $F$  to the government the government repays a fraction  $0 < g < 1$  of the granted amount  $L$  to the bank if the loan defaults.

A bank would grant a PGL when doing so results in higher profits than granting a non-PGL, and at the same time the PGL has a positive NPV for the bank. These two conditions can be expressed as

$$-L + p[Dx_i + Y] - F + (1 - p)gL \geq -L + p[Dx_i + Y] \text{ and}$$

$$-L + p[Dx_i + Y] - F + (1 - p)gL \geq 0$$

The first condition, which states that granting a PGL is preferred to granting a non-PGL, can be rewritten as:

$$-F + (1 - p)gL \geq 0.$$

Such condition states that the PGL would be granted instead of the non-PGL, whenever the value of the guarantee is positive. Rearranging, this occurs when

$$p \leq 1 - \frac{F}{gL}$$

which states that a PGL is only going to be granted for a sufficiently risky firm.<sup>12</sup> The main intuition is that the riskier the firm the larger the value of the guarantee the government provides making paying the fee more probable. This condition also suggests that banks more subject to moral hazard problems resulting in lower probability of loan success (for example because of lower incentives to monitor) are more prone to grant a PGL. We analyze this point in more detail in the next subsection.

<sup>12</sup> The second condition (the PGL has a positive NPV for the bank) imposes a limit to the riskiness of such firm, i.e., a firm with probability of success tending to 0 would never receive a PGL. That is, given  $F$ , PGL are valuable to recover the existing debt  $D$ .

At this point, it is relevant to note that there are two different cases in which the PGL is granted. The first one is a situation in which the non-PGL would also have existed, which is the case when the following condition holds

$$-L + p[Dx_i + Y] - F + (1 - p)gL \geq -L + p[Dx_i + Y] \geq 0.$$

In such case, the PGL would only be substituting the private market of credit and the exposure bank  $i$  to the firm,  $x_i$  is not a main determinant for granting it. However, there is a second case in which the PGL has a positive NPV for the bank but the non-PGL does not. This occurs when the following condition holds

$$-L + p[Dx_i + Y] - F + (1 - p)gL \geq 0 \geq -L + p[Dx_i + Y].$$

In such case, the inclusion of the PGL has the positive effect of allowing a loan to be granted when the private market was not operating. These are the circumstances in which PGL have a positive effect on overall amount of credit at the firm level. In these cases, granting a PGL has both a positive effect on overall credit and on firm survival. From now on we focus on this later case as the main objective of the PGL scheme in Spain was to support overall lending.

#### *4.3 Public guaranteed loans: Comparative statics*

We now turn to developing our main testable hypotheses by analyzing which bank and firm characteristics make a PGL more probable to be granted. We focus on understanding the effects of bank exposure,  $x$ , firm's riskiness,  $p$ , and, in the following subsection, the risk of the bank. Under the previous condition, i.e., that the PGL scheme expands credit, the relevant condition that determines if a PGL is granted is that it has a positive NPV for the bank

$$-L + p[Dx_i + Y] - F + (1 - p)gL \geq 0,$$

which allows us to determine that a bank would have incentives to grant a PGL as long as

$$Dx_i \geq \frac{[1 - (1 - p)g]L + F}{p} - Y.$$

This expression highlights how granting a PGL is more probable the higher the exposure bank  $i$  to the firm,  $x_i$ .<sup>13</sup>

More specifically, we can define

$$D\bar{x} = \frac{[1 - (1 - p)g]L + F}{p} - Y$$

as the minimum exposure that a bank has to have with a firm in order to have incentives to grant a PGL. This determines that, only banks with high enough exposure to a firm have incentives to grant a PGL.<sup>14</sup> From this follows our first testable hypothesis:

*Hypothesis 1: The probability of granting a guaranteed loan is increasing in the ex-ante loan exposure of the firm to the bank.*

By analyzing how the exposure threshold,  $\bar{x}$ , varies with  $p$ , we can determine when the exposure of a bank is a key determinant in granting a PGL. Note that the larger the  $\bar{x}$ , the lower the range of  $x$  such that both banks have incentives to grant the loan, and also the lower the range of  $x$  such that the bank with the larger exposure has incentives to grant a loan. Specifically, we find that

$$\frac{d\bar{x}}{dp} = \frac{gLpD - D[1 - (1 - p)g]L - F}{p^2D^2} < 0.$$

Hence, the safer the firm the lower the necessary threshold for a bank to grant the PGL. In other words, the exposure of a given bank  $x$  is more determinant to grant a PGL the riskier the firm.

<sup>13</sup> As previously shown, when the PGL do not expand the loan market, then the only relevant determinant of granting a PGL versus a non-PGL is the value of the guarantee, which is independent of the exposure of the bank.

<sup>14</sup> Whenever  $\bar{x} = ([1 - (1 - p)g]L + F) / pD - Y / D < 0.5$ , there would be circumstances in which both banks have incentives to grant the PGL. Those circumstances are the ones in which the bank with the lowest exposure  $x_l$  has  $0.5 > x_l > \bar{x}$ . For those cases we could assume that bank grants the loan either in a purely random manner or in proportion to the ex-ante weights (as they might capture some hidden costs). Irrespective of the underlying assumption, in such cases the holding of a given bank  $x$  would not be as crucial a determinant in the granting the PGL, as both banks have incentives to grant a loan, as when only one of the banks has incentives to grant the loan  $x_l < \bar{x} < x_h = 1 - x_l$ .

Similarly, we can obtain how a decrease in the firm's pledgeable income  $Y$ , which can capture if the firm belongs to a sector that is more affected by the pandemic, makes the exposure threshold increase. Specifically, we can obtain that

$$\frac{d\bar{x}}{dY} = -\frac{1}{D} < 0.$$

Hence, the lower the pledgeable income of the firm, the higher the exposure needed to grant a PGL. This leads to the next hypothesis:

*Hypothesis 2: The positive effect of the ex-ante bank-firm loan exposure on the granting of guaranteed loans is stronger the riskier (or more affected by the pandemic) the firm is.*

One further aspect that we analyze in our empirical setup is the relevance of banks non-performing loan (NPL) ratio at the onset of the crisis. The overall effect of this variable is not clear cut. On the one hand, banks with higher NPL ratios are more prone to end in failure giving them incentives to risk-shift. This would lead banks to have incentives to forgo paying of the fee and take a gambling for resurrection strategy by lending in the private market. On the other hand, banks with higher NPL ratios would have less incentives to properly monitor their loans making the value of the guarantee higher and inducing them to grant through the PGL system. Therefore, we conclude that the effect of NPL on the granting of PGL and non-PGL is ambiguous from a theoretical point of view and can only be answered empirically.

#### **4. Data**

We combine four different data sources: (i) the Spanish Credit Register (CIR), (ii) loan application data of firms to non-current banks, (iii) supervisory bank balance sheet information, and (iv) firm balance-sheet information from the Spanish Mercantile Registers collected by the Banco de España.

Our main database comes from the credit register owned by Banco de España which contains granular information at loan level since 1984 and at a monthly frequency of all type of loans, firms and banks operating in Spain. The CIR is a comprehensive database with a very low threshold (almost 0, which makes it a census) that includes information of the loan such as the type of instrument, amount

(drawn and undrawn), degree of collateralization, maturity, currency, interest rate, grace period, default status. From the CIR we can construct exhaustive information on the credit exposure of all firms with all of their banks. This is particularly relevant as one of our main variables of interest is the share of total credit outstanding that the firm has with a bank just before the eruption of the COVID-19 pandemic and its evolution over time. The CIR also provides some information about the borrower such as its identity, industry (at NACE 3 digits), location (at zip-code level) and size. In terms of the lender, the CIR has information on the bank identity. These firm and bank identifiers allow us to match each loan to firm and bank characteristics from the Spanish Mercantile Register and supervisory bank balance sheet information.

Important for our purposes, the CIR has detailed information on any loan guarantees, and in particular on whether the loan has an ICO guarantee as part of the Spanish (COVID) pandemic loan guarantee program. This information is a clear advantage of the Spanish credit register as we use it to construct an indicator variable for whether the loan has an ICO guarantee or not. For example, the European credit register Anacredit does not have this information (it has just public guarantees but not specific to individual programs such as the pandemic one).

We also exploit information on loan applications from the CIR. At monthly frequency, a bank receives automatically from the Banco de España information about their current borrowers' exposure. Additionally, banks can request this information from the Banco de España for their potential borrowers with their consent (Jiménez et al. 2012; Jiménez et al. 2014). We take such individual requests from banks on potential borrowers as a clear indication that, in general, the firm is searching for a loan and that, specifically, it has asked the bank for a loan. This information is stored monthly by the Banco de España since 2002. We use this information on loan applications, joint with granted loans, to capture firms that have actively sought funding during the pandemic.

The economic and financial information of firms is collected from the balance sheets and income statements that Spanish firms must submit yearly to the Spanish Mercantile Register. We use the unique firm identifier (CIF) to merge this information with the credit registry. We also have information at bank level of the

balance sheets and income statements that banks are required to report monthly to the Banco de España in its role as banking supervisor. We merge this information using the bank identifier which is in both databases.

We restrict our analysis to non-financial corporations and the sample period to 2019:12-2021:06,<sup>15</sup> so that we contrast the evolution of lending immediately before and after the introduction of the Spanish loan guarantee scheme in March 2020. We exclude from the (main) sample firms that are not eligible for participation in the ICO guarantee scheme, because they had loans in arrears as of December 31, 2019. We use these latter set of loans for identification purposes in a regression as explained in the Introduction and in the following sections.

## 5. Empirical Strategy

We perform alternative empirical analyses to test the hypotheses developed in section 3 and provide answers to the following two sets of questions:

(i) Which firms/banks are more likely to participate in the public loan guarantee scheme as opposed to non-PGL? Does larger ex-ante loan bank-firm exposure affect differently PGL vs non-PGL, and do effects change for riskier firms and banks? Exploiting borrower (or borrower\*lender) fixed effects and loan volume vs. interest rates, are results consistent with a borrower (credit demand) or with a lender (supply) channel?

(ii) What are the implications of PGL for lending and real effects to firms? Are there substitution between PGL and non-PGL loans?

To answer the first set of questions, we construct a dataset at the firm-bank level to capture firms that have actively sought funding during this time period. We first identify all firm-bank pairs in the CIR in terms of new financing transactions granted, as well as loan applications made to non-current banks, between March (the time of the COVID shock) and December 2020. Then, for those firms identified in the previous step we also consider all bank-firm relationships as of December 2019, to account for the possibility that if a company seeks a loan, it will likely try

<sup>15</sup> We have decided to stop in June 2021 mainly because the majority of ICO loans were granted until that date (89% in terms of total amount granted) and also because in mid-2021 a new Royal Decree allowed extending the maximum term of operations to a maximum of 10 years, which drastically changed the comparative.

the banks with which it has a prior relationship. We pool the observations at the firm-bank level for the considered period. This allows us to include firm and bank fixed effects to account for unobservables in some specifications. This database includes 128 banks and around 200,000 firms, and results in 718,000 (firm-bank) observations. With this database we investigate what firm, bank and firm-bank characteristics make a company more likely to get a PGL from a bank between March and December 2020.

We first consider the following regression specification to analyze the extensive margin estimated by OLS as a linear probability model:

$$PGL_{ij} = \beta_0 Share_{ij} + \beta_1 Firm_i + \beta_2 Bank_j + \beta_3 Firm-Bank_{ij} + \eta_i + \eta_j + \varepsilon_{ij} \quad (1)$$

where  $PGL_{ij}$  is an indicator variable denoting whether the firm has a public guaranteed loan with the bank or not,  $i$  refers to firms and  $j$  refers to banks. We are interested in the coefficient on the  $Share_{ij}$  variable, which captures the share of the firm with the bank in terms of the amount of the firm's total credit as of December 2019. This variable allows us to understand whether, in line with hypothesis 1, prior lending relationships are a key driver to obtain a PGL. Share is predetermined to the COVID shock.

We are also interested on whether firm and bank risk characteristics are associated to PGL.  $Firm_i$  is a vector of firm variables that include firm ex-ante credit risk (captured by a scoring measure with higher values implying higher risk),<sup>16</sup> and the size of the firm (proxied by a SMEs dummy).<sup>17</sup>  $Bank_j$  refers to a set of bank variables that includes the NPL ratio (defined as the ratio of non-performing loans,

<sup>16</sup> The scoring function synthesizes a battery of firm financial and non-financial ratios in a sufficient statistic of the solvency of a firm. It is based on 19 firm variables such as debt-term structure; average cost of debt; capital ratio, ROE, ROA and sales' profitability; industry (which also takes into account whether the firm belong to more severely affected sectors by the COVID-19 crisis, defined as those whose turnover decreased by more than 15% in 2020); age; bank loan defaults, etc. Each of the firms' variables is assigned to a specific area: financial indebtedness, solvency, liquidity, profitability, business information, and default history. Moreover, each variable is categorized in six intervals and a different rating value is assigned depending on the allocation to each of the buckets. Then, each rating value is weighted inside its corresponding area, and each of the six areas is again weighted to get the final score, which is the weighted sum of the ratings assigned to the different characteristics. The computed score is increasing in the firm's credit risk. Results are robust to using a score that does not take into account sectors more affected by the pandemic and including this risk as a separate regressor and also in interactions.

<sup>17</sup> Based on the definition of the Commission Regulation (EU) No. 651/2014, of June 17, 2014.



doubtful and 90 days overdue, over total loans of the bank), bank capital ratio (defined as the ratio of own funds over total assets), its liquidity position (defined as the ratio of liquid assets over total assets), ROA and the size of the bank (defined as the log of total assets). In some specifications we also control for firm ( $\eta_i$ ) and bank ( $\eta_j$ ) fixed effects that account for observable and unobservable time-invariant firm and bank factors. Finally,  $\varepsilon_{ij}$  is the error term. All firm and bank explanatory variables are measured as of December 2019, before the unexpected COVID shock. Standard errors are multi-clustered at the firm and bank level to allow for serial correlation across firms and banks.

To analyze differences in the likelihood to obtain non-PGL, we run the same exercise but replacing the dependent variable by one capturing whether the firm only obtained a non-PGL during the sample period. In the Appendix, we also check the stability of the results conditioning on banks that granted a loan (PGL or not) to a firm. We distinguish between three types of firm-bank pairs: those with a PGL, those with a non-PGL, or those without any credit during our COVID sample period. We can perform this analysis because our dataset is compiled by associating banks to firms with loan applications during the COVID period, with information on credit granted in the COVID period and on previous bank-firm lending exposures. Therefore, effectively we have the pool of potential lenders for each firm that have positive credit before COVID as of December 2019.

We are also interested in analyzing whether the effect of the loan share variable (proxying for bank incentives) on the likelihood to obtain a PGL is more pronounced for ex-ante riskier firms and/or banks as stated in our hypotheses 2. To capture this possibility, we estimate a model where we include double and triple interactions terms of the *Share* variable with the firm risk scoring variable and the bank NPL ratio. The enriched regression specification is as follows:

$$PGL_{ij} = \beta_0 Share_{ij} + \beta_1 Share_{ij} * Risk_i + \beta_2 Share_{ij} * Risk_i * Bank\ NPL_j + Controls_{ij} + \eta_i + \eta_j + \varepsilon_{ij} \quad (2)$$

where  $Controls_{ij}$  is a vector of variables that contains the rest of the interactive terms of lower degree not showed and not absorbed by the fixed effects. Moreover, it also includes triple interactions of the other bank controls (including always lower degree terms) to mitigate concerns about omitted variables. With this specification

we can evaluate whether, as pre-COVID share increases, weaker banks lend more to riskier firms after the COVID shock using PGL. If this were the case, following hypotheses 1 and 2, we would expect the estimated betas to be all positive and statistically significant.<sup>18</sup>

Table 1 presents summary statistics of the main regression variables. Just over a third of the observations (37.8%) have a PGL during the analyzed period, while 28.7% of all firm-bank pairs only have non-PGL, which highlights the relevance of both the guaranteed and nonguaranteed (private) credit market during this period. A total of 95% of all observations correspond to small and medium-size firms (SMEs). The average value of the *Share* variable is 26.7% and its median is 13.6%. Appendix Table A1 presents the definition of the main regression variables.

Turning to the analysis of the lending terms of granted loans, i.e., the amount granted or the loan interest rate applied, we construct a database of new loans granted from 2020:03 to 2020:12. For every firm and bank we collapse all new loans in two types: PGL and non-PGL. As a result, we obtain a database at the firm-bank-type of loan level. This dataset has more than 620,000 observations and allows us to control for firm or firm\*bank fixed effects. Using this data, we estimate the following equation:

$$\begin{aligned} Loan\ conditions_{ijk} = & \beta_0 PGL_{ijk} + \beta_1 PGL_{ijk} * Share_{ij} * Risk_i * Bank\ NPL_j + \\ & + Controls_{ijk} + \eta_{ij} + \varepsilon_{ijk} \quad (3) \end{aligned}$$

where  $k$  refers to the loan type and PGL is a dummy that equals 1 for public guaranteed loans, and 0 for private (non-PGL) loans and  $Controls_{ijk}$  is a vector of variables that contains the rest of the interactive terms of lower degree not showed

<sup>18</sup> In the Appendix, we show some robustness exercises on the share and risk variables. First, in addition to including the share variable we use a dummy variable that captures whether the bank is the main lender of the firm as of December 2019 to show that the *Share* variable is not just capturing main bank. Second, we replace the risk variable with the bad credit history of the firm before December 2019 (note that mechanically a firm with defaults as of December 2019 cannot get PGL). We also study if the results are robust to focusing on high-risk firms, defined as those in the highest decile of the distribution of the risk variable. Finally, it is possible that the results were affected by some seasonal effects that occurred on a recurring basis after March. We therefore analyze the likelihood of getting a new credit in 2019 for different treatment periods, as a falsification test. In addition, not only do we analyze the exposure of a bank to a given firm just before the negative unexpected shock, but also from the (long) time since the bank started lending to the firm for the first time. Further, we also analyze the importance that firms that have significant (granular) lending exposures to a bank have in obtaining private non-public guaranteed loans as compared to PGL.

and not absorbed by the fixed effects. The previous equation is the most saturated one due to the inclusion of firm-bank fixed effects ( $\eta_{ij}$ ). In the tables we also show the estimation results of similar models that includes only bank and firm fixed effects. In Eq. (3) the coefficient on PGL is capturing the differential effect on the committed amount or the interest rate charged of the granted loan being a PGL, while the interaction captures whether the effects depend on share, firm risk, and bank risk. In this way we can analyze whether our results on equation (1) and (2) are more consistent with a credit supply (bank-driven) rather than demand (borrower-driven) channel. For the analysis of the loan amount granted, Eq. (3) is estimated using a Poisson model to reduce possible biases arising from a classical log linear estimation (see Santos Silva and Tenreyro, 2006). When the left-hand-side variable is the interest rate, Eq. (3) is estimated by OLS. As before standard errors are clustered at the firm and bank level. Table 1 also provides the descriptive statistics of these dependent variables. The loan amount has an average value of 129,649 euros with a median of around 60,000 euros. The average new loan has an interest rate of 3.3%.

For the second question, we analyze the effects of PGL on credit availability, including firm-level credit availability and real effects as well as bank-firm overall credit and credit substitution from non-PGL to PGL. To estimate these effects, we analyze the evolution of outstanding credit between two dates (2019:12 and 2021:06), an event (the COVID-19 pandemic that started in March 2020), and whether a PGL has been granted.

As PGL is endogenous, for identification we use two alternative features of the public policy on PGL that introduced exogenous variation: (i) whether the firm is eligible or not to get a PGL; and (ii) differential access to the program in terms of their degree of public coverage (for those firms which were eligible). Companies with loans in default as of December 2019 were excluded from the program, while those companies with loans in default between January and February 2020 (just before the start of the program) but not before (December 2019) could instead participate. Note that the COVID shock came to Spain in March 2020, and the PGL program started in April. Additionally, under the PGL program, the public guarantee for loans to SMEs was 80%, while it was lower (70 or 60%) for larger firms.

Importantly, we find that the group of eligible and non-eligible firms are very similar in observables (for the sample of firms with loans defaulted as of December 2019 and firms with loans defaulted in January or February 2020). Table A5 Panel A shows the results of a mean test comparing firms with loans in arrears in December 2019 with those firms without delinquent loans in December 2019 but with delinquent loans in January or February 2020. The table reports the normalized difference test proposed by Imbens and Wooldridge (2009), for which Imbens and Rubin (2015) suggested a heuristic threshold of 0.25 in absolute value. The results show that both group of firms have all the firm characteristics not different, but one group of firms cannot access the PGL (excluded) while the other group can access PGL (eligible).<sup>19</sup> Differently, when we use the difference in the public guaranteed loan coverage of the PGL program (80% vs below), firm observables are obviously different across the two groups of firms (as the cutoff across the public coverage is based on firm size), and hence we use a matching estimator when we analyze the implications of PGL. In this case, Table A5 Panel B shows no difference for the group of firms with public coverage of 80% vs lower.

We estimate by OLS the following model on firm-bank level credit outcomes that exploit PGL eligibility at the firm level:

$$\Delta y_{ij} = \beta \text{Eligible}_i + \eta_i + \eta_j + \varepsilon_{ij} \quad (4)$$

And for firm level credit and real effects outcomes:

$$\Delta y_i = \beta \text{Eligible}_i + \text{Firm Controls}_i + \text{Main bank}_i + \varepsilon_i \quad (5)$$

Where  $y_{ij}$  refers to the symmetric change in credit (total and non-PGL) or the change in the share between the firm and the bank for the periods 2019:12 and 2021:06, and where  $y_i$  refers to the firm-level change in credit from 2019:12 to 2021:06, firm investment over 2019:12 and 2020:12 or firm survival as of 2020:12.

Our key variable on the right side (*Eligible*) is a dummy variable that captures whether the firm is eligible (or not) to participate in the PGL program to address PGL endogeneity. Specifically, for the first strategy, loans in default are

<sup>19</sup> We also compare firms defaulted in January or February 2020 and not before with those firms with loans in arrears in December or November of 2019 and not before. The results hold but the number of observations fall by 70%.

considered eligible in January or February 2020 and not before (versus loans defaulted as of December 2019), while for the second strategy, for firms with access to PGL, if the coverage of the public guarantee is 80% (versus less). In some specifications we instead use PGL as the right-hand side variable and we instrument PGL with the *Eligible* variable or alternatively with 80% or lower public guarantee. Our more saturated specification for the bank-firm specification includes local area\*industry fixed effects or firm fixed effects,  $\eta_i$ , and bank fixed effects,  $\eta_j$ , and standard errors are multi-clustered at firm and bank level. For the firm-level outcomes, our specification includes a set of firm characteristics (industry and local area fixed effects) and main bank fixed effects, and standard errors are clustered at firm and main bank level.

## 6. Results

This section provides the results of our analysis. We first document in section 6.1 which determinants are driving the allocation of public guaranteed loans. Second, we document in section 6.2 the effects of such allocation of public guaranteed loans in terms of total credit, credit substitution between publicly guaranteed and non-publicly guaranteed credit, and firm real effects.

### *6.1 Allocation of credit: Loan granting decision*

The results on the analysis of the determinants of obtaining a PGL are presented in columns (1) to (5) of Table 2. The analysis is conducted at the firm-bank level. Regressions include an increasingly richer set of fixed effects as one moves across the table columns, with column (5) including firm and bank fixed effects. We keep the sample fixed to avoid compositional effects, which has the drawback of ruling out firms that have only one banking relationship. Column (1) of Table A6 in the Appendix shows that results are the same when these firms are included, increasing the sample size by 20%.

We find that PGL are more likely to be granted to risky firms (based on ex-ante credit risk scoring) and SMEs. This indicates that, as suggested by our theoretical framework, there is an association between PGL extension and firms' risk (hypothesis 2). In terms of bank-firm characteristics, we find that PGL are more

likely to be extended by banks to firms with a higher ex-ante loan share with the bank (hypothesis 1). Moreover, we find that PGL are more likely to be extended by banks with higher NPL ratios, banks with lower capital ratios and with lower return on assets (ROA), and also by larger banks.

The likelihood of getting a PGL increases by 29.1% for SMEs, by 19.6% for riskier firms (for an interquartile range of this variable) and by 10.4% for weaker banks (again for an interquartile range of the NPL ratio). The remainder of Table 2 presents results for non-PGL. Importantly for non-PGL, the firm and bank variables have the opposite sign (and statistically significant) than for PGL. Column (3) of Table A6 in the Appendix shows that results are the same when we include firms without multiple firm-bank relationships.

We also find that the *Share* variable obtains a much smaller coefficient when analyzing non-PGL(0.03) than when analyzing PGL (0.22) (based on columns (10) and (5) respectively). Quantitatively, an interquartile range increase in the firm's prior share of credit outstanding with the bank increases the probability of obtaining a PGL by 24.4% ( $0.216 \cdot (0.429 - 0.003) / 0.378 \cdot 100$ ), compared with 4.0% for non-PGL ( $0.027 \cdot (.429 - .003) / 0.287 \cdot 100$ ).<sup>20</sup> This highlights that while, as our model suggests, *Share* is a relevant determinant of granting non-PGL credit, it is much more so for public credit. It is important to highlight that, while the share of the firm's total credit outstanding with the bank before the COVID-19 is plausibly endogenous to bank-firm (un)observables, it is exogenous to the COVID-19 shock. Moreover, as Table 2 shows, when we control for firm and bank observables as well as firm and bank fixed effects (capturing unobservables), the estimated coefficient on *Share* does not decrease while the R2 dramatically increase, hence the Oster (2017) test (following Altonji et al., 2005) suggests that results are robust to self-selection and omitted variables problems.

In Table 3, we estimate heterogeneous effects of the *Share* variable depending on pre-determined bank and firm risk characteristics based on the more demanding specification with firm and bank fixed effects. The heterogeneous results for the

<sup>20</sup> Results presented thus far also include loan applications that did not result in the granting of loans. We obtain similar results when limiting the sample by conditioning only on granted loans, presented in Appendix Table A2, Panel A. These estimates show the differential effects between granted PGL and non-PGL and highlight the different loan granting strategies followed in PGL and non-PGL conditional on a loan being granted.

granting of PGL indicate that the positive effects of the *Share* variable are larger for riskier firms as well as for banks with higher NPL ratios. The regressions for non-PGL obtain much smaller effects of the *Share* variable and the opposite sign for its interaction with risky firms and banks.<sup>21</sup> The economic effects of the results in Table 3 are also important. The heterogeneous effects estimated in Table 3 imply that the probability of obtaining a PGL increases by 32% for a higher interquartile range for share and risky variable, and by 34.7% when, additionally, the bank is weak (for an interquartile range increase of the NPL ratio of the bank).

In addition to fixed effects and controls shown in Table 3, results are robust to other permutations. For example, as before, the differential effects for granted loans are presented in Appendix Table A2, Panel B, with similar results. Results in Appendix Table A3 show that the results so far are robust to alternative measures of the exposure of a firm with a bank (the *Share* variable) and to how we measure firm risk. In Panel A, we replace the *Share* variable with a main bank dummy, which equals 1 if the bank was the main lender of the firm in 2019:12 (in terms of total amount of credit committed) and 0 otherwise. Panel B horse races the *Share* variable and the main bank dummy showing that our results on *Share* are over and above the bank being the firm's primary lender (i.e., results are not purely driven by the main bank of the firm). Panel C replaces the risk variable by its highest decile (denoted High risk). In each of these cases we obtain qualitatively similar results as in our baseline specification.

In Appendix Table A4, we perform a falsification test to make sure that the effect of the *Share* variable is specific to PGL and derives from the pandemic period, and not to possible seasonal effects. Specifically, this table reports regression results of a linear probability model at firm-bank level of the probability of a firm to get a loan (of any type, being publicly guaranteed or not). We consider different time periods to address concerns that the effect of the *Share* variable analyzed in the period 2020:03-2020:12 may be picking up seasonal effects other than the COVID-19 pandemic. Post is a dummy that equals 1 for the months after the reference date until December of that year. We find that there is no significantly different effect of the *Share* variable on the likelihood of receiving a loan between

<sup>21</sup> Columns (2) and (4) from Table A6 in the Appendix show that we get similar results when firms without multiple firm-bank relationships are included.

periods before COVID-19 suggesting the inexistence of relevant seasonal effects (note that these loans prior to COVID are private loans or public guaranteed loans but not due to COVID).

Next, we consider two alternative dimensions of lending relationships: granularity and duration of lending relationships. A substantial amount of credit risk of banks tends to be concentrated among few firms, consistent with the notion of granularity developed by Gabaix (2011). Moreover, durable lending relationships may produce valuable informational advantages for banks, as in Bolton et al. (2016). We want to understand whether our main results on lending exposures, as captured by the *Share* variable, are robust to controlling for these alternative lending relationship considerations. To capture the granularity of the lending relationship between the bank and the firm, we use the ratio between the total amount of loans of the firm with the bank over the total assets of the bank as of 2019:12, and to capture the duration of the lending relationship between the bank and the firm, we use the log of one plus the number of months since the first lending relationship with the bank since 1999:12. The results are presented in Table 4. We find that our main results on the *Share* variable are robust to controlling for the concentration of the bank's credit risk in the firm (Panel A) and for the duration of lending relationships between the bank and the firm (Panel B). Moreover, we find that for important firms for the bank (the granularity measure), interestingly, the bank lends equally with PGL as compared to non-PGL.

In Table 5, we estimate the implications of the public guaranteed loan scheme for the loan amount (Panel A) and the interest charged (Panel B) of granted loans. The analysis is conducted at the firm-type of loan-bank level (where types are PGL and non-PGL). This specification allows us to include firm\*bank fixed effects and effectively compare different type of loans granted to the same firm by the same bank (columns (3) to (6)), however we also show that results are also present when only firm and bank fixed effects are included which compares loans of the same firm with different banks (columns (1) and (2)).

In Panel A we find that PGL are on average larger in magnitude, 46% higher than non-PGL (column (3)), and that the *Share* variable has a positive effect on the loan amount (column (1)). We also observe that the amount granted for PGL is even



higher among firms with higher ex-ante credit dependency with the bank (i.e., with higher *Share*), and specially for riskier firms and when the bank is weaker (has a higher NPL).

We also estimate the effect on the loan interest rate in Panel B. We find that PGL also tend to have lower interest rates than non-PGL (2.3 pp on average). We also find that a higher *Share* reduces the loan interest rate and, interestingly, that the effect on *PGL* is amplified for higher levels of *Share*. Interest rates of PGL further decreases if the firm's credit share with the bank is high and for riskier firms working with weaker (riskier) banks.

These opposite volume and pricing results are therefore not consistent with a borrower (demand)-driven channel, but instead are consistent with a credit supply(lender)-driven channel. Moreover, these results control for firm fixed effects, or firm-bank fixed effects, and thus for unobserved borrower (and borrower-lender) fundamentals. Altogether, all these results suggest that a credit supply mechanism at play.

#### *6.2 Overall credit and substitution of non-PGL credit; real effects. Eligibility criteria of the public guarantee program as a source of exogeneity*

We turn to analyze whether the granting of PGL results in a change in overall credit exposures between bank-firm pairs and in a substitution of non-PGL credit by PGL credit, as well as in firm-level overall credit availability and real effects. Since this analysis is potentially contaminated by the endogeneity of the decision to grant a PGL, to push on the causality front of PGL on lending and improve our identification, in this section we analyze a feature of the public policy on PGL that introduced exogenous variation in whether the firm can obtain a PGL or not. The prerequisite for companies to be eligible for the program, already mentioned in Section 2 (data) and 5 (empirical strategy), is not to be registered as delinquent in the CIR (credit register) as of December 31, 2019.

Regarding the loan impairment status of the firm, we select those firms with loans in arrears between December 2019 and February 2020. We compare firms with defaulted loans only in January or February 2020 (eligible for PGL) versus firms with defaulted loans in December 2019 (excluded from PGL). With this empirical strategy we obtain two sets of firms in a very similar financial situation

just before the COVID pandemic (see Section 5 and balance Table A5),<sup>22</sup> but with completely different access to PGL: firms with defaults in December 2019, which are excluded of the program as they are ineligible, and those with defaults only between January and February 2020 and not in December 2019 that are eligible for the PGL program. We use this stark discontinuity to test whether the change in total bank credit between December 2019 and June 2021 is larger for the set of firms eligible for the program and if there is a substitution between PGL and non-PGL credit. We also analyze associated real effects due to the PGL program.

Table 6 Panel A analyzes the granting decision, in line with our analysis in Table 2, using the above sample of firms. The first three columns show that having some defaulted loans in the first two months of 2020 and not in December 2019 is a relevant determinant of whether the firm gets a PGL. In line with our previous results, we find that this effect is stronger when the share with the bank is higher (column (4)) and more so for weaker (riskier) banks (column (5)). Instead, columns (6) to (10) show that these effects are insignificant for non-PGL. These results confirm the relevance of our previous estimations in Section 6.1 for the subsample of firms used in this section.

Table 6 Panel B studies the credit substitution for this sample of firms at the bank-firm level as well as firm-level credit availability and real effects. For the bank-firm analysis, in columns (1) to (10) we analyze the change in total and non-PGL credit between December 2019 and June 2021, whereas in column (11) we focus on the change in the share with the bank.<sup>23</sup> Our most saturated specification, in column (4), which includes bank fixed effects, industry\*zip code fixed effects as well as firm and bank controls, shows that the change in total credit is 6.7 pp higher for firms with delinquencies between January and February 2020 and not before, compared with the firms that had arrears as of December 2019.<sup>24</sup> Moreover, in

<sup>22</sup> Table A5 Panel A in the Appendix illustrates the differences between the two set of firms for firm observable characteristics. The table shows that the differences are not statistically significant, meaning that both set of firms are very similar on observables, including the bank's lending to the two groups of firms.

<sup>23</sup> We start with bank-firm level data as we can then analyze interactions with bank variables (NPL), while this would not be possible with firm-level data.

<sup>24</sup> We do not include firm fixed effects in the baseline specification because the unobserved heterogeneity would absorb our main variable. Note that as we control for firm and bank observables as well as bank fixed effects (capturing unobservables), the main estimated coefficient is stable while the R2 jumps massively, the Oster (2017)'test (following Altonji et al., 2005)) suggests that results are robust to self-selection and omitted variables problems.

column (5) we instrument the dummy of whether the firms has a PGL or not with the PGL eligibility (based on the differential delinquent situation of the firm) and we observe that the first stage has a F-test of 34.57, indicating that the instrument is relevant, and having a PGL increases the total credit with the bank by 49.4 pp. Columns (9) and (10) show that the difference is stronger for banks with higher NPL ratio (8.4 pp more for an interquartile range increase).<sup>25</sup> Finally, in column (11) we find similar effects for the change in the firm's credit share. We also analyze the change in non-PGL in columns (6) to (8) and find that, non-PGL credit is reduced for these firms.

Columns (12) to (15) show that there are effects at firm level beyond the effects at the firm-bank level. In columns (12) and (13) we show that PGL eligible firms increase total loans by 10.8 pp, this effect is completely due to PGL as these firms decrease non-PGL loans by 9.6 pp. Moreover, in column (14) we analyze if this increase in credit availability, due to PGL access, has an impact on the likelihood of firms' survival of eligible firms. We observe that this is the case. Eligible firms compared to non-eligible firms increase the probability of firm's survival during 2020 by 10.9%. Finally, in column (15) we document further real effects at the firm level beyond firm's survival. We show that eligible firms improve their performance in terms of investment. The symmetric change between 2019 and 2020 of investment increases by 24.3 pp for eligible firms compared to non-eligible firms.

Summing up, exploiting a design feature of the public guarantee program established before its entry into force, we can identify that PGL causes higher bank credit (for risky firms) and that this is more likely for weaker (riskier) banks. We also observe that PGL improves overall credit availability and the likelihood of firm survival and corporate investment, which, given the economic slowdown due to COVID suggest that PGL had a positive impact in the economy.

<sup>25</sup> In unreported regressions we do not find a statistically significant effect of share in these results, similarly for Table 7 –i.e., note that share increases PGL, and higher PGL increases credit, but we find that credit is not increased by an interaction of PGL (which already depends on share) and share. Moreover, we do not include firm risk as an interaction term because in this sample all firms are risky based on this default variable used for the PGL eligibility.

### *6.2.1 The degree of coverage of the PGL program as another source of exogeneity*

In this subsection we analyze the differences in the coverage of PGL to exploit another (alternative) source of exogeneity. In this case we are analyzing differences in the percentage covered by the program, whereas before it was the change between being or not being eligible for the PGL program, so the effects, if they exist, are plausible weaker. In Panel A of Table 7 we perform a similar analysis to that shown in Table 2 but using the fact that under the program the guarantee for SME loans was 80% while it was lower (70 or 60%) for larger firms. We find that, as previously reported in Table 2, firms with public guarantees of 80% are more prone to receive a PGL and that the effect of the credit share of the firm with the bank on the likelihood of getting a PGL is more pronounced for firms that enjoy a higher degree of coverage (column (4)), and even more for riskier firms (column (5)) and more so when the loan is granted by a weaker bank (i.e., with a higher NPL ratio) (column (6)). We do not observe these differential effects for non-PGL.

In Panel B of Table 7 we analyze the implications of the different public coverage provided by the PGL program on total credit and credit substitution. As explained in section 5, to do so we refine the analysis as there are relevant differences between the set of firms with different public guaranteed loan coverage. We select among firms with a lower guarantee and perform a propensity score matching to match firms with a similar set of observables except that they have a PGL with an 80% guarantee. Once we perform the match, based on a set of firm characteristics (assets, sales, employees, share, sector) as well as the banks' lending to those firms (size, capital, liquidity and NPL ratios, ROA), we analyze the effects of having different guarantee coverage on the change in credit for this restricted group of companies. Panel B in Table A5 shows the normalized differences between the selected firms after the matching. There are no systematic differences in any characteristic.

In Panel B Table 7 we report the results of estimating the symmetric change in total credit for similar firms in observables that differ in their degree of coverage. Columns (1) to (4) show that firms with public guarantees of 80% are more likely to increase credit (around a 28.8 pp higher) than those with a lower level of

coverage. Columns (6) to (8) analyze non-PGL credit and show that non-PGL credit does not change for loans with greater degree of coverage. Columns (5) and (8) instrument the dummy that captures whether the firm has a PGL or not with the bank with the degree of public coverage and the results show that to have a PGL increases the total credit availability (and it does not affect the non-PGL credit). Columns (9) and (10) show that these effects are more pronounced for risky firms (the increase is 58.5 pp for an interquartile range increase), and more so for the banks with the highest risk (in terms an interquartile range change of the NPL ratio), with a 94.6 pp increase (see column (10)).

Columns (12) and (13) show how these previous results are confirmed when analyzing our data at the firm level: total credit at the firm level increases for firms with higher public guarantees (by 31.8 pp). When analyzing the real effects, we find in column (15) that firms with more coverage of public guarantees increase their investment between 2019 and 2020 by 12.1 pp compared to those with lower coverage.

Summing up, exploiting two different and alternative exogenous sources of variation in Table 6 and 7 across very similar firms with different PGL access, we show that PGL increases banks' overall lending, and this has relevant effects at the firm level in terms of firm survival and corporate investment.

## **7. Conclusions**

The COVID-19 pandemic prompted large-scale government interventions to keep firms afloat, including public guaranteed loan schemes to improve corporate outcomes. Crucially, some COVID-19 related policies were implemented through third parties, notably public guaranteed loans (PGL), as PGL granting decisions were delegated to privately-owned banks. This delegation could lead to potential allocative problems in the presence of divergences between banks' private incentives and social incentives.

We show that PGL increase credit availability improving real effects, but private bank incentives imply that riskier corporate loans are shifted to taxpayers, especially by weaker (riskier) banks. In particular, unlike non-PGL, banks provide more PGL to riskier firms in which banks have higher pre-crisis shares of firm total credit. Importantly, these effects are stronger for weaker banks. Results using firm(-

bank) fixed effects and loan volume versus price information suggest a credit supply-driven mechanism. Moreover, exploiting exogenous variation across very similar firms with different PGL access, we corroborate our previous findings, and we additionally show that PGL increases banks' overall lending, and credit share, with associated positive effects for firms' survival and investment.

Our results contribute to our understanding of the effectiveness and desirability of the use of public guarantees in the provision of credit to the real economy during crisis times. While a full-fledged welfare analysis is beyond the scope of this paper, our contribution is to show that, there are positive real effects associated to public guarantees, and also that such analysis would need to incorporate the private interests of the lenders, and in particular the incentives for risk shifting arising from limited liability in the presence of partially guaranteed debt.

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TABLE 1  
SUMMARY STATISTICS

This table reports units, means, standard deviations and first/second/third quartiles of the variables used in our analysis. In Panel A we show the descriptive statistics at firm-bank level of the study of the extensive margin (receiving a public guaranteed loan), and of the intensive margin at firm-bank-type of loan (public guaranteed or not) level (credit amount) and loan interest rate in Spain between 2020:03 to 2020:12. In Panel B we report the statistics at firm-bank level of the study of overall credit and credit substitution between public and non-public guaranteed loans of the public guaranteed loan program for two samples exploiting different exogenous differential access to PGL (the sample exploiting the exclusion criteria of PGL, and the sample exploiting different degree of public coverage), see Section 5 and 6. All firm and bank characteristics are calculated as of December 2019. For the definition of the variables, see Appendix Table A1.

PANEL A. Loan granting decision and loan terms of granted loans

		Mean	S.D.	P25	Median	P75
<i>Loan Granting Decision</i>						
Public Guaranteed Loan (PGL)	0/1	0.378	0.485	0.000	0.000	1.000
Non-PGL	0/1	0.287	0.453	0.000	0.000	1.000
<i>Loan Terms</i>						
Public Guaranteed Loans (PGL)	0/1	0.500	0.500	0.000	0.500	1.000
Committed amount	€	129,649	162,690	20,000	59,994	163,897
Interest rate	%	3.334	2.966	1.530	2.427	3.665
<i>Firm Characteristics(i)</i>						
Risk	Standardized	0.000	1.000	-0.677	0.048	0.671
SME	0/1	0.954	0.208	1.000	1.000	1.000
<i>Firm-Bank Characteristics(ij)</i>						
Share		0.266	0.312	0.003	0.136	0.429
Granularity	%	0.001	0.034	0.000	0.000	0.000
Length of the relationship	Log(months)	3.969	2.122	3.091	4.159	5.198
<i>Bank Characteristics(j)</i>						
NPL ratio	%	4.577	1.808	3.021	4.956	5.634
Ln(Assets)	Log(1000€)	18.212	1.894	17.405	18.991	19.810
Capital ratio	%	9.260	4.042	6.420	7.972	11.805
ROA	%	0.905	1.165	0.487	0.609	0.681
Liquidity ratio	%	7.435	3.916	6.909	7.403	9.482

PANEL B. Overall credit and credit substitution

		Mean	S.D.	P25	Median	P75
<i>Exclusion criteria of the public guarantee program</i>						
$\Delta$ Credit non-PGL <sub>2021:06-2019:12</sub>	%	-64.090	92.134	-186.871	-21.133	0.000
$\Delta$ Credit Total loans <sub>2021:06-2019:12</sub>	%	-61.073	92.486	-178.968	-17.868	0.000
$\Delta$ Share Total loans <sub>2021:06-2019:12</sub>	%	-1.240	17.544	-3.771	-0.090	2.224
Firm defaulted in Jan. or Feb. 2020 and not in Dec. 2019	0/1	0.197	0.398	0.000	0.000	0.000
PGL	0/1	0.029	0.168	0.000	0.000	0.000
Bank NPL ratio	%	4.806	1.787	3.966	5.106	5.634
Firm survival	0/1	0.903	0.296	1.000	1.000	1.000
Investment	%	-25.585	73.395	-23.451	-5.078	0.000
<i>The degree of coverage of the public guarantee program</i>						
$\Delta$ Credit non-PGL <sub>2021:06-2019:12</sub>	%	-75.559	102.347	-200.000	-57.886	0.000
$\Delta$ Credit Total loans <sub>2021:06-2019:12</sub>	%	-32.033	101.939	-89.610	-7.325	28.571
$\Delta$ Share Total loans <sub>2021:06-2019:12</sub>	%	-1.187	13.206	-3.851	-0.307	1.710
Firm with PGL covered at 80%	0/1	0.440	0.496	0.000	0.000	1.000
PGL	0/1	0.363	0.481	0.000	0.000	1.000
Risk	Standardized	0.000	1.000	-0.636	0.033	0.591
Bank NPL ratio	%	4.539	1.738	3.021	4.833	5.634
Firm survival	0/1	0.994	0.076	1.000	1.000	1.000
Investment	%	-2.354	41.948	-11.147	-3.844	1.990

TABLE 2

LOAN GRANTING DECISION AT FIRM-BANK LEVEL

This table reports regressions results of a linear probability model at firm-bank level of the probability of a firm to get a public guaranteed loan or a fully private (non-public-backed) one, between 2020:03 to 2020:12. Coefficients are listed in the first row, robust standard errors are reported in the row below which are corrected for multi-clustering at the firm and bank level, and the corresponding significance levels are in the adjacent column. "Yes" indicates that the set of characteristics or fixed effects is included, "No" that is not included and "-" that is comprised by the included set of fixed effects. \*\*\* Significant at 1%, \*\* significant at 5%, \* significant at 10%. For the definition of the variables, see Appendix Table A1.

Dependent variable:	Public Guaranteed Loan (0/1)				Non-Public Guaranteed Loan (0/1)					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Risk	0.035*** (0.005)	0.055*** (0.010)	0.056*** (0.011)	0.055*** (0.011)	-0.013** (0.005)	-0.020* (0.010)	-0.019* (0.011)	-0.022** (0.011)		
SME	0.110*** (0.019)	0.105*** (0.017)	0.099*** (0.016)	0.101*** (0.015)	-0.151*** (0.019)	-0.143*** (0.018)	-0.138*** (0.018)	-0.128*** (0.019)		
Share	0.097*** (0.019)	0.097*** (0.019)	0.130*** (0.020)	0.117*** (0.020)	0.216*** (0.023)	0.037** (0.015)	0.042*** (0.015)	0.044*** (0.016)	0.035** (0.015)	0.027* (0.015)
Bank NPL ratio	0.017*** (0.006)	0.017** (0.007)	0.015** (0.006)	0.015** (0.006)	-0.015 (0.015)	-0.015 (0.015)	-0.015 (0.015)	-0.015 (0.015)		
Ln(Bank Total Assets)	0.056*** (0.006)	0.056*** (0.006)	0.058*** (0.005)	0.058*** (0.005)	0.006 (0.010)	0.007 (0.010)	0.006 (0.010)	0.006 (0.010)		
Bank Capital ratio	-0.654* (0.369)	-0.658* (0.370)	-0.618* (0.358)	-0.618* (0.358)	1.963* (1.080)	1.982* (1.086)	1.997* (1.057)	1.986*** (1.057)		
Bank ROA	-2.085** (0.936)	-2.143** (0.952)	-2.168** (0.926)	-2.168** (0.926)	5.091 (3.537)	5.185 (3.538)	5.190 (3.475)	5.190 (3.475)		
Bank Liquidity ratio	0.382 (0.265)	0.378 (0.264)	0.365 (0.255)	0.365 (0.255)	0.972*** (0.359)	0.975*** (0.360)	0.986*** (0.358)	0.986*** (0.358)		
Zip code Fixed Effects	Yes	Yes	-	-	-	Yes	Yes	-	-	-
Industry Fixed Effects (NACE 2 digits)	No	Yes	-	-	-	No	Yes	-	-	-
Industry*Zip Code Fixed Effects	No	No	Yes	Yes	-	No	No	Yes	Yes	-
Bank Fixed Effects	No	No	No	Yes	Yes	No	No	No	Yes	Yes
Firm Fixed Effects	No	No	No	No	Yes	No	No	No	No	Yes
Observations	718,204	718,204	718,204	718,204	718,204	718,204	718,204	718,204	718,204	718,204
R2	0.148	0.155	0.256	0.275	0.475	0.122	0.126	0.214	0.266	0.437

TABLE 3

LOAN GRANTING DECISION AT FIRM-BANK LEVEL: HETEROGENEITY

This table reports regressions results of a linear probability model at firm-bank level of the probability of a firm to get a public guaranteed loan or a fully private (non-public-backed) one between 2020:03 to 2020:12. Coefficients are listed in the first row, robust standard errors are reported in the row below which are corrected for multi-clustering at the firm and bank level, and the corresponding significance levels are in the adjacent column. "Yes" indicates that the set of characteristics or fixed effects is included, "No" that is not included and "-" that is comprised by the included set of fixed effects. \*\*\* Significant at 1%, \*\* significant at 5%, \* significant at 10%. For the definition of the variables, see Appendix Table A1.

Dependent variable:	Public Guaranteed Loan (0/1)			Non-Public Guaranteed Loan (0/1)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share	0.220*** (0.023)	0.194*** (0.021)	0.217*** (0.023)	0.197*** (0.021)	0.027* (0.015)	0.027* (0.015)	0.027* (0.015)	0.027* (0.015)
Share*Risk	0.047*** (0.004)			0.037*** (0.004)	-0.004 (0.004)			0.002 (0.003)
Share*Bank NPL ratio		0.025*** (0.008)		0.025*** (0.008)		-0.020*** (0.005)		-0.019*** (0.005)
Risk*Bank NPL ratio			0.004*** (0.001)	0.004*** (0.001)			-0.003** (0.001)	-0.003** (0.001)
Share*Risk*Bank NPL ratio				0.007** (0.003)				-0.004* (0.003)
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	718,204	718,204	718,204	718,204	718,204	718,204	718,204	718,204
R2	0.476	0.476	0.475	0.477	0.437	0.440	0.438	0.440

TABLE 4

## LOAN GRANTING DECISION AT FIRM-BANK LEVEL: OTHER RELATIONSHIP VARIABLES

This table reports regressions results of a linear probability model at firm-bank level of the probability of a firm to get a public guaranteed loan (columns (1) to (6)) or a fully private (non-public-backed) one (columns (7) and (8)) between 2020:03 to 2020:12. Share is the share of a firm's total credit obtained from the bank, computed at the firm-bank level using committed loan amounts as of 2019:12. Granularity is the ratio between the total amount of loans of the firm with the bank over the total assets of the bank as of 2019:12 (this variable has been standardized to have 0 mean and the same variance that the variable "Share" to make their effects comparable). Length of the relationship measures the number of months since the first relationship with the bank, starting in 1999:12. Coefficients are listed in the first row, robust standard errors are reported in the row below which are corrected for multi-clustering at the firm and bank level, and the corresponding significance levels are in the adjacent column. Lower degree terms of any interaction are included although not showed for the sake of space. "Yes" indicates that the set of characteristics or fixed effects is included, "No" that is not included and "-" that is comprised by the included set of fixed effects. \*\*\* Significant at 1%, \*\* significant at 5%, \* significant at 10%. For the definition of the rest of the variables, see Appendix Table A1.

## Panel A. Granularity versus Share

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:	Public Guaranteed Loan (0/1)						Non-PGL (0/1)	
Share				0.216*** (0.023)	0.220*** (0.023)	0.196*** (0.021)		0.027* (0.015)
Share*Risk					0.047*** (0.004)	0.037*** (0.004)		
Share*Risk*Bank NPL ratio						0.007** (0.003)		
Granularity	0.010*** (0.003)	0.010*** (0.003)	0.083*** (0.021)	0.007*** (0.002)	0.006** (0.003)	0.060*** (0.016)	0.008** (0.004)	0.008** (0.004)
Granularity*Risk		0.001 (0.002)	0.004 (0.014)		-0.002 (0.001)	-0.009 (0.011)		
Granularity*Risk*Bank NPL ratio			-0.000 (0.001)			-0.000 (0.001)		
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	718,204	718,204	718,204	718,204	718,204	718,204	718,204	718204
R2	0.466	0.466	0.467	0.475	0.476	0.478	0.437	0.437

## Panel B. Length of the relationship versus Share

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:	Public Guaranteed Loan (0/1)						Non-PGL (0/1)	
Share				0.228*** (0.022)	0.231*** (0.023)	0.208*** (0.021)		0.036** (0.016)
Share*Risk					0.047*** (0.004)	0.038*** (0.004)		
Share*Risk*Bank NPL ratio						0.006** (0.003)		
Length of the relationship	-0.031*** (0.002)	-0.031*** (0.002)	-0.031*** (0.001)	-0.033*** (0.002)	-0.033*** (0.002)	-0.032*** (0.001)	-0.025*** (0.002)	-0.025*** (0.002)
Length*Risk		-0.000 (0.001)	-0.002*** (0.000)		-0.001 (0.001)	-0.002*** (0.000)		
Length*Risk*Bank NPL ratio			0.000 (0.000)			0.000 (0.000)		
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	718,204	718,204	718,204	718,204	718,204	718,204	718,204	718204
R2	0.475	0.475	0.476	0.485	0.486	0.488	0.444	0.444

TABLE 5

## LOAN TERMS OF GRANTED LOANS AT FIRM-BANK-TYPE OF LOAN (PGL AND NON-PGL)

This table reports regressions results of a Poisson model (for the loan amount), or a linear model (for interest rate) at firm-bank-type of loan (public guaranteed loan or not) level of the new commitment amount granted between 2020:03 to 2020:12. Panel A analyzes the effect on loan amount. Panel B analyzes the effect on interest rate. PGL is a dummy equal to 1 if the firm received a public guaranteed loan and 0 otherwise. Loan amount captures the total committed amount of new loans. Interest rate is the weighted average (using the loan amount) interest rate of new loans granted by type of loan. Coefficients are listed in the first row, robust standard errors are reported in the row below which are corrected for multi-clustering at the firm and bank level, and the corresponding significance levels are in the adjacent column. "Yes" indicates that the set of characteristics or fixed effects is included, "No" that is not included and "-" that is comprised by the included set of fixed effects. \*\*\* Significant at 1%, \*\* significant at 5%, \* significant at 10%. For the definition of the variables, see Appendix Table A1.

## Panel A. Loan amount

Dependent variable: Loan amount	(1)	(2)	(3)	(4)	(5)	(6)
PGL	0.442*** (0.089)	0.446*** (0.088)	0.460*** (0.106)	0.397*** (0.089)	0.398*** (0.089)	0.442*** (0.034)
Share	0.768*** (0.032)	0.757*** (0.030)				
PGL*Share		0.141* (0.085)		0.189*** (0.071)	0.183** (0.072)	0.183** (0.072)
PGL*Share*Risk					0.032* (0.017)	0.024* (0.014)
PGL*Share*Risk*Bank NPL ratio						0.007* (0.004)
Bank Fixed Effects	Yes	Yes	-	-	-	-
Firm Fixed Effects	Yes	Yes	-	-	-	-
Bank*Industry and Zip Code Fixed Effects	Yes	Yes	-	-	-	-
Firm*Bank Fixed Effects	No	No	Yes	Yes	Yes	Yes
Observations	592,123	592,123	345,416	345,416	345,416	345,416
Pseudo R2	0.760	0.760	0.785	0.785	0.786	0.795

## Panel B. Loan interest rate

Dependent variable: Interest rate	(1)	(2)	(3)	(4)	(5)	(6)
PGL	-2.247*** (0.200)	-2.231*** (0.188)	-2.306*** (0.237)	-2.299*** (0.224)	-2.297*** (0.223)	-2.360 (1.625)
Share	-0.589*** (0.063)	-0.516*** (0.087)				
PGL*Share		-0.759*** (0.282)		-0.946*** (0.348)	-0.958*** (0.363)	-0.958*** (0.363)
PGL*Share*Risk					-0.075 (0.083)	1.028 (2.367)
PGL*Share*Risk*Bank NPL ratio						-0.071* (0.036)
Bank Fixed Effects	Yes	Yes	-	-	-	-
Firm Fixed Effects	Yes	Yes	-	-	-	-
Bank*Industry and Zip Code Fixed Effects	Yes	Yes	-	-	-	-
Firm*Bank Fixed Effects	No	No	Yes	Yes	Yes	Yes
Observations	450,453	450,453	289,358	289,358	289,358	289,358
R2	0.608	0.609	0.695	0.697	0.697	0.705



TABLE 6

## EXOGENOUS DIFFERENTIAL ACCESS TO PGL:

## FIRMS WITH DEFAULTED LOANS IN JANUARY/FEBRUARY 2020 (ELIGIBLE) VERSUS IN DECEMBER 2019 (NON-ELIGIBLE)

Panel A. Loan granting decision at firm-bank level restricted to firms with defaulted loans in December 2019 (ineligible) versus in January/February 2020 but not in December 2019 (eligible)

This table shows the analysis of the exclusion criteria in the public guaranteed loan program of having loans defaulted in December 2019 comparing firms with loans in arrears in that date (ineligible) with those firms without delinquent loans in December 2019 but with delinquent loans in January or February 2020 (eligible). This panel reports regressions results of a linear probability model at firm-bank level of the probability of a firm to get a public guaranteed loan or a fully private (non-public guaranteed) loan, between 2020:03 to 2020:12. Lower degree terms of any interaction are included (if not spanned by fixed effects) although not showed for the sake of space. Bank and firm controls are included in all specifications. "Yes" indicates that the set of characteristics or fixed effects is included, "No" that is not included and "-" that is comprised by the included set of fixed effects. \*\*\* Significant at 1%, \*\* significant at 5%, \* significant at 10%. For the definition of the variables, see Appendix Table A1.

	Dependent variable: Loan Granting Decision									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Firm defaulted in Jan./Feb. 2020 vs Dec. 2019	0.132*** (0.015)	0.119*** (0.023)				0.003 (0.016)	0.009 (0.023)			
Share	0.002 (0.008)	0.018* (0.010)	0.021*** (0.008)	0.030*** (0.009)	0.021*** (0.008)	-0.009 (0.026)	-0.006 (0.029)	0.000 (0.030)	0.001 (0.030)	0.002 (0.032)
Firm defaulted in Jan./Feb. 2020 vs Dec. 2019*Share				0.231*** (0.040)	0.181*** (0.042)				-0.011 (0.041)	-0.022 (0.047)
Firm defaulted in Jan./Feb. 2020 vs Dec. 2019*Share*Bank NPL					0.058* (0.030)					-0.013 (0.024)
Bank Fixed Effects	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Industry*Zip Code Fixed Effects	No	Yes	-	-	-	No	Yes	-	-	-
Firm Fixed Effects	No	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Observations	25,308	25,308	25,308	25,308	25,308	25,308	25,308	25,308	25,308	25,308
R2	0.148	0.420	0.475	0.462	0.491	0.044	0.333	0.359	0.358	0.358

Panel B. Credit substitution and overall firm-level credit and real effects restricted to firms with defaulted loans in Dec 2019 (ineligible) versus in Jan/Feb 2020 but not in Dec 2019 (eligible)

This table shows the analysis of the exclusion criteria in the public guaranteed loan program of having loans defaulted in December 2019 comparing firms with loans in arrears in that date (ineligible) with those firms without delinquent loans in December 2019 but with delinquent loans in January or February 2020 (eligible). This panel analyses the symmetric growth rate of total credit at bank-firm and credit and real effects at the firm level. Columns (5) and (8) show the results of an instrumental variable estimation, where the first stage is showed below the dotted line. Columns (12) and (13) show the PGL effects on credit at the firm level, while Column (14) reports regressions result of a linear probability model of firm-level survival, and column (15) analyses the firm-level investment between 2019 and 2020. Coefficients are listed in the first row, robust standard errors are reported in the row below which are corrected for multi-clustering at the firm and bank level, and the corresponding significance levels are in the adjacent column. Lower degree terms of any interaction are included (if not spanned by fixed effects) although not showed for the sake of space. Bank and firm controls are included in all specifications. "Yes" indicates that the set of characteristics or fixed effects is included, "No" that is not included and "-" that is comprised by the included set of fixed effects. \*\*\* Significant at 1%, \*\* significant at 5%, \* significant at 10%. For the definition of the variables, see Appendix Table A1.

Dependent variable:	ΔCredit															ΔShare			ΔCredit Firm Level			Firm Level	
	Total			Non-PGL			Total			Total			Total			Survival		Investment					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)								
Firm defaulted in Jan./Feb. 2020 vs Dec. 2019	5.974** (2.785)	6.905*** (2.333)	4.643* (2.357)	6.731* (3.901)	-7.033*** (2.460)	-7.042* (3.630)	6.695* (3.870)	3.206*** (1.069)	3.486*** (0.986)	0.361* (0.204)	10.756* (6.265)	-9.581* (4.982)	0.098*** (0.276)	24.329** (11.401)									
Firm defaulted in Jan./Feb. 2020 vs Dec. 2019*Bank NPL ratio																							
PGL				49.412* (27.531)			-56.023* (28.940)																
First Stage: PGL on Firm defaulted in Jan./Feb. 2020 vs Dec. 2019				0.126*** (0.021)			0.126*** (0.021)																
Bank Fixed Effects	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No									
Industry*Province Fixed Effects	No	No	Yes	-	Yes	-	-	-	-	-	-	-	-	-									
Industry*Zip Code Fixed Effects	No	No	No	Yes	Yes	No	Yes	Yes	Yes	-	Yes	Yes	Yes	Yes									
Firm Fixed Effects	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No									
F-test	25.548	25.548	25.548	25.548	25.548	25.548	25.548	25.548	25.548	25.548	1.202	1.202	1.202	320									
R2	0.061	0.204	0.270	0.412	0.272	0.418	0.412	0.440	0.440	0.115	0.500	0.506	0.479	0.570									

TABLE 7

EXOGENOUS DIFFERENTIAL ACCESS TO PGL: THE DEGREE OF PGL COVERAGE

Panel A. Loan granting decision at firm-bank level for firms with 80% public coverage versus lower

This table shows the analysis of the difference in the level of public guarantees in the public guaranteed loan program. The program states that SMEs has a guaranteed of 80% and larger firms of 60% or 70%. This panel reports regression results of a linear probability model at the firm-bank level of the probability of a firm to get a public guaranteed loan or a fully private (non-public guaranteed) loan, between 2020:03 to 2020:12. This table uses the 80% dummy as a proxy of the difference in public guaranteed levels. Coefficients are listed in the first row, robust standard errors are reported in the row below which are corrected for multi-clustering at the firm and bank level, and the corresponding significance levels are in the adjacent column. Lower degree terms of any interaction are included (if not spanned by fixed effects) although not showed for the sake of space. Bank and firm controls are included in all specifications. "Yes" indicates that the set of characteristics or fixed effects is included, "No" that is not included and "-" that is comprised by the included set of fixed effects. \*\*\* Significant at 1%, \*\* significant at 5%, \* significant at 10%. For the definition of the variables, see Appendix Table A1.

Dependent variable:	Public Guaranteed Loan (0/1)					Non-Public Guaranteed Loan (0/1)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Firms with PGL covered at 80%	0.089*** (0.033)	0.101*** (0.015)	0.101*** (0.015)	-0.113*** (0.034)	-0.128*** (0.019)	-0.113*** (0.034)	-0.128*** (0.019)	-0.113*** (0.034)	-0.128*** (0.019)	-0.113*** (0.034)	-0.128*** (0.019)	-0.113*** (0.034)
Share	0.211*** (0.036)	0.117*** (0.020)	0.216*** (0.023)	0.228*** (0.021)	0.240*** (0.020)	0.234*** (0.019)	-0.016 (0.034)	0.035*** (0.015)	0.027* (0.018)	0.039*** (0.018)	0.037** (0.018)	0.035*** (0.015)
Firms with PGL covered at 80%*Share				0.167*** (0.017)	0.184*** (0.019)	0.095* (0.053)			-0.069*** (0.017)		-0.071*** (0.017)	-0.111*** (0.051)
Firms with PGL covered at 80%*Share*Risk					0.057*** (0.011)	0.119*** (0.040)					-0.013 (0.014)	-0.094 (0.060)
Firms with PGL covered at 80%*Share*Risk*Bank NPL ratio						0.012* (0.007)						-0.010 (0.009)
Bank Fixed Effects	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Industry* Zip Code Fixed Effects	No	Yes	-	-	-	-	No	Yes	-	-	-	-
Firm Fixed Effects	No	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes
Observations	718,204	718,204	718,204	718,204	718,204	718,204	718,204	718,204	718,204	718,204	718,204	718,204
R2	0.034	0.275	0.475	0.476	0.477	0.480	0.050	0.266	0.437	0.438	0.438	0.441

Panel B. Credit substitution at the firm-bank level and overall firm-level credit and real effects using matching estimator

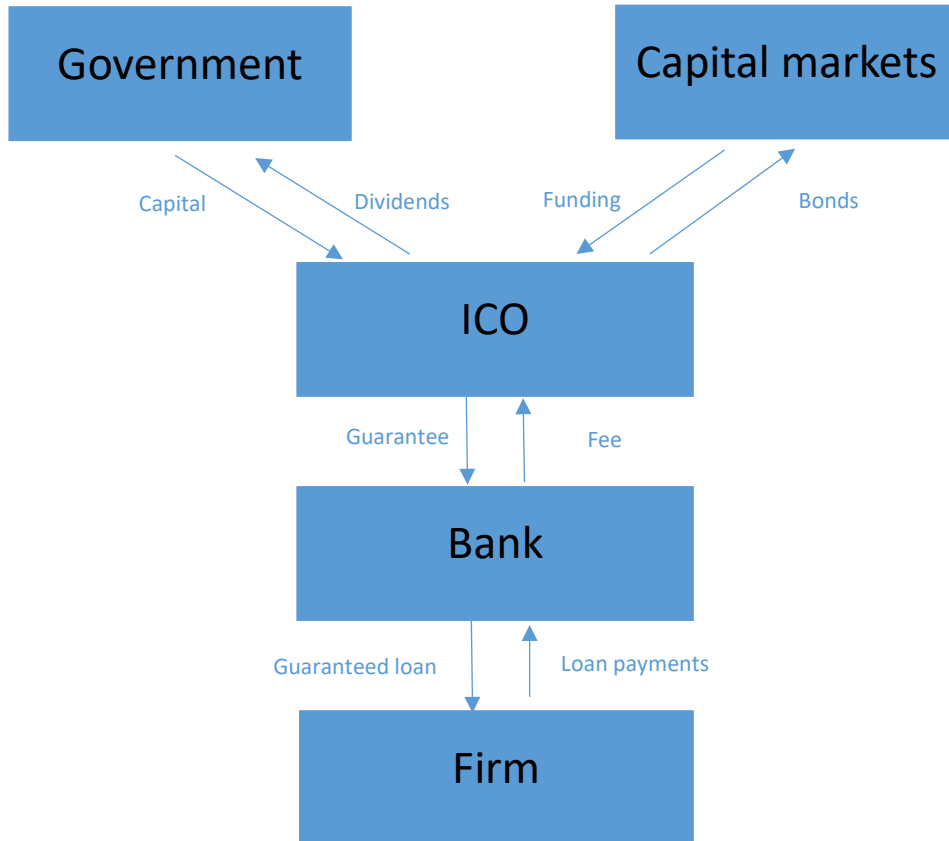
This table shows the analysis of the difference in the level of public guarantees in the public guaranteed loan program. The program states that SMEs has a guaranteed of 80% and larger firms of 60% or 70%. This panel analyses the symmetric growth rate of total credit at the bank-firm and credit and real effects at the firm level using a propensity score matching for firms with different public guaranteed loan coverage. Columns (5) and (8) show the results of an instrumental variable estimation, where the first stage is showed below the dotted line. Columns (12) and (13) show the PGL effects on credit at the firm level, while Column (14) reports regression results of a linear probability model of firm survival, and column (15) analyses the firm investment between 2019 and 2020. Coefficients are listed in the first row, robust standard errors are reported in the row below which are corrected for multi-clustering at the firm and bank level, and the corresponding significance levels are in the adjacent column. Lower degree terms of any interaction are included (if not spanned by fixed effects) although not showed for the sake of space. Bank and firm controls are included in all specifications. "Yes" indicates that the set of characteristics or fixed effects is included, "No" that is not included and "-" that is comprised by the included set of fixed effects. \*\*\* Significant at 1%, \*\* significant at 5%, \* significant at 10%. For the definition of the variables, see Appendix Table A1.

Dependent variable:	ΔCredit				ΔShare				ΔCredit Firm Level				Firm Level		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Firms with PGL covered at 80%	26.225*** (6.485)	28.575*** (5.058)	22.984*** (6.832)	28.747* (16.049)	-0.039 (6.138)	-1.445 (8.875)			22.918* (13.175)		15.479* (8.707)	31.746*** (6.891)	7.923 (5.432)	0.012 (0.009)	12.055*** (5.371)
Firms with PGL covered at 80%*Risk									24.229** (9.908)						
Firms with PGL covered at 80%*Risk*Bank NPL											1.983** (0.862)				
PGL					116.914*** (35.087)		17.374 (38.257)								
First Stage: PGL on Firms with PGL covered at 80%					0.259*** (0.074)		0.259*** (0.074)								
Bank Fixed Effects	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No
Industry*Province Fixed Effects	No	No	Yes	-	-	Yes	-	-	-	-	-	Yes	Yes	Yes	Yes
Industry*Zip Code Fixed Effects	No	No	No	Yes	Yes	No	Yes	Yes	Yes	-	-	No	No	No	No
Firm Fixed Effects	No	No	No	No	No	No	No	No	No	Yes	Yes	No	No	No	No
F-test					12.32		14.67								
Observations	3,858	3,858	3,858	2,948	2,948	2,948	2,948	2,948	3,858	2,725	2,725	418	418	418	363
R2	0.100	0.212	0.362	0.461	0.339	0.467	0.461	0.461	0.490	0.218	0.426	0.523	0.550	0.400	0.400

FIGURE 1

FINANCIAL FLOWS OF SPANISH LOAN GUARANTEE SCHEME

This figure shows the financial obligations and flows of a loan disbursed on the Spanish loan guarantee scheme



# ONLINE APPENDIX A

## TABLE A1

### DEFINITION OF THE VARIABLES

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<i>Loan Granting Decision</i>	
Public Guaranteed Loan (PGL)	A dummy equal to 1 if the firm received a loan guaranteed by the estate and 0 otherwise.
Non-PGL	A dummy equal to 1 if the firm only received non-public guaranteed loans during the sample period.
<i>Loan Terms</i>	
Loan amount	Drawn plus undrawn amount of the loan.
Interest rate	Interest rate of the loan.
<i>Firm Characteristics(i)</i>	
Risk	A scoring variable which captures the credit risk of the firm (higher values implies higher risk).
SME	A dummy that takes 1 if the firm is a small or medium-sized enterprise (based on Commission Regulation (EU) No. 651/2014) and 0 otherwise.
Firm defaulted in Jan./Feb. 2020 vs Dec. 2019	A dummy that takes 1 if the firm defaulted in January or February 2020 and not if December 2019 and 0 otherwise.
Firms with PGL covered at 80%	A dummy that takes 1 for firms to which the program establishes a guarantee of 80% and 0 otherwise.
Firm survival	A dummy that takes 1 when a firm survives in 2020.
Firm investment	Tangible and Intangible Fixed Assets and Real State Investments in 2020 with respect 2019.
<i>Firm-Bank Characteristics(ij)</i>	
Share	The share of a firm's total credit obtained from the bank, computed at the firm-bank level using committed loan amounts as of 2019:12.
Granularity	The ratio between the total amount of loans of the firm with the bank over the total assets of the bank as of 2009:12.
Length of the relationship	The log of 1 plus the number of months since the first relationship with the bank (since 1999:12).
<i>Bank Characteristics(fj)</i>	
Log(Assets)	The log of the bank's total assets (expressed in thousands of euros).
Capital ratio	The ratio of own funds over total assets of the bank in percentage points.
ROA	The ratio of the bank's net profits to total assets. Liquidity ratio of the bank is the ratio of liquid assets over total assets in percentage points.
Liquidity ratio	Bank's liquid assets over total assets in percentage points.
NPL ratio	Non-performing loans (doubtful and 90 days overdue) over total loans of the bank in percentage points.

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TABLE A2

## LOAN GRANTING DECISION CONDITIONAL ON HAVING A LOAN GRANTED

This table reports regressions results of a linear probability model at firm-bank level of the probability of a firm to get a public guaranteed loan between 2020:03 to 2020:12 given that a loan was granted between the firm and the bank. Panel A shows the direct effect and Panel B shows heterogeneous effects. Coefficients are listed in the first row, robust standard errors are reported in the row below which are corrected for multi-clustering at the firm and bank level, and the corresponding significance levels are in the adjacent column. Lower degree terms of any interaction are included although not showed for the sake of space. "Yes" indicates that the set of characteristics or fixed effects is included, "No" that is not included and "-" that is comprised by the included set of fixed effects. \*\*\* Significant at 1%, \*\* significant at 5%, \* significant at 10%. For the definition of the variables, see Appendix Table A1.

## Panel A. Direct effect

Dependent variable: Public Guaranteed Loan (0/1)	(1)	(2)	(3)	(4)	(5)
Risk	0.031*** (0.006)	0.054*** (0.012)	0.055*** (0.014)	0.055*** (0.014)	
SME	0.190*** (0.023)	0.182*** (0.022)	0.175*** (0.022)	0.175*** (0.022)	
Share	0.035 (0.022)	0.031 (0.022)	0.061** (0.023)	0.054** (0.023)	0.127*** (0.020)
Bank NPL ratio	0.018* (0.010)	0.018* (0.010)	0.017* (0.010)		
Ln(Bank Total Assets)	0.051*** (0.010)	0.051*** (0.010)	0.052*** (0.010)		
Bank Capital ratio	-1.715*** (0.523)	-1.738*** (0.534)	-1.665*** (0.520)		
Bank ROA	-3.579*** (1.249)	-3.691*** (1.282)	-3.755*** (1.260)		
Bank Liquidity ratio	-0.012 (0.411)	-0.030 (0.411)	-0.030 (0.401)		
Zip code Fixed Effects	Yes	Yes	-	-	-
Industry Fixed Effects (NACE 2 digits)	No	Yes	-	-	-
Industry*Zip Code Fixed Effects	No	No	Yes	Yes	-
Bank Fixed Effects	No	No	No	Yes	Yes
Firm Fixed Effects	No	No	No	No	Yes
Observations	413,104	413,104	413,104	413,104	413,104
R2	0.208	0.215	0.341	0.373	0.565

## Panel B. Heterogeneity

Dependent variable: Public Guaranteed Loan (0/1)	(1)	(2)	(3)	(4)
Share	0.127*** (0.020)	0.103*** (0.018)	0.128*** (0.020)	0.104*** (0.018)
Share*Risk	0.027*** (0.005)			0.033*** (0.006)
Share*Bank NPL ratio		0.035*** (0.008)		0.035*** (0.008)
Risk*Bank NPL ratio			0.004** (0.002)	0.004** (0.002)
Share*Risk*Bank NPL ratio				0.008** (0.003)
Bank Fixed Effects	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Observations	413,104	413,104	413,104	413,104
R2	0.565	0.565	0.565	0.566

TABLE A3

## LOAN GRANTING DECISION: ROBUSTNESS OF SHARE AND RISK VARIABLES

This table reports regressions results of a linear probability model at firm-bank level of the probability of a firm to get a public guaranteed loan between 2020:03 to 2020:12. Panel A replaces the *Share* variable with a main bank dummy, which equals to 1 if the bank was the main lender of the firm in 2019:12 (in terms of credit) and 0 otherwise. Panel B includes share and main bank at the same time, each one interacted with firm variables and bank NPL. Panel C replaces the risk variable by its highest decile (high risk). Coefficients are listed in the first row, robust standard errors are reported in the row below which are corrected for multi-clustering at the firm and bank level, and the corresponding significance levels are in the adjacent column. Lower degree terms of any interaction are included although not showed for the sake of space. "Yes" indicates that the set of characteristics or fixed effects is included, "No" that is not included and "-" that is comprised by the included set of fixed effects. \*\*\* Significant at 1%, \*\* significant at 5%, \* significant at 10%. For the definition of the variables, see Appendix Table A1.

## Panel A: Main bank

Dependent variable: Public Guaranteed Loan (0/1)	(1)	(2)	(3)
Main bank	0.118*** (0.009)	0.119*** (0.009)	0.105*** (0.009)
Main bank*Risk		0.020*** (0.002)	0.016*** (0.002)
Main bank*Risk*Bank NPL ratio			0.003** (0.002)
Bank Fixed Effects	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes
Observations	718,204	718,204	718,204
R2	0.474	0.474	0.475

## Panel B: Share interactions controlling by main bank in all interactions

Dependent variable: Public Guaranteed Loan (0/1)	(1)	(2)	(3)
Share	0.155*** (0.027)	0.160*** (0.028)	0.138*** (0.030)
Share*Risk		0.063*** (0.006)	0.050*** (0.006)
Share*Risk*Bank NPL ratio			0.009** (0.004)
Bank Fixed Effects	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes
Observations	718,204	718,204	718,204
R2	0.475	0.476	0.476

## Panel C: High firm risk

Dependent variable: Public Guaranteed Loan (0/1)	(1)	(2)	(3)
Share	0.216*** (0.023)	0.217*** (0.023)	0.195*** (0.021)
Share*High Risk		0.079*** (0.009)	0.067*** (0.010)
Share*High Risk*Bank NPL ratio			0.025*** (0.007)
Bank Fixed Effects	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes
Observations	718,204	718,204	718,204
R2	0.475	0.476	0.477



TABLE A4

## LOAN GRANTING DECISION AT THE FIRM-BANK LEVEL: FALSIFICATION TEST OF THE PERIOD

This table reports regressions results of a linear probability model at firm-bank level of the probability of a firm to get a loan. Different time periods are considered to address concerns that the effect of the *Share* variable analyzed in the period 2020:03-2020:12 is not affected by seasonal effects other than the COVID-19 pandemic. *Post* is a dummy that equals 1 for the months after the reference date until December of that year. *Share* is computed and the end of 2018. Coefficients are listed in the first row, robust standard errors are reported in the row below which are corrected for multi-clustering at the firm and bank level, and the corresponding significance levels are in the adjacent column. "Yes" indicates that the set of characteristics or fixed effects is included, "No" that is not included and "-" that is comprised by the included set of fixed effects. \*\*\* Significant at 1%, \*\* significant at 5%, \* significant at 10%. For the definition of the variables, see Appendix Table A1.

Dependent variable: Some loan received (0/1)	(1)	(2)	(3)	(4)	(5)
Post $\geq$	2019:02	2019:03	2019:04	2019:05	2019:06
Share*Post	-0.025 (0.051)	-0.022 (0.041)	-0.037 (0.037)	-0.018 (0.024)	-0.032 (0.019)
Bank*Post Fixed Effects	Yes	Yes	Yes	Yes	Yes
Firm*Post Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	972,897	1,037,420	1,073,568	1,114,195	1,133,724
R2	0.410	0.409	0.397	0.393	0.391

TABLE A5

## EXOGENOUS DIFFERENTIAL ACCESS TO PGL: MEAN TEST

This table shows the results of a mean test comparing firms with loans in arrears in December 2019 with those firms without delinquent loans in December 2019 but in January or February 2020 (Panel A) or firms with a different level of public coverage (Panel B). In Panel B we first match firms with a similar set of firm and bank observables, except that they have a PGL with a 80% guarantee (see section 5). The table reports the normalized difference test proposed by Imbens and Wooldridge (2009), for which Imbens and Rubin (2015) suggested a heuristic threshold of 0.25 in absolute value. The normalized difference statistic tests the null of no differences in means between treated and control group through a scale-and-sample-size-free estimator, where \* means that the difference is higher than 0.25 in absolute value. For the definition of the variables, see Appendix Table A1.

Panel A: Firms with defaulted loans in Jan/Feb 2020 (and not in Dec 2019) vs defaulted in December 2019

	Firm defaulted in Dec. 2019		Firm defaulted in Jan. or Feb. 2020 and not in Dec. 2019		Normalized Differences test
	Mean	S.D.	Mean	S.D.	
PGL	0.00	-	0.16	(0.37)	0.44*
Non-PGL	0.45	(0.50)	0.49	(0.50)	0.05
Log(Assets)	7.42	(1.93)	7.22	(1.96)	-0.07
Own funds/Total assets	13.66	(33.68)	18.76	(27.11)	0.12
Liquidity assets/ Total assets	0.05	(0.11)	0.05	(0.11)	0.03
Share	0.19	(0.24)	0.18	(0.22)	-0.03
Log(Bank total assets)	18.22	(1.84)	18.14	(1.89)	-0.03
Bank capital ratio	8.75	(3.77)	8.98	(4.11)	0.04
Bank ROA	0.71	(0.95)	0.84	(1.17)	0.08
Bank liquidity ratio	8.03	(3.77)	7.77	(4.01)	-0.05
Bank NPL ratio	4.77	(1.75)	4.65	(1.72)	-0.05

Panel B: The degree of PGL coverage (below 80% vs 80%)

	not 80%		80%		Normalized Differences test
	Mean	S.D.	Mean	S.D.	
PGL	0.25	(0.43)	0.52	(0.50)	0.41*
Log(Assets)	10.50	(2.10)	10.78	(2.53)	0.09
Own funds/Total assets	35.72	(23.21)	35.90	(22.10)	0.01
Liquidity assets/ Total assets	5.78	(7.45)	6.19	(8.46)	0.04
Share	0.17	(0.21)	0.17	(0.21)	0.02
Log(Bank total assets)	18.04	(1.96)	18.18	(1.82)	0.05
Bank capital ratio	7.88	(3.05)	7.88	(3.00)	0.00
Bank ROA	0.58	(0.51)	0.56	(0.48)	-0.02
Bank liquidity ratio	8.19	(3.21)	8.20	(3.20)	0.00
Bank NPL ratio	4.52	(1.75)	4.63	(1.73)	0.04

TABLE A6

## LOAN GRANTING: ROBUSTNESS. INCLUDING FIRMS WITH ONE BANKING RELATIONSHIP

This table reports regressions results of a linear probability model at firm-bank level of the probability of a firm to get a public guaranteed loan or a fully private (non-public-backed) one between 2020:03 to 2020:12. It reports the analogous of column (4) from Table 2 and column (5) from Table 3 but including firms without multiple firm-bank relationships. Coefficients are listed in the first row, robust standard errors are reported in the row below which are corrected for multi-clustering at the firm and bank level, and the corresponding significance levels are in the adjacent column. Lower degree terms of any interaction are included although not showed for the sake of space. "Yes" indicates that the set of characteristics or fixed effects is included, "No" that is not included and "-" that is comprised by the included set of fixed effects. \*\*\* Significant at 1%, \*\* significant at 5%, \* significant at 10%. For the definition of the variables, see Appendix Table A1.

Dependent variable:	Public Guaranteed Loan (0/1)		Non-Public Guaranteed Loan (0/1)	
	(1)	(2)	(3)	(4)
Risk	0.049*** (0.011)	0.053*** (0.010)	-0.022** (0.011)	-0.023** (0.009)
SME	0.091*** (0.017)	0.100*** (0.016)	-0.112*** (0.021)	-0.127*** (0.019)
Share	0.116*** (0.019)	0.102*** (0.015)	0.082*** (0.015)	0.071*** (0.012)
Share*Risk		0.021*** (0.004)		-0.001 (0.003)
Share*Risk*Bank NPL ratio		0.005* (0.003)		-0.007** (0.003)
Bank Fixed Effects	Yes	Yes	Yes	Yes
Industry*Zip Code Fixed Effects	Yes	Yes	Yes	Yes
Observations	868,473	785,657	868,473	785,657
R2	0.304	0.274	0.271	0.260

## ONLINE APPENDIX B

### STRATEGIC INTERACTION IN BANK LENDING DECISIONS

This section provides a micro foundation for the loan granting decision of banks when banks are strategic and take into account that the other bank can have incentives to grant the loan.

To determine which of the two banks grants the loan we assume that the decision to grant the loan is sequential. First one bank decides to grant the loan or not, and if such bank declines to grant the loan, then the other bank can decide to grant the loan or not. To simplify the analysis, we assume that decisions are final, and that which bank is the first one to take the decision is random. For simplicity we assume that banks have all the bargaining power and set the maximum loan rate possible, which in our case is the pledgeable income  $Y$ .

We solve the problem by backwards induction. The bank that decides in second place, which without loss of generality we denote by subindex 2, will grant the loan as long as

$$Dx_2 \geq \frac{(1 - (1 - p)g)L + F}{p} - Y = D\bar{x}$$

The bank that decides in first place takes into account that if it decides not to grant the loan, the second bank will grant the loan as long as  $x_2 > \bar{x}$ . When  $x_2 > \bar{x}$  we can show that there are circumstances in which the first bank will not grant the loan, as it would profit from the second bank being the one that incurs in the costs of granting the loan. This happens when

$$-L + p(Dx_1 + Y) - F + (1 - p)gL < p(Dx_1),$$

which can be rewritten as

$$-L + pY - F + (1 - p)gL < 0,$$

This states that, in such circumstances, the PGL is valuable for the bank because it also allows the bank to obtain previous debt, and without such previous debt the PGL would not be granted. In such circumstances we know that the first bank will grant the loan as long as  $x_2 < \bar{x}$  and  $x_1 > \bar{x}$ . If on the other hand

$$-L + pY - F + (1 - p)gL > 0,$$

the first bank will grant the loan as long as  $x_i > \bar{x}$ .

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