The Effect of Credit Guarantees on Credit Availability and Delinquency Rates.☆

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Abstract

Partial credit guarantees are among the most important interventions designed to improve financial opportunities to small- and medium-sized entrepreneurs (SMEs). For guaranteed loans, a third party usually the government, assures the repayment to the lender in the event that the borrower defaults. Almost one hundred countries have some form of PCGs; and, in the U.S. alone, PCGs support US$ 62.5 billion in loans to SMEs. Despite the magnitude of this intervention, the empirical evidence about its effectiveness and impact on economic incentives is contentious. We use novel data to examine whether credit guarantees affect economic incentives, and whether they affect the credit available to SMEs. We find important distortions to the incentives of the participants in guarantee programs, and in particular to the incentive of banks to exert effort in the collection of guaranteed loans. These distortions increase the delinquency rate by more than 1% after twelve months, and about 2% after twenty four months. We also find that credit guarantees increase the aggregated amount of credit; in particular one additional dollar of guarantees increases the total credit for SMEs by US$ 0.65.

Keywords: banking, financial intermediation, guarantees, credit constraints

JEL: G2, G21, G22, G28, G32, G38

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1. Introduction

A consistent finding in empirical economics is that small- and medium-sized entrepreneurs (SMEs) experience stronger and more costly financial impediments in investing than large firms.[1] Substantial effort have been exerted by governments and multilateral organizations to reduce these obstacles.[2] However, despite the large amount of time and resources allocated to improve SMEs access to finance, the success of interventions has been mixed at best (Stiglitz et al., 1993). This finding emphasizes the importance of well-designed interventions to further enhance the access to finance for SMEs.

Recent literature documents that direct subsidies managed by the government are not cost effective (Khwaja and Mian, 2005; Zia, 2008). These management inefficiencies lead governments to indirect subsidies where part of the administration is delegated to private institutions. One of the most prominent indirect interventions is the partial credit guarantee (PCGs) where a private institution issues and monitors the loans, and a third party, usually the government, guarantees the repayment to the lender in the event that the borrower defaults.[3] Green (2003) reports that almost one hundred countries have some form of PCGs; and, in the U.S. alone, PCGs support US$ 62.5 billion in loans to SMEs. The size of PCGs across other countries presents large variations. For example, in Chile, PCGs represent 1% of the GDP, whereas they represent 9% of the GDP in Korea (Beck et al., 2010).

Partial Credit Guarantees aim to increase the credit capacity of SMEs' that lack collateral to access the credit markets. However, financial institutions are still able to use the guarantees to reduce the risk of loans to clients that already have enough collateral. Another problem is that guarantees might distort the incentives of the lender, the borrower, or both.

[1] See, for example, Evans and Jovanovic (1989); Beck et al. (2005, 2007)

[2] For example, the Inter-American Development Bank estimates that their interventions to reduce financial market deficiencies in Latin America and the Caribbean between 1990 and 2004 account for US$ 22 billion.

[3] In practice PCGs work like credit insurance. In the text we will use the terms insurance and guarantees indistinctively.

This problem is mitigated by making the guarantee partial. However, lending without (or with reduced) collateral might exacerbate asymmetric information problems and create important economic distortions even if the lender retains part of the risk (Bester, 1985; Jimnez et al., 2006; Rajan and Winton, 1995).

A substantial body of theoretical work studies the effectiveness of PCGs and the extent to which they distort the incentives of the participants in the market (Innes, 1991; Chaney and Thakor, 1985; Gale, 1990). There is also ample empirical work that studies the effect of credit guarantees in different parts of the world. For example, Craig et al. (2007a,b, 2008) study the effect of credit guarantee programs implemented by the U.S. Small Business Administration. They find that credit guarantees have a positive impact on employment rates. Additionally, they find a weak relationship between guaranteed lending and future per capita income growth. Uesugi et al. (2010) study a government guarantee program in Japan. They find that though credit guarantees increase the availability of credit in the short term, most participants in the guarantee programs experience a deterioration in their long term performance. Boocock and Shariff (2005) study a Guarantee Scheme in Malaysia to find no conclusive evidence about the effectiveness of the program. Their study also suggests important losses borne by lenders. Cowling (2010) studies a government credit guarantee program in the U.K.. He finds that the program achieves the primary objective of increasing availability of credit; However, the costs associated with the program are unclear.

Despite the ample empirical work on the subject, a central question has not yet been addressed: how do partial credit guarantees distort the incentive of lenders and borrowers? The main contribution in our paper is to shed light on this rather unexplored dimension of credit guarantees. Our work highlights the severe problems that arise when the financial institution that performs the monitoring and the collection tasks is not the residual claimer of the loan.

We study the operations of the PCG program in Chile between 2003 and 2006. What makes these PCGs special is that entrepreneurs can borrow from multiple sources and can maintain insured and uninsured obligations with each of them. Moreover, we observe the repayment behavior on each of these obligations separately. These features allow us to study the effects of PCGs at the firm level by including in our specifications, a rich set of fixed effects that control for bank and borrower characteristics. Furthermore, we can control for time varying characteristics of the relationship between the borrower and the bank. This is a major contribution to the empirical banking literature that has mainly focused on time invariant borrower-bank fixed effects. Our approach thus tests whether the same firm borrowing from the same bank shows a different repayment behavior on its insured loans, compared to its repayment behavior on uninsured loans. Another interesting feature of the PCGs in Chile is that guarantees are allocated through an auction with sealed bids. Therefore, the amount of guarantees allocated to a bank does not only depend on its demand, but also on the bids of other participants in the auction. This feature generates nonlinear variation in the amount of guarantees allocated to each financial institution. In the paper this nonlinear variation is used to identify the effect of PCGs on the aggregate lending to SMEs.

We find that credit guarantees severely affect economic incentives, which in turn increase delinquency rates. For example, the presence of guarantees increases the delinquency rate by 1.5% in 12 months and more than 2% in 24 months compared to similar uninsured obligations. Furthermore, we explore if the increase in the delinquency rate can be explained by a distortion to the incentives of borrowers, lenders, or both. In most PCGs, and in particular in Chile, the insurance does not reduce the legal rights of the bank to demand repayment. In fact borrowers remain liable for the loan even after the government repays the guaranteed capital. All things being equal, this liability makes it unlikely that the borrower will have weaker incentives to repay the insured loan. Thus, the increase in delinquency must be a consequence of distortions to the incentives of the bank. One explanation is that banks reduce the monitoring of clients with guaranteed loans and therefore have less information to enforce repayment. However, a reduction in the intensity of the monitoring of client i by bank b should affect the repayment on both the insured and the uninsured obligations of borrower i with bank b. We find that only the repayment of insured obligations is affected but repayment to other loans at the same institution remains unchanged, suggesting that the monitoring effort does not change. An explanation that better fits our findings is that banks, even with abundant information about the client, decide to reduce their effort in the collection of guaranteed loan installments.

We also use the nonlinear variation in the amount of guarantees to each institution to quantify the effect of insurance on the aggregated credit to SMEs. While similar approaches have been used to test the effect of other types of government interventions, we are the first to use nonlinear variation to study the effect of partial credit guarantee programs.[4] We find that PCGs are effective in increasing the aggregated amount of credit available to SMEs. In particular, an increase of one dollar in the guarantees available to a bank is associated with an increase of US$ 0.65 in credit to SMEs; more specifically, the amount of credit for new borrowers increases by US$ 0.21, and the amount of credit for preexisting borrowers increases by US$ 0.44. The remainder of the guarantees is allocated to loans that would have been issued anyway.

The rest of the paper is organized as follows. In Section 2, we describe the institutional details of the PCG intervention in Chile and the details of the data. In Section 3, we explain the methodology and present the main results. Lastly, in Section 4, we present the conclusion and policy implications.

2. Description of the Intervention and Data

2.1. Description of the Intervention

In a PCG program, a third party guarantees the complete or partial repayment to the lender in the event that the borrower defaults. PCGs reduce the banks' exposure to system-

[4] For example Paravisini (2008) uses nonlinear variation to study the effect of a direct subsidy to small businesses lending in Argentina.

atic risk and reduce their capital constraints when capital requirements are binding (Ayuso et al., 2004). Borrowers benefit from PCGs because the reduction in the banks' capital constraints has a positive impact on the aggregate supply of credit (Paravisini, 2008). Borrowing with PCGs also help early entrepreneurs to build a credit reputation which might reduce their collateral requirements in future transactions (Berger et al., 2011). PCGs can also facilitate borrowing to early entrepreneurs in capital intensive industries until they accumulate enough assets to access the financial markets without external insurance.

The appeal of PCGs compared to direct subsidies is that the screening, monitoring, and collection tasks can be performed by private financial institutions that might have more expertise in performing these tasks than the provider of the guarantees (Honohan, 2008). The delegation of management tasks in indirect interventions is a significant advantage over direct subsidies, given that most of the time direct subsidies managed by the government do not achieve their expected performance (Khwaja and Mian, 2005; Zia, 2008).

In this study, we focus on a PCG structure where the government provides the guarantees and the private sector provides the principal and performs the screening, monitoring, and collection of the loan installments. Though this structure is very common for PCGs in developing countries, it is not the only one. For example, in some countries PCGs are privately funded. Also, in some countries, the government has a more active role in the screening and monitoring of loans. For a comprehensive description of the different PCG structures across countries see Beck et al. (2010).

The results for this study are based on the operations of the Chilean Credit Guarantee Program (FOGAPE) between January 2003 and September 2006. During that time frame, FOGAPE had a fund of US$60 million in liquid assets, and the law allowed the administration to provide guarantees to loans for a total of up to ten times the size of the fund.

The administration of FOGAPE allocates guarantees among the financial institutions through an auction with sealed bids. Financial institutions can use the allocated guarantees to insure loans at their discretion, subject to satisfying the following conditions:

- Only new loans are eligible for insurance (new loans to preexisting clients are eligible, but preexisting loans are not).

- Insured loans cannot exceed US$ 200,000.

- The maximum coverage ratio for loans below US$ 120,000 is 80%.

- The maximum coverage ratio for loans above US$ 120,000 is 50%.

- The client has to be up to date on all its financial obligations to be eligible for guaranteed loans.[5]

- Only clients with yearly sales below US$ 1,000,000 can get insured loans.

The management of the guarantees charges each institution a fee that depends on its historic default rate on insured loans. Due to legal restrictions, the fee cannot exceed 2%. Further, the administration reserves the right to exclude institutions from the auction based on poor past performance.

In each auction, the insurance administration offers to guarantee a fixed volume of loans. These guarantees are allocated among all participating financial institutions. Each financial institution requests guarantees for a certain volume of loans, at a certain coverage ratio. Institutions requesting the lowest coverage ratio have priority over other institutions to get guarantees for their lending. In the event of a tie in the requested coverage ratio, the tied institutions receive guarantees pro rata to their requested volume. Therefore, if the insurance administration offers to guarantee a volume of loans larger than the aggregated volume requested by all financial institutions, then each institution receives guarantees for 100% of the loan volume requested. On the other hand, if the volume of loans to be guaranteed offered by the insurance administration is smaller than the aggregated volume requested

[5] This restriction is intended to avoid situations in which a financially distressed client pays off its uninsured debt with newly issued insured debt. In practice, it is easy for banks and clients to hide financial distress from the administration of the guarantees; therefore, this restriction is weakly enforceable.

by all financial institutions, then the guarantees are allocated in a pecking order from the institution with the lowest coverage ratio to the institution with the highest coverage ratio until guarantees are exhausted. In Table 1, we present the results of the auctions for the five largest financial institutions in Chile between 2003 and 2006. In the odd rows, we present the coverage ratio requested by each institution. In the even rows, we present the guarantees allocated to a financial institution as a fraction of its requested volume. For example, on 06/19/03 all institutions requested an 80% coverage ratio and the summation of the loan volume to be guaranteed requested by each bank was 64% higher than the available guarantees. As a consequence, all institutions were allocated guarantees for 61% of their requested loan volume. On 09/01/05, institution 1 requested a 69% coverage ratio, while the rest of the institutions requested 70% coverage ratios. Consequently, institution 1 received guarantees for 100% of its requested loan volume, while the other institutions received guarantees for 8% of their requested loan volume.

2.2. Data

The data in this study is from two sources FOGAPE and SBIF. The administration of FOGAPE provides us with the bids of each financial institution and the outcome of each auction. FOGAPE also provides us with the following information about insured loans: the identification number of the borrower, the identification number of the issuing institution, the issue date, the loan size, the coverage ratio, and the maturity.[6]

The Chilean Bureau for Bank Regulation (SBIF) provides financial information at the bank-borrower-typeofcredit-month level: for each firm i, bank b, type of credit l, and time t we observe the total credit amount and the fraction of the amount that has been in arrears.[7]

[6]To comply with the Chilean law for bank information privacy the identification number of the borrower was fictitious, but consistent across time.

[7]Credit type l can be commercial credit, consumption credit, or mortgages. For this study we are interested in loans that can be spent at the discretion of the borrower and that are not secured by a specific and sizable asset. Therefore mortgages are excluded from the analysis.

We solely focus on amounts that have been in arrears for more than 60 days as these loans are considered delinquent for regulatory purposes.

This financial information is self-reported by all formal financial institutions; reporting is mandatory, and the data is audited by the SBIF.[8] The SBIF uses the data to control whether the banks satisfy the capital requirements recommended in the Basel treaty. The registry also provides financial institutions with information about the riskiness and leverage of potential borrowers. The version of the registry available to financial institutions includes the total credit amount and late payment amounts of each borrower, but does not disclose the distribution of these amounts among different banks.

For the analysis in the paper, some variables are aggregated at the institution level. C_{bt} is the total credit to SMEs by bank b at time t and equals the summation of all loans outstanding to SMEs ($\sum c_{ibt}$), N_{bt} is the total number of new loans to SMEs by institution b at time t, and $\bar{C}_{bt}$ is the average size of new loans to SMEs by institution b at time t.[9]

We also generate state variables at the client level. The variable "number of banks" nb_{it} indicates the number of banks in which the borrower i has non-zero debt at time t, and the variable "simultaneous" s_{it} takes the value of one if the borrower i maintains both uninsured and insured loans in at least one financial institution at time t and zero otherwise.

For the analysis in this study, we use the fact that commercial loans are eligible for insurance, but consumption loans are not. The distinction between consumption and commercial loans is based on the borrower's declared use of the money. However, since money is fungible, the borrower can indiscriminately use commercial or consumption loans for business or household expenses. In our FE approach, identification comes from borrowers that

[8]Similar registries exist in other countries. The information collected in these registries varies across countries. Some countries collect very detailed information about the borrowers that can include credit amount, late payments, demographic data, credit inquiries, ratings, and even utility payments. Other countries collect less detailed information, and in some countries the information is only collected for large borrowers (Djankov et al., 2007).

[9]We do not have balance sheet information; therefore, we use loan size as a proxy for firm size. Any firm with credit equal or less than US $ 200,000 is considered an SME.

simultaneously have consumption and commercial loans with the same bank.

During the period of analysis, approximately 100,000 operations were insured. In Table 2, we observe that for the sample period, FOGAPE guaranteed between 5.5% and 8% of the total loans in the financial system. The average coverage ratio was 68%, and the average size of an insured loan was $12,433 in 2004, $14,173 in 2005, and $17,466 in 2006.

In Table 3, we observe that among clients with insured loans, the average number of banks is approximately 2.5, the delinquency rate ranges from 4.5% to 6.9% depending on the year, and the average fraction of clients that maintain uninsured and insured loans at the same bank is approximately 17%.

3. Methodology and Results

3.1. Guarantees and Repayment Distortions

PCGs aim to reduce the credit constraints of SMEs which are particularly vulnerable due to the lack of collateral (Menkhoff et al., 2006). However, substituting collateral with insurance might come at a cost; collateral can be used to reduce adverse selection (Bester, 1985; Jimnez et al., 2006) and to increase monitoring (Rajan and Winton, 1995). Therefore, we are concerned that loans issued with PCGs might suffer from adverse selection and/or moral hazard problems.

Our analysis of the distortions associated with credit insurance relies on the study of two types of loans: "loans that are eligible for insurance" and "loans that are not eligible for insurance". Before we proceed, we will clarify the analysis with an example: let's assume that we only have one borrower i that borrows from two identical banks; b and c. The borrower has two loans with each bank. Let's call the loans b_e, b_{ne}, c_e, and c_{ne}, and their delinquency rates d_{b_e}, $d_{b_{ne}}$, d_{c_e}, and $d_{c_{ne}}$. Loans b_e and c_e are eligible for insurance but loans b_{ne} and c_{ne} are not. Borrower i agrees with bank b to insure loan b_e, and agrees with bank c to leave loan c_e uninsured. If the information set of bank b about client i changes as a consequence of insuring loan b_e, we expect the delinquency of both b_e and b_{ne} to be affected. In that case, $d_{b_e} \neq d_{c_e}$ and $d_{b_{ne}} \neq d_{c_{ne}}$. On the other hand, if insuring b_e does not affect the information set of bank b about client i, we expect $d_{b_{ne}} = d_{c_{ne}}$.

In our analysis, loans labeled by the registry as "commercial loans" are equivalent to loans b_e and c_e in the example and are legally eligible for insurance. Similarly, loans labeled by the registry as "consumption loans" are equivalent to loans b_{ne} and c_{ne} and are not eligible for insurance. The category of a loan depends on the borrower's declared use of the money; however, because money is fungible, the borrower can indiscriminately use commercial or consumption loans for business or household expenses. Therefore, the category of the loan is immaterial.[10] Note that our strategy does not depend on the characteristics of "loans eligible for insurance" being the same as the characteristics of "loans not eligible for insurance". Furthermore, in our specification we explicitly assume that the borrower might have different incentives to repay "loans eligible for insurance" and "loans not eligible for insurance".

In a standard non FE OLS approach, the effect of insurance on delinquency rate is estimated using the following specification:

$$d_{ibl} = K + \beta I_{ibl} + \epsilon_{ibl}, \tag{1}$$

where d_{ibl} is the delinquency of firm i on loan l (at bank b), and I_{ibl} takes the value of one if loan l is guaranteed and zero otherwise. The problem in the former specification is that insured loans and uninsured loans can be allocated to clients with different characteristics, and β might capture these differences in characteristics rather than the effect of the insurance on delinquency rates. To address this problem, we exploit the fact that we separately observe the delinquency rate on loans eligible for insurance and those not eligible for insurance. In addition, we take into account the fact that clients maintain insured and uninsured loans

[10]While not common, some clients might maintain several consumption loans at the same bank and/or several commercial loans at the same bank. For the analysis in the paper, we aggregate all consumption loans of client i at bank b and treat it as a single loan. Similarly, we aggregate all commercial loans of client i at bank b and treat it as a single loan.

with multiple banks.

Our identification strategy is as follows: we model the default rate on "insurance eligible loans" as:

$$d_{ibe} = K + \alpha_{ib} + \varphi_{i_e} + \gamma_b + \beta I_{ibe} + \epsilon_{ibe}, \tag{2}$$

where d_{ibe} is the delinquency rate of firm i on its insurance eligible loan at bank b, α_{ib} captures how the specific relationship between bank b and borrower i affects delinquency, φ_{i_e} captures the effect of borrower characteristics on its delinquency on insurance eligible loans, γ_b captures bank wide policies that affect repayment, and I_{ibe} takes the value of one if the loan is insured and zero otherwise.

Similarly, we model the default rate on "loans not eligible for insurance" as:

$$d_{ibne} = K + \alpha_{ib} + \varphi_{ine} + \gamma_b + \epsilon_{ibne}, \tag{3}$$

Where most parameters are the same as in equation 2. And φ_{ine} is different from φ_{i_e} because the cost of defaulting on insurance eligible loans might be different from the cost of defaulting on loans not eligible for insurance. For example, it is possible that not honoring the installments on a loan not eligible for insurance might have a stronger impact on the borrower's credit score than not honoring the installments on a loan eligible for insurance.

We can include a borrower fixed effect in equation 2 to control for firm characteristics; however, the equation will still be misspecified as long as default depends on idiosyncrasies at the firm-bank level (α_{ib}). Nonetheless, because some borrowers simultaneously maintain loans eligible for insurance and loans not eligible for insurance at the same bank, we can subtract equation 3 from equation 2. This leads to the following specification:

$$d_{ibe} - d_{ibne} = \varphi_{i_e} - \varphi_{ine} + \beta I_{ibe} + \epsilon_{ibe} - \epsilon_{ibne} \tag{4}$$

calling $\tilde{\varphi}_i = \varphi_{i_e} - \varphi_{ine}$, and $\tilde{\epsilon_{ib}} = \epsilon_{ibe} - \epsilon_{ibne}$, equation 4 reduces to:

$$d_{ibe} - d_{ibne} = \tilde{\varphi}_i + \beta I_{ibe} + \tilde{\epsilon_{ib}} \tag{5}$$

Note that 5 does not depend on α_{ib}. Following Khwaja and Mian (2008) we can include a firm fixed in specification 5 to control for firm characteristics. The OLS estimation of specification 5 is presented in tables 4, and 5.

Table 4 shows that twelve months after a guaranteed loan is issued, its delinquency rate is on average 1.3% higher than the delinquency rate on similar loans issued without guarantees. The gap in delinquency rate between guaranteed loans and regular loans widens over time. More specifically, 24 months after a guaranteed loan is issued, its delinquency rate is on average 2.4% higher than the delinquency rate on similar loans issued without guarantees. These results are robust to including a rich set of fixed effects (e.g. time, bank, firm, firm-time, and firm-bank), and support our view that the presence of insurance reduces the likelihood that the borrower repays the loan.

One explanation for the increased delinquency is that borrowers have lower incentives to repay insured loans (even if the bank exerts the same level of effort in collecting the installments of insured and uninsured loans). However, borrowers remain liable for the unpaid balance even if the government repays the capital to the bank, which makes this explanation unlikely. A second explanation is that banks reduce monitoring when insurance is in place and therefore have less information to enforce repayment. A third explanation is that banks, even with the same information about the borrower, decide to reduce their collection efforts. To test the second and the third explanations, we assess whether the fact that client i has an insured loan at bank b affects the delinquency rate on its non-eligible insurance loan at bank b. If borrower i having an insured loan at bank b reduces the incentives of the bank to monitor, then both the repayment rate on the insured loan and the repayment rate on the uninsured loan should be (negatively) affected by the presence of guarantees. In table 6, we observe that borrower i having an insured loan with bank b has no effect whatsoever on the delinquency rate on its loan not eligible for insurance. This finding supports the view that the increase in the delinquency rate of insured loans is not explained by reduced monitoring efforts, but rather by a reduction in the bank's effort to collect the installments of insured loans.

There are many reasons why banks might not reduce monitoring even when repayment is guaranteed. One explanation is that effective monitoring increases banks' information about the borrower, thus increasing the expected value of future transactions with the borrower (see Petersen and Rajan (1994, 1995) for a detailed explanation of this mechanism). Therefore, even if repayment is guaranteed, it is still in the interest of the bank to exert effort in monitoring the client. On the other hand, reducing the collection effort is cheap for the bank because the government covers most of the losses, and the reduction in collection efforts is less likely to affect the value of future transactions with the borrower.

3.2. Guarantees and Loan Size at the Borrower Level

In this section we study how guarantees affect the size of loans to small borrowers. The methodology resembles that in section 3.1 with a small twist; we start from the following specification:

$$log_{ibe} = K + \alpha_{ib} + \varphi_{ie} + \gamma_b + \beta I_{ibe} + \epsilon_{ibe}, \tag{6}$$

Where most variables are equivalent to those in equation 2 and log_{ibe} is the logarithm of the size of the insurance eligible loan of client i with bank b. In this case, we cannot construct the analogue to equation 5 in section 3.1, because borrowers seldom get a loan eligible for insurance and a loan not eligible for insurance at the same time and in the same institution. We can, however, take the first time difference to study how loan size growth is affected by the presence of guarantees.

The OLS estimation of the first time-difference of equation 6 is presented in table 7. We observe that credit growth is 25% larger when a loan is issued with guarantees, compared to a similar loan issued without guarantees. The effect is economically large in all estimations, but is not statistically significant when including firm, firm-period, and firm-institution fixed effects. The results in table 7 suggest that guarantees are effective in helping borrowers get larger loans if they need to. The caveat in this analysis is that we cannot control for characteristics at the firm-bank level. This might be problematic if borrower i has a different motivation to borrowing from bank b at time t, than to borrowing from bank $\tilde{b}$ at time $\tilde{t}$. Thus the results in table 7 should be interpreted cautiously.

3.3. Guarantees and Aggregated credit

We estimate how insurance affects the aggregated credit that goes to SMEs by exploiting the nonlinear variation in the amount of guarantees generated in the bidding process. We also include a time fixed effect to control for the aggregated trend in the credit market and an institution fixed effect to control for the heterogeneity between banks. We estimate the extent to which the amount of insurance allocated to financial institution b affects the total amount of credit, the average size of new loans, and the number of new loans issued to SMEs by institution b. Specifically we use the following specification:

$$\Delta X_{bt} = K + \beta \Delta I_{bt} + \mu_t + \gamma_b + \epsilon_{bt}, \tag{7}$$

where Δ is the first time-difference operator, X_{bt} is the dependent variable (e.g. total credit, number of new loans, and average size of new loans) for institution b at time t , I_{bt} is the guarantees allocated to institution b at time t, μ_t captures time fixed effects, and γ_b captures bank fixed effects.

In Table 8, we present the effect of the availability of insurance on the amount of credit issued to SMEs. In the first three columns we present the effect on the total amount of credit. In columns four through nine, we separate the effect into two categories: credit for new clients and credit for preexisting clients. We observe that for each additional unit of guarantees to institution b, its credit to SMEs increases by 0.65, credit to new clients increases by 0.21, while credit for preexisting clients increases by 0.44.

The increase in credit found in Table 8 can be explained by an increase in the size of new loans, an increase in the number of new loans, or both. In Table 9, we present the effect of guarantees on the number and average size of new loans and loan renewals. In the first, second, and third columns, we observe that the addition of guarantees for loans equivalent to US$ 1,700 (Chilean$1,000,000) is associated with an increase of 0.147 in the number of loans, 0.022 in the number of new loans, and 0.125 in the number of loan renewals; all changes are significant at the 1% level.

In section 3.2, we showed that when more guarantees are allocated to a bank, the bank increases the size of loans to small business. We also expect banks to increase the number of loans to small business (who borrow smaller amounts) when they are allocated more guarantees. Therefore, the effect of guarantees on the average loan size issued to SMEs is ambiguous. In the fourth, fifth, and sixth columns of table 9, we observe that the addition of guarantees does not change the average loan size, suggesting that the effects previously described cancel each other.

In specification 7, we control for time trends and for institutional fixed characteristics. However, there can still be time varying institutional characteristics that are correlated to the amount of guarantees allocated to financial institutions. For example, banks might increase their bids for insurance when there is an increase in the demand for credit and that would create a spurious positive correlation between the amount of insurance and credit for SMEs. Because the auction data is at the institution-time level, we cannot include $time-institution$ fixed effects to control this bias. However, we can address this concern by using the structure of the auction.

As described in section 2, the availability of insurance to institution b depends on the volume of guarantees offered by FOGAPE, the institution's b bid in the auction, and the other participants' bids in the auction. Institution b can affect the outcome of the auction by changing its own bid, but the other variables are beyond its control. We estimate the expected amount of insurance to institution b (from the perspective of institution b) as the fitted value of the following specification:

$$I_{bt} = K + \omega CR_{bt} + \rho G_{bt} + \epsilon_{bt} + \mu_t + \gamma_b \tag{8}$$

where I_{bt} is the amount of guarantees allocated to institution b at time t, CR_{bt} is the coverage ratio requested by institution b at time t, G_{bt} is the volume of guarantees requested by institution b at time t, μ_t captures time fixed effects, and γ_b captures bank fixed effects. The residual of the OLS estimation of specification 8 can be interpreted as the "unexpected" amount of insurance allocated to institution b.

As a robustness check to our findings in table 8, we re-estimate equation 7 by substituting the amount of insurance allocated to each institution with the residual of equation 8. This leads to the following specification,

$$\Delta X_{bt} = K + \beta \Delta R_{bt} + \mu_t + \gamma_b, \tag{9}$$

that is similar to specification 7, except we use the residual of equation 8 R_{bt} instead of the allocated amount of insurance I_{bt}.

The results of the OLS estimation of specification 9 are presented in Table 10. We see that one unit of "unexpected" insurance increases total credit by 0.61, credit to new clients increases by 0.23, and credit to preexisting clients increases by 0.38. The results in Table 10 provide additional support to the idea that PCGs increase the aggregated amount of credit available to SMEs.

4. Conclusions and Policy Implications

The results in this paper show that partial credit guarantees severely affect the repayment of insured loans. In particular, insured loans between borrower i and bank b are 2.4% more likely to be delinquent after 24 months of being issued than similar loans without insurance. Interestingly, the repayment of loans not eligible for insurance between the same borrower i and the same lender b remains unchanged. This lack of change suggests that banks reduce the effort exerted in collecting insured loans but do not reduce monitoring of the client.

The reduction in collection effort by the bank increases the borrower's delinquency rate, which can in turn undermine the borrower's future credit capacity with other banks.[11] Therefore, the importance of increasing the bank's collection incentives is twofold: it makes partial credit guarantees more sustainable, and most importantly, it positively affects the future credit capacity of the borrower that is one of the main objectives of partial credit guarantees.

We also confirm previous findings that guarantees are effective in increasing credit to SMEs. One unit of insurance is associated with an increase of 0.65 in the amount of credit issued to SMEs. Nonetheless, part of the insurance is allocated to loans that would have been issued anyway. A challenge for policy makers is to increase the fraction of the guarantees that are allocated to loans that would have not been issued without insurance.

[11] We are assuming a myopic client, which based on anecdotal information, is a sensible assumption for this type of borrower.

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Table 1: Insurance Bidding Summary

The following table presents the result of the auction for guarantees for the five largest financial institutions in Chile. The even rows present the coverage ratio requested by each institution, and the odd rows present the volume of guarantees allocated to each institution as a fraction of the volume it requested. All values are expressed in percentages.

	Inst. 1		Inst. 2		Inst. 3		Inst. 4		Inst. 5	
Date	cover	funds	cover	funds	cover	funds	cover	funds	cover	funds
03/31/03	80	98	80	98	80	98	80	98	80	98
06/19/03	80	61	80	61	80	61	80	61	80	61
09/22/03	80	47	80	47	80	47	80	47	80	47
12/19/03	80	67	80	67	80	67	80	67	80	67
03/31/04	70	100	80	92	80	92	80	92	80	92
06/30/04	70	100	80	81	80	81	80	81	80	81
09/30/04	70	100	80	77	80	77	80	77	80	77
12/30/04	70	100	80	61	80	61	80	61	80	61
04/01/05	70	100	80	58	80	58	80	58	80	58
07/01/05	70	100	80	12	80	12	80	12	80	12
09/01/05	69	100	70	8	70	8	70	8	70	8
11/01/05	67	100	60	100	65	100	70	7	67	100
01/02/06	60	100	60	100	65	100	60	100	65	100
03/16/06	60	100			65	100	65	100	65	100
05/01/06	60	100	80	100	65	100	70	100	65	100
07/01/06	63	100	80	100	80	100	80	100	70	100
09/01/06	70	100	80	100	75	100	80	100	70	100

Table 2: Number of New Operations and Average Loan Size

The following table presents the total number of new credit operations in the Chilean financial market, the fraction of those operations that are insured, the average loan size including all new operations, the average loan size of insured operations, and the average coverage ratio of insured operations.

	New operations	Fraction of loans with insurance	Loan size	Insured loan size	Coverage ratio
2004	435205	7.97%	26,238	12,433	69.9%
2005	436421	7.57%	25,867	14,173	68.9%
2006	461671	5.56%	25,669	17,466	66.8%

Table 3: Summary Statistics for Insured Borrowers

The following table presents the average number of bank relationships for borrowers with insured loans, their average delinquency rate, and the fraction of those borrowers that have insured and uninsured loans coexisting in the same bank.

Year	Average N of banks	Delinquency rate	Simultaneous loans
2004	2.38	4.5%	15.4%
2005	2.46	5.7%	18.1%
2006	2.57	6.9%	18.3%

Table 4: Effect of Guarantees on Delinquency Rates Twelve Months After the Loan is Issued

This table presents the double difference in delinquency rates between loans eligible for insurance and loans not eligible for insurance when guarantees are used, compared to the difference in delinquency rates between loans eligible for insurance and loans not eligible for insurance when guarantees are not used. Delinquency is estimated twelve months after a loan eligible for insurance is issued. Columns differ in the type of fixed effects included in the estimation. Standard errors in parentheses are clustered at the bank level.

	Insurance eligible - Insurance non eligible					
Guarantees	0.013***	0.013***	0.018***	0.013***	0.012***	0.011***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
N	287891	287891	287891	287891	287891	287891
$adj-r^2$	0.001	0.002	0.004	0.199	0.392	0.393
Time f.e.	no	yes	yes	yes	no	no
Bank f.e.	no	no	yes	yes	no	no
Firm f.e.	no	no	no	yes	no	no
Firm-time f.e.	no	no	no	no	yes	no
Firm-bank f.e.	no	no	no	no	no	yes

Table 5: Effect of Guarantees on Delinquency Rates Twenty Four Months After the Loan is Issued

This table presents the double difference in delinquency rates between loans eligible for insurance and loans not eligible for insurance when guarantees are used, compared to the difference in delinquency rates between loans eligible for insurance and loans not eligible for insurance when guarantees are not used. Delinquency is estimated twenty four months after a loan eligible for insurance is issued. Columns differ in the type of fixed effects included in the estimation. Standard errors in parentheses are clustered at the bank level.

	Insurance eligible - Insurance non eligible					
Guarantees	0.028***	0.027***	0.037***	0.022***	0.018**	0.012**
	(0.009)	(0.008)	(0.005)	(0.004)	(0.008)	(0.004)
N	212599	212599	212599	212599	212599	212599
$adj - r^2$	0.003	0.003	0.033	0.370	0.560	0.563
Time f.e.	no	yes	yes	yes	no	no
Bank f.e.	no	no	yes	yes	no	no
Firm f.e.	no	no	no	yes	no	no
Firm-time f.e.	no	no	no	no	yes	no
Firm-bank f.e.	no	no	no	no	no	yes

Table 6: Delinquency rate For Insurance Eligible Loans and Insurance Non Eligible Loans Twelve Months After the Loan is Issued

The first three columns in the table present the single difference in delinquency rate between loans eligible for insurance issued with guarantees, compared to the delinquency rate of loans eligible for insurance issued without guarantees. The last three columns present the single difference in delinquency rate between loans not eligible for insurance that coexist with guaranteed loans, compared to the delinquency rate of loans not eligible for insurance that coexist with loans eligible for insurance issued without guarantees. Delinquency is estimated twelve months after a loan is issued. Columns differ in the type of fixed effects included in the estimation. Standard errors in parentheses are clustered at the bank level.

	Insurance eligible			Insurance non eligible		
Guarantees	0.017***	0.015***	0.014***	0.000	0.001	0.001
	(0.001)	(0.003)	(0.002)	(0.001)	(0.002)	(0.002)
N	287891	287891	287891	49902	49902	49902
$adj-r^2$	0.263	0.474	0.476	0.333	0.445	0.445
Firm f.e.	yes	no	no	yes	no	no
Firm-time f.e.	no	yes	no	no	yes	no
Firm-bank f.e.	no	no	yes	no	no	yes

Table 7: Effect of Guarantees on Loan Size Growth at the Borrower Level

This table presents the difference between the growth rate of loans issued with guarantees and the growth rate of similar loans issued without guarantees. Growth rate is estimated as the difference in the logarithm of the new loan amount $log(newloanamount + 1)$, and the logarithm of the pre-existing credit amount $log(preexistingcreditamount + 1)$. Columns differ in the type of fixed effects included in the estimation. Standard errors in parentheses are clustered at the bank level.

	Loan size growth					
Guarantees	0.297***	0.253**	0.310***	0.141	0.290	0.229
	(0.091)	(0.096)	(0.097)	(0.189)	(0.327)	(0.323)
N	62175	62175	62175	62175	62175	62175
$adj - r^2$	0.002	0.007	0.016	0.159	0.257	0.264
Time f.e.	no	yes	yes	yes	no	no
Bank	no	no	yes	yes	no	no
Firm f.e.	no	no	no	yes	no	no
Firm-time f.e.	no	no	no	no	yes	no
Firm-bank f.e.	no	no	no	no	no	yes

Table 8: Availability of Credit Guarantees and Aggregated Amount of Credit for Small Businesses

This table presents the effect of credit insurance on the aggregated amount of credit available for small- and medium-sized entrepreneurs. Columns one, two, and three present the total increase in credit generated by one additional unit of insurance. Columns four, five, and six present the increase in credit to new clients generated by one additional unit of insurance, and the rest of the columns present the increase in credit to preexisting clients generated by one unit of insurance. Standard errors in parentheses are clustered at the bank level.

	Credit increase								
	Total			New			Renewed		
Insurance	0.792***	0.787***	0.649***	0.253***	0.253***	0.207***	0.539***	0.535***	0.442***
	(0.101)	(0.104)	(0.099)	(0.048)	(0.049)	(0.062)	(0.062)	(0.064)	(0.075)
N	475	475	475	475	475	475	475	475	475
adj r^2	0.0382	0.0070	0.1284	0.0509	0.0169	0.1483	0.0237	-0.0067	0.0692
Bank f.e.	no	yes	yes	no	yes	yes	no	yes	yes
Time f.e.	no	no	yes	no	no	yes	no	no	yes

Table 9: Availability of Credit Guarantees and Number and Size of Loans to SMEs

This table presents the effect of credit insurance on the total number of loans issued to small- and medium-sized entrepreneurs, and the effect of credit insurance on the average size of loans to SMEs. Columns one, two, and three present the increase in the number of loans generated by the addition of $ 1,700 (Ch $ 1,000,000) of insurance, and columns four, five, and six present the increase in loan size. Standard errors in parentheses are clustered at the bank level.

	Number of loans			Size of loans		
	Total loans	New loans	Renewed loans	All loans	New loans	Renewed loans
Insurance	0.147***	0.022***	0.125***	-0.219	-0.194	-0.173
	(0.051)	(0.005)	(0.047)	(0.296)	(0.228)	(0.247)
N	475	475	475	452	450	440
adj r^2	-0.0302	0.1298	-0.0376	0.0347	0.0017	-0.0206
Bank f.e.	yes	yes	yes	yes	yes	yes
Time f.e.	yes	yes	yes	yes	yes	yes

Table 10: Credit to SMEs as A Function of Unexpected Changes in the Availability of Guarantees

This table presents the effect of unexpected changes in availability of guarantees on the aggregated amount of credit available for small- and medium-sized entrepreneurs. Columns one, two, and three present the total increase in credit generated by one unexpected additional unit of insurance, columns four, five, and six present the increase in credit to new clients generated by one unexpected additional unit of insurance, and the rest of the columns present the increase in credit to preexisting clients generated by one unexpected unit of insurance. Standard errors in parentheses are clustered at the bank level.

	Credit increase								
	Total			New			Renewed		
Residual	0.671	0.665	0.613*	0.266**	0.265**	0.234**	0.405	0.400	0.378
	(0.414)	(0.418)	(0.339)	(0.118)	(0.12)	(1.109)	(0.327)	(0.331)	(0.286)
N	475	475	475	475	475	475	475	475	475
adj r^2	0.0116	-0.0203	0.1127	0.0257	-0.0092	0.1347	0.0048	-0.0260	0.0578
Bank f.e.	no	yes	yes	no	yes	yes	no	yes	yes
Time f.e.	no	no	yes	no	no	yes	no	no	yes