Credit Guarantees, Firm Response, and Macroeconomics

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Abstract

We evaluate the impact of Belgium's 2020 Public Credit Guarantee Scheme (CGS). By using administrative data, we exploit a policy-induced discontinuity in loan eligibility: although all firms were eligible for the Scheme, firms with fewer than 50 employees received a 25 basis point (bp) lower interest rate. We compare firms just below the 50-employee threshold to those just above it. Our results suggest that firms benefiting from the lower interest rates experienced increases in employment, operating revenues, and investment. The policy operates by partially alleviating price-related credit constraints: we show that for every €1 of guaranteed debt provided at a 25 bp lower interest rate, decrease non-guaranteed debt by €0.13.

Keywords: Credit guarantees, credit frictions, regression discontinuity design
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1 Introduction

During periods of economic disruption, governments often seek to stimulate economic activity through firm-level interventions. Policymakers have long debated the optimal design and implementation of these measures. This paper empirically examines one such intervention by assessing the impact of guaranteed loans on firms' economic performance. Guaranteed loans have emerged as a widely used policy tool globally, aimed at supporting high-risk borrowers who lack sufficient collateral to obtain credit. In this arrangement, a third party—typically the government—partially or fully guarantees the loan, thereby insuring banks against the risk of firm default. Firms that secure guaranteed loans also benefit from more favorable pricing terms relative to other debt instruments.

Our paper provides novel evidence on the effects of alleviation of credit constraints using Belgium's 2020 Credit Guarantee Scheme (CGS). We contribute to these policy discussions by leveraging a policy-induced variation in the pricing conditions of guaranteed loans. Specifically, we exploit a discontinuity in loan price eligibility. While all firms were eligible to apply for the CGS, those with more than 50 employees were required to pay an additional fee of 25 basis points (bp), in compliance with EU State aid regulations.

The setup in our paper provides an ideal context for isolating the causal effect of favorable pricing conditions on firm outcomes. As we later show, firms near the eligibility threshold are comparable in all key dimensions, including access to additional credit, with the only distinction being that some receive more favorable loan pricing conditions. Using a regression discontinuity (RD) design, we compare firms above and below the 50-employee threshold to estimate the causal impact of lower borrowing costs for credit guarantees on firms' economic performance.

Our main results show that a reduction on interest rates for guaranteed loans improves firms' real outcomes. In particular, firms benefiting from lower interest rates increase their investment rate, employment growth, and revenue growth by 0.20 pp., 0.31 pp., and 0.34 pp. relative to firms paying higher interest rates. However, firms along the eligibility cutoff where not different in economic performance on year prior the policy was implemented.

Both constrained and unconstrained firms may be eager to take advantage of all the guaranteed credit available, as it is often more affordable than other funding sources. However, constrained firms will use this credit to expand investment, whereas unconstrained firms will mainly use it to replace existing borrowing. What we are finding is firms are rather price constrained. Our evidence suggest that the effect captured with our RD design is consistent with better price conditions on credit guarantees mitigating price-related financial frictions for firms. In particular, we find that firms enjoying lower interest rates do

not accumulate more guaranteed debt; instead, they reduce non-guaranteed debt by 0.18 pp. more, which lowers average interest costs by 0.015 pp. compared to firms accessing guaranteed loans at a relatively higher interest rate. By partially replacing existing debt, these firms can alleviate the debt overhang problem, which occurs when a debt burden becomes so substantial that it precludes the entity from taking on additional debt to finance future projects. With reduced debt overhang problem, firms can increase investment and employment by undertaking more profitable projects.

Literature Review: Our paper contributes to the literature on financial frictions and macroeconomics by offering micro-level evidence on how relaxing credit constraints, particularly during times of economic hardship, can reshape the economic landscape. Credit access limitations are now widely recognized as a crucial aspect of the economic environment. For instance, using India as a case study under a targeted lending program, Banerjee and Duflo (2014a) demonstrate the significant role that credit alleviation plays in a firm's decision-making process. We contribute to these discussions by demonstrating that, in addition to credit constraint channel, the pricing of credit plays a crucial role as well. We show that credit guarantees can similarly improve outcomes by facilitating access to cheaper credit and mitigating the debt overhang problem.

Our paper also joins the literature on alleviation measures for firms that are in stress. Önder et al., 2023 study the effect of firm moratoria and following the COVID-19 pandemic, subsequent policies regarding credit guarantees emerged. Some recent studies are Gonzalez-Uribe and Wang 2022,Bonfim et al. 2023, Lelarge et al. 2010. Our paper contributes to this literature by providing a causal estimate that can isolate the impact of loan pricing for credit guarantees. Additionally, our paper also contributes to the literature studying the impact of policy interventions on financial frictions faced by firms (Brown et al. 2009, Banerjee and Duflo 2014b). We show that lower borrowing costs with credit guarantees impact firms primarily by reducing price related financial frictions.

2 Institutional Details and Research Design

We begin by describing the characteristics of the 2020 CGS in Belgium. Next, we focus on the policy's eligibility criteria for the interest rates charged to firms and how this feature creates the ideal scenario to isolate the causal impact of better price conditions on guaranteed loans.

2.1 The Belgian Credit Guarantees Scheme

First, we outline the characteristics of the 2020 CGS in Belgium. We provide details regarding eligibility to participate in the guarantee program, as well as the characteristics and conditions of the guaranteed loans.

The Belgian government announced the implementation of the CGS on April 1st, 2020. The envelope amount for the guarantee scheme was €50 billion, equivalent to 11.8% nominal GDP in 2020, and accounted for more than 90% of the nominal fiscal measures put forward by the Belgian government to respond to the COVID-19 pandemic. The program targeted firms affected by liquidity problems linked to the pandemic: eligible Belgian firms need not have arrears on existing loans and tax and social security contributions by February 1, 2020, and have less than 30 days in arrears by February 29, 2020.[1]

Under the first scheme, valid from April 1 to December 31, 2020, Belgian financial institutions received a fraction of the €50 billion envelope based on their market share to issue new loans to any eligible firm. New loans guaranteed by the Belgian government[2] had a maturity up to a year. Guaranteed loans could be destined for any purpose except to refinance existing credits (i.e., issued before April 1, 2020). The maximum loan amount was determined by the highest among the (i) the firm's liquidity needs[3], (ii) twice the last wage bill reported by the firm, and (iii) 25% of the firm's turnover reported in the previous financial report. Most importantly, the interest rate, which included a fee for the guarantee the lender needed to refund the government, was capped differently for certain firms receiving guaranteed loans.

2.2 Loan Price Conditions on Guaranteed Loans

Now, we describe the circumstances generating a differential interest rate on new loans guaranteed by the Belgian government in 2020. We show that eligibility for better price conditions on guaranteed loans was linked to a size category defined by three pre-determined dimensions: employment, turnover, and total assets.

Eligible firms receiving guaranteed loans were charged a differential interest rate that was directly linked to their size category. Specifically, the loan pricing varied due to the differential guarantee fee: (i) 25 basis points (bp.) for Small and Medium Enterprise (SMEs)

[1] With the COVID-19 pandemic, the European Commission relaxed the restrictions on state aid allowing EU economies to implement CGS under the *Temporary Framework*, which, among other things, defined eligibility requirements based on the definition of "*undertakings in difficulty*" (Anderson et al. 2021)

[2] In the event of default, the Belgian government would cover 50% and 80% of the losses on guaranteed loans after the bank's reference portfolio losses were 3%-5% and more than 5%, respectively.

[3] Which was set to 12 months for Small and Medium Enterprises and 18 months for large enterprises.

and (ii) 50 bp. for large enterprises. This meant that the interest rate on guarantee loans was capped at 1.50% for SMEs and 1.75% for large enterprises.

The size category a firm receives in a given year is based on comparing the last two previous yearly balance sheet reports with three thresholds: 50 full-time employees, a turnover of €9 million, and €4.5 million in total assets. Any firm surpassing no more than one threshold is classified as an SME, while it is categorized as large if it is above two or more thresholds. It is worth noticing that employment is the most relevant dimension in determining a firm's size category. Particularly, about 98% of firms during 2018-2019 are classified as SMEs or Large corporations due to the employment being above and below the 50-employee threshold.

Overall, this implies that for firms receiving guarantee loans in 2020, the interest rate deterministically increases once pre-determined employment, assets, or turnover surpasses more than one of the cutoffs defining the size category for firms.

2.3 Identification

Next, we argue how the discontinuity in eligibility to receive a different guaranteed loan pricing can be exploited as an exogenous source of variation to estimate the effect of lowering the interest rate on credit guarantees. Then, formulate the empirical strategy characterizing our RD setup.

As explained previously, the differential fee imposed by the Belgian government to provide guarantees on new loans under the CGSs in 2020 generated a unique variation in borrowing costs: the interest rate on guaranteed loans reduced deterministically by 25 bp. for firms classified as SMEs relative to large corporations.

The first step to define our empirical strategy is to single out firms receiving credit guarantees in 2020. This step is crucial as the discontinuity in the interest rate is only relevant for firms that obtain guaranteed loans. To identify firms participating in the CGSs, we employ administrative balance-sheet data on statements for amounts payable for 2020; in that year, firms were required to report in detail the outstanding amount on all items in their guaranteed debt portfolio. Using this information, we define firms participating in the Belgian CGSs if they report having a positive outstanding balance on total debts guaranteed by Belgian public authorities at the end of 2020.

Our second step is to reduce the number of dimensions characterizing the discontinuity of our RD setup to simplify our analysis. We know that receiving a lower interest rate on credit guarantees depends on a multidimensional size categorization defined by three cutoffs: employment, total assets, and turnover. But, as we described earlier, the

employment dimension is usually binding the most: firms typically receive a different size classification if they surpass the employment cutoff. With this in mind, we restrict our sample to firms that, at the end of 2018, were either (i) SMEs with less than 50 employees or (ii) large corporations with more than 50 employees. In this way, we are sure that firms above and below the employment cutoff are treated by a differential interest rate on their credit guarantees.

We can employ a *sharp* RDD setup based on the sample selection restrictions described before. For any firm "i" receiving a publicly guaranteed loan in 2020, let $FTE_i = 50 - fte_i$, be our running variable defined as the difference between the employment threshold and the number of employees (fte_i) for that firm at the end of 2018. Moreover, let D_i be the treatment indicator for receiving a lower interest rate (i.e., "treatment") on a guaranteed loan in 2020, with $D_i = 1$ a firm is treated and zero if the firm belongs to the control group. Given the regulatory conditions of the Belgian CGSs, we know that D_i is entirely defined by the running variable FTE_i. Therefore:

$$D_{ij} = \mathbf{1}\{FTE_i \geq 0\} \tag{1}$$

To obtain our *sharp*-RD estimates, we employ a local non-parametric linear regression approach (Calonico et al., 2014). In particular, for an outcome variable $Y_{i,t}$ of firm "i" at the end of year "t" we estimate:

$$\arg\min_{\boldsymbol{\beta}_{Y_t}} \sum_{i}^{I} \Big(Y_{i,t} - \beta_{0,Y} - \beta_{1,Y_t} D_i + \beta_{2,Y_t} FTE_i - \beta_{3,Y_t} FTE_{ij} \times D_i \Big)^2 K\left(\frac{FTE_i}{h}\right) \tag{2}$$

In the non-parametric approach described in equation (2), we first estimate the optimal employment bandwidth "h" to determine the firm variation arbitrarily close to the cutoff we employ. Then, restricting our sample to firms within the optimal bandwidth, we estimate $\boldsymbol{\beta}_{Y_t}$ by minimizing the quadratic sum of residuals weighted by our triangular kernel $K(\cdot)$ giving more importance to firms closer to the cutoff.

The baseline specification in our RD design controls for fixed effects at the two-digit industry level (NACE 2008-Rev. 2) to absorb any industry unobservable confounders affecting some industries differently than others (e.g., 2020 COVID pandemics). Additionally, our specification also controls for a dummy taking the value of one if firms report having guaranteed loans with private banks in 2020.

The coefficient of interest capturing the sharp-RD estimator is β_{1,Y_t}. Notice that this coefficient is computed on a year-by-year basis using cross-section variation of firms: (i) one year before (i.e., $t = T - 1$), (ii) during the year (i.e., $t = T$), and (ii) up to three years after (i.e., $t = T + 1, T + 2, T + 2$) the policy was implemented. Equation (3) defines the

RD estimator for the contemporaneous effect of lowering the interest rate on outcome Y.

$$\beta_{1,Y_t} = \lim_{x \downarrow 0} \mathbb{E}[Y_{i,t} | FTE_i = x] - \lim_{x \uparrow 0} \mathbb{E}[Y_{i,t} | FTE_i = x] \tag{3}$$

Intuitively, this expression captures the mean difference in Y across firms receiving credit guarantees at the end of 2020 but differently treated in terms of the interest rate: some firms treated with a lower interest rate due to being marginally below the employment threshold in 2018, and firms charged a higher interest rate because had slightly more than 50 employees in 2018.

Our RD design identifies the local treatment effect of receiving a lower interest rate for firms exactly at the employment cutoff (i.e., continuity condition). In our case, this condition required that firms within an arbitrarily small bandwidth of the employment threshold are similar in all observable and unobservable characteristics, then any difference in Y_i during the year of the policy should be explained by the fact that some received a guaranteed loan with relatively lower interest rate.

3 Data

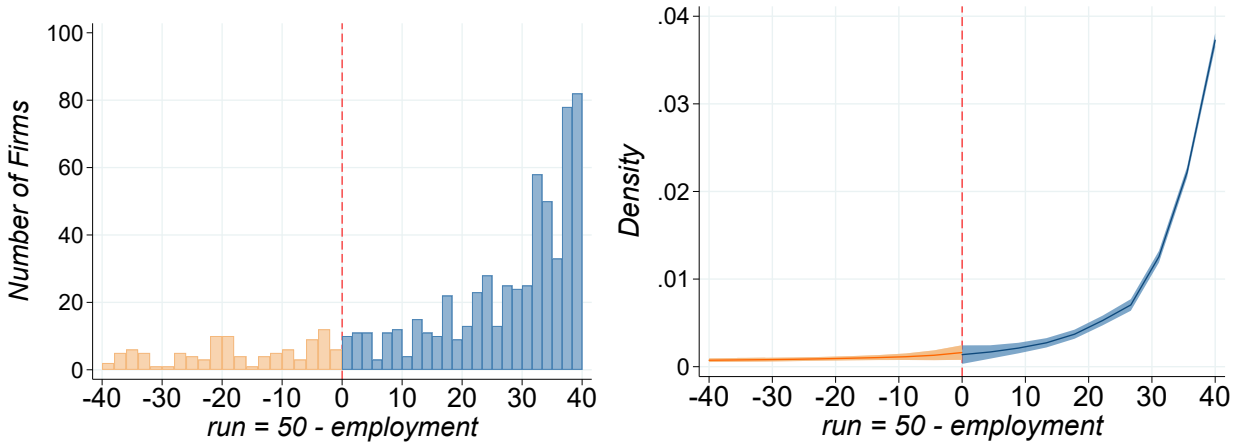
We use firm-level balance sheet information from *Bel-first*. This data source provides comprehensive annual information on balance sheet items for the universe of companies in Belgium from 2015 to 2024. We employ the unconsolidated balance-sheet reports. In particular, we focus on the statements of amounts payable for 2020 to be able to identify firms receiving credit guarantees in that year. Additionally, to measure real and financial outcome variables, we gathered information from the assets, income, and social balance statements from 2018 to 2023.

Our sample includes 2,904 firms reporting positive publicly guaranteed debt in 2020: 2,564 firms are treated (i.e., less or equal to 50 employees), and 344 belong to the control group (i.e., more than 50 employees). Firms in our sample capture 93% of all Belgian companies reporting positive balances of guaranteed debt in 2020.

Figure 1 plots the distribution of firms in our sample along the running variable. Panel (a) presents a histogram of the frequency of firms receiving a publicly guaranteed loan in 2020 within a small bin of our running variable. The x-axis represents the distance of a firm's employment level in 2018 from the threshold (i.e., 50 employees). Then, conditional on obtaining a guaranteed loan in 2020, any firm to the right (orange colored) of zero receives a lower interest rate, while a firm to the left of zero (blue colored) gets a higher interest rate on its credit guarantee. Notice that we move along our running variable

from -40 to +40 the number of firms increases. This only reflects the importance of firms with less than 50 employees in Belgium and is consistent with the case of other advanced economies: in 2017 SMEs captured 70% of total employment.

Figure 1: Treatment Distribution Along the Employment Cutoff



(a) Treatment Distribution

(b) McCrary's Test

Panel (a) shows the histogram of firms firms with a guaranteed loan in 2020 along the running variable. The running variable represents employment re-centered around zero using the cutoff of 50 employees. All firms to the right (orange) of the cutoff report less than 50 employees in 2018 are treated with a lower interest rate while firms to the left (blue) of the cutoff with more than 50 employees in 2018 get a higher interest rate. Panel (b) shows the point estimates (line) and confidence intervals (shaded) for the density to evaluate bunching of observations around the employment cutoff.

In Appendix A, Table A1 we report the summary statistics for firms in our sample at the end of 2020. The average firm in our sample holds €2.5 million in publicly credit guarantees, which represents 33% of their total debt portfolio. In terms of assets, the average firm in our sample holds €13.6 million in total assets, out of which 44% of can be used as collateral (i.e., tangible fixed assets) while only 13% are fully liquid (i.e., cash and equivalents). The latter is consistent with 39% of firms in our sample holding privately guaranteed credit.

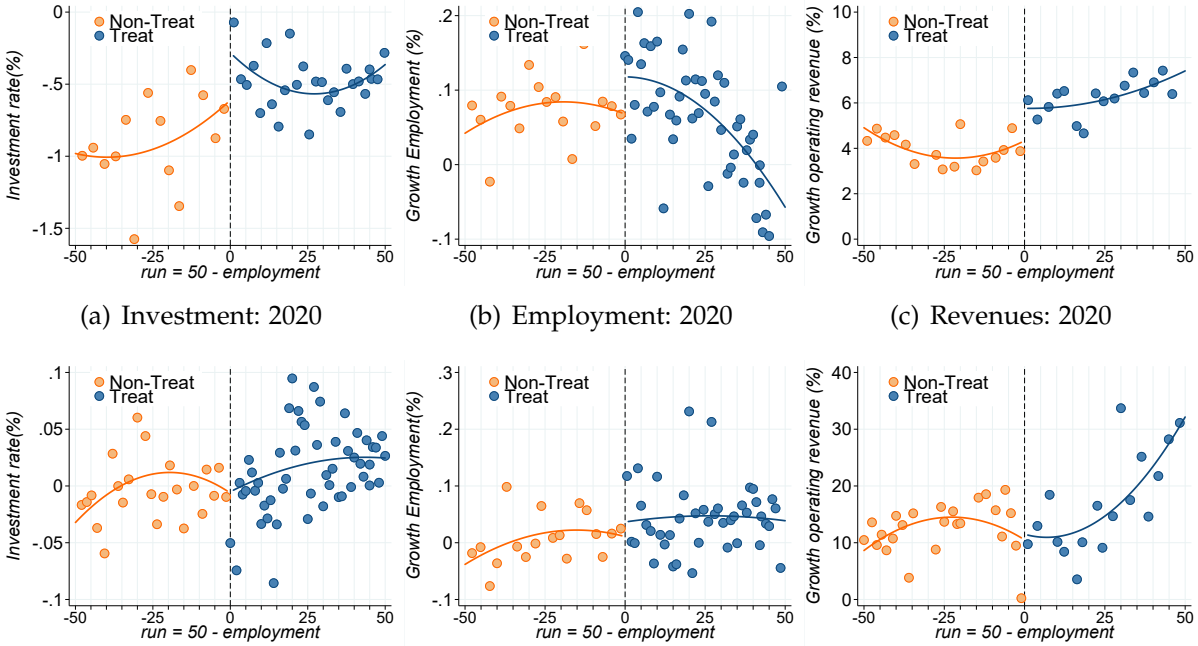
4 Main Results

In this section, we report the main results. We begin describing the RD-estimates for firm's economic performance. Next, we show evidence on the mechanism explaining how lower borrowing costs from credit guarantees impact firms' performance. Finally, we present the evidence supporting the identification strategy in our RD setup.

4.1 Firm Real Outcomes

First, we describe our results on firm's performance. Our variables of interest are investment rate, employment growth, and revenue growth. We define the investment rate as the ratio of tangible fixed assets acquisition relative to the previous year's total fixed assets. We measure employment using the number of full-time equivalent employees entered in the staff register. Finally, we proxy revenues with gross added value.[4] We compute growth rates using a yearly symmetric definition.

Figure 2: Firm-level outcomes



(a) Investment: 2020 (b) Employment: 2020 (c) Revenues: 2020

(d) Investment: 2019 (e) Employment: 2019 (f) Revenues: 2019

The figure examines pre-existing differences along the running variable before the implementation of the Credit Guarantee Scheme. We employ balance sheet data for firms receiving a guaranteed loan in 2020. All variables are expressed as percentage changes. Panel (a), (b), and (c) shows the investment rate, and growth rate of employment and revenue for 2020, while panel (c), (d), (e) shows the same variables for 2019. Each dot represents the mean of the outcome within a bin of the running variable. The solid lines are quadratic fits using dots on each side of the cutoff. The number of bins and specific location are determined using a quantile-spaced mimicking variance approach (see Cattaneo et al., 2019).

Figure 2 visually depicts our main findings for these variables. In each plot, a dot captures the average outcome value using information for firms within a particular bin of the running variable. The lines depict a quadratic fit estimated using only dots to the right

[4]Information on operating revenues (turnover) is missing for most firms in our sample. This is because Belgian SMEs are not required to report this variable in their annual statements.

side (orange) or left side (blue) of the employment cutoff. The first row visually depicts an upward jump in investment (Panel A), employment growth (Panel B), and revenue growth (Panel C) in 2020 when moving along the employment cutoff. Notice that, in the second row, the discontinuous increase disappears on the three variables one year before the Belgian CGS was implemented.

Table 1: RD benchmark results: Firm-Level Outcomes

	T-1	T	T+1	T+2	T+3
	(1)	(2)	(3)	(4)	(5)
(A) Inv. Rate					
Sharp-RD	0.05	0.20**	0.11	0.20	0.07
	(0.08)	(0.08)	(0.08)	(0.19)	(0.28)
Observations	2,331	2,773	2,429	2,392	1,700
Bandwidth (in # emp.)	8.0	10.5	9.9	14.6	10.0
(B) Δ Emp.					
Sharp-RD	0.02	0.28***	-0.21***	0.07***	-0.07
	(0.03)	(0.04)	(0.07)	(0.03)	(0.04)
Observations	1,729	1,743	1,702	1,643	1,337
Bandwidth (in # emp.)	10.4	7.3	8.5	5.9	13.7
(C) Δ Rev.					
Sharp-RD	0.03	0.34***	0.32***	-0.59**	0.06**
	(0.11)	(0.02)	(0.06)	(0.26)	(0.03)
Observations	2,545	2,897	2,529	2,480	1,767
Bandwidth (in # emp.)	8.1	4.7	4.5	7.6	6.9

Authors' calculations. The table shows the main RD-estimates for outcomes related to firm's economic performance. Robust Bias-corrected standard errors in parentheses, *, **, ***, indicate significance at the 10%, 5%, and 1% respectively.

Table 1 presents the RD estimates on firm performance outcomes. Panel (A) presents the results for investment, while Panel (B) and Panel (C) report our findings for employment and revenue growth. On each panel, the first row reports the point estimates for β_{Y_t} (equation (2)) one year before the start of the CGS (Column 1), during the year of the policy (Column 2), and up to three years after the program ended (Columns 3-5).

Consistent with our previous visual evidence, we find that firms receiving credit guarantees at a lower interest rate are performing better during the year the policy was implemented. Specifically, firms borrowing €1 of guaranteed debt at a 25 bp. lower

interest rate increase investment, employment growth, and revenue growth by 0.20 pp., 0.28 pp., and 0.34 pp., respectively. Our previous results do not seem to be explained by pre-existent differences in economic performance: one year prior, the estimates for investment, employment growth, and revenue growth are not statistically significant and economically small (i.e., 0.05 pp., 0.02 pp., and 0.03 pp.).

The dynamic response of investment, employment, and revenues after the policy ended is consistent with the characteristics of the policy: receiving a lower interest rate on credit guarantees should last as long as the guaranteed loans mature 12 months later. First, treated firms have a 0.11 pp. and 0.20 pp. higher investment rate one and two years after the policy was implemented, but these estimates are statistically insignificant. Nonetheless, the effect on investment ultimately died out three years after the CGS ended. Employment growth is 0.21 pp. lower and 0.07 pp. higher one and two years after the policy. This can be interpreted as employment catching up, initially for firms in the control and later in the treatment group. Regardless, this difference in employment growth returns to its pre-policy levels three years after the policy ended. A similar pattern is observed for revenue growth, with the only difference being a short-lived increase of 0.32 pp. for treated firms one year after the policy ended.

4.2 Exploring the Mechanism

Table 2 presents the RD estimates for the contemporaneous impact on the firm's debt portfolio. In particular, we study how a firm's credit guarantee issuances, average borrowing costs, and non-guaranteed liabilities respond to the lower interest rate on credit guarantees. This analysis provides evidence on the mechanism to explain our findings on real performance for firms.

Our results indicate that firms receiving additional credit guarantees at a lower interest are not accumulating guaranteed debt more than the control group but are reducing their holdings (i.e., substitution) of the relatively more expensive non-guaranteed debt, which reduces the debt portfolio's average financial costs. First, in Column (1), we present our estimates for publicly guaranteed debt accumulation in the year of the policy; we find that firms getting a lower interest rate issue 0.003 pp. less publicly guaranteed debt compared to firms ineligible for the interest rate discount, this estimate is economically insignificant and can be regarded as zero.

Moreover, Column (2) shows evidence of firms substituting non-guaranteed debt if they are eligible for the interest rate discount on credit guarantees. We measure non-guaranteed debt substitution as the yearly change in non-guaranteed debt balances relative to total

liabilities. Our results show that firms receiving the interest rate reduction on credit guarantees reduce non-guaranteed debt by -0.18 pp more than firms with higher interest rates. This result implies that for each €1 of credit guaranteed received at a 25 bp. lower interest rate reduces non-guaranteed debt by approximately €0.13.[5]

On the other hand, in Column (3), we observe that average interest costs are reducing for firms receiving credit guarantees at a lower interest rate. We measure average interest costs as the ratio of financial costs on total liabilities relative to the total debt balance. We find that firms for firms receiving guarantees in 2020, the ones with a lower interest rate, are reducing average interest cost by -0.015 pp. more than firms with a higher interest rate.

Table 2: Interest costs, Guaranteed, and Non-Guaranteed Debt

	Guarantee Debt Accumulation (1)	Debt Substitution (2)	Average Interest (3)
Sharp-RD	-0.003	-0.181**	-0.015***
	(0.02)	(0.09)	(0.00)
Observations	1,437	1,518	2,264
Bandwidth (in # emp.)	12.0	10.0	8.5

Authors' calculations. The table shows the RD-estimates for guarantee debt accumulation, debt substitution, and average interest costs during the year the CGSs was implemented. Robust Bias-corrected standard errors in parentheses, *, **, ***, indicate significance at the 10% 5% and 1% respectively

Table C3 (Appendix C) further characterizes the dynamics of debt substitution and average interest costs. First, in Column 1, we show no significant difference among firms receiving credit guarantees in 2020 across treatment and control groups one year before the policy was implemented. Moreover, the reduction in substitution for non-guaranteed debt and average interest costs is still observed one year after the policy, which can be due to the different timing firms obtained the credit guarantees. In Column (3), we find a short-lived increase (0.13 pp.) in non-guaranteed debt balances for firms receiving the interest discount two years after the policy ends; this is because firms in the treatment group switched back to non-guaranteed debt after their guaranteed loan matured (one year later). Nonetheless, in Column (5), we observe that any significant difference in debt substitution and interest costs completely disappears three years into the policy.

[5]We use a back-of-the-envelope calculation to obtain this estimate. Specifically, Table A1 shows that the average firm holds €8.99 million non-guaranteed debt, which was reduced by -3.4% in 2020. At the same time, the average firm holds €2.5 million in publicly credit-guaranteed debt. Therefore our estimate of -€0.1287 is equal to $-\frac{\frac{-(3.4+0.18)}{100}\times 8.99}{2.5}$.

4.3 Supporting Evidence on Identification

To close our empirical analysis, we explore how appropriate our research design is to evaluate the sole effect of lower interest rates on credit guarantees. Specifically, we provide evidence supporting the identification strategy regarding the continuity assumption in our RD setup.

The most important element in our RDD identification strategy is that firms with lower (treatment) and higher (control) interest rates on their credit guarantees in 2020 are almost identical except for receiving treatment. We begin by testing how suitable this assumption is for our RD setup. In particular, we present evidence of potential jumps in the distribution of firms and other firm-level pre-determined observable characteristics along our running variable.

A first concern is that the announcement of the Belgian government about the conditions imposed on the interest rate for credit guarantees could induce firms to "manipulate" their employment levels to reduce the cost of credit guarantees (i.e., around the cutoff). Figure 1, Panel (b) evaluates manipulation or self-selection by checking for evidence on bunching of observations around the employment cutoff. A simple inspection of this figure shows no discernible jump in the estimated densities (continuous lines) when we move to the right side of the employment cutoff. More formally, we follow McCrary, 2008 and evaluate the null of continuity of the treatment distribution around the cutoff: the resulting p-value of 0.61 eliminates any concern of firms misreporting their employment levels in 2018.

Additionally, Figure D1 (Appendix D) presents the "donut-hole" test, where we further check for evidence on manipulation that the McCrary test might have potentially missed. We estimate the contemporaneous coefficient (β_{1,Y_T}) for all the firm-level outcomes in our analysis, but we exclude observations in the immediate neighborhood to test for "bunching" of observations around the employment cutoff. Most of our results are similar when excluding firms with 1, 2, and 3 employees above or below the cutoff.

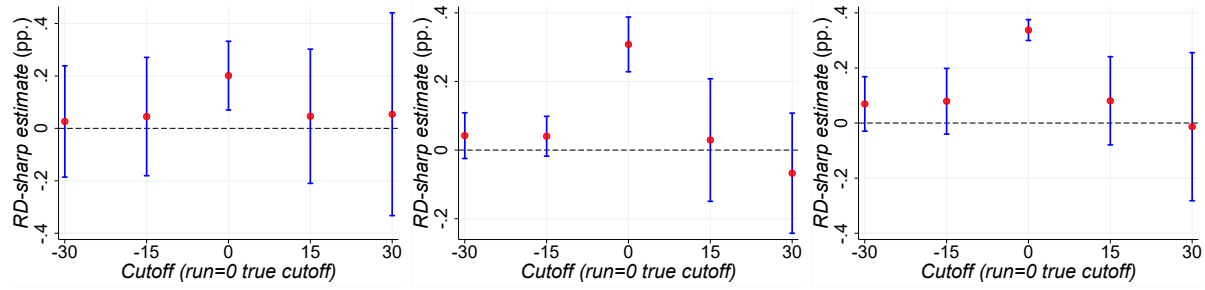
On the other hand, if our continuity assumption holds, there should not be any observable difference in pre-determined characteristics when moving from the left side to the right side of the employment threshold. We have already shown that this was the case for the main outcomes of interest. Next, we expand this analysis to other firm-level observable characteristics.

Table B2 (Appendix B) presents our formal results using firm-level variables related to assets, debt, labor costs, and profitability during 2018-2019. The second column provides the sharp-RD point estimates, and the third and fourth columns report the p-values and

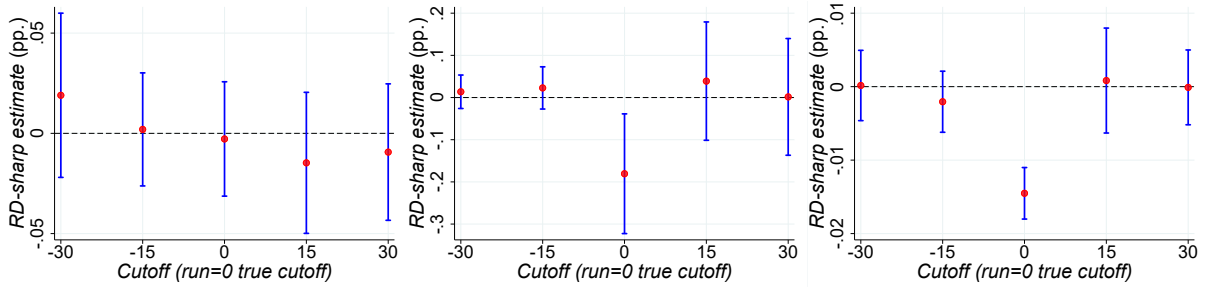
95% confidence intervals. Our results provide evidence of equally balanced distributions across the running variable before the CGS were enacted: firms on either side of the cutoff are not statistically different in terms of pre-determined levels of assets (i.e., total, fixed, tangible fixed, and cash), leverage, short-term and long-term debt share, wage bill, earnings, and profits.

Finally, In Figure 3, we evaluate arbitrary cutoff points different from the one that triggers a discount in the interest rate. Finding significant effects on placebo cutoffs could indicate systematic differences among firms on each side of the cutoff or a concurrent policy, potentially contaminating our results. We evaluate placebo cutoffs for up to ± 30 employees lower and higher than the actual cutoff $FTE_i = 0$. As expected, none of our baseline results on firm performance and debt portfolio are statistically significant on the placebo cutoffs.

Figure 3: Alternative Cutoffs



(a) Investment (b) Employment (c) Revenues



(d) Credit Guarant. Accumulation (e) Debt Substitution (f) Average Interest

The figure shows RD estimates for β_{1,Y_T} under alternative placebo cutoffs for each firm level outcome.

5 Discussion

In this section, we explore the implications of our results regarding the effectiveness of guaranteed programs and discuss some potential improvements in light of the empirical results in the paper.

We show that enabling stressed firms to secure financing on credit guarantees at more favorable terms facilitates investment opportunities and expands employment and revenue growth. First, our results contrast with the traditional view of credit guarantees as only increasing the credit supply, which can lead to credit rationing and potential misallocation of resources. Our evidence should highlight the importance of the interest rate on credit guarantees as instruments for financial frictions to stressed firms.

On the other hand, we also find that firms' real performance only improves in the short run. This does not reflect the short-lived impact of lowering interest rates on credit guarantees but is related to the short-term maturity imposed on credit guarantees during the Belgian CGS in 2020. Potentially, there could be persistent positive impacts on firms' economic performance if this policy is applied to a guaranteed debt instrument with longer maturity.

Finally, our combined evidence speaks to the potential mechanism through which lowering interest rates on credit guarantees impacts firm's economic performance. Among firms receiving credit guarantees, treated firms eligible for an interest rate discount do not hold more guaranteed debt compared to the control group. These results highlight that reducing borrowing costs on credit guarantees eases price-related financial frictions. The argument is that quantity-related frictions are more important if additional credit makes firms increase debt until all new borrowing sources are exhausted, especially if this is offered at more favorable pricing conditions (Banerjee and Duflo, 2014b). However, our evidence shows the opposite: compared to the control group, firms receiving an interest rate discount do not increase their holdings of guaranteed debt by more but reduce their average interest costs by lowering their balance on costlier non-guaranteed debt. The distinction between price and quantity-related financial frictions is critical as it highlights the nuanced ways credit guarantees can enhance financial access. Our results show that firm performance improves because guaranteed debt provides a less costly alternative for borrowing to stressed firms.

6 Conclusions

This paper, study the impact of reducing interest rates for credit guarantees on firms. Empirically, we exploit a discontinuity in loan price eligibility during Belgium's 2020 Credit Guarantee Scheme (CGS). While all firms were eligible to apply for the CGS, those with more than 50 employees were required to pay an additional fee of 25 basis points (bp). Using a regression discontinuity (RD) design, we compare firms just above the 50-employee threshold to those just below it in 2020 to estimate the causal impact of these better pricing conditions on firms' economic performance.

We assert that our RD setup is robust and provides the ideal context for isolating the causal effect of improved pricing conditions on guaranteed loans. In particular, we demonstrate that firms near the eligibility threshold are comparable in all key dimensions, including access to additional credit, with the only distinction being that some receive more favorable loan pricing conditions.

Our primary finding is that firms receiving guaranteed loans at lower interest rates increase investment, employment and revenues. Additional evidence suggests that the mechanism through which firms' real performance improves is explained by the reduction in price-related financial frictions when interest rates on credit guarantees reduce.

Our study not only highlights the centrality of price-related financial frictions on stressed firms but also the importance of the interest rate on credit guarantees as instruments to ease credit frictions. In light of the novel evidence in our study, we argue that the Belgian CGS in 2020 could have been improved if the maturity on guaranteed debt was extended to more than one year.

7 References

Anderson, Julia, Francesco Papadia, and Nicolas Véron, "COVID-19 Credit Support Programs in Europe's Five Largest Economies," *Peterson Institute for International Economics Working Paper*, 2021, (21-6).

Banerjee, Abhijit V. and Esther Duflo, "Do Firms Want to Borrow More? Testing Credit Constraints Using a Directed Lending Program," *The Review of Economic Studies*, 02 2014, *81* (2), 572–607.

Banerjee, Abhijit V and Esther Duflo, "Do firms want to borrow more? Testing credit constraints using a directed lending program," *Review of Economic Studies*, 2014, *81* (2), 572–607.

Bonfim, Diana, Cláudia Custódio, and Clara Raposo, "Supporting small firms through recessions and recoveries," *Journal of Financial Economics*, 2023, *147* (3), 658–688.

Brown, Martin, Tullio Jappelli, and Marco Pagano, "Information sharing and credit: Firm-level evidence from transition countries," *Journal of financial intermediation*, 2009, *18* (2), 151–172.
Calonico, Sebastian, Matias D Cattaneo, and Rocio Titiunik, "Robust nonparametric confidence intervals for regression-discontinuity designs," *Econometrica*, 2014, *82* (6), 2295–2326.
Cattaneo, Matias D, Nicolás Idrobo, and Rocío Titiunik, *A practical introduction to regression discontinuity designs: Foundations*, Cambridge University Press, 2019.
Gonzalez-Uribe, Juanita and Su Wang, "The real effects of small-firm credit guarantees during recessions," *Available at SSRN 3382280*, 2022.
Lelarge, Claire, David Sraer, and David Thesmar, "Entrepreneurship and credit constraints: Evidence from a French loan guarantee program," in "International differences in entrepreneurship," University of Chicago Press, 2010, pp. 243–273.
McCrary, Justin, "Manipulation of the running variable in the regression discontinuity design: A density test," *Journal of Econometrics*, February 2008, *142* (2), 698–714.
Önder, Yasin Kürşat, Mauricio Villamizar-Villegas, and Jose Villegas, "Debt Moratorium: Theory and Evidence," 2023. Central Bank of Colombia Working Papers, No.1253.

Appendix A Summary Statistics

Table A1: Summary Statistics: 2020

	Mean	S.D	P^{25}	P^{50}	P^{75}	N_{obs}
Pub. guarant. debt (mill. €')	2.5	10.2	0.1	0.3	0.9	2,908
Total debt (mill. €')	7.4	25.5	0.4	1.0	3.4	2,744
Leverage	0.6	0.3	0.4	0.6	0.8	2,744
Short-term debt (%)	54.6	29.4	29.2	57.0	81.4	1,668
Long-term debt (%)	45.4	29.4	18.6	43.0	70.8	1,668
Priv. guarant. debt (%)	39.8	24.7	18.9	37.1	57.1	710
Total assets (mill. €')	13.6	48.2	0.7	1.7	5.7	2,908
Fixed assets (mill. €')	7.6	26.5	0.2	0.8	3.2	2,908
Tangible fixed assets (%)	44.8	29.4	18.2	45.3	69.0	2,810
Cash and equiv. (%)	13.5	14.9	2.6	8.2	19.6	2,870
Acquis. tang. fixed assets (mill. €')	2.9	19.4	0.0	0.1	0.7	2,773
Inv. rate (%)	34.0	94.5	1.0	5.8	24.9	2,773
Δ Emp. (%)	-0.5	55.2	-9.5	0.0	7.3	1,743
Δ Rev. (%)	-0.9	72.4	-22.6	1.2	15.5	2,897
Average interest (%)	2.5	2.9	1.3	2.0	3.0	2,264
Pub. gurant. debt accumulation (%)	35.4	32.5	9.1	26.0	59.9	1,339
Non guarant. debt (mill. €')	9.0	125.4	0.2	0.5	2.0	2,744
Debt substitution (%)	-3.4	52.7	-8.3	-0.6	7.3	1,518

Authors' calculations. The Table presents the summary statistics for our selected sample. We employ firm-level balance sheet data from *Belfirst* for 2020.

Appendix B Pre-existing differences

Table B2: Testing for pre-policy differences in firms' observable characteristics

Variable	Mean		RD Estimator	Robust Inference		Bandwidth (in # emp.)	Observations
	Treatment	Control		p-value	95% Conf. Int.		
Total assets	44.53	44.19	-0.35	0.87	[-3.95, 3.26]	7.5	5,319
Fixed assets total	17.05	16.61	-0.44	0.74	[-2.63, 1.75]	10.1	5,297
Tangible fixed assets	14.29	14.14	-0.14	0.91	[-2.23, 1.94]	9.8	5,131
Cash at hand	1.84	2.12	0.28	0.44	[-0.32, 0.88]	13.7	5,226
Leverage	2.21	2.18	-0.03	0.92	[-0.57, 0.50]	15.8	4,814
Short-term debt share	0.30	0.35	0.05	0.27	[-0.02, 0.12]	8.8	5,319
Long-term debt share	0.28	0.24	-0.04	0.42	[-0.12, 0.04]	13.9	4,904
Wage Bill	3.01	2.84	-0.17	0.35	[-0.47, 0.13]	22.1	5,283
Ebitda	1.08	1.13	0.05	0.91	[-0.62, 0.72]	12.8	5,318
Profit rate	-0.00	0.02	0.02	0.21	[-0.006, 0.052]	13.4	5,318

Authors' calculations. The table shows the RD estimates (rows) for pre-determined observable characteristics across the employment threshold. Robust bias-corrected standard errors are employed for computing the confidence intervals and p-values. We employ balance-sheet information for 2018-2019 of firms receiving credit guarantees in 2020. In all rows control for industry and year fixed effects. Total assets, fixed assets, tangible fixed assets, cash at hand, wage bill, and Ebitda are expressed in million of euros. Leverage is defined as the ratio of total liabilities relative to total fixed assets. Short-term and long-term debt shares are computed as the ratio of liabilities due in one year and more than one year relative to total liabilities, respectively. Profit rate is the ratio of net profits to total assets.

Appendix C Interest and Debt Substitution Dynamics

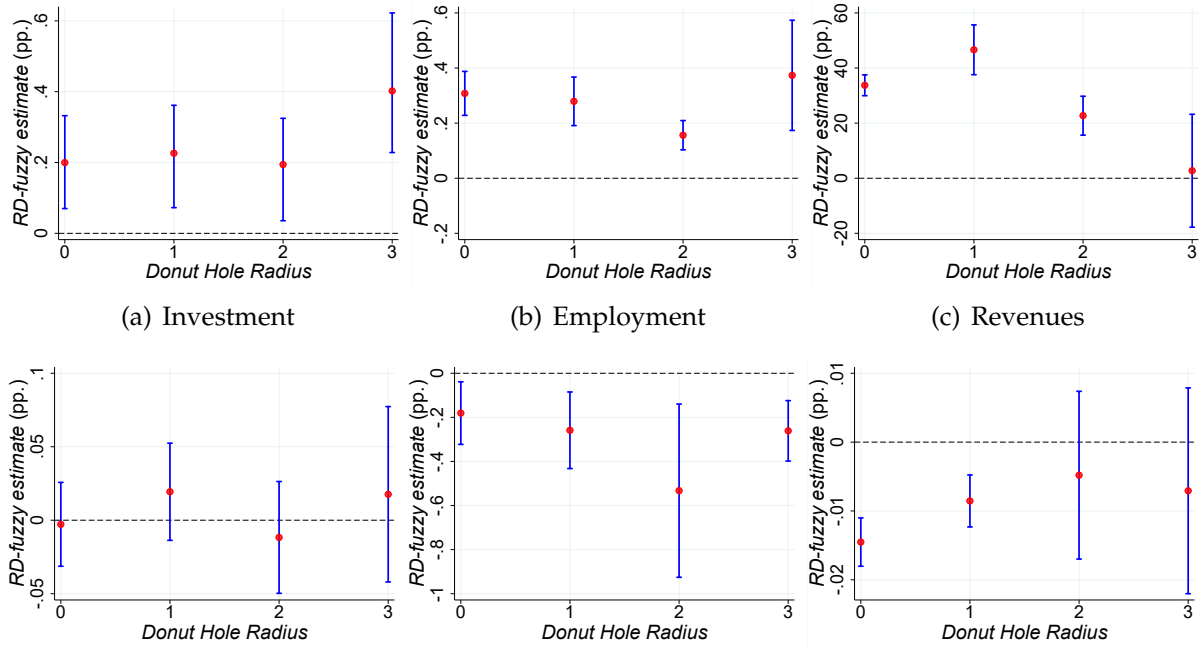
Table C3: Interest costs and Non-Guaranteed Debt: Dynamics

	T-1	T	T+1	T+2	T+3
	(1)	(2)	(3)	(4)	(5)
(A) Debt Substitution					
Sharp-RD	0.020	-0.181**	-0.095***	0.137***	0.047
	(0.03)	(0.09)	(0.02)	(0.03)	(0.06)
Observations	895	1,518	1,541	1,153	685
Bandwidth (in # emp.)	18.5	10.0	7.8	9.3	14.8
(B) Average Interest					
Sharp-RD	-0.001	-0.015***	-0.015***	0.007	0.003
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)
Observations	2,442	2,264	2,525	2,478	1,763
Bandwidth (in # emp.)	9.8	8.5	7.1	13.7	14.6

Authors' calculations. Robust Bias-corrected standard errors in parentheses, *, **, ***, indicate significance at the 10%, 5%, and 1% respectively.

Appendix D Donut-Hole Test

Figure D1: Donut-Hole Sensitivity Test



(a) Investment (b) Employment (c) Revenues

(d) Credit Guarant. Accumulation (e) Debt Substitution (f) Average Interest

The figure shows the Donut-hole sensitivity test, excluding firms with 1, 2, and 3 equivalent full time employees above/below the cutoff.