Credit Guarantees, Firm Response, and Macroeconomics

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Abstract

We evaluate the impact of Belgium's 2020 Public Credit Guarantee Scheme (CGS) using administrative data. The CGS applied to all firms, with those employing fewer than 50 workers benefiting from a 25 basis point reduction in interest rates. Leveraging this policy-induced discontinuity, we compare firms around the employment threshold. Firms receiving the lower interest rates experienced increases in employment and investment, along with a reduction in firm exit rates. The scheme helped address the debt overhang problem by easing price-related credit constraints: for every €1 of guaranteed debt at a 25 basis points lower rate, non-guaranteed debt decreased by €0.13.

Keywords: Credit guarantees, credit frictions, regression discontinuity design, debt overhang
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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. The Small Business Acts (1953, 1958, 2010), as well as the American Recovery and Reinvestment Act of 2009 and the Paycheck Protection Program (PPP) under the CARES Act of 2020, offer loan guarantees to encourage banks and other lenders to extend credit to small businesses. 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. Advocates argue that these Credit Guarantee Schemes (CGS) stimulate economic activity. However, critics contend that such schemes may crowd out bank lending for other sectors of the economy by diverting funds through the CGS.

Our paper provides novel evidence on the effects of alleviation of credit constraints using Belgium's 2020 Credit Guarantee Scheme (CGS). We contribute to policy and theoretical 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 indicate that a reduction in interest rates for guaranteed loans improves firms' real outcomes. Specifically, compared to firms paying higher interest rates, those benefiting from lower rates experienced increases in investment rate, employment growth, and revenue growth by 0.20 percentage points (pp), 0.31 pp, and 0.34 pp, respectively, along with a 0.19 pp decline in firm exit rates. However, firms near the eligibility cutoff did not differ in economic performance in the year prior to the policy's implementation.

In theory, CGS should not have general equilibrium effects unless there are inefficiencies addressed by the scheme in the economy. The underlying intuition is that loans diverted to firms via CGS would otherwise have been allocated by banks to alternative loans. However, we identify a specific inefficiency in the economy and a distinct channel through which credit guarantees operate: firms face price-related constraints rather than quantity constraints. The policy mitigates the *debt overhang problem* —measured by the ratio of EBITDA to short-term debt—where the debt burden becomes so substantial that it prevents firms from taking on additional debt to finance future projects.

Specifically, we observe that firms on the both side of the cut-off accumulate similar amounts of guaranteed debt. However, firms that secure loans at interest rates 25 bp lower reduce their non-guaranteed debt by 0.18 pp, which, in turn, lowers their average interest costs by 0.015 pp and increase their debt service capacity by 0.29 pp.

By partially replacing their existing debt, these firms alleviate the debt overhang problem. With a mitigated debt overhang, firms invest more in profitable ventures, leading to increased investment and employment, along with a reduction in firm exit rates.

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 regarding CGS are Gonzalez-Uribe and Wang 2022, Bonfim et al. 2023, Lelarge et al. 2010. For the Belgian CGS, Güler and Samarin 2023 studies the impact of guarantee fees on banks' decisions on non-guaranteed loans issuance and pricing. Our paper contributes to this literature by providing a causal estimate that can isolate the impact of credit guarantees pricing on firms. 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

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.

Certain types of credit are explicitly excluded from the guarantee program. These include: (1) leasing agreements, (2) factoring arrangements, (3) consumer and mortgage loans, (4) refinancing of existing credit, (5) renewed borrowing under credit issued before April 1, 2020, (6) credit restricted by contract for activities outside Belgium, and (7) credit that would normally qualify as "guaranteed credit" but has been specifically designated as outside the guarantee scheme at the time it is issued. 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. See NBB, 2020 for more details on the Belgian CGS.

[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.

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 bp for Small and Medium Enterprise (SMEs) 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

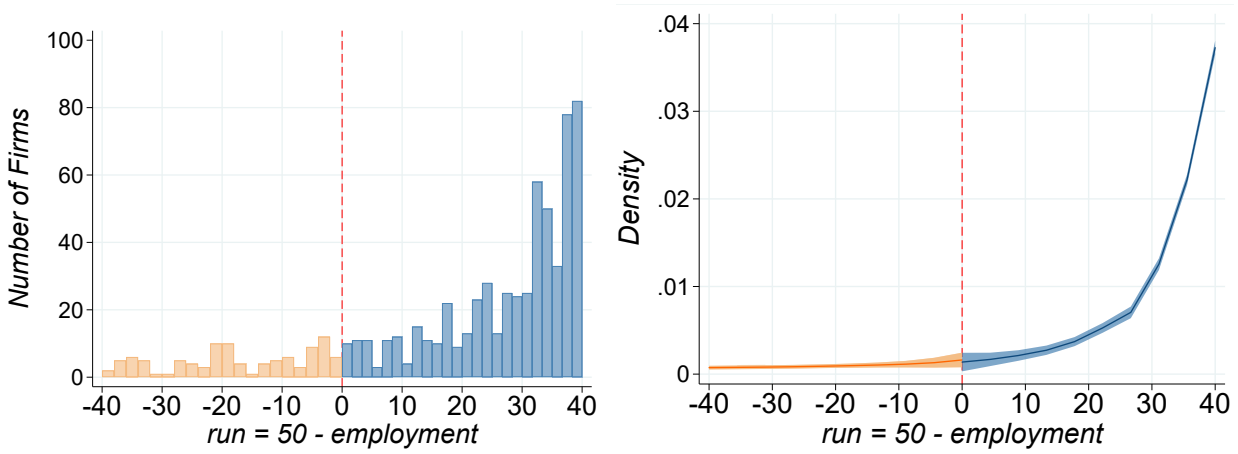
We use firm-level balance sheet information from *Bel-first*. This data source provides comprehensive annual information on balance sheet items for the universe of companies in Belgium from 2015 to 2024. We employ the unconsolidated balance-sheet reports. In particular, we focus on the statements of 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.

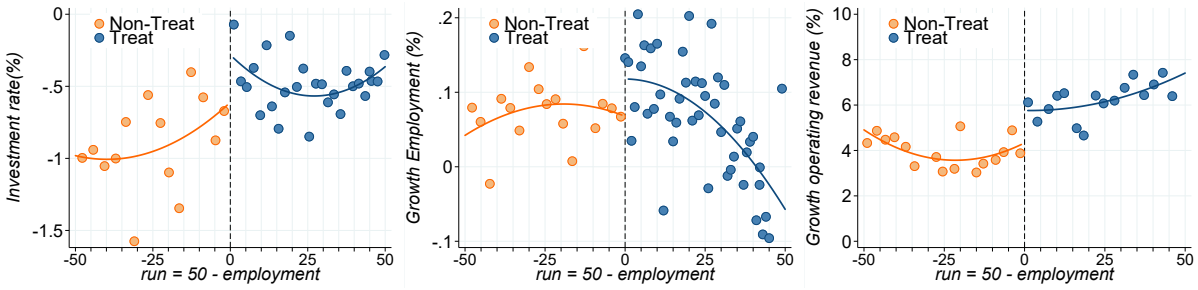
4.1 Firm Real Outcomes

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.

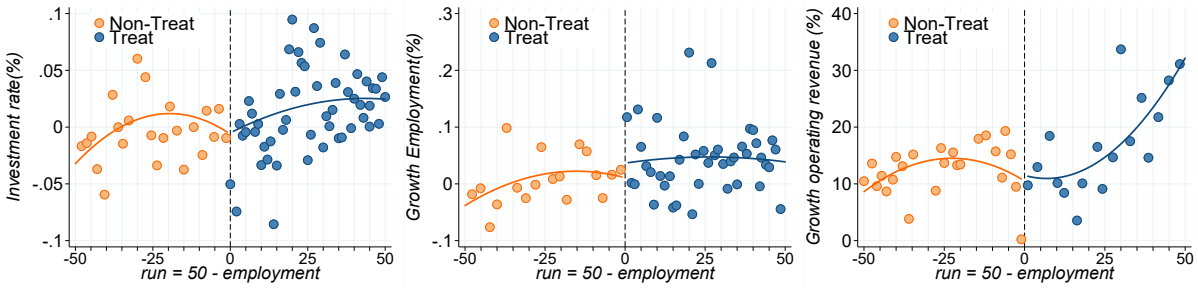
Figure 2 visually depicts our main findings for these variables. In each plot, a dot captures the average outcome value using information for firms within a particular bin of the running variable. The lines depict a quadratic fit estimated using only dots to the right side (orange) or left side (blue)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

[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.

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).

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 credit guarantees 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 results are not 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.).

Table 1: RD benchmark results: Firm-Level Outcomes

	T-1	T	T+1	T+2	T+3
	(1)	(2)	(3)	(4)	(5)
(A) Investment 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) ΔEmployment					
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) ΔRevenues					
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
(D) ΔTotal Assets					
Sharp-RD	0.003	0.032	0.020	-0.042	0.010
	(0.04)	(0.07)	(0.05)	(0.05)	(0.04)
Observations	2,274	2,337	2,322	2,270	2,066
Bandwidth (in # emp)	23.8	8.6	18.1	28.6	18.9
(E) ΔEquity					
Sharp-RD	-0.008	0.011	0.036	-0.002	-0.009
	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)
Observations	2,551	2,551	2,530	2,483	2,256
Bandwidth (in # emp)	25.5	24.3	14.7	18.7	18.5
(F) ΔLiabilities					
Sharp-RD	0.102	-0.117*	-0.034	-0.074	-0.069
	(0.07)	(0.06)	(0.06)	(0.07)	(0.06)
Observations	2,551	2,552	2,531	2,485	2,254
Bandwidth (in # emp)	22.9	22.0	24.3	25.0	13.8

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.

The dynamic response of investment, employment, and revenues following the end of the policy aligns with the policy's structure: the benefit of lower interest rates on credit guarantees persists until the guaranteed loans mature 12 months later. First, treated firms experience a 0.11 pp and 0.20 pp higher investment rate one and two years after the policy was implemented, though these estimates are statistically insignificant. Ultimately, the effect on investment dissipates three years after the credit guarantee scheme (CGS) ends. Employment growth is 0.21 pp lower in the first year and 0.07 pp higher in the second year, which can be interpreted as employment catching up—initially for firms in the control group and later for those in the treatment group. Nonetheless, the difference in employment growth returns to pre-policy levels three years after the policy ends. A similar pattern is observed for revenue growth, except for a short-lived 0.32 pp increase for treated firms in the year following the policy's conclusion.

Additionally, Panel (D), Panel (E), and Panel (F) show the dynamic response for the growth rate of total assets, equity, and total liabilities. First, firms do not differ in pre-policy growth trends for assets, equity, and liabilities across treatment and control groups. However, firms treated with a lower interest rate on guaranteed loans increase their total assets growth rate by 0.032 pp and 0.020 pp during the year and one year after the policy was implemented, albeit the estimated effect is not statistically significant in both periods. Similarly, equity grows by 0.011 pp and 0.036 pp higher for firms receiving credit guarantees at a lower interest rate during the first two years of the CGS introduction, but again, both estimates are not significant. Lastly, we estimate that during the first two years of the policy implementation, total liabilities growth is 0.117 pp and 0.034 lower, although only the contemporaneous effect is statistically significant. As we show later, the lower growth of total liabilities for treated firms is consistent with our evidence that lower interest rates on credit guarantees reduce inefficiencies linked to debt overhang.

4.2 Exploring the Mechanism

Table 2 presents the RD estimates for the contemporaneous impact on the firm's debt portfolio, financial burden, and default probability. In particular, we study how a firm's credit guarantee issuances, non-guaranteed liabilities, average borrowing costs, debt service capacity, and exit probability 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.

First, our results suggest that firms receiving additional credit guarantees at a lower interest rate are not accumulating more guaranteed debt than the control group. Instead,

they are reducing their holdings of relatively more expensive non-guaranteed debt (i.e., substitution), thereby lowering the average financial costs of their debt portfolio. In column (1), we present estimates of publicly guaranteed debt accumulation during the policy year. We find that firms benefiting from lower interest rates issue 0.003 pp less publicly guaranteed debt compared to firms ineligible for the rate discount. This estimate is economically insignificant and can be considered effectively zero.

On the other hand, column (2) provides evidence that firms eligible for the interest rate discount on credit guarantees substitute non-guaranteed debt more intensively. We measure this substitution as the yearly change in non-guaranteed debt balances relative to total liabilities. Our findings indicate that firms benefiting from the interest rate reduction on credit guarantees reduce their non-guaranteed debt by 0.18 pp more than firms facing higher interest rates. This result suggests that for every €1 of credit guaranteed at a 25 bp lower interest rate, non-guaranteed debt decreases by approximately €0.13.[5]

Our results also show that the financial burden for firms receiving credit guarantees reduces if they obtain a discount on their interest rate. In column (3), average interest costs, defined as the ratio of financial costs on total liabilities relative to the total debt balance, drop by 0.015 pp for firms receiving guarantees in 2020 with a lower interest rate. While in column (4), we find that the yearly change in the EBITDA to short-term debt ratio, a measure of improvement/deterioration of debt service capacity in the short run, is approximately 0.30 pp higher for firms receiving a discount on their guaranteed loans interest rate.

Finally, we find evidence suggesting default risk reduces as the probability of exiting the market lowers for treated firms. We define exit as a dummy taking the value of one for firms with available balance sheet information up to 2022. Column (5) shows that the exit probability is 0.19 pp for firms with lower interest rates on credit guarantees. We arrive at similar results if our exit measure is based on liquidation, bankruptcy, dissolution, or absorption events for firms during 2020-2023.[6] This results are reported in Table D4 (Appendix D).

[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 $-\frac{\frac{-(3.4+0.18)}{100}\times 8.99}{2.5}$.

[6]These events are registered and reported by the Crossroads Bank for Enterprises (CBE) managed by the Ministry of Economy (FPS).

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

	Guarant. Debt Accum. (1)	Debt Subst. (2)	Average Interest (3)	ΔDebt Serv. Capacity (4)	Exit Probab. (5)
Sharp-RD	-0.003	-0.181**	-0.015***	0.294***	-0.192**
	(0.02)	(0.09)	(0.00)	(0.08)	(0.09)
Observations	1,437	1,424	2,547	2,552	2,662
Bandwidth (in # emp)	12.0	10.0	8.5	7.4	8.9

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

Table C3 (Appendix C) further explores the dynamics of debt substitution, average interest costs, and debt service capacity. In column (1), we show no significant difference between firms receiving credit guarantees in 2020 across treatment and control groups one year prior to the policy's implementation, which shows the validity of the design. In column (2), we observe that the reduction in non-guaranteed debt substitution, average interest costs, and improvement in debt service capacity persists one year after the policy, likely due to the varying timing of when firms received the credit guarantees. In column (3), we observe a short-lived increase of 0.13 pp in non-guaranteed debt balances for firms benefiting from the interest rate discount two years after the policy ended, as firms in the treatment group reverted to non-guaranteed debt following the maturity of their guaranteed loans. However, in column (5), we find that any significant differences in debt substitution, interest costs, and debt service capacity completely vanish three years after the policy.

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 E1 (Appendix E) 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.

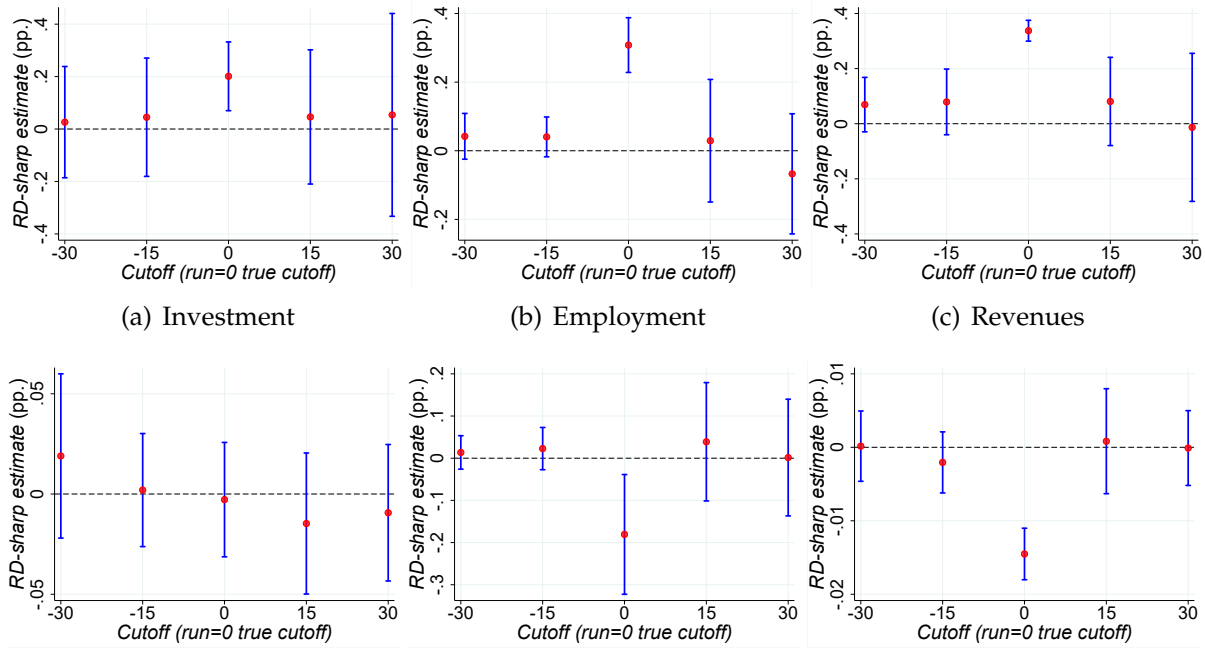
On the other hand, if our continuity assumption holds, there should not be any observable difference in pre-determined characteristics when moving from the left side to the right side of the employment threshold. We have already shown that this was the case for the main outcomes of interest. Next, we 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, which, in turn, reduce debt overhang problems and default risk for this firms. 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 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 exhibit increases in investment, employment, and revenue, alongside a general reduction

in firm exit rates. We identify that the scheme mitigates a significant inefficiency in the economy: the debt overhang problem, where the debt burden becomes so substantial that it hinders firms from acquiring additional debt to finance future profitable projects. We demonstrate that firms reduce their non-guaranteed debt, thereby lowering their interest payment costs, which enables them to undertake additional projects.

7 References

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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.)	Obs.
	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 Debt Substitution, Interest Costs, and Debt Service Capacity 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
(C) Debt Service Capacity					
Sharp-RD	-0.019	0.294***	0.207***	-0.013	-0.135
	(0.09)	(0.08)	(0.06)	(0.05)	(0.09)
Observations	2,551	2,552	2,529	2,481	1,766
Bandwidth (in # emp)	20.0	7.4	12.7	14.6	10.3

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

Appendix D Exit Rate

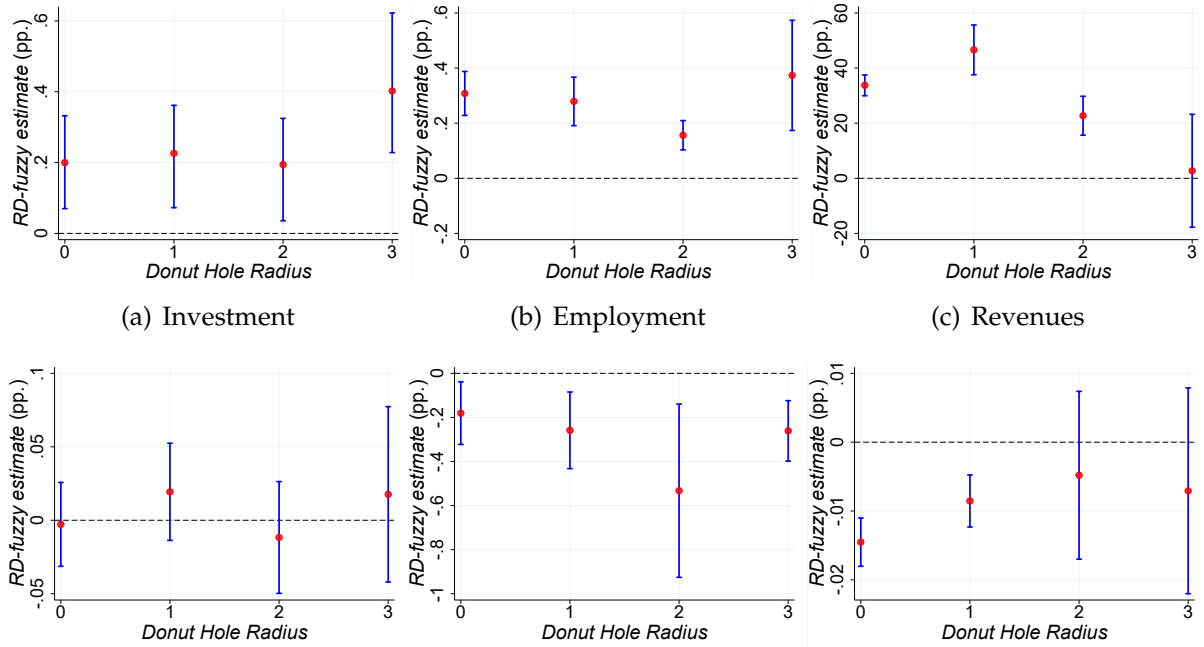
Table D4: Exit Probability: 2020-2023

	Last available year	Legal Situation
Sharp-RD	-0.19**	-0.07**
	(0.09)	(0.03)
Observations	2,662	2,662
Bandwidth (in # emp)	8.9	8.9

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

Appendix E Donut-Hole Test

Figure E1: 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.