The Labor Market Effects of Loan Guarantee Programs[†]

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Abstract

We investigate the labor market effects of a loan guarantee program targeting French SMEs in the midst of the financial crisis. Exploiting worker-level panel data and differences in regional treatment intensity in a border discontinuity design, we find that the program has a significant and persistent positive impact on workers' employment and earnings trajectories, in particular for those initially employed in high-unemployment areas. However, the program dampens workers' reallocation towards productive firms, especially for workers with high earnings capacity. In the aggregate, the program appears to be revenue-positive for the government, as the savings in unemployment benefits outweigh the losses from the defaults of guaranteed loans, and the number of jobs preserved by the program is of comparable magnitude as the number of workers prevented from moving to a more productive firm.

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1 Introduction

Numerous countries facilitate bank lending to small businesses through loan guarantee programs, whereby a government agency underwrites a share of the notional of loans issued by banks to qualifying borrowers (such as the Small Business Agency (SBA) programs in the U.S).[1] As banks retain skin in the game, loan guarantees are designed to address the mis-targeting and rent-seeking that plague direct public lending (see for instance Khwaja and Mian (2005)). Policy makers' interest in these programs increased in the wake of the 2008 financial crisis due to concerns that small businesses might be prevented from accessing sufficient capital for them to be resilient, grow, and create jobs (Chen et al., 2017; Bord et al., 2021).[2] This latter concern is particularly acute as SMEs represent 70% of employment in OECD countries.[3] The question of the design and efficiency of these programs has become even more important to policy makers since the Covid-19 outbreak as a large number of governments, including the U.S. and the majority of European countries, have massively turned to this tool to address the sharp recession resulting from the pandemic.[4,5] Despite their large and growing implementation, we know surprisingly little about the long-term effects of these programs on workers' employment and their mobility across firms, and on whether such programs represent overall a cost-effective way of mitigating the labor market effects of financing frictions.

While these programs have been shown to foster job growth at beneficiary firms (Brown and Earle, 2017), assessing their effectiveness at mitigating net employment effects of financing frictions, as well as the worker reallocation effects of such programs, calls for measuring the impact of these programs on both workers' transitions in-and-out of unemployment and job-to-job mobility following a downturn. If these programs prevent workers from experi-

[1] See Beck et al. (2010) for a summary of these programs around the world.

[2] In the U.S., the main SBA 7(a) loan guarantee programs have significantly expanded with the financial crisis. The stock of SBA 7(a) loans has increased from $46 billion in 2007 to $92 billion in 2018. See CRS (2019) for more details.

[3] See https://www.oecd.org/mcm/documents/C-MIN-2017-8-EN.pdf

[4] The Covid-19 outbreak created a sudden revenue shortfall, accompanied with increased financial frictions, particularly for small firms that rely mostly on bank lending. Blanchard et al. (2020) argue that banks are reluctant to lend even to viable firms that may be short on liquidity, as diversifying away the Covid-19 risk is difficult, and they are facing compressed capital ratios due to losses on their loan portfolios.

[5] Covid-19 related loan guarantee programs vary in design across countries, with for instance the Paycheck Protection Program (PPP) in the U.S. being closer economically to a short-time work program.

encing lengthy periods of unemployment, and/or impairing their human capital, the benefit of these programs can be large. However, these programs might also create a friction to the beneficial reallocation of workers in the economy typically happening following recessions by keeping workers in less productive firms.

In this paper, we use novel administrative micro data combined with geographic variation in program design to assess this trade-off. We estimate the long-term impact of a counter-cyclical loan guarantee program in France on workers' employment and earnings trajectories. Our data tracks a representative sample of individual workers across firms over time, as well as their transitions between employment and unemployment and the associated welfare benefits they receive. Matched with firms' balance-sheet information, this data also allows us to study how such programs affect workers' reallocation following a recession, for instance, by observing how the productivity and growth of their new employer differs from the one of their initial employer. At a macro level, the data allows us to implement a cost-benefit analysis of the program that includes both the ex-post cost of guarantees and the savings associated with reduced unemployment insurance, which we can benchmark against the cost of other types of employment policies. We can also contrast the number of jobs preserved through the program to the resulting reduction in the reallocation of the workforce towards high productivity firms in the economy.

Implemented in the midst of the financial crisis, the Recovery Loan Guarantee Program offers a public guarantee for French small and medium-sized enterprises (SMEs) to rollover and extend their short-term debt. This new program, administered by Bpifrance, the French equivalent to the SBA, was announced in the last quarter of 2008 and extended until the end of 2010.[6] As French regions differently augment the funding of the national program, the treatment intensity varies geographically in a significant and plausibly exogenous manner. We exploit this heterogeneity and integrate it with a regional border discontinuity approach in order to estimate the causal impact of the program on workers at firms benefiting from a loan guarantee. The identifying assumption in our setting is that workers in firms located on each side of a regional border would have experienced similar labor market outcomes in the absence of the loan guarantee program.

We first provide evidence that the regional intensity of the loan guarantee program trans-

[6] A similar yet significantly larger loan guarantee program was launched in the second quarter of 2020, in response to the Covid-19 crisis.

lates into a higher take-up of loan guarantees at the firm level within the regional border area. Heterogeneity in regional treatment intensity is largely explained by the idiosyncratic size of regional top-up funds. Furthermore, higher treatment intensity is associated with both an increase in the quantity of bank debt on firms' balance sheets and a decrease in their cost of borrowing, which supports that our measure of treatment intensity captures heterogeneity in guarantee supply, and not in firms' demand for loans across regional borders. We then leverage our longitudinal worker-level data to evaluate how this program affects worker employment, earnings, mobility, and matching with firms until 2015.

We find that the program has a significant and persistent positive impact on workers' employment and earnings trajectories. Quantitatively, when extrapolating our estimates to the average treatment at the worker level, we obtain that individual workers initially employed by a treated firm receive earnings that are 27% higher on average over the 2009-2015 period, compared to a counterfactual set of workers initially employed by non-treated SMEs. This finding mostly reflects an employment margin: workers more exposed to the program are significantly less likely to separate from their initial employer, and in turn to be unemployed over the sample period.

The program particularly benefits workers initially employed in slack labor markets, whereas it has only a small and statistically insignificant effect on workers' cumulative employment in tight labor markets. Such heterogeneous effects can be rationalized by the labor market adjustment margin we can flesh out with our data. While workers more exposed to the guarantee program are significantly more likely to stay at their initial firm, the employment effect of this higher retention is offset by half as treated workers are less likely to move to other firms in the economy. These findings speak to the relevance of loan guarantee programs in high unemployment contexts, whereas their benefit in terms of employment are less clear when it is relatively easy for displaced workers to find new jobs at other firms.[7]

We then document that loan guarantee programs dampen the reallocation of workers towards productive and growing firms that typically occurs following recessions, and particularly so for workers with skills in high demand. By comparing the productivity and growth of both initial and new employers of the workers in our sample, we first show that workers more exposed to the program are significantly less likely to move to firms with higher productivity and growth than workers from the counterfactual. Turning to the cross-section of

[7]We define slack labor markets as areas in which the unemployment rate is above 10%.

workers and occupations, we find that this dampening effect is particularly pronounced for workers with high earnings capacity, for occupations for which firms report hiring difficulties, and for non-routine/cognitive-analytical occupations. Taken together, these findings highlight an important counterpart to the employment benefit of countercyclical loan guarantee programs we previously document: by keeping workers in their current firms and thereby creating a friction to beneficial worker reallocation, these programs might affect the trajectory of the economy following recessions.

We conduct a battery of tests to ensure that these results are not driven by alternative mechanisms. First, we find no correlation between regional treatment intensity and the level or change in workers' earnings, firm performance, or aggregate economic activity in the border area prior to the implementation of the program. Second, the estimates are robust to the inclusion of a comprehensive set of controls mitigating concerns over possible confounding factors: local government debt, taxes, and investment at the regional level, lending activity by local banks, national public programs targeting employment such as subsidies for short-time work, regional subsidies from the European Union, as well as political preferences at the regional level. We address concerns over an upward bias in our estimates resulting from business stealing effects across regional borders by removing non-tradable industries (e.g. restaurants) from our sample and find comparable magnitudes. Last but not least, we conduct a placebo analysis on non-eligible firms, and find no effects of the program on the set of workers initially employed by these firms, which confirms that our baseline estimates are caused by the loan guarantee program, rather than other policies that could confound our results.

We conclude our study by providing an aggregate cost-benefit analysis of the loan guarantee program. We estimate that the program had a positive impact on French aggregate employment of around 260,000 jobs(-year), while the ex-ante cost was the provision of a €683 million fund. The ex-post cost of the guarantee program can be estimated as the difference between the guarantee payments made by Bpifrance for defaulting loans minus the premiums paid to Bpifrance at origination for all guaranteed loans, which equals €207 million. This corresponds to a gross cost to preserve a job(-year) of respectively €2,650 and €800 when accounting for the ex-ante or ex-post cost. As savings for the unemployment national fund amount to around €1.1 billion, since the loan guarantee program reduced workers' unemployment spells, the program actually exhibits a *negative* net cost. However,

these attractive features of the policy are to be contrasted against the reduction in workers' reallocation towards more productive firms we document. We estimate the number of workers prevented from moving to more productive firms to be around 270,000 and thus of comparable magnitude as the number of jobs preserved by the program. As the productivity differential between the average firm and the set of firms in the right tail of the productivity distribution is large, this counterfactual reduction in worker flows towards the most productive firm constitutes a sizable hidden cost for the program.

Our research contributes to the literature on government programs and small business lending (Zia, 2008; Banerjee and Duflo, 2014; Bach, 2014; Ru, 2018; Jiménez et al., 2018), and loan guarantees in particular (de Andrade and Lucas, 2009; Beck et al., 2010; Lelarge et al., 2010; Mullins and Toro, 2018; Brown and Earle, 2017; D'Acunto et al., 2017; de Blasio et al., 2018; Bachas et al., 2021).[8]

Two recent studies (Bonfim et al., 2021; Gonzalez-Uribe and Wang, 2019) build on Brown and Earle (2017) and study the real effects of loan guarantees in the context of Portugal and the UK. Our study differs from these analysis on several dimensions. First, our focus is on dissecting the overall labor market effects of loan guarantee programs, as opposed to studying a broad set of firm outcomes. Second, by exploiting unique worker level data that allows tracking workers in and out of employment, and from firms to firms, we can isolate the causal effect of the loan guarantee program on the long-term trajectories of individual workers' earnings, employment and reallocation to other firms. Third, our setting allows us to aggregate our micro-estimates to measure the impact of these programs on overall employment and worker reallocation during recession, contrast it to their explicit cost and compare it with other policies having the same goal.

Relatedly, we add to the empirical debate on the effectiveness of public policies aiming to protect or stimulate employment in downturns, such as hiring credits (Cahuc et al., 2019; Neumark and Grijalva, 2017), and subsidies for short-time work (Cahuc et al., 2018; Giupponi and Landais, 2018). We show that loan guarantees have a positive and persistent impact on

[8] A burgeoning literature studies the (short-term) effects of loan guarantees implemented during the Covid-19 outbreak, see e.g. Granja et al. (2020); Core and De Marco (2020); Bartik et al. (2020); Autor et al. (2020); Chetty et al. (2020); Li and Strahan (2020); Hubbard and Strain (Forth.). Many countries have indeed used loan guarantees as one of their key measures to support the economy during the pandemic. Using data from the OECD and the IMF, Benmelech and Tzur-Ilan (2020) report that government loan guarantees amount to an average of 2.73% of GDP in the year 2020 across 85 countries, while total fiscal spending (excluding these guarantees) averages 4.97% of GDP.

workers' employment and earnings trajectories obtained at a relatively low cost, likely due to effective targeting resulting from the loan guarantee design (Philippon, 2020), but also significantly dampen the reallocation of the workforce towards more productive firms.

Last, our work assesses a possible remedy to the significant employment effects of financing frictions documented by a large body of empirical studies, both at the firm level (Chodorow-Reich, 2014; Duygan-Bump et al., 2015; Greenstone et al., 2020; Giroud and Mueller, 2017; Bentolila et al., 2018), and worker level (Berton et al., 2018; Caggese et al., 2019; Baghai et al., 2021; Babina, 2020; Acabbi et al., 2020; Gortmaker et al., 2020). Our study also contributes to the literature studying labor misallocation effects resulting from financial policies (e.g Bai et al., 2018; Barbosa et al., 2019; Fonseca and Van Doornik, 2022). To the best of our knowledge, this study is the first to document and quantify the negative impact of loan guarantee programs on the reallocation of the workforce towards more productive firms. Our study thus highlights an important trade-off between addressing unemployment and preserving worker mobility when using loan guarantees as an intervention.

Our study proceeds as follows: In section 2, we provide institutional details on loan guarantee programs in general, as well as on the French one that underlies our study. In section 3, we describe the data we use and detail the identification strategy we implement to establish the causal effect of loan guarantee programs on employment. Section 4 provides our baseline results at the micro level, while section 5 estimates the impact of the program on workers' reallocation towards other firms in the economy. Section 6 addresses alternative mechanisms that could explain our results. Section 7 assesses the cost of the program and develops a cost-benefit analysis at the macro level. Section 8 concludes.

2 Background

2.1 Public Loan Guarantee Programs

Numerous governments, including the U.S., provide loan guarantees to small firms. These programs are usually implemented through a specialized entity, such as the Small Business Administration (SBA) in the U.S., or Bpifrance in France, which partners with banks.

2.1.1 Relaxing Financing Frictions

Loan guarantees by a government-backed entity have several advantages over direct public lending. First, this public intervention design typically delegates screening and monitoring to private banks. Relying on banks' expertise and infrastructure mitigates the risk that political considerations drive the allocation of credit. Second, as the guarantees are partial, banks retain skin in the game when screening loans. Lastly, guarantees do not require the guarantor institution to disburse cash and raise capital at the time of their implementation, although they do create regulatory capital requirements.

These programs allow small businesses to mitigate their financing frictions, which are particularly pronounced during recessions. Access to credit for small firms might be limited in general by adverse selection (Stiglitz and Weiss, 1981), moral hazard (Holmstrom and Tirole, 1997), and transaction costs. Such financing frictions are typically amplified during recessions, since revenue shortfall worsens the pool of borrowers and increases debt overhang (Brunnermeier and Krishnamurthy, 2020). On the other hand, one potential risk of credit guarantee schemes is that they might attract low-productivity borrowers. They might also deteriorate bank incentives to properly monitor borrowers in the presence of moral hazard.

2.1.2 Labor Market Effects

Employment Effects for Recipient Firms. Theoretically, the employment effects of loan guarantee schemes are ambiguous. At the level of recipient firms, while access to guarantee loans might allow them to preserve or increase the scale of their operations, workers of these firms might be hurt if capital and labor are substitutes. Prior work documents positive effects of relaxing financial constraints on employment growth at the firm level, suggesting that capital and labor are instead gross complements (among others, see Chodorow-Reich, 2014; Brown and Earle, 2017). During downturns, the main focus of our study, one important economic rationale for loan guarantee schemes is to support labor hoarding, as put forward during both the financial crisis and the Covid-19 pandemic. Financial constraints might prevent firms facing a temporary shock from optimally maintaining employment relationships with their workers, as argued in Giroud and Mueller (2017), creating an excess sensitivity of separations to business cycle fluctuations. It might be optimal for firms to maintain employment relationships in downturns, for instance, if it is costly to hire and

train workers, and/or because worker-firm relationships involve firm-specific human capital that is lost during layoffs. If separations are indeed inefficiently high during downturns because of financing frictions, using loan guarantee schemes to incentivize labor hoarding can be efficient.

Labor Reallocation. It is crucial to investigate the employment effects of loan guarantees not only for recipient firms, but across all firms of the economy. While loan guarantees might allow recipient firms to retain their workforce, this would not necessarily translate into net aggregate positive effects on employment. In particular, in areas or periods with low unemployment rates, displaced workers might easily find a job in other firms of the economy, in which case the positive effect of guarantees on the employment of recipient firms does not translate into net employment gains in the aggregate.

Moreover, such reallocation of workers in the absence of the loan guarantee program might be beneficial to the economy. Downturns are typically associated with significant reallocation of workers from low to high-productivity firms, as less productive firms reduce the scale of their operations or exit, while more productive firms might better resist or even grow. In this context, loan guarantees might reduce efficiency on the labor market – that is, the aggregate quality of the matches between workers and firms – if they allow recipient firms with structurally low labor productivity to retain their employees, and thus dampen the reallocation of the workforce towards firms with higher labor productivity.

2.2 The French Public Guarantor: Bpifrance

Bpifrance[9] is the entity managing public loan guarantee programs in France, and was created in 1982 as a French equivalent of the SBA. Bpifrance activities are mostly targeted towards SMEs and encompass, in addition to loan guarantees, direct lending, providing grants, and investing in equity. Bpifrance does not collect deposits, but funds itself in the wholesale market.

Bpifrance works with a network of partner banks that include all major French banks, and relies on them to source loan applications. As of 2017, Bpifrance possesses 48 local branches that process the loan guarantee applications provided by banks. Starting in the second half of the 2000s, French regions have been partnering with Bpifrance. This partnership takes

[9]Previously named Sofaris, and then Oseo-Garantie.

the form of complementing Bpifrance intervention, by guaranteeing an additional fraction of the loans that Bpifrance underwrites. This additional guaranteed fraction is capped, with a cap varying across regions according to bilateral agreements between French regions and Bpifrance. The partnership is based on top-up financing independently provided by the regions through dedicated entities, the *Fonds Regional de Garantie*. The existence, timing and generosity of such partnerships result from an idiosyncratic local political process conducted in the regional parliaments.

For the purpose of our empirical analysis, we focus on a new loan guarantee program created at the end of 2008, which specifically aimed at allowing firms to access short and medium term debt in the wake of the financial crisis.

2.3 The Recovery Plan

The French recovery plan of 2009-2010 led to the creation of a large short-term credit guarantee program managed by Bpifrance (under the Oseo-Garantie name at that time). As illustrated in Figure 1, the plan guaranteed €5.3bn of new bank debt between 2008Q4 and 2010Q4, which represents 0.2% of GDP. The plan targeted new lines of credit with a term between 12 and 18 months, as well as the restructuring of existing short-term debt into new loans with maturity between two and seven years. 4,000 firms received guarantees on their new lines of credit for an amount of €1.8 bn, and 17,000 firms received guarantees on their medium-term new loans for €3.5 bn. Bpifrance charges an average insurance premium of around 1% per annum of the loan notional in exchange for such a guarantee. Ex post, the premiums represented a total of €126M, while banks claimed guarantees for €333M, which illustrates that the guarantee was subsidized on average.

3 Empirical Strategy

3.1 Data

We use three complementary sources of administrative micro data, which we obtained from Bpifrance and the French Statistical Office (INSEE): an exhaustive file of individual loan guarantees, the exhaustive firm registry, and a balanced ~~matched~~ worker-~~firm~~ panel covering

1/12th of the French workforce that allows to track workers across jobs and employers, as well as in and out of unemployment.

In particular, we are able to observe workers' employment trajectories across employers and match this information with firm financial statements. This scope allows us to study both the overall impact of the program on the career of individual workers, and the potential negative consequences on their mobility towards firms with high productivity and growth.

3.1.1 Loan Guarantees

We use proprietary data provided by Bpifrance on the universe of firms benefiting from loan guarantee programs since 2002.[10] This data provides a unique firm identifier (SIREN), and information on the guarantee characteristics, including the date and amount of the loan, whether the guarantee was part of the recovery plan, the type of loan underlying the guarantee, and the fraction of the loan covered by the guarantee. Bpifrance data does not include information on interest rates, but includes information on default: whether the loan benefiting from the guarantee defaults over its life, and the loss amount. The dataset does not include unsuccessful application data, as Bpifrance did not collect such data.

3.1.2 Firm-level Tax Filings

We use administrative micro data extracted from tax files available until 2015. The data includes balance sheets as well as profit and loss statements for the universe of French firms. The data is not publicly available, but is available for academic research through a procedure similar to accessing Census data in the U.S. We track firms through time using their unique identifying number ascribed by INSEE. We retrieve industry classification using a historical four-digit industry classification code ascribed to each firm by INSEE itself, which is similar to the SIC coding system in the U.S. This data exhibits a discontinuity in the number of firm-level variables available for researchers from 2010, which means that we observe the breakdown of firm debt between bank debt and other debt only until 2009.

[10]The data sharing agreement does not grant Bpifrance any form of control over the findings of this study or their publication.

3.1.3 Worker-level Data

We rely on ~~matched employer-employee~~ worker longitudinal data ("DADS Panel"), built by INSEE from social security contribution declarations of firms and from unemployment benefits. The sample covers all individuals born in October of each year, i.e. 1/12th of the French workforce. Each year firms declare the employment spells, the number of hours worked, and the associated wages for each worker. For workers who have multiple jobs in a given year, we aggregate earnings across all jobs and retain the identifier of the employer that accounted for the largest share of the worker's earnings. Data on unemployment benefits is available since 2008. This data covers all active workers including self-employed workers as long as they pay themselves a wage, as well as unemployed workers actively looking for a job and are therefore eligible to unemployment benefits. As such, firms exiting the sample due to bankruptcy does not impair our ability to observe workers over time.

3.2 Data Filtering

We apply the following filters to the data at the firm and worker level. At the firm level, given that SMEs (defined as firms with less than 250 employees) represent virtually all the beneficiaries from the recovery plan, we restrict the sample to SMEs, and use larger firms that are ineligible to the program in a placebo analysis. We then follow the literature and exclude firms from the financial and real estate sectors, as well as utilities, non-profit, and regulated sectors. Finally, for the purpose of our identification strategy described below, we restrict the sample to firms with all employees in the same region and located within 10 miles of a regional border, leaving 31,949 firms.

At the worker level, we restrict the sample to workers with high labor force attachment (as e.g. in Autor et al. (2014); Yagan (2019)), namely workers with annual earnings above €10,000 in 2006, 2007, and 2008. To avoid measurement errors due to initial entry and exit from the workforce, we focus on workers that were at least 24 years old in 2008 and at most 58 years old in 2015, that is workers who were born between 1957 and 1984. The results of our empirical analysis are however robust to including a broader age range, such as 18 to 62 years, the age of full pension benefit eligibility in France. We also restrict our analysis to French citizens in order to alleviate concerns over unobserved employment in foreign countries. Last, we only keep workers initially employed by establishments located within the region

border zone. This filtering leaves 38,568 workers in the sample, which are by construction representative of 12 times more workers, or 462,816. For each of these workers, we then track their employment status (employed or unemployed), the source and magnitude of their earnings, labor earnings or unemployment benefits, as well as the economic performance (e.g. productivity and growth) of their new employers when they change jobs, over the sample period.

3.3 Descriptive Statistics

Table 1 presents descriptive statistics for our sample.

Panel A provides information on the exposure to the loan guarantee program, both at the regional and firm level. $Raw\ Guarantee_{region,2009-2010}$ corresponds to the average ratio of loan guarantees to firm assets, computed across all eligible firms in a given region, excluding firms within 10 miles of a regional border. The generosity of the program varies significantly across the 21 regions, with firms from the least generous region receiving on average 0.1% of their total assets in guarantees, while firms from the most generous region receive 7.3 times more.

Panel B and C present descriptive statistics at the worker level. The average worker has worked for 6.5 years during the 2009-2015 period, received earnings equal to 6.5 times their initial annual earnings (average annual earnings over the 2006-2008 period), and received 0.2 times their initial annual earnings in unemployment benefits. The average worker is 38 years old, works 1,872 hours, and earns €23,836 per year.[11] Table A.1 in the online appendix presents the same characteristics separately for workers employed in treated and non-treated firms. We note that 5.1% of workers in our sample are initially employed in a firm receiving a loan guarantee.

Finally, in Panel D, we present a number of firm characteristics measured in 2008. The average firm in our sample has 20 employees in 2008, is 18 years old, has assets of €3.04 million, and return on assets of 10%.

[INSERT TABLE 1]

[11] Earnings include all wages earned during the year net of social contributions and exclude unemployment benefits. Variables are expressed in €2015.

By construction, our main sample includes only SMEs and their associated workers initially located within a 10 mile distance to a regional border. One possible concern is that this sample is not representative of the whole universe of SMEs. In order to shed light on this potential issue, Online Appendix Table A.2 displays firm and worker characteristics for our sample of SMEs located within a 10 mile distance of a regional border, and for the whole universe of French SMEs. Overall, the characteristics of the two groups are comparable. In particular, SMEs within a 10 mile distance to a regional border are similar with the rest of French SMEs in terms of standard measures for financial constraints used in the literature, such as credit risk, dividend payout, and cash-flows. Still, we note that workers' annual earnings are slightly lower in the sample of SMEs within a 10 mile distance (on average €23,836 against €25,786 for the rest of French SMEs), most likely because high-paid jobs are over-represented in large metropolitan areas, which are rarely located close to regional borders. In Online Appendix Table A.3, we present the distribution of SMEs across a list of 18 industries for both groups. Overall, these distributions are similar. Taken together, these statistics make us confident that our estimates extend beyond our border sample, and are informative for the whole population of SMEs.

3.4 Empirical Design

3.4.1 Setting and Micro-foundation of Treatment Heterogeneity

Studying the effects of a loan guarantee program requires overcoming a major empirical challenge: receiving a loan guarantee is most likely correlated with firm characteristics, either observables or unobservables. A naive OLS regression of worker outcomes on firm-level guarantee treatment is therefore prone to endogeneity, for instance due to the selection of treated firms on distress.

For the purpose of identification, we rely on a border discontinuity design to estimate the treatment effects of the loan guarantee program. Border discontinuities have been used in a number of studies to estimate program effects in a variety of economic contexts (see e.g. Holmes, 1998; Black, 1999; Dube et al., 2010; Huang, 2008). In our setting, we exploit variation in the intensity of the loan guarantee program across regions, and focus on workers along regional borders in order to absorb the effect of local economic conditions.

We obtain the longitude and latitude coordinates of the centroid of each municipality,

and calculate the minimum distance from the population centroid of the municipality to the regional border. The grey area in Figure 2 represents the set of municipalities whose centroid lies within 10 miles of a regional border. These municipalities form a land strip on both sides of the border of fairly uniform width. Our baseline sample includes workers initially employed by establishments located in one of these border municipalities. Importantly, the discontinuity in exposure to the program that we exploit is sharp: the location of the firm (and not of the lenders) determines the Bpifrance regional office in charge of processing the loan guarantee application.[12]

To filter out demand factors such as firm composition or other regional public policies, we construct our main measure of regional exposure to the 2009-2010 loan guarantee program, $\text{Guarantee}_{region,09-10}$, by estimating regional fixed effects while controlling for an extensive set of firm and regional characteristics, thereby focusing on idiosyncratic program variation at the regional level. Specifically, we estimate regional fixed effects across eligible firms outside the border area, with the following specification:

$$Guarantee_{firm,2009-2010} = \Phi_r.\theta_r + \delta_1.X_f + \delta_2.X_r + \epsilon_f, \tag{3.1}$$

where $Guarantee_{firm,2009-2010}$ is the ratio of the loan guarantee amount received by firm f from Bpifrance through the recovery plan over the firm total assets in 2008, θ_r are regional fixed effects, X_f is a vector of firm characteristics including the logarithm of firms' total assets, the logarithm of firm age, credit risk, return on assets, the ratio of dividends over sales, property plants and equipment (PPE) over assets, and debt over assets, as well as industry fixed effects (for 56 2-digit industries), all measured in 2008, and X_r is a vector of regional characteristics including the regional 2008-10 per-capita change in public spending, local taxes, public equipment expenditures, public debt, state contribution, value-added of non-SMEs, and lending by local banks. We then use this residualized treatment as our main explanatory variable in the border area.[13] Yet our analysis is robust to using the

[12]If the firm's headquarters are located in region A, the Bpifrance regional office in region A is in charge of processing the loan guarantee application. Exposure to the program therefore cannot be "manipulated" by borrowing from banks outside the region in which the firm is located. As noted before, we keep only firms with all establishments in the same region in the sample.

[13]By doing so, we reduce the likelihood that unobservable characteristics of firms in the non-border subsample are correlated with the error terms in our main specification implemented in the border area sample. In that respect, the independence between the explanatory variable and the error term is more likely to

non-residualized measure of treatment intensity, i.e. the regional average of the ratio of the amount of loan guarantee received by a firm through the recovery plan over the firm total assets in 2008, computed across eligible firms outside the border area.

Figure 2 displays our main measure of treatment intensity, $\text{Guarantee}_{region,09-10}$. Our empirical strategy exploits this regional variation in treatment intensity as a source of identification. Thin grey lines within each region separate departments, a finer geographical level, which we rely upon to absorb local economic conditions.

[INSERT FIGURE 2]

Regional treatment intensity tightly relates to the level of funding of the regional companion fund in 2008, as illustrated in column 1 of Table A.4 that shows that each additional euro in the regional guarantee fund leads to an additional 62 cents of loans guaranteed under the program.[14] As discussed in the previous section, this level is the outcome of a local and arguably idiosyncratic political process. Column 2 of Table A.4 confirms that an increase in size of the regional fund results in an increase in the guaranteed fraction of loans. In turn, since banks' skin in the game is lower in these regions, they tend to extend more guaranteed loans, as evidenced in column 3 of Table A.4.

3.4.2 Specifications

Our empirical strategy is akin to a difference-in-differences setting with continuous treatment, as areas are differentially exposed to the short-term loan guarantee program. The exclusion restriction relies on the regional loan guarantee exposure only affecting workers' outcomes through the subsidized access to new lines of credit and bank loans offered by the program to their employers in 2009 and 2010. In particular, regional exposure to the program needs to be orthogonal to other local shocks that would otherwise affect workers' outcomes over the sample period. This requirement motivates our border discontinuity approach which aims at comparing workers/firms with similar characteristics and economic environment. Unobserved economic or policy shocks correlated with the exposure to the program could still differentially affect workers on each side of regional borders in a way that would confound

hold under this specification than when simply controlling for firm and regional characteristics in our main specification.

[14] The large R^2 of this bivariate regression illustrates that the generosity of the regional companion fund is the main driver of the heterogeneity in regional treatment intensity.

our findings. However, such confounders should affect workers' outcomes irrespective of the eligibility of their employers to the guarantee program, which we can assess empirically by running a placebo analysis with a similar specification on the workers initially employed at firms ineligible to the guarantee program.

Our first stage boils down to the following cross-sectional regression on the set of eligible firms located within 10 miles of a regional border:

$$Guarantee_{firm,2009-2010} = \beta.Guarantee_{region,2009-2010} + \delta_1.X_f + \delta_2.X_r + \gamma_s + \epsilon_f, \qquad (3.2)$$

where $Guarantee_{firm,2009-2010}$ is the ratio of the amount of loan guarantee received by firm f from Bpifrance through the recovery plan over the firm total assets in 2008, and $Guarantee_{region,2009-2010}$ is the residualized regional treatment intensity. γ_s are department-pair fixed effects (a finer geographic division than regions) that allow us to absorb local shocks. Our identification therefore comes from within (short) sections of the border band we study. We further include X_f, a vector of firm characteristics including the logarithm of firms' total assets, the logarithm of firm age, credit risk, return on assets, the ratio of dividends over sales, property plants and equipment (PPE) over assets, and debt over assets, as well as industry fixed effects (for 56 2-digit industries), all measured in 2008, and X_r, a vector of regional characteristics including the regional 2008-10 per-capita change in public spending, local taxes, public equipment expenditures, public debt, state contribution, value-added of non-SMEs, and lending by local banks. We cluster the error term, ϵ_f, at the treatment level: regions.[15]

We then estimate a similar cross-sectional specification as (3.2) with employment and earnings outcomes at the worker level as dependent variables:

$$y_{w,2009-2015} = \beta.Guarantee_{region,2009-2010} + \delta_1.X_f + \delta_2.X_r + \delta_3.X_w + \gamma_s + \epsilon_w, \qquad (3.3)$$

where y denotes an employment or related outcome over our sample period (2009-2015) for worker w employed as of 2008 in an establishment located within 10 miles of a regional border. Following Autor et al. (2014) and Yagan (2019), one of our main variables of interest – cumulative earnings – are normalized by workers' initial earnings, that is, over the period

[15]There were 21 regions in France as of the sample period. All results are robust to clustering at the department-pair level instead, to mitigate concerns over the issue raised by Moulton (1990).

2006-2008. β, the main coefficient of interest, measures the causal effect of initial regional exposure to the loan guarantee program on workers' outcomes. We also include X_w, a vector of worker characteristics including worker age, gender, and occupation fixed effects all measured in 2008.

The main identifying assumption is that workers on each side of the border would have experienced similar labor market outcomes in the absence of treatment. We first note that if labor markets are frictionless and workers can easily move to another region and obtain identical compensation in alternative firms, we should see no earnings or employment impact at the worker level from differences in their regional exposure to the French loan guarantee program in the period 2009-2010.

We then check that initial worker and firm characteristics are not correlated with the treatment variable. For this, we run a similar cross-sectional specification as (3.2) with workers' and firms' outcomes as dependent variables, all measured in 2008. We present the results in Online Appendix Table A.5. The differences across low and high exposure regions in workers' earnings, hours worked, unemployment benefits, as well as firm age, size, return on assets, credit risk, payout ratio, tangibility, and leverage, all measured in 2008, are all small and statistically insignificant. We also test for the presence of pre-trends in economic activity correlated with our treatment variable. We proxy for economic activity by summing the value-added of firms located in the border area of each region, scaled by the corresponding population. Table A.6 shows no evidence of diverging pre-trends in economic activity before the program.

3.5 First-Stage Evidence

3.5.1 Predicting Firm-level Treatment with Regional-level Treatment

We start by establishing the internal validity of our empirical setting. Column 1 in Table 2 displays the regression coefficients of the first stage as described in equation (3.2) at the firm level. The coefficient on $Guarantee_{region,2009-2010}$ is positive and strongly statistically significant, with a t-stat of 5.6, which confirms that higher treatment intensity at the regional level (excluding border areas) translates into higher treatment intensity at firms located close to regional borders. Column 2, where the dependent variable is an indicator variable for receiving a guarantee, illustrates that the regional intensity is associated with a significantly

higher likelihood of receiving a guarantee.

[INSERT TABLE 2]

In addition, we check that our first stage is driven by firms facing high financial constraints, consistent with the program target. To do so, we split our sample along proxies for firm financial constraints widely used in the literature: credit risk, measured as the inverse of the interest coverage ratio, dividend payout, and cash flows. We run our first stage specification on each of these sub-samples and present the regression results in Online Appendix Table A.7. We confirm that the relationship between $Guarantee_{region,2009-2010}$ and $Guarantee_{firm,2009-2010}$ is indeed driven by firms with above median credit-risk, not paying dividends, and below median cash flows, as of 2008.

3.5.2 Firm-level Quantity and Price Effects

To further strengthen the validity of our first stage, we test whether a higher regional treatment intensity is associated with an increase in the quantity of bank debt combined with a similar or lower cost of debt, consistent with a supply effect.

We first run a specification similar to our first stage where the dependent variable is the firm-level growth rate of bank debt over 2008-2009.[16] As shown in Column 3 of Table 2, higher exposure to the loan guarantee program is indeed associated with a significantly higher growth in bank debt, which is consistent with a relaxation of financial constraints for the treated group. Second, we run a similar specification where the dependent variable is the change in the average interest rate paid on outstanding debt between 2008 and 2010.[17] Column 4 of Table 2 displays the regression coefficient. Treated firms exhibit a significantly lower interest rate, even when controlling for firm characteristics, which is consistent with the program driving the increase in debt, rather than higher local demand for credit.

[16]Due to data limitations, we can only observe the debt composition of firms until the end of 2009, and therefore can only measure the effect on bank debt in the first year of the program. This result is robust to using total debt growth rate over 2008-2010 as a dependent variable, which covers the whole treatment period, but does not zoom in on the part of debt directly affected by the program.

[17]We calculate the average interest rate from the yearly interest payments divided by the beginning of year amount of outstanding debt. Due to data constraints, we cannot restrict our analysis to newly issued debt.

4 Impact of Loan Guarantees on Employment and Earnings

We now turn to analyzing the impact of exposure to the loan guarantee program on workers' employment and earnings.

4.1 Effect on Employment and Earnings

We run our baseline specification (3.3) to study the causal impact of this program on worker employment trajectories. Coefficients are displayed in Table 3. Panel A studies the cumulative effects of the loan guarantee program on years employed and cumulative earnings over the period 2009-2015. All specifications include department-pair fixed effects, regional controls, and firm-level controls. We add worker-level controls in columns 2 and 4.

We observe a statistically significant and robust relationship between regional variation in the program intensity and the number of years employed and cumulative earnings of workers over the 2009-2015 period. The point estimate is left virtually unchanged when worker-level controls are introduced in the specification. The effects are economically sizable. Relative to the pre-crisis period, workers in a region with the average treatment experience a total gain in years employed of 0.07 years, when compared to a hypothetical region with no exposure to the program.[18] A similar calculation for earnings yields an increase by 8.6 percentage points in cumulative earnings for workers in a region with the average treatment.

This effect is large: in any given region, only a small fraction of workers are employed in firms actually receiving a loan guarantee. To see this, we extrapolate our estimates to obtain the economic magnitude of being treated at the worker level. Given that 5.1% of the workers in our data are initially employed at treated firms (see Online Appendix Table A.1), this suggests that workers employed in firms receiving a guarantee during the financial crisis experience a total increase of 1.4 additional years in employment over the sample period, and of 1.7 times their initial annual income in cumulative earnings, or 24% in annualized terms.[19]

[18] The average (raw) regional treatment is equal to 0.29 (%) of total firm assets, which we multiply by the most conservative point estimate of our regression, 0.240.

[19] These numbers are obtained by multiplying our estimates in respectively columns 2 and 4 of Panel A of Table 3 with the average regional treatment of 0.29 and then dividing by 0.051.

In Online Appendix Table A.8 we confirm that the relationship between $Guarantee_{region,2009-2010}$ and worker employment trajectories is driven by firms likely facing financial constraints, consistent with the higher take-up of these firms shown in Table A.7.

In Panel B, we run a 2SLS specification, and instrument $Guarantee_{firm,2009-2010}$ with $Guarantee_{region,2009-2010}$. The results confirm that worker exposure to the treatment has a significant effect on their labor outcomes. Footnote: Note that the coefficients in the 2SLS specification are larger then in the reduced-form since the first-stage coefficients are less than one.

In Panel C, we implement a similar specification as in Panel A on the border area worker sample, using the raw measure of regional treatment intensity. Reassuringly, this exercise leads to similar point estimates than in Panel A.

[INSERT TABLE 3]

Dynamics and Pre-Trends. We then study the year-to-year impact of the loan guarantee program on worker outcomes. We plot the estimated effect of exposure to the loan guarantee program for each year from 2004 to 2015 on annual worker earnings in Figure 3. Exposure to the loan guarantee program is associated with a large and statistically significant effect on annual earnings for the whole sample period following the treatment. Reassuringly, the point estimates for 2004 to 2008 are all insignificant, which supports the absence of pre-trends and our interpretation of a causal impact of the guarantees on workers' earnings trajectories. As annual earnings are higher post treatment for the treated group, the cumulative effect on earnings keeps growing over that period. Overall, the effects of the policy on earnings are immediate and strikingly persistent until the end of the sample period. Table A.9 in the appendix shows the baseline results from Table 3 with worker outcomes in 2015 as dependent variable and confirms the persistence of the effect across specifications.

[INSERT FIG 3]

4.2 Effect on Unemployment Insurance

In developed economies, earning losses due to involuntary unemployment are partly mitigated by unemployment insurance. In France, unemployment benefits cover a fraction of the initial wage, are subject to eligibility criteria, and are earned for up to two years. In our dataset,

we can isolate earnings coming from unemployment benefits, which allows us to estimate the fraction of earning losses in the counterfactual offset by unemployment insurance. We use the cumulated amount of unemployment benefits (scaled by initial earnings) during 2009-2015 as the dependent variables in our baseline specification. Results are displayed in Table A.10 of the appendix.

We find that treated workers collect significantly lower amounts of unemployment benefits over the study period. In economic terms, this point estimate indicates that workers from the average treatment region receive lower unemployment benefits over the 2009-2015 period, representing 2% of their initial annual income. This magnitude indicates that unemployment insurance offsets around 15% of the gap in earnings between the treated group and the counterfactual documented in Table 3. This finding is consistent with the large effect on employment we document and the specific design of unemployment insurance in France that offers a replacement ratio around 60% for an eligibility period ranging from 4 to 24 months. This reduction in unemployment benefits is of first order importance for the net cost of the intervention estimated in Section 7.

4.3 Adjustment Margin

In Table A.11 in the appendix, we run a similar specification as in equation (3.3) using an indicator variable for workers no longer employed as of 2015 at the firm that they were working at in 2008. The likelihood of separation is significantly lower for workers initially employed in firms more exposed to the loan guarantee program. This result suggests that the loan guarantee program affects worker employment trajectories by preserving initial firm-worker matches.

Given our ability to follow workers over time, and their job-to-job transitions across firms, we turn to precisely measuring both the impact of the loan guarantee program on employment in initial firms, and how much of this effect is offset by the adjustment margin at other firms.

We therefore follow prior work (e.g. Autor et al. (2014)) to decompose the overall effect on years employed and cumulated earnings in Table 4. Column 1 displays the net effect, which corresponds to the results in column 2 of Table 3, column 2 presents the share coming from the firm at which the worker is initially employed as of 2008, and column 3 the share

coming from their subsequent employment at other firms.

The point estimate of column 2 captures the differences in employment and earnings obtained by workers at their initial employer. The baseline coefficients of column 1 represent less than half of these effects at the initial firm, and reflect the fact that the relative employment and earning gains at the initial firm for treated workers are partially offset by counterfactual workers' mobility to other firms. Indeed, as shown in column 3, workers less exposed to the loan guarantee program are more likely to subsequently work and receive earnings from other employers over the sample period.

[INSERT TABLE 4]

This exercise highlights the benefit of using worker-level panel data to accurately assess the net employment effects of loan guarantee programs. Frictions in the labor market appear to be sizable, as in their absence the effect at the initial firm should be fully offset when accounting for employment at other firms, whereas only half of it actually is. This result illustrates the benefit of loan guarantee programs on the employment trajectories of workers in the presence of frictions in the labor market. Relatedly, in Table A.12 in the appendix, we find that higher treatment intensity is associated with a higher likelihood for workers to move to a job requiring more advanced analytical skills. Such effect on skill upgrading is consistent with loan guarantee programs protecting worker human capital accumulation.

On the other hand, the result that workers in the counterfactual offset some of the earnings loss by moving to other firms naturally raises the question whether loan guarantee programs might be preventing the efficient reallocation of the workforce towards productive firms in response to adverse economic shocks.

4.4 Low versus High Unemployment Areas

To pin-down local labor markets in which loan guarantee programs are the most effective, we split our sample between low and high unemployment municipalities and run our central specification to measure both the net effect and the retention effect.[20] Theoretically, the program should have less impact in low unemployment areas, as workers that are displaced in the absence of support to their employers can more easily find a new job in another firm.

[20] We use municipality-level unemployment data from INSEE and define high unemployment as above 10%.

Regression coefficients are displayed in Table 5, separately for high unemployment areas (columns 1 and 2) and low unemployment areas (columns 3 and 4). In low unemployment areas, although the retention effect is large and significant (column 4), the net effect of the loan guarantee program on workers' cumulative employment over the sample period is instead low and statistically insignificant. Workers from the counterfactual can therefore easily earn similar wages at other firms when the unemployment rate is low.

However, in high unemployment areas, while exposure to the program is associated with a large and significant retention effect by initial employers as in low unemployment areas (as shown in column 6 comparing the coefficients presented in columns 2 and 4), the net effect on workers' cumulative employment remains large, and of similar magnitude compared to the effect on retention. This indicates that in high unemployment areas, higher retention rates at recipient firms benefit the employment trajectories of individual workers, preventing them from experiencing lengthy periods of unemployment. Such result speaks to the context in which loan guarantee programs are the most effective, namely in slack labor markets.

[INSERT TABLE 5]

5 Impact of Loan Guarantees on Labor Allocation

Having established the causal beneficial effect of the loan guarantee program on worker employment and earnings, we study whether the program has the unintended effect of dampening the reallocation process of workers to more productive firms.

5.1 Dampened Worker Reallocation to More Productive Firms

The loan guarantee program might indeed dampen a beneficial reallocation of workers by keeping workers in their current firm, as they would have moved to more productive firms in the absence of the policy. Since the richness of our matched employer-employee data allows us to track both the employment history of individual workers over time and the identity of their new employers, we can observe which type of firms workers reallocate to in our counterfactual.

Specifically, in columns 2 to 9 of Table 6, we study whether counterfactual workers tend to move to more or less productive firms than the firm they worked at as of 2008. We

implement the same specification as in column 1, and split the set of other firms along proxies of productivity and growth: labor productivity, measured by value-added per employee in columns 2 and 3, total factor productivity for columns 4 and 5, return on assets for columns 6 and 7, and sales growth for columns 8 and 9.[21] The coefficients in columns 2, 4, 6 and 8, are significantly negative, while the ones of columns 3, 5, 7 and 9, are not statistically different from zero. Treated workers are therefore less likely to work and earn wages from more productive firms than their initial firm in 2008 during the sample period, relative to counterfactual workers. This analysis evidences that workers from firms less exposed to the loan guarantee program tend to move to more productive firms, consistent with a beneficial reallocation of workers.

Overall, these results suggest that workers separated from their employer during the crisis are likely to move subsequently to more productive firms. In turn, the loan guarantee program dampens such phenomenon and therefore introduces a friction to the efficient allocation of workers in the economy. This unintended effect of the program should be taken into account when assessing the benefits of loan guarantee programs as a public policy. While the policy appears to be effective at reducing unemployment, the counterpart is an increased rigidity in the labor market.

[INSERT TABLE 6]

5.2 Heterogeneity in Reallocation Dampening by Worker Characteristics

Next, we explore whether this dampening of worker reallocation towards more productive firms is more pronounced for certain types of workers. We reproduce the specification of columns 2 and 3 of Table 6, while splitting the sample between high (column 1 and 2) and low (column 3 and 4): earners within age cohorts in Panel A, occupations with high and low hiring difficulty in Panel B, and high and low cognitive-analytical task content in Panel C.[22]

[21] $TFP_{f,j} = VA_{f,j}/L^{\alpha_j} \times K^{(1-\alpha_j)}$, where f indexes firm, j 2-digit industry. *VA* is value-added, L is number of employees, and K is property, plant and equipment. We compute the labor share α_j as the average ratio of salaries and social contributions scaled by value-added across all firms in each 2-digit industry.

[22] The hiring difficulty data are from a survey on the personnel needs of firms, the Enquête *Besoins en Main d'Oeuvre* (BMO). The task content data of French occupations is described in Le Barbanchon and Rizzotti (2020). We thank the authors for sharing the data.

Regression coefficients are provided in Table 7. We observe that coefficients between columns 1 and 2 are significantly different from each other, while this is not the case for columns 3 and 4. This illustrates that the reallocation towards more productive firms is particularly dampened by the loan guarantee program for workers with high earnings, in high demand and with high cognitive-analytical task content. While retention of such workers is likely beneficial to their initial employers, their reallocation towards productive firms might be particularly beneficial to the overall economy. This evidence further highlights the hidden cost of loan guarantee programs resulting from reducing worker mobility.

[INSERT TABLE 7]

6 Alternative Explanations

In this section, we address alternative mechanisms that could explain our central results.

6.1 Confounding Local Shocks

A legitimate concern is that our treatment variable is correlated with other local shocks, such as other public policies which in turn affect the labor market.

Reassuringly, in Online Appendix Table A.6, we observe no correlation between the economic activity in the border area in the years before the implementation of the program and treatment intensity at the regional level, which indicates that our results are unlikely to result from diverging trends in economic activity between regions with low versus high exposure to the loan guarantee program.

Further, in Table A.13 we directly control for other public policies which may confound our estimates as well as for the political preferences of the region. Specifically, we control for changes in EU funds the region received from 2008-2010, the size of a short-time work program implemented in 2009 in the region, and the vote share of the left party in regional elections in 2004, the last election before the start of the program.[23] Reassuringly, we find similar results when controlling for these regional confounders.

[23]The data on short-term work is described in (Cahuc et al., 2018). We thank the authors for sharing the data.

We also run a placebo analysis on non-eligible firms which allows us to reject that other local economic or policy shocks affect differentially the outcomes of workers on each side of regional borders, in a way that could have biased the treatment effects of the loan guarantee program. Specifically, we run our baseline specification on the labor outcomes of workers from firms that were not eligible to the loan guarantee program because they employed more than 250 employees.[24] We therefore construct a placebo sample of workers employed in 2008 by firms with more than 250 but at most 1,500 employees and present the estimates in Table 8.[25] Reassuringly, the coefficients of the treatment variable on the employment and earnings of workers of *non-eligible firms* are all small and statistically insignificant in each specification of Table 8. This confirms that our baseline results in Table 3 are not driven by unobserved confounders but rather reflect the causal impact of the loan guarantee program.

[INSERT TABLE 8]

6.2 Spill-overs

One may be concerned that the program distorts competition in product markets in favor of firms located in regions more exposed to the guarantee program. Under this hypothesis, our coefficients would also reflect business-stealing effects between more and less exposed firms on each side of the regional borders. We address this concern by removing non-tradable industries from our sample (e.g. restaurants), where local demand spillovers could bias our estimates upward, and present the results in Panel A of Online Appendix Table A.14. Reassuringly, our baseline results are quantitatively comparable when we restrict the sample to tradable industries only. A related concern pertains to local labor market effects. Workers from low treatment regions might benefit from the proximity to nearby firms headquartered in high treatment regions when losing their jobs. Such a phenomenon would however induce a downward bias in our estimates. As shown in Appendix Table A.15, we fail to find evidence that workers move from low to high treatment regions over the sample period.

[24] Bpifrance's mandate indeed focuses on SMEs, defined as per this employee threshold. We confirm in the data that virtually all loan guarantee beneficiary firms are below this threshold.

[25] We impose an upper limit on firm employment in 2008 to improve the comparability of the placebo sample with our baseline sample. Results are robust to using alternative upper limits (e.g., 750; 1,000; 2,500; or 5,000 employees) and to using all firms instead.

6.3 Robustness to Border Area Definition

Finally, we ensure that our results are robust to the definition of regional border areas. In Panel B and C of Online Appendix Table A.14 we use 5 and 15 instead of 10 miles from the regional border as a cutoff to define the border area. The results are consistent with our baseline estimates and remain highly statistically significant, despite the substantially lower sample size when we restrict to 5 miles.

7 Aggregate Cost-Benefit Analysis

While we have so far studied the effects of the loan guarantee program at a micro level, conducting a cost-benefit analysis of the policy at an aggregate level is helpful to facilitate comparison with other policies aimed at preserving employment during downturns.

We calculate the cost-per-job(-year) resulting from the policy, contrast it to estimates from the public policy literature, and put it in perspective with the implicit cost of preventing the worker reallocation we previously documented.[26] The analysis below suggests that loan guarantee programs are a cost-effective method of preserving employment during downturns, as the net cost to the government is likely negative. This policy tool is particularly attractive in areas of high unemployment. However, such efficiency is to be balanced with increased labor market rigidity that can prevent worker reallocation towards more productive firms, which further informs the contexts in which these programs are the most relevant.

We start with estimating the number of job-years preserved by the policy. As our empirical analysis is conducted at the worker level, we multiply the average treatment of 0.29 (% of total assets) by the coefficient estimated in our baseline specification (0.240, see column 2 of Table 3) to calculate the average effect by worker. This calculation corresponds to an average gain of 0.07 years of employment for the average worker in our sample. As the full-time employee equivalent employment at SMEs in 2008 in France was 3.7 million, we obtain an estimate of around 260,000 job(-years) preserved over the period 2009-15 ($3.7m \times 0.29 \times 0.240$).

[26] One caveat is that this exercise ignores potential fiscal externalities and spill-over effects. One concern may be that, in the aggregate, saved jobs in high treatment regions might have been partially offset by lost jobs in low treatment regions due to crowding-out on the labor market. While this might happen in tight labor markets where higher labor demand may drive up wages, this is unlikely to be the case here, since unemployment fluctuated at historically high levels – between 9% and 11% – over the sample period.

This extrapolation exercise is motivated by the comparability of SMEs in the border area with the general pool of such firms, as documented in Online Appendix Table A.2.

This benefit needs to be compared to the cost of the intervention. The ex-ante gross cost to the French government was the provision of a €683M fund, which translates into an estimate for the gross cost-per-job(-year) of around €2,650.[27] The ex-post gross cost of the guarantee program can be estimated as the difference between the amount of Bpifrance payments to the banks of defaulting firms less the premiums paid to Bpifrance. Banks have claimed guarantee payments for an aggregate amount of €333M, and Bpifrance has received premiums for an aggregate amount of €126M. The ex-post cost is therefore €207M, which translates into an estimate for the gross cost-per-job(-year) around €800.[28]

This gross cost-per-job is significantly smaller than estimates from the literature on fiscal multipliers in the U.S (Suárez Serrato and Wingender, 2016; Chodorow-Reich et al., 2012), which are closer to $30,000 per job. It is also smaller than estimates from the U.S loan guarantee program 7.(a) in Brown and Earle (2017), who find a cost-per-job of around $25,000 (over three years).[29] Finally, it is of the same order of magnitude as the gross cost-per-job estimated for other employment policies implemented in France in 2009: €2,619 for short-time work subsidies (Cahuc et al., 2018), and €8,000 for hiring credits (Cahuc et al., 2019), which are primarily targeted at low skill workers.

This gross cost-per-job(-year) ignores savings in unemployment and social benefits, as well as avoided reduction in social contributions, i.e., compulsory payments by firms and employees, resulting from the loan guarantee program. We can easily adjust for the savings in unemployment benefits that we estimate in Section 4, and estimate a lower bound of the avoided reduction in social contributions.

Using the point estimate given in column 2 of Table A.10 multiplied by 0.29, the average regional treatment intensity, we obtain a reduction in unemployment benefits of 1.3% of 2008

[27] Following Lucas and McDonald (2010), one can alternatively value the ex-ante cost of the program as a put option using derivative pricing methods. Assuming a risk-free rate of 3.5%, time to maturity of 2 years, and volatility of 40%, the Black-Scholes value of a 70% guarantee on €5.3bn loans is €640M.

[28] These cost estimates do not account for potential distortions associated with raising the taxes used to finance the program nor do they account for potential increases in the operating cost of the Bpifrance branches due to the program.

[29] Brown and Earle (2017) study firm employment growth, which is different from our focus on net employment effects. Other important distinctions are our focus on countercyclical loan guarantee programs and our ability to follow workers over time, which permits to study reallocation effects.

annual earnings, that is savings of around €300 per worker. Applied to the 3.7 million jobs in SMEs in 2008, this gives us an estimate of €1.1 bn savings in unemployment benefits, i.e. roughly five times the value of the ex-post losses on the program. Turning to the avoided reduction in social contributions, we apply a 20% rate – the amount of social contribution for the lowest income bracket – to the gain in earnings we can attribute to the program, which yields an avoided reduction in social contributions of €1.5 bn.[30]

This calculation therefore yields a negative net cost for the program and the jobs it helps preserve. Despite its caveats, this exercise supports the loan guarantee program as a cost effective intervention to support employment in downturns, in particular in contexts where financial shocks hinder SMEs access to external funds.

Finally, we turn to providing a back-of-the-envelope calculation for the reduction in workers' flows towards more productive firms due to the program. While the estimates in Table 4 indicate that the policy is associated with the preservation of 540,000 job-years for initial employers ($3.7m \times 0.29 \times 0.503$), the estimates in Table 6 imply a counterfactual decline of around 270,000 job-years ($3.7m \times 0.29 \times 0.255$) at more productive firms. The cost of the program associated with this reduction in workers' reallocation towards more productive firms depends on the productivity differential between initial and destination employers. Using the average value added per employee of 57 (K€) for eligible firms in our sample, and of 110 (K€) for high value-added firms,[31] we obtain an estimate of €31 bn in value-added preserved at treated firms, and a counterfactual loss in valued added of €30 bn associated with the reduction in workers' flows towards more productive firms.[32]

This calculation illustrates that the dampening of worker reallocation resulting from loan guarantee programs is of first order importance when assessing the net benefit of such programs.

[30]To obtain this number, we multiply 20% with the average treatment of 0.29%, the coefficient obtained on cumulative earnings (0.298, see column 4 of Table 3), the average initial earnings in our sample, and the full-time employee equivalent employment at SMEs.

[31]For the latter, we use the value-added per employee in 2008 of the universe of French firms with value-added per employee above 57 K€.

[32]This back-of-the-envelope calculation again ignores equilibrium effects and aims to compare in a simple way the relative magnitude of the benefit of the program for treated firms retaining their workers against its cost in terms of reduction in workers' reallocation towards more productive firms. We leave a general equilibrium analysis of loan guarantee programs on aggregate employment to future research.

8 Conclusion

In this paper, we use administrative micro data to examine how exposure to a loan guarantee program implemented in France during the 2008-2009 financial crisis affects the employment and earnings trajectories of workers over the medium run. We find that exposure to the program results in a significantly higher likelihood of being employed over the next seven years, which translates into significantly higher cumulated earnings, and lower unemployment benefits.

An unintended effect of the policy, however, is to dampen the reallocation of workers towards more productive firms. This is especially true for workers with high earnings, in high demand and with high cognitive-analytical task content.

Finally, we perform an aggregate cost-benefit analysis of the loan guarantee program, and find that the program was revenue-positive for the government, as the savings in unemployment benefits outweigh the losses from the defaults of guaranteed loans.

However, we also find a dampening of the workforce reallocation towards more productive firms that typically happens following a recession of similar magnitude as the benefits of the policy.

Our findings have also important implications for the targeting of loan guarantee programs, indicating in particular that they are more effective at sustaining aggregate employment in periods or areas characterized by high unemployment rates, and are particularly relevant when policy cost is an important constraint, or workforce rigidity less of a concern.

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9 Figures and Tables

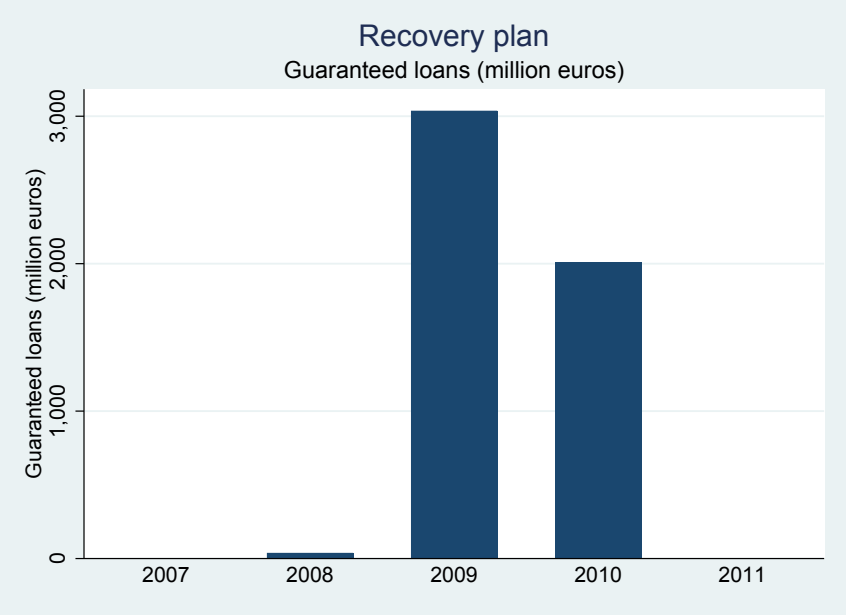

Figure 1
Yearly Volume of Guarantees of the Recovery Plan

Note: This figure displays the total volume of guarantees by Bpifrance as part of the recovery plan.

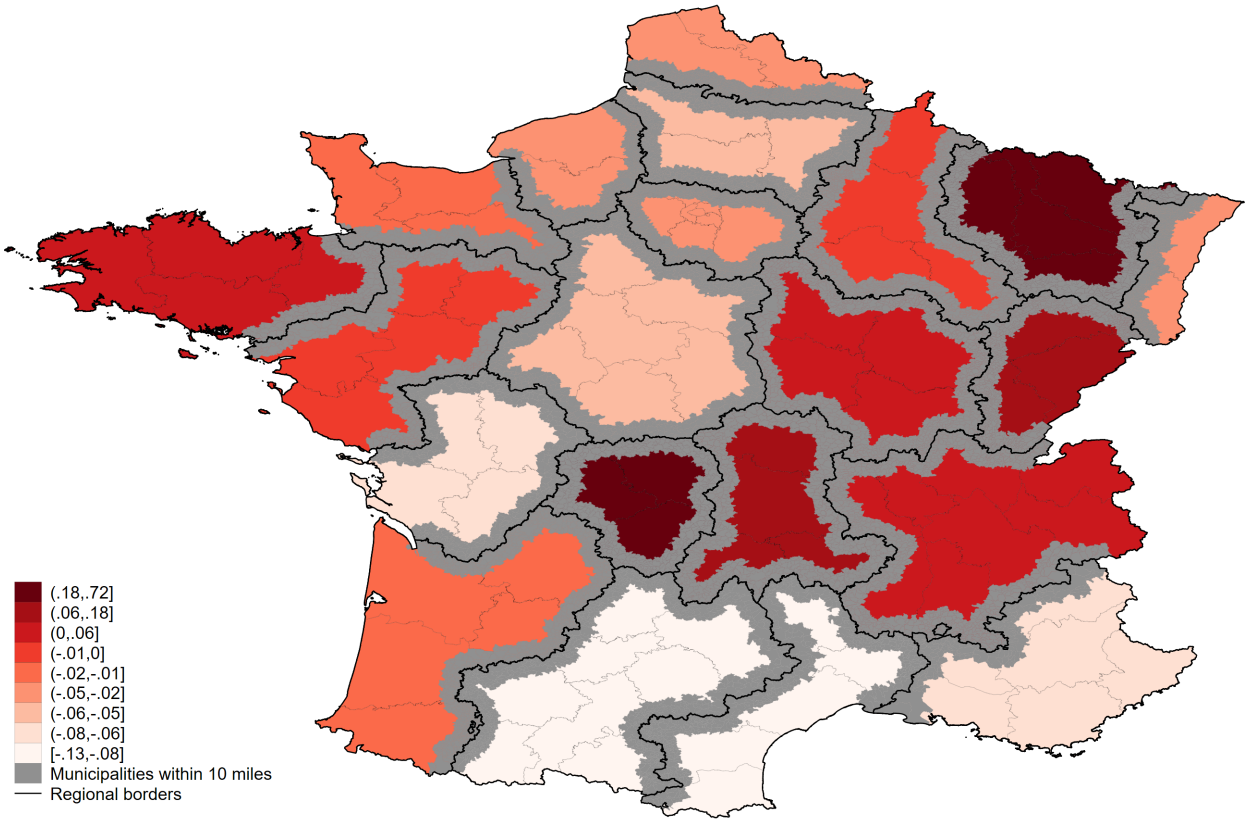

Figure 2
Regional Intensity of Loan Guarantee Intervention

Note: This figure displays the regional intensity of intervention by Bpifrance, $\text{Guarantee}_{region,09-10}$, estimated across SMEs outside the border area, see Table 1. Darker colors represent regions with higher treatment intensity. The grey area corresponds to municipalities within 10 miles of a regional border. Thin lines in grey represent department boundaries within regions.

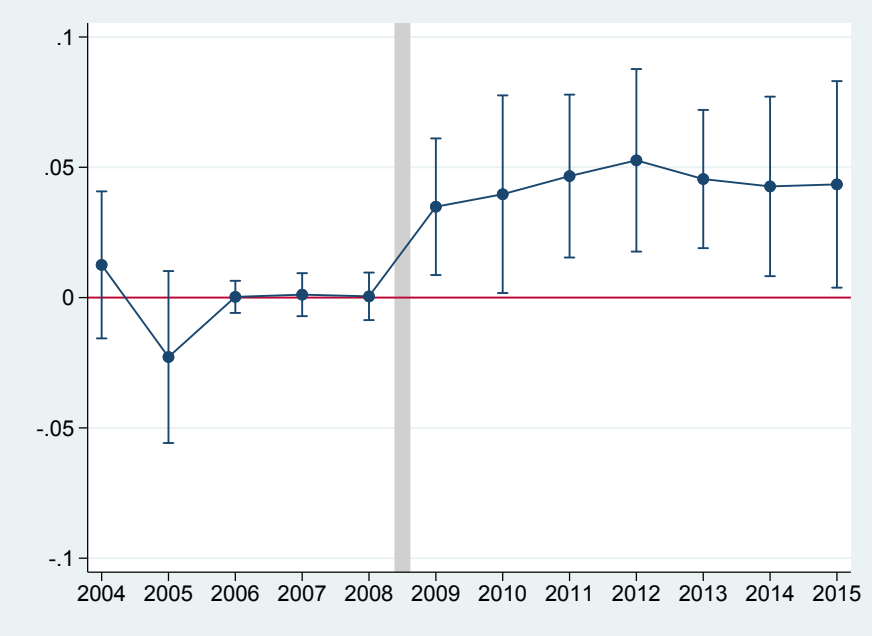

Figure 3
Dynamics: Effect on Earnings

Note: This figure plots regression coefficients and 95% confidence intervals from twelve regressions of earnings that a worker obtains in the year indicated on the x-axis, normalized by average annual earnings in 2006-2008, on our measure of regional exposure to the 2009-2010 loan guarantee program, $\text{Guarantee}_{region,09-10}$. All regressions include department-pair fixed effects, the distance from the regional border, changes in regional controls from 2008 to 2010 (public spending, local taxes, public equipment expenditures, public debt, state contribution, value-added of non-SMEs, and regional bank lending), as well as firm and worker controls measured in 2008.

Table 1
Summary statistics

	(1)	(2)	(3)	(4)	(5)	(6)
	Obs.	Mean	SD	p1	p50	p99
Panel A: Loan guarantee exposure						
Raw Guarantee$_{region,09-10}$ (over assets in %)	21	0.290	0.156	0.105	0.256	0.769
Guarantee$_{region,09-10}$	21	0.040	0.185	-0.140	-0.018	0.726
Guarantee$_{firm,09-10}$ (over assets in %)	31949	0.307	1.666	0.000	0.000	11.876
Guarantee (1/0)	31949	0.040	0.196	0.000	0.000	1.000
Default Amount$_{firm}$ (over assets in %)	31949	0.030	0.381	0.000	0.000	0.000
Default on Guaranteed Loan (1/0)	31949	0.010	0.098	0.000	0.000	0.000
Panel B: Main outcome variables, 2009-2015						
Years Employed$_{2009,2015}$	38568	6.512	1.295	1.000	7.000	7.000
Earnings$_{2009,2015}$	38568	6.498	2.167	0.140	7.085	11.022
Separation$_{2009,2015}$ (1/0)	38568	0.488	0.500	0.000	0.000	1.000
Unemployment Benefits$_{2009,2015}$	38568	0.218	0.478	0.000	0.000	2.154
Panel C: Worker characteristics in 2008						
Earnings	38568	23836	13435	12112	20755	74275
Hours	38568	1872.131	215.916	1152.000	1844.000	2479.000
Age	38568	38.320	7.762	24.000	39.000	51.000
Male	38568	0.740	0.439	0.000	1.000	1.000
Panel D: Firm characteristics in 2008 and outcomes						
$\Delta_{08-09}\frac{BankDebt}{Debt}$	23238	-0.043	0.258	-0.957	0.000	0.827
$\frac{BankDebt}{Debt}_{08}$	25487	0.652	0.373	0.000	0.810	1.000
Δ_{08-10}Interest Rate	24176	-0.013	0.048	-0.209	-0.005	0.147
Interest Rate$_{08}$	26579	0.065	0.064	0.000	0.048	0.334
Nb Employees	31949	19.948	27.932	0.000	10.750	155.250
Assets (€'000s)	31949	3037	75255	48	754	26908
ROA	31949	0.104	0.187	-0.619	0.101	0.703
Firm Age	31949	17.987	12.888	1.000	16.000	54.000
Dividend/Sales	31949	0.016	0.037	0.000	0.000	0.218
PPE/Assets	31949	0.453	0.331	0.000	0.376	1.000
Debt/Assets	31949	0.150	0.193	0.000	0.070	0.856
Credit Risk	31949	5.977	2.953	1.000	6.000	10.000

Note: This table presents summary statistics at the regional and firm level (Panel A), at the worker level (Panel B, C), and firm level (Panel D). The sample includes 1/12th of employees who were working in SMEs located within a 10 mile distance to a regional border in 2008.

Table 2
First stage: Firm-level exposure to the loan guarantee program

	(1)	(2)	(3)	(4)
	$\text{Guarantee}_{firm,09-10}$	Guarantee (1/0)	$\Delta_{08-09}\frac{BankDebt}{Debt}$	Δ_{08-10}Interest Rate
$\text{Guarantee}_{region,09-10}$	0.501***	0.051***	0.043***	-0.005*
	(0.089)	(0.010)	(0.013)	(0.002)
Distance to border	0.004	0.001	0.000	0.000
	(0.003)	(0.000)	(0.000)	(0.000)
Department-Pair FE	Y	Y	Y	Y
Regional Controls	Y	Y	Y	Y
Firm-level Controls	Y	Y	Y	Y
F-statistic	18.222	14.267	-	-
Observations	31949	31949	23238	24176
R^2	0.009	0.009	0.060	0.090

Note: This table reports the results of the first stage OLS regressions. The dependent variable is the amount of guaranteed loans the firm received due to the 2009-2010 recovery plan scaled by 2008 firm assets in column (1), a dummy variable equal to one if the firm received any loan guarantee from the recovery plan in 2009-2010 in column (2), the change in bank debt/debt from 2008 to 2009 in column (3), and the change in interest rate expenses/debt from 2008 to 2009/2010 in column (4). The main explanatory variable is the regional intensity of the recovery plan, $\text{Guarantee}_{region,09-10}$, estimated across SMEs outside the border area. All regressions include department pair fixed effects, changes in regional controls from 2008 to 2010 (public spending, local taxes, public equipment expenditures, public debt, state contribution, value-added of non-SMEs, and regional bank lending), and firm-level controls including log of assets, ROA, log of firm age, dividend/sales, PPE/assets, debt/assets, credit risk and two-digit industry fixed effects. Firm controls are measured in 2008. Standard errors clustered by region are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table 3
Worker-level employment effects

	(1)	(2)	(3)	(4)
Panel A: Baseline	Years Employed $_{09,15}$		Earnings $_{09,15}$	
Guarantee$_{region,09-10}$	0.246***	0.240***	0.333***	0.298***
	(0.049)	(0.051)	(0.061)	(0.066)
Observations	38568	38568	38568	38568
R^2	0.031	0.039	0.053	0.064
Panel B: 2SLS	Years Employed $_{09,15}$		Earnings $_{09,15}$	
$\widehat{\text{Guarantee}}_{firm,09-10}$	0.433***	0.420***	0.586***	0.522***
	(0.142)	(0.141)	(0.172)	(0.177)
Observations	38568	38568	38568	38568
Panel C: Raw Treatment	Years Employed $_{09,15}$		Earnings $_{09,15}$	
Raw Guarantee$_{region,09-10}$	0.267***	0.258***	0.367***	0.328***
	(0.062)	(0.063)	(0.076)	(0.082)
Observations	38568	38568	38568	38568
R^2	0.030	0.038	0.051	0.062
Department-Pair FE	Y	Y	Y	Y
Regional Controls	Y	Y	Y	Y
Firm-level Controls	Y	Y	Y	Y
Worker-level Controls		Y		Y

Note: This table reports regression results of the effect of loan guarantees on worker-level outcomes. Panel A presents the baseline reduced-form results with the regional intensity of the recovery plan, Guarantee$_{region,09-10}$ as main explanatory variable. Panel B presents the corresponding 2SLS estimates, and Panel C presents reduced-form results using the raw treatment variable, Raw Guarantee$_{region,09-10}$, defined as the average regional ratio of loans guaranteed under the recovery plan in 2009-2010 scaled by assets in 2008, computed across SMEs outside the border area. Earnings are the sum of earnings 2009-2015 scaled by average annual earnings 2006-2008. All regressions include department pair fixed effects, distance to the border, as well as changes in regional controls from 2008 to 2010 (public spending, local taxes, public equipment expenditures, public debt, state contribution, value-added of non-SMEs, and regional bank lending) and firm level controls (log of assets, ROA, log of firm age, dividend/sales, PPE/assets, debt/assets, credit risk and two-digit industry fixed effects). Worker-level controls added in columns (2) and (4) include worker age, gender, and occupation fixed effects. Firm and worker controls are measured in 2008. Standard errors clustered by region are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table 4
Adjustment margins and worker reallocation

	(1)	(2)	(3)
(N=38,568)	all firms	initial firm	other firm
Years Employed	0.240***	0.503***	-0.264**
	(0.051)	(0.084)	(0.100)
Cumulative Earnings	0.298***	0.523***	-0.225**
	(0.066)	(0.099)	(0.101)

Note: This table reports reduced-form OLS regression results of the effect of loan guarantees on employment and earnings at the initial firm and at other firms. Column (1) shows the effect across all firms. Column (2) measures employment and earnings at the initial firm (in 2008). Column (3) measures employment and earnings at other firms. The main explanatory variable is the regional intensity of the recovery plan, $\text{Guarantee}_{region,09-10}$, estimated across SMEs outside the border area. All regressions include department pair fixed effects, distance to the border, and changes in regional controls from 2008 to 2010 (public spending, local taxes, public equipment expenditures, public debt, state contribution, value-added of non-SMEs, and regional bank lending), firm (log of assets, ROA, log of firm age, dividend/sales, PPE/assets, debt/assets, credit risk and two-digit industry fixed effects) and worker-level controls (worker age, gender, and occupation fixed effects). Firm and worker controls are measured in 2008. Standard errors clustered by region are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table 5
Employment effects and local labor market conditions

	(1)	(2)	(3)	(4)	(5)	(6)
Local Unemployment Rate:	High		Low		*High-Low*	
	all firms	initial firm	all firms	initial firm	all firms	initial firm
Years Employed	0.385***	0.386**	0.105	0.495***	0.280***	-0.109
	(0.037)	(0.160)	(0.074)	(0.146)	(0.077)	(0.221)
Cumulative Earnings	0.529***	0.504***	0.108	0.472**	0.421***	0.031
	(0.082)	(0.169)	(0.101)	(0.168)	(0.113)	(0.233)

Note: This table reports the effect of loan guarantees on worker employment and earnings at all firms and at the initial firm separately for municipalities with unemployment rates above and below 10%. Columns (1) and (3) show the effect across all firms. Columns (2) and (4) measure employment and earnings at the initial firm (in 2008). Columns (5) and (6) show the difference between high and low unemployment areas for all firms and at the initial firm respectively. The main explanatory variable is the regional intensity of the recovery plan, $\text{Guarantee}_{region,09-10}$, estimated across SMEs outside the border area. All regressions include department pair fixed effects, distance to the border, and changes in regional controls from 2008 to 2010 (public spending, local taxes, public equipment expenditures, public debt, state contribution, value-added of non-SMEs, and regional bank lending), firm (log of assets, ROA, log of firm age, dividend/sales, PPE/assets, debt/assets, credit risk and two-digit industry fixed effects) and worker-level controls (worker age, gender, and occupation fixed effects). Firm and worker controls are measured in 2008. Standard errors clustered by region are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table 6

Dampened worker reallocation to more productive firms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(N=38,568)	other firm	other firm VA/Emp		other firm TFP		other firm ROA		other firm Sales Growth	
		higher	lower	higher	lower	higher	lower	higher	lower
YE	-0.264**	-0.255***	-0.009	-0.262***	-0.001	-0.268***	0.004	-0.275***	0.011
	(0.100)	(0.065)	(0.103)	(0.062)	(0.085)	(0.080)	(0.043)	(0.067)	(0.106)
CE	-0.225**	-0.214***	-0.011	-0.213***	-0.012	-0.218***	-0.007	-0.237***	0.012
	(0.101)	(0.059)	(0.098)	(0.050)	(0.092)	(0.055)	(0.058)	(0.050)	(0.118)

Note: This table reports reduced-form OLS regression results of the effect of loan guarantees on worker employment and earnings at firms other than their initial employer. Column (1) measures employment and earnings at other firms. Column (2), (4), (6), and (8) measure employment and earnings at other firms with higher labor productivity (value-added/employment), total factor productivity (TFP), return-on-assets (ROA), and sales growth compared to the initial firm. Column (3), (5), (7), and (9) measure employment and earnings at other firms with lower labor productivity, TFP, ROA, and sales growth compared to the initial firm. The main explanatory variable is the regional intensity of the recovery plan, $\text{Guarantee}_{region,09-10}$, estimated across SMEs outside the border area. All regressions include department pair fixed effects, distance to the border, and changes in regional controls from 2008 to 2010 (public spending, local taxes, public equipment expenditures, public debt, state contribution, value-added of non-SMEs, and regional bank lending), firm (log of assets, ROA, log of firm age, dividend/sales, PPE/assets, debt/assets, credit risk and two-digit industry fixed effects) and worker-level controls (worker age, gender, and occupation fixed effects). Firm and worker controls are measured in 2008. Standard errors clustered by region are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table 7
Heterogeneity in reallocation dampening by worker characteristics

	(1)	(2)	(3)	(4)
Panel A: Earnings Capacity	High		Low	
(N=38,568)	other firm VA/Emp		other firm VA/Emp	
	higher	lower	higher	lower
Years Employed	-0.434***	-0.037	-0.116	-0.022
	(0.096)	(0.102)	(0.096)	(0.126)
Cumulative Earnings	-0.293***	-0.079	-0.144	-0.007
	(0.082)	(0.107)	(0.091)	(0.117)
Panel B: Hiring Difficulty	High		Low	
(N=38,568)	other firm VA/Emp		other firm VA/Emp	
	higher	lower	higher	lower
Years employed	-0.523***	0.146	-0.001	-0.173
	(0.151)	(0.141)	(0.134)	(0.119)
Cumulative Earnings	-0.416***	0.092	-0.026	-0.131
	(0.142)	(0.148)	(0.135)	(0.108)
Panel C: Cognitive-Analytical Task Content	High		Low	
(N=38,568)	other firm VA/Emp		other firm VA/Emp	
	higher	lower	higher	lower
Years employed	-0.387***	-0.070	-0.137*	-0.022
	(0.089)	(0.096)	(0.077)	(0.132)
Cumulative Earnings	-0.297***	-0.044	-0.133**	-0.055
	(0.079)	(0.082)	(0.056)	(0.132)

Note: This table reports the effect of loan guarantees on employment and earnings at other firms for sub-groups of workers. Columns (1) and (3) show the effect across firms with higher labor productivity (value-added/employment) compared to the initial firm. Columns (2) and (4) show the effect across firms with lower labor productivity compared to the initial firm. Panel A splits the sample based on workers' earnings (within their age cohort) in 2008. Panel B splits the sample based on firms' reported difficulty to hire workers in a given occupation and department. Panel C splits the sample based on the non-routine, cognitive-analytical task content of a workers' occupation in 2008. High (low) is a dummy variable equal to one if the respective variable is above (below) the sample median. The main explanatory variable is the regional intensity of the recovery plan, $\text{Guarantee}_{region,09-10}$, estimated across SMEs outside the border area. All regressions include department pair fixed effects, distance to the border, and changes in regional controls from 2008 to 2010 (public spending, local taxes, public equipment expenditures, public debt, state contribution, value-added of non-SMEs, and regional bank lending), firm (log of assets, ROA, log of firm age, dividend/sales, PPE/assets, debt/assets, credit risk and two-digit industry fixed effects) and worker-level controls (worker age, gender, and occupation fixed effects). Firm and worker controls are measured in 2008. Standard errors clustered by region are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table 8
Placebo test using non-eligible firms

	(1)	(2)	(3)	(4)
	Years Employed $_{09,15}$		Earnings $_{09,15}$	
$\text{Guarantee}_{region,09-10}$	0.022	0.019	0.015	-0.010
	(0.075)	(0.074)	(0.244)	(0.238)
Department-Pair FE	Y	Y	Y	Y
Regional Controls	Y	Y	Y	Y
Firm-level Controls	Y	Y	Y	Y
Worker-level Controls		Y		Y
Observations	14334	14334	14334	14334
R^2	0.023	0.027	0.063	0.082

Note: This table reports placebo reduced-form OLS regression results of the effect of loan guarantees on worker-level outcomes. The sample consists of workers in the border area employed by non-eligible firms with 251-1500 employees in 2008. Earnings are the sum of earnings 2009-2015 scaled by average annual earnings 2006-2008. The main explanatory variable is the regional intensity of the recovery plan, $\text{Guarantee}_{region,09-10}$, estimated across SMEs outside the border area. All regressions include department pair fixed effects, distance to the border, as well as changes in regional controls from 2008 to 2010 (public spending, local taxes, public equipment expenditures, public debt, state contribution, value-added of non-SMEs, and regional bank lending) and firm level controls (log of assets, ROA, log of firm age, dividend/sales, PPE/assets, debt/assets, credit risk and two-digit industry fixed effects). Worker-level controls added in columns (2) and (4) include worker age, gender, and occupation fixed effects. Firm and worker controls are measured in 2008. Standard errors clustered by region are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Internet Appendix

Data Access

The French employment registers (DADS) and the fiscal data (FICUS-FARE), used in this paper, can be accessed by researchers. Authorization must be obtained from the *comité du secret*. The procedure is described at https://www.comite-du-secret.fr. Then researchers use a remote secure server (CASD) to work on the data. The "Bpifrance files" that contain information on the firms receiving guarantees, is produced and owned by the Banque Publique d'Investissement.

Supplemental Analyses

Table A.1
Summary statistics - No loan guarantee vs. Treated

	(1)	(2)	(3)	(4)	(5)	(6)
	No loan guarantee			Treated		
	Obs.	Mean	SD	Obs.	Mean	SD
Panel A: Firm Sample						
$\text{Guarantee}_{firm,09-10}$ (over assets in %)	30664	0.000	0.000	1285	7.637	3.615
$\text{Default Amount}_{firm,09-10}$ (over assets in %)	30664	0.000	0.000	1285	0.748	1.751
Default on Guaranteed Loan (1/0)	30664	0.000	0.000	1285	0.239	0.427
$\Delta_{08-09}\frac{BankDebt}{Debt}$	22234	-0.045	0.260	1004	0.015	0.209
$\frac{BankDebt}{Debt}_{08}$	24396	0.645	0.376	1091	0.796	0.249
Δ_{08-10}Interest Rate	23151	-0.012	0.047	1025	-0.032	0.059
$\text{Interest Rate}_{08}$	25473	0.063	0.063	1106	0.106	0.074
Nb Employees	30664	19.585	27.675	1285	28.612	32.321
Assets (€'000s)	30664	3043	76804	1285	2902	6408
ROA	30664	0.107	0.189	1285	0.049	0.137
Firm Age	30664	17.934	12.857	1285	19.249	13.550
Dividend/Sales	30664	0.017	0.038	1285	0.007	0.020
PPE/Assets	30664	0.453	0.331	1285	0.453	0.316
Debt/Assets	30664	0.148	0.194	1285	0.194	0.174
Credit Risk	30664	5.893	2.959	1285	7.991	1.908
Panel B: Worker Sample						
$\text{Years Employed}_{2009,2015}$	36602	6.511	1.299	1966	6.538	1.226
$\text{Earnings}_{2009,2015}$	36602	6.506	2.171	1966	6.345	2.101
Separation	36602	0.486	0.500	1966	0.528	0.499
$\text{Unemployment Benefits}_{2009,2015}$	36602	0.214	0.474	1966	0.285	0.535
Earnings 2008	36602	23826	13430	1966	24015	13518
Hours 2008	36602	1872	216	1966	1876	205
Age 2008	36602	38.300	7.772	1966	38.703	7.561
Male	36602	0.737	0.440	1966	0.795	0.404

Note: This table compares summary statistics at the firm (Panel A) and worker level (Panel B) for SMEs that received no guarantee under the recovery plan to SMEs that received guarantees under the recovery plan. The sample includes SMEs within a 10 mile distance to a regional border in 2008.

Table A.2
Summary statistics - below versus above 10 miles

	(1)	(2)	(3)	(4)	(5)	(6)
	Our Sample			SMEs > 10 miles		
	Obs.	Mean	SD	Obs.	Mean	SD
Panel A: Firm Sample						
Guarantee$_{firm,09-10}$ (over assets in %)	31949	0.307	1.666	130423	0.259	1.544
Guarantee (1/0)	31949	0.040	0.196	130423	0.033	0.179
Default Amount$_{firm,09-10}$ (over assets in %)	31949	0.030	0.381	130423	0.028	0.389
Default on Guaranteed Loan (1/0)	31949	0.010	0.098	130423	0.009	0.092
$\Delta_{08-09}\frac{BankDebt}{Debt}$	23238	-0.043	0.258	94287	-0.046	0.276
$\frac{BankDebt}{Debt}_{08}$	25487	0.652	0.373	104225	0.639	0.384
Δ_{08-10}Interest Rate	24176	-0.013	0.048	96616	-0.012	0.049
Interest Rate$_{08}$	26579	0.065	0.064	107117	0.062	0.064
Nb Employees	31949	19.948	27.932	130423	19.556	27.766
Assets (€'000s)	31949	3037	75255	130423	3807	100385
ROA	31949	0.104	0.187	130423	0.102	0.195
Firm Age	31949	17.987	12.888	130423	17.495	15.306
Dividend/Sales	31949	0.016	0.037	130423	0.018	0.040
PPE/Assets	31949	0.453	0.331	130423	0.385	0.323
Debt/Assets	31949	0.150	0.193	130423	0.145	0.196
Credit Risk	31949	5.977	2.953	130423	5.870	3.056
Panel B: Worker Sample						
Years Employed$_{2009,2015}$	38568	6.512	1.295	153639	6.460	1.363
Earnings$_{2009,2015}$	38568	6.498	2.167	153639	6.492	2.300
Separation	38568	0.488	0.500	153639	0.526	0.499
Unemployment Benefits$_{2009,2015}$	38568	0.218	0.478	153639	0.232	0.486
Earnings 2008	38568	23836	13435	153639	25786	16869
Hours 2008	38568	1872	216	153639	1864	222
Age 2008	38568	38.320	7.762	153639	37.932	7.697
Male	38568	0.740	0.439	153639	0.730	0.444

Note: This table compares summary statistics at the firm (Panel A) and worker level (Panel B) for employees working in SMEs located within a 10 mile distance to a regional border in 2008 to employees working in SMEs located outside a 10 mile distance to a regional border in 2008.

Table A.3
Industry Composition

	(1)	(2)	(3)	(4)
	Our Sample		SMEs > 10 miles	
Agriculture, forestry and fishing	39	(0.1%)	66	(0.1%)
Mining and quarrying	112	(0.4%)	345	(0.3%)
Manufacturing	7761	(24.3%)	22730	(17.4%)
Electricity, gas, steam and air conditioning supply	14	(0.0%)	60	(0.0%)
Water supply; sewerage, waste management and remediation activities	203	(0.6%)	828	(0.6%)
Construction	6187	(19.4%)	24414	(18.7%)
Wholesale and retail trade; repair of motor vehicles and motorcycles	9515	(29.8%)	39091	(30.0%)
Transportation and storage	2088	(6.5%)	6923	(5.3%)
Accommodation and food service activities	1906	(6.0%)	9533	(7.3%)
Information and communication	304	(1.0%)	3576	(2.7%)
Professional, scientific and technical activities	1843	(5.8%)	11741	(9.0%)
Administrative and support service activities	1196	(3.7%)	6868	(5.3%)
Arts, entertainment and recreation	223	(0.7%)	1187	(0.9%)
Other service activities	558	(1.7%)	3061	(2.3%)
	31949		130423	

Note: This table compares the industry composition of SMEs located within a 10 mile distance to a regional border in 2008 to SMEs located outside a 10 mile distance to a regional border in 2008.

Table A.4
Regional funds and treatment intensity

	(1)	(2)	(3)
	$\text{Guarantee}_{region,09-10}$	$\text{Fraction Guaranteed}_{region,09-10}$	$\text{No. Guarantees}_{region,09-10}$
$\text{Funds}_{region,08}$	0.621***	0.183***	0.241***
	(0.153)	(0.052)	(0.071)
Observations	21	21	21
R^2	0.466	0.395	0.378

Note: This table reports OLS regressions of loan guarantee activity under the recovery plan in 2009-2010 on regional guarantee funds. $\text{Funds}_{region,08}$ is the amount of regional guarantee funds in 2008, scaled by 2008 SME assets. $\text{Guarantee}_{region,09-10}$ is our main measure of exposure to the recovery plan loan guarantee program, Fraction $\text{Guaranteed}_{region,09-10}$ is the average fraction of the loan notional covered by the guarantee, and No. Guarantees $_{region,09-10}$ is the number of guarantees granted in the region, scaled by 2008 SME assets. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table A.5
Firm/worker characteristics and treatment variable

	(1)	(2)	(3)	(4)
Firm Characteristic:	Ln(Assets)_{08}	$\text{EBITDA/Assets}_{08}$	Ln(FirmAge)_{08}	Credit Risk
$\text{Guarantee}_{region,09-10}$	0.027	-0.013	0.031	0.135
	(0.039)	(0.013)	(0.060)	(0.168)
Department-Pair FE	Y	Y	Y	Y
Regional Controls	Y	Y	Y	Y
Observations	31949	31949	31949	31949
R^2	0.009	0.005	0.010	0.08
Firm Characteristic:	$\text{Dividend/Sales}_{08}$	PPE/Assets_{08}	Debt/Assets_{08}	
$\text{Guarantee}_{region,09-10}$	0.002	0.013	0.002	
	(0.001)	(0.023)	(0.006)	
Department-Pair FE	Y	Y	Y	
Regional Controls	Y	Y	Y	
Observations	31949	Y	31949	
R^2	0.007	0.047	0.009	
Worker Characteristic:	Ln(Wage)_{08}	Ln(Hours)_{08}	Ln(UI)_{08}	
$\text{Guarantee}_{region,09-10}$	-0.021	-0.006	0.032	
	(0.019)	(0.004)	(0.026)	
Department-Pair FE	Y	Y	Y	
Regional Controls	Y	Y	Y	
Observations	38568	38568	38568	
R^2	0.046	0.008	0.005	

Note: This table reports OLS regressions of worker and firm characteristics in 2008 on loan guarantees under the recovery plan in 2009-2010. The main explanatory variable is the regional intensity of the recovery plan, $\text{Guarantee}_{region,09-10}$, estimated across SMEs outside the border area. All regressions include department pair fixed effects, distance to the border, and changes in regional controls from 2008 to 2010 (public spending, local taxes, public equipment expenditures, public debt, state contribution, value-added of non-SMEs, and regional bank lending). Standard errors clustered by region are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table A.6

Are there regional economic activity pre-trends correlated with treatment?

	(1)	(2)	(3)
	$\text{Ln(VA/Capita)}_{08}$	$\Delta_{07-08}\text{Ln(VA/Capita)}$	Δ_{05-08} Ln(VA/Capita)
$\text{Guarantee}_{region,09-10}$	-0.076	-0.010	0.013
	(0.286)	(0.054)	(0.056)
Observations	21	21	21
R^2	0.004	0.002	0.003

Note: This table reports OLS regressions of regional economic activity on loan guarantees under the recovery plan in 2009-2010. VA/Capita is the sum of value-added of all firms operating in municipalities within ten miles of the regional border, scaled by the population in the same area. The main explanatory variable is the regional intensity of the recovery plan, $\text{Guarantee}_{region,09-10}$, estimated across SMEs outside the border area. Standard errors are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table A.7

Firm heterogeneity in take-up - financial constraints

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Guarantee$_{firm,09-10}$								
	Credit Risk			Dividends			Cash-Flows		
	Low	High	Diff	Div	No Div	Diff	High	Low	Diff
Guarantee$_{region,09-10}$	-0.021	1.087***	1.108***	-0.006	0.786***	0.792***	0.179**	0.803***	0.624***
	(0.085)	(0.218)	(0.262)	(0.105)	(0.126)	(0.175)	(0.080)	(0.132)	(0.106)
Department-Pair FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Regional Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm-level Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	17371	14573	31944	11634	20311	31945	15970	15973	31943
R^2	0.023	0.049	0.061	0.050	0.045	0.048	0.049	0.046	0.052

Note: This table reports first stage OLS regression results for sub-samples along proxies for financial constraints. The dependent variable is the amount of loans a firm received under the recovery plan 2009-2010, scaled by firm assets in 2008. Column (1) and (2) show the results for sub-samples of firms below and above the median credit risk respectively, while column (3) shows the difference. Credit risk is measured by the inverse of the interest coverage ratio in 2008. Column (4) and (5) split the full sample based on a dummy variable equal to one if the firm paid dividends in 2008 and column (6) displays the difference. Column (7) and (8) show the results for sub-samples of firms above and below the median firm profitability in 2008 respectively, with column (9) presenting the difference. The main explanatory variable is the regional intensity of the recovery plan, Guarantee$_{region,09-10}$, estimated across SMEs outside the border area. All regressions include department pair fixed effects, distance to the border, changes in regional controls from 2008 to 2010 (public spending, local taxes, public equipment expenditures, public debt, state contribution, value-added of non-SMEs, and regional bank lending), and firm-level controls (log of assets, ROA, log of firm age, dividend/sales, PPE/assets, debt/assets, credit risk and two-digit industry fixed effects) measured in 2008. Standard errors clustered by region are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table A.8
Worker-level employment effects - financial constraints

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Years Employed	Credit Risk			Dividends			Cash-Flows		
	Low	High	Diff	Div	No Div	Diff	High	Low	Diff
$\text{Guarantee}_{region,09-10}$	0.067	0.385***	0.318***	0.117	0.270***	0.153	0.091	0.364***	0.273***
	(0.059)	(0.057)	(0.049)	(0.077)	(0.062)	(0.105)	(0.078)	(0.046)	(0.079)
Observations	21134	17421	38555	14559	23995	38554	19819	18736	38555
R^2	0.045	0.050	0.048	0.040	0.042	0.046	0.050	0.042	0.046
Panel B: Cumulative Earnings	Credit Risk			Dividends			Cash-Flows		
	Low	High	Diff	Div	No Div	Diff	High	Low	Diff
$\text{Guarantee}_{region,09-10}$	0.138	0.431***	0.293**	0.138	0.332***	0.194	0.128	0.449***	0.321*
	(0.102)	(0.070)	(0.119)	(0.141)	(0.083)	(0.181)	(0.118)	(0.091)	(0.171)
Observations	21134	17421	38555	14559	23995	38554	19819	18736	38555
R^2	0.056	0.085	0.074	0.058	0.065	0.072	0.063	0.082	0.075

Note: This table reports the baseline worker-level employment results for sub-samples along proxies for financial constraints. Column (1) and (2) show the results for sub-samples of firms below and above the median credit risk respectively, while column (3) shows the difference. Credit risk is measured by the inverse of the interest coverage ratio in 2008. Column (4) and (5) split the full sample based on a dummy variable equal to one if the firm paid dividends in 2008 and column (6) displays the difference. Column (7) and (8) show the results for sub-samples of firms above and below the median firm profitability in 2008 respectively, with column (9) presenting the difference. The main explanatory variable is the regional intensity of the recovery plan, $\text{Guarantee}_{region,09-10}$, estimated across SMEs outside the border area. All regressions include department pair fixed effects, distance to the border, changes in regional controls from 2008 to 2010 (public spending, local taxes, public equipment expenditures, public debt, state contribution, value-added of non-SMEs, and regional bank lending), and firm-level controls (log of assets, ROA, log of firm age, dividend/sales, PPE/assets, debt/assets, credit risk and two-digit industry fixed effects) measured in 2008. Standard errors clustered by region are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table A.9
Worker-level employment effects in 2015

	(1)	(2)	(3)	(4)
Panel A: Baseline	Employed $_{15}$		Earnings $_{15}$	
Guarantee$_{region,09-10}$	0.045***	0.043***	0.053***	0.043**
	(0.010)	(0.011)	(0.018)	(0.019)
Observations	38568	38568	38568	38568
R^2	0.027	0.031	0.043	0.057
Panel B: 2SLS	Employed $_{15}$		Earnings $_{15}$	
$\widehat{\text{Guarantee}}_{firm,09-10}$	0.080***	0.075***	0.093**	0.076**
	(0.023)	(0.023)	(0.035)	(0.036)
Observations	38568	38568	38568	38568
Panel C: Raw Treatment	Employed $_{15}$		Earnings $_{15}$	
Raw Guarantee$_{region,09-10}$	0.051***	0.048***	0.059**	0.048**
	(0.013)	(0.013)	(0.022)	(0.023)
Observations	38568	38568	38568	38568
R^2	0.027	0.031	0.042	0.056
Department-Pair FE	Y	Y	Y	Y
Regional Controls	Y	Y	Y	Y
Firm-level Controls	Y	Y	Y	Y
Worker-level Controls		Y		Y

Note: This table reports regression results of the effect of loan guarantees on worker-level outcomes in 2015. Earnings in 2015 are scaled by average annual earnings 2006-2008. See table 3 for detailed descriptions.

Table A.10
Effects on unemployment insurance

	(1)	(2)
	UB $_{09,15}$	
Guarantee$_{region,09-10}$	-0.043*	-0.046**
	(0.021)	(0.021)
Department-Pair FE	Y	Y
Regional Controls	Y	Y
Firm-level Controls	Y	Y
Worker-level Controls		Y
Observations	38568	38568
R^2	0.052	0.060

Note: This table reports reduced-form OLS regression results of the effect of loan guarantees on unemployment benefits. Cumulative unemployment benefits are the sum of unemployment benefits 2009-2015 scaled by average annual earnings 2006-2008. The main explanatory variable is the regional intensity of the recovery plan, Guarantee$_{region,09-10}$, estimated across SMEs outside the border area. All regressions include department pair fixed effects, distance to the border, changes in regional controls from 2008 to 2010 (public spending, local taxes, public equipment expenditures, public debt, state contribution, value-added of non-SMEs, and regional bank lending) and firm-level controls (log of assets, ROA, log of firm age, dividend/sales, PPE/assets, debt/assets, credit risk and two-digit industry fixed effects). Worker-level controls added in column (2) include worker age, gender, and occupation fixed effects. Firm and worker controls are measured in 2008. Standard errors clustered by region are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table A.11
Effects on employee separation

	(3)	(4)
	Separation $_{09,15}$	
Guarantee$_{region,09-10}$	-0.071***	-0.080***
	(0.020)	(0.020)
Department-Pair FE Y	Y	Y
Regional Controls	Y	Y
Firm-level Controls	Y	Y
Worker-level Controls		Y
Observations	38568	38568
R^2	0.067	0.080

Note: This table reports reduced-form OLS regression results of the effect of loan guarantees on workers' likelihood to separate from their initial employer. The dependent variable is a dummy equal to one if the worker did not work the entire period from 2009-2015 at the initial firm as of 2008. The main explanatory variable is the regional intensity of the recovery plan, Guarantee$_{region,09-10}$, estimated across SMEs outside the border area. All regressions include department pair fixed effects, distance to the border, as well as changes in regional controls from 2008 to 2010 (public spending, local taxes, public equipment expenditures, public debt, state contribution, value-added of non-SMEs, and regional bank lending) and firm level controls (log of assets, ROA, log of firm age, dividend/sales, PPE/assets, debt/assets, credit risk and two-digit industry fixed effects). Worker-level controls added in column (2) include worker age, gender, and occupation fixed effects. Firm and worker controls are measured in 2008. Standard errors clustered by region are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table A.12
Skill upgrading

	(1)	(2)
	Increase Analytical Tasks $_{09,15}$	
Guarantee$_{region,09-10}$	0.078***	0.065***
	(0.020)	(0.020)
Department-Pair FE	Y	Y
Regional Controls	Y	Y
Firm-level Controls	Y	Y
Worker-level Controls		Y
Observations	36619	36619
R^2	0.035	0.049

Note: This table reports reduced-form OLS regression results of the effect of loan guarantees on workers' skill upgrading. Increase Analytical Tasks $_{09,15}$ is a dummy variable equal to one if a worker moved to an occupation with higher non-routine, cognitive-analytical task content than her initial occupation in 2008 during the sample period. The main explanatory variable is the regional intensity of the recovery plan, Guarantee$_{region,09-10}$, estimated across SMEs outside the border area. All regressions include department pair fixed effects, distance to the border, changes in regional controls from 2008 to 2010 (public spending, local taxes, public equipment expenditures, public debt, state contribution, value-added of non-SMEs, and regional bank lending) and firm-level controls (log of assets, ROA, log of firm age, dividend/sales, PPE/assets, debt/assets, credit risk and two-digit industry fixed effects). Worker-level controls added in column (2) include worker age, gender, and occupation fixed effects. Firm and worker controls are measured in 2008. Standard errors clustered by region are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table A.13
Employment effects: Controlling for regional confounders

	(1)	(2)	(3)	(4)	(5)	(6)
	Years Employed $_{09,15}$			Earnings $_{09,15}$		
Guarantee$_{region,09-10}$	0.240***	0.246***	0.269***	0.297***	0.331***	0.478***
	(0.060)	(0.051)	(0.064)	(0.070)	(0.063)	(0.123)
ΔEU funds$_{08-10}$	-0.001			0.001		
	(0.072)			(0.116)		
Short-time work$_{09}$		0.007*			0.036***	
		(0.004)			(0.009)	
Left-Party Vote-Share			-0.001			-0.009*
			(0.002)			(0.004)
Department-Pair FE	Y	Y	Y	Y	Y	Y
Regional Controls	Y	Y	Y	Y	Y	Y
Firm-level Controls	Y	Y	Y	Y	Y	Y
Worker-level Controls	Y	Y	Y	Y	Y	Y
Observations	38568	38568	38568	38568	38568	38568
R^2	0.039	0.039	0.039	0.064	0.064	0.064

Note: This table reports reduced-form OLS regression results of the effect of loan guarantees on worker-level outcomes, controlling for EU structural funds, subsidies for short-time work, and the 2004 regional election. ΔEU funds$_{08-10}$ is the log change of EU structural funds per capita in the region from 2008 to 2010. Short-time work$_{09}$ is the amount of short-time work subsidies per capita in the region in 2009. Left-Party Vote-Share is the vote-share of the left-party in the 2004 regional election. Earnings are the sum of earnings 2009-2015 scaled by average annual earnings 2006-2008. The main explanatory variable is the regional intensity of the recovery plan, Guarantee$_{region,09-10}$, estimated across SMEs outside the border area. All regressions include department pair fixed effects, distance to the border, and changes in regional controls from 2008 to 2010 (public spending, local taxes, public equipment expenditures, public debt, state contribution, value-added of non-SMEs, and regional bank lending), firm (log of assets, ROA, log of firm age, dividend/sales, PPE/assets, debt/assets, credit risk and two-digit industry fixed effects) and worker-level controls (worker age, gender, and occupation fixed effects). Firm and worker controls are measured in 2008. Standard errors clustered by region are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table A.14
Employment effects: Robustness

	(1)	(2)	(3)	(4)
Panel A: Excluding Non-Tradable Industries	Years Employed $_{09,15}$		Earnings $_{09,15}$	
$\text{Guarantee}_{region,09-10}$	0.232***	0.214***	0.452***	0.408***
	(0.061)	(0.061)	(0.113)	(0.114)
Department-Pair FE	Y	Y	Y	Y
Regional Controls	Y	Y	Y	Y
Firm-level Controls	Y	Y	Y	Y
Worker-level Controls		Y		Y
Observations	16433	16433	16433	16433
R^2	0.030	0.038	0.058	0.075
Panel B: Distance <= 5 miles	Years Employed $_{09,15}$		Earnings $_{09,15}$	
$\text{Guarantee}_{region,09-10}$	0.282***	0.281***	0.472***	0.438***
	(0.071)	(0.071)	(0.073)	(0.083)
Department-Pair FE	Y	Y	Y	Y
Regional Controls	Y	Y	Y	Y
Firm-level Controls	Y	Y	Y	Y
Worker-level Controls		Y		Y
Observations	19296	19296	19296	19296
R^2	0.042	0.050	0.061	0.074
Panel C: Distance <= 15 miles	Years Employed $_{09,15}$		Earnings $_{09,15}$	
$\text{Guarantee}_{region,09-10}$	0.203***	0.194***	0.314***	0.285***
	(0.057)	(0.057)	(0.077)	(0.082)
Department-Pair FE	Y	Y	Y	Y
Regional Controls	Y	Y	Y	Y
Firm-level Controls	Y	Y	Y	Y
Worker-level Controls		Y		Y
Observations	58169	58169	58169	58169
R^2	0.028	0.035	0.051	0.062

Note: This table reports robustness tests for the baseline results. Panel A excludes non-tradable industries from the sample. Panel B uses 5 miles distance to the border and Panel C 15 miles to define the sample. Earnings are the sum of earnings 2009-2015 scaled by average annual earnings 2006-2008. The main explanatory variable is the regional intensity of the recovery plan, $\text{Guarantee}_{region,09-10}$, estimated across SMEs outside the border area. All regressions include department pair fixed effects, distance to the border, and changes in regional controls from 2008 to 2010 (public spending, local taxes, public equipment expenditures, public debt, state contribution, value-added of non-SMEs, and regional bank lending), firm (log of assets, ROA, log of firm age, dividend/sales, PPE/assets, debt/assets, credit risk and two-digit industry fixed effects). Columns (2) and (4) add worker-level controls (worker age, gender, and occupation fixed effects). Firm and worker controls are measured in 2008. Standard errors clustered by region are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.

Table A.15
Do workers relocate to the other side of the border?

	(1)	(2)
	Move Across Border $_{09,15}$	
Guarantee$_{region,09-10}$	0.011	0.003
	(0.074)	(0.074)
Department-Pair FE	Y	Y
Regional Controls	Y	Y
Firm-level Controls	Y	Y
Worker-level Controls		Y
Observations	38568	38568
R^2	0.026	0.030

Note: This table reports reduced-form OLS regression results of the effect of loan guarantees on workers relocating across the regional border. Move Across Border $_{09,15}$ is a dummy variable equal to one if the worker relocated to an establishment located across the regional border during the sample period. The main explanatory variable is the regional intensity of the recovery plan, Guarantee$_{region,09-10}$, estimated across SMEs outside the border area. All regressions include department pair fixed effects, distance to the border, changes in regional controls from 2008 to 2010 (public spending, local taxes, public equipment expenditures, public debt, state contribution, value-added of non-SMEs, and regional bank lending) and firm-level controls (log of assets, ROA, log of firm age, dividend/sales, PPE/assets, debt/assets, credit risk and two-digit industry fixed effects). Worker-level controls added in column (2) include worker age, gender, and occupation fixed effects. Firm and worker controls are measured in 2008. Standard errors clustered by region are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1%, respectively.