

# National Firms, Local Effects: Spillovers from Multi-Establishment Employers' Expansions\*

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## JOB MARKET PAPER

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### Abstract

This paper examines how the expansion of large, multi-establishment (national) employers influences the wage and hiring policies of smaller, local firms. To distinguish spillover effects from local productivity changes, I develop a novel research design that leverages the wage and employment polices of national employers in large cities, which are likely unaffected by labor market dynamics in less populous areas. Using administrative Brazilian data, I conduct a matched event study to assess how local employers outside large cities respond to large idiosyncratic national employers' labor demand shifts. The findings reveal that when national employers increase wages in large cities by 8 log points (relative to other employers in large cities), they simultaneously raise wages by 5 log points and expand employment in other locations. This expansion pressures local employers to increase wages by 2 log points, resulting in a 1.5 log point wage growth for incumbent workers. Despite local employers reducing employment, workers are not adversely affected, as they reallocate to the expanding national employers. Even though my results are based on independent expansion decisions by national employers, they suggest that policies aiming to attract new large employers could positively affect all workers in the labor market through wage spillovers.

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\* [jan.rosa1993@gmail.com](mailto:jan.rosa1993@gmail.com). I am indebted to David Green, Raffaele Saggio, Heather Sarsons and Jesse Perla for their generous guidance and support. I also thank Paul Beaudry, Gorkem Bostanci, Thomas Lemieux, Giovanni Gallipoli and Samuel Norris and session participants at CEA conference. I also thank Pierre-Loup Beauregard, Yige Duan, Sarah Fritz, Sam Gyetvay, Pascuel Plotkin, Catherine van der List, and all other past and present members of the UBC PhD Labour Group. All errors are my own.

# 1 Introduction

Governments in both developed and developing countries often provide tax breaks or subsidies to attract new employers (Greenstone and Moretti, 2003; Duranton and Venables, 2021). When implementing such policies, it is crucial to consider not only the direct jobs created by the new employers but also the spillover effects on the broader local economy. Much of the literature has focused on spillovers channeled through the product market—such as new firms purchasing from or selling to incumbent businesses or competing for consumers (Greenstone et al., 2010; Adams, 2016; Atkin et al., 2018). However, spillovers arising from competition in the labor market can be equally significant. For example, a new employer may poach workers from existing firms, reducing the net increase in employment. Furthermore, a new source of labor demand can affect not only the number of jobs at existing firms but also the wages they offer (Beaudry et al., 2012; Caldwell and Harmon, 2019).

Analyzing cross-employer spillovers is challenging because shifts in the wage or employment policies of one employer might depend on local labor market conditions, leading to bias when estimating the responses of other employers. Consequently, prior studies (Wiltshire, 2021; Derenoncourt and Weil, 2024) have limited their analyses to patterns of individual large firms (e.g., Walmart, Amazon). This restriction, however, does not allow for the estimation of more general spillover effects.

This paper addresses this challenge by examining the spillover effects from the expansions of large multi-establishment employers—referred to as *national employers*—on the wage and hiring policies of other, *local* employers. I develop an empirical strategy based on the idiosyncratic labor demand changes of national employers, applying it to various large firms rather than focusing on a single employer. Grounded in recent evidence of national wage and employment setting (Hazell et al., 2021; Schubert et al., 2021), the main idea is straightforward: national employers that expand (or contract) their wages and employment in large cities due to national-level decisions are likely to exhibit similar patterns in other locations. Therefore, wage and employment changes observed in large cities enable me to construct a measure of

local labor market exposure—outside the large cities—to national employers’ idiosyncratic policies. I use this constructed exposure measure to causally estimate the reactions of local employers to national employers’ labor demand shifts.

My empirical analysis utilizes Brazilian employer-employee data from 2007 to 2018, covering almost the entire universe of the formal labor market. Unlike other administrative datasets, it contains not only firm and individual identifiers but also establishment identifiers with precise location information. Furthermore, unlike most tax-based datasets, it provides detailed information on the occupations of employed workers. These features are essential for my empirical strategy: they allow me to track the employment and wages of multi-establishment employers for specific occupations in specific locations, thereby enabling identification of labor demand for specific jobs across national employers’ locations.

I begin by introducing a random search model, which serves as the foundation for deriving the empirical specification—this approach follows the structural methodology of studies on outside options (Beaudry et al., 2012, 2018; Caldwell and Danieli, 2021). In the model, there are two types of employers: local and national. National employers determine wages and post vacancies based on their idiosyncratic labor demand factors and local labor market conditions, for simplicity defined as a linear function of these two factors. In contrast, local employers set wages through continuous bargaining and post vacancies according to a convex cost function. I demonstrate that expansions by national employers enhance workers’ outside options and increase their likelihood of meeting employers in the labor market. Consequently, workers can negotiate higher wages from their local employers. However, because national employers’ expansions are correlated with local productivity shocks, accurately measuring cross-employer spillovers requires an identification strategy that relies on the idiosyncratic labor demand changes of national employers.

The model indicates that, to validly identify spillover effects, it is essential to isolate the idiosyncratic labor demand shocks of national employers. Although examining national employers’ entries might seem like a natural approach to investigate the effects of their

expansions (Basker, 2002; Neumark et al., 2008; Wiltshire, 2021), this method would be biased unless these entries are driven solely by the employers' idiosyncratic labor demand changes. Modeling and instrumenting for entries is challenging because various regional characteristics can influence firms' location choices. To overcome this challenge, I propose a new empirical strategy that leverages the expansions of multi-location firms, which are decided at the national level and focus on locations where these firms are already present. This simplifies identification: instead of predicting both *if* and *where* a national employer will expand, I concentrate on predicting only the *if* aspect of the problem.

As outlined above, I implement my empirical strategy by tracking the wages and employment of national employers across Brazil's major cities, where labor markets for specific occupations are well-developed, stable, and thick.<sup>1</sup> By measuring a national employer's hiring or wage changes relative to other employers operating in such labor markets, I obtain a reliable metric for its labor demand changes.

As an illustration, consider the case when a large supermarket chain operating in many locations, including Rio de Janeiro and São Paulo, that decides to increase cashier wages and employment in these cities. By computing this increase relative to other firms employing cashiers in large city labor markets, I capture an effective change in labor demand for cashiers by this specific chain. As a result, it is likely that the firm will hire new cashiers and offer higher wages in other locations where it operates, due to its national-level decision to build new establishments or expand existing ones. Such a decision might be driven by factors like securing new financing, changes in national-level strategy, or cost-effective adjustments in their supply chain. Essentially, it is idiosyncratic to the specific national firm and not determined by retail booms in specific, non-metropolitan locations.

Next, I aggregate the relative wage and employment shocks of individual national employers<sup>2</sup> into a measure of the exposure of local labor markets to the idiosyncratic labor

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<sup>1</sup>Moretti and Yi (2024) suggest that large and thick labor markets facilitate matching between workers and firms, minimizing search frictions.

<sup>2</sup>I use three-year changes to isolate the long-term changes in national employers' policies.

demand shocks of national employers. Specifically, the measure weights the computed wage and employment changes of national employers by their employment shares in the local labor market.

Consistent with Hazell et al. (2021) and Schubert et al. (2021), my findings reveal strong national wage and hiring patterns. A 1 log point wage increase by national employers in major city regions (relative to other large-city employers) is accompanied by approximately a 0.6 log point wage increase by national employers in smaller labor markets within the same occupation. Similarly, a 1 log point relative increase in employment by national employers is matched by a 0.5 log point increase in employment in less populous locations. Moreover these comovements are highly powerful and robust across many specifications. Consequently, the strength of these co-movements confirms that constructed exposure measures effectively captures the idiosyncratic labor demand shocks of national employers.

Next, I proceed to the main research design: a matched event study of national employers' expansions, defined as large increases in the constructed exposure measures. The analysis reveals that such expansions trigger an outflow of incumbent workers from local employers, who cannot replace these workers with new hires, leading to about a 2 log point decrease in their employment. Local employers subsequently raise wages for both remaining and newly hired employees. I observe positive wage spillovers at both the job and worker levels: the average wage in local employers' jobs rises by about 2 log points at the job level and about 1.5 log points at the worker level. Furthermore, incumbent workers who remain with their employers also experience wage increases that converge to the same level as all workers. This suggests that local firms adapt to more intense labor market competition not by selecting workers but by changing their wage policies.

Importantly, the national employers' expansions do not decrease the employment prospects of workers: the employment probability for workers employed by local employers in the baseline period remains unaltered by the expansion. Consequently, the expansions are beneficial for workers.

The theoretical analysis also provides guidance on which groups of workers are likely to gain from national employers' expansions, highlighting the relationship between the probability of joining the national employer and the workers' wage increase. The event study results confirm this connection. Workers of local employers in the baseline period who are closer (in the same municipality) to the expanding national employer receive about 100% higher wage increases than workers in other municipalities within the same commuting zone. Moreover, using the [Caldwell and Harmon \(2019\)](#) measure of workers' connections to national employers, I find that workers with past co-workers now working for national employers are three times more likely to join the national employer and experience much faster and 50% higher wage increases than other workers.

Last set of results explore the impact of national employers on spatial wage inequalities, and use larger dataset, not limited to study only expansions. This expanded analysis is motivated by large variation in the local labor markets' exposure to national employers' policies: while the national employers' expansions are relatively rare, the total impact of national employers is not limited to only these periods. Using constructed exposure measures as shift-share instruments, I demonstrate that outside option opportunities created by national employers can explain a substantial part of regional wage inequalities. The results suggest that increasing the outside option level provided by national employers by one standard deviation would lead to a 2.7 log point wage increase in local employers' wages. This finding reinforces the argument made by [Hazell et al. \(2021\)](#): national employers affect spatial income inequalities not only through their national wage policies but also due to the spillover effects of these policies.

The main contribution of this paper is to causally estimate local employers' responses to national employers' expansions using a novel research design. Closely related to my work is the study by [Derenoncourt and Weil \(2024\)](#), which examines spillovers from Amazon's and other large retailers' voluntary minimum wages. Unlike their study, my empirical strategy is not limited to individual firm patterns but allows for the identification of spillovers from

various types of national employers. Moreover, I measure the responses of different local employers, primarily medium- to small-sized firms, whereas Derenoncourt and Weil (2024) focus on a group of large employers. Lastly, I estimate a different margin of adjustment: while they study how large employers' wage changes lead to decreased separations and lower hiring, I estimate the effects of a more standard labor demand shock, where large employers increase wages and, even more so, their employment levels and hiring intensity.

My work contributes to the literature estimating cross-employer spillovers. Seminal papers by Beaudry et al. (2012), Caldwell and Danieli (2021), and Gathmann et al. (2020) relied on sectoral variation (or variation in sector and job characteristics), whereas I use variation at the individual employer level. In this respect, my paper is similar to the recent work of Bassier (2021) and Green et al. (2022) on outside option changes determined by union contracts, as well as studies of outside option shocks at the individual worker level (Caldwell and Harmon, 2019; Lachowska et al., 2022; Urena et al., 2021). I view my paper as complementary; while these studies focus on individual changes in workers' outside options, I estimate the total effects of a large market-level shock, which potentially is not limited to outside option shocks.

Additionally, my work relates to the local multipliers literature (Bartik, 1991; Moretti, 2010; Bartik and Sotherland, 2019; Bartik, 2019, 2021). Unlike these studies, I focus on spillovers that are outcomes of intensified labor market competition, not the new input-output linkages created by the expanding firm. My approach allows for precise identification of wage spillovers, which were typically overlooked in this literature.

## 2 Theoretical Framework

This section develops a simple model of a search and continuous bargaining labor market. The model combines the wage-setting mechanism from Beaudry et al. (2012) with the employment model of convex vacancy costs from Lise and Robin (2017). The aim of this section

is twofold. First, I derive the estimating equation for the wage and employment spillovers resulting from changes in national employers' wages and vacancies. This helps clarify the identification issues and distinguishes between the effects of a labor market productivity shock and the spillovers from national employer expansions.

Secondly, the model provides testable predictions on *who* gains from the expansion. Specifically, if wages are set through a bargaining process, the workers with the highest probability of joining national employers are those who should gain the most through this process.

## 2.1 Model Setup

In the labor market  $m$  defined as combination of occupation  $o$  and commuting zone  $c$ , in period  $t$ , there are  $K$  local employers (denoted by subscript  $j$ ) and one national employer<sup>3</sup> (denoted by superindex  $N$ ). A measure  $L_{m,t}$  of workers is either employed and receiving wages or unemployed and receiving unemployment benefits  $b_{m,t}$ . Matches are destroyed with exogenous probability  $\delta$ . Time is discrete, and both employers and workers discount the future at rate  $\rho$ .

Local employers vary by productivity  $\epsilon_{j,m,t} = \epsilon_{m,t} + \varepsilon_{j,m,t}$ , where  $\epsilon_{m,t}$  is the market-level productivity, and  $\varepsilon_{j,m,t}$  is an idiosyncratic local employer shock. When an employer  $j$ 's vacancy is filled, the match produces  $y_t + \epsilon_{j,m,t}$ , where  $y_t$  is the average output level in occupation  $o$ . Local firms inherit from the previous period  $(1 - \delta)l_{j,m,t-1}$  matches and post  $V_{j,m,t}$  new vacancies. The national employer posts wage  $w_{m,t}^N$ , inherits  $(1 - \delta)l_{m,t-1}^N$  matches, and posts vacancies  $V_{m,t}^N$ . Producing the vacancies generates a cost defined by the convex function  $c(V)$ .

The unemployed workers are matched with vacancies via a matching technology with constant returns to scale, defined by the function  $M(u_{m,t}L_{m,t}, \sum_{j=1}^K V_{j,m,t} + V_{m,t}^N)$ , where  $u_{m,t}$  is the unemployment rate. Under standard assumptions, the probability that an unemployed

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<sup>3</sup>For simplicity, I define just one national employer; this analysis can be generalized to  $K_n \geq 1$  national employers.

worker finds a job,  $p_{m,t}$ , and the probability that a vacancy is filled depend on the market tightness  $\theta_{m,t} = \frac{\sum_{j=1}^K V_{j,m,t} + V_{m,t}^N}{u_{m,t} L_{m,t}}$ . Conditional on being matched, the probability that a worker is matched with a specific local employer  $j$  or the national employer depends on their vacancy share  $\gamma_{j,m,t} = \frac{V_{j,m,t}}{\sum_{k=1}^K V_{k,m,t} + V_{m,t}^N}$  or  $\gamma_{m,t}^N = \frac{V_{m,t}^N}{\sum_{k=1}^K V_{k,m,t} + V_{m,t}^N}$ .

At the beginning of each period, the timing of events is as follows:

1. Both local employers and the national employer inherit  $(1 - \delta)$  matched workers.
2. The national employer posts wages  $w_{m,t}^N$  and vacancies  $V_{m,t}^N$  according to its idiosyncratic productivity  $\Omega_t$ , and the market-level productivity  $\epsilon_{m,t}$ :

$$w_{m,t}^N = \phi_{1,W}\Omega_t + \phi_{1,\epsilon}\epsilon_{m,t} \quad (1)$$

$$V_{m,t}^N = \phi_{2,E}\Omega_t + \phi_{2,\epsilon}\epsilon_{m,t} \quad (2)$$

Where all coefficients  $\phi$  are positive.

3. Local employers take the national employer's wages and vacancies level as given and choose the vacancy level  $V_{j,m,t}$ .
4. Unemployed workers match with employers.
5. Local employers bargain wages with their workers.

While assumption on the national employers being a wage posters is restrictive, it is plausible given the national wage-setting patterns and the fact they pay way above labor market average, as it is discussed in the section 4.3.3.

## 2.2 Local Employers' Vacancy and Wage Determination

Here, I describe the value functions. I assume that  $K$  is large, so local employers take  $\theta_{m,t}$  as given. The value of a match  $Y_{j,m,t}^f$  for a local employer  $j$  is given by:

$$Y_{j,m,t}^f = y_t + \epsilon_{j,m,t} - w_{j,m,t} + \rho(1 - \delta)Y_{j,m,t+1}^f$$

Local employers set vacancies  $V_{j,m,t}$  to maximize profits by solving:

$$\max_{V_{j,m,t}} Y_{j,m,t}^f ((1 - \delta)l_{j,m,t-1} + q_{m,t}V_{j,m,t}) - c(V_{j,m,t})$$

For a worker employed by local employer  $j$ , the value of a match  $W_{j,m,t}$  depends on the wage received  $w_{j,m,t}$  and the value of unemployment  $U_{m,t+1}$ :

$$W_{j,m,t} = w_{j,m,t} + \rho(\delta U_{m,t+1} + (1 - \delta)W_{j,m,t+1})$$

Finally, the value of unemployment depends on the benefit  $b_{m,t}$ , the probability of being matched with an employer  $p_{m,t}$ , and the expected value of the job provided by an employer, denoted as  $\mathbf{EW}_{k,m,t}$ :

$$U_{m,t} = b_{m,t} + \rho(p_{m,t}\mathbf{EW}_{k,m,t} + (1 - p_{m,t})U_{m,t+1})$$

$$\mathbf{EW}_{k,m,t} = \sum_{j=1}^K \gamma_{j,m,t} W_{j,m,t} + \gamma_{m,t}^N W_{m,t}^N$$

Local employers' wages are set via a continuous bargaining process after matching takes place. The bargaining process splits the surplus between the firm's value of a filled vacancy (relative to producing nothing) and the worker's value of being employed by  $j$  over being unemployed:

$$\kappa Y_{j,m,t}^f = (1 - \kappa)(W_{j,m,t} - U_{m,t})$$

Where  $\kappa$  is a Nash-bargain parameter.

## 2.3 Linear Steady-State Approximation

In the steady state, local employers' wages and employment are determined by national employers' vacancies and wage postings, the vacancies and wages of other local employers, and the labor market tightness. To simplify notation, I drop the time subscript for steady-state equations in this section.

For simplicity, I assume that the vacancy creation cost function is given by  $c(V) = cV_{j,m}^2$ . Moreover, in the steady state, the tightness — and thus the probability of matching with an employer for workers and the probability of filling a vacancy — is a function of the employment rate  $\text{ER}_m$ , separation rate  $\delta$ , and matching function parameter  $\sigma$ , given by:

$$p_m = \frac{\delta\text{ER}_m}{1 - \text{ER}_m}$$

$$q_m = \left( \frac{1 - \text{ER}_m}{\delta\text{ER}_m} \right)^{\frac{\sigma}{1-\sigma}}$$

where the employment rate  $\text{ER}_{o,m}$  is defined as:

$$\text{ER}_m = \frac{\sum l_{j,m} + l_m^M}{L_m} = \frac{E_m}{L_m}$$

In Appendix A, I show that the linear approximation of steady-state local employers' wages and employment is given by the following expressions<sup>4</sup>:

$$\ln w_{j,m} \approx \alpha_0 + \alpha_1 y + \alpha_{2,E} E_m + \alpha_{2,L} L_m + \alpha_3 \gamma_m^N w_m^N + \alpha_1 (\epsilon_m + \varepsilon_{j,m}) \quad (3)$$

$$\ln l_{j,m} \approx \beta_0 + \beta_1 y + \beta_{2,E} E_m + \beta_{2,L} L_m + \beta_3 \gamma_m^N w_m^N + \beta_1 (\epsilon_m + \varepsilon_{j,m}) \quad (4)$$

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<sup>4</sup>I assume that the population of workers is not changing and ignore the "feedback effect size."

Both expressions depends to the  $\gamma_m^N w_m^N$ , which represents the outside option provided by national employer. To simplify notation, I denote it then as national employer's outside option index  $OOI_m^N$ :

$$OOI_m^N = \gamma_m^N w_m^N$$

## 2.4 Endogeneity Issues

In the empirical work, I focus on the first-difference versions of equations 3 and 4:

$$\Delta \ln w_{j,m} = \alpha_1 \Delta y_o + \alpha_2 \Delta E_{o,m} + \alpha_3 \Delta OOI_m^N + \varsigma_{j,m}^W \quad (5)$$

$$\Delta \ln l_{j,m} = \beta_1 \Delta y_o + \beta_2 \Delta E_{o,m} + \beta_3 \Delta OOI_m^N + \varsigma_{j,m}^E \quad (6)$$

where I define the  $\Delta x$  operator as the difference in  $x$  values between two steady states. For example, let  $x$  be at time  $t_1$  in steady state 1 and at time  $t_2$  in steady state 2. Then,  $\Delta x = x_{t_2} - x_{t_1}$ . The unobservables  $\varsigma_{j,m}^W$  and  $\varsigma_{j,m}^E$  are linear combinations of  $\epsilon_m$  and  $\varepsilon_{j,m}$ . Importantly, as shown in Appendix A, the local productivity changes should be positively correlated with both local employers' wage and employment changes, while changes in  $\Delta\Omega$  are positively correlated with local employers' wages but negatively with employment.

To compute the difference in the outside option level provided by national employers,  $\Delta OOI_m^N$ , I observe it is the difference in national employer share (given the previous wage level) and in their wage (given the previous share), thus:

$$\Delta OOI_m^N = \Delta \gamma_m^N w_m^N + \gamma_m^N \Delta w_m^N$$

From equations 1 and 2, the changes in national employers' wages and vacancies are determined by both local productivity shocks and exogenous national employers' productivity shock. Therefore, using only national employers' wage changes in the local labor market, it

is impossible to identify the causal effects of  $\Delta OOI_m^N$  on local employers' wage and employment policies.

To address this issue, I propose a novel measure based on results elaborated in Section 3 from Hazell et al. (2021). The strategy hinges on national employers' wage and employment shocks in large labor markets, isolating the exogenous components  $\Delta\Omega$  from national employers' wage and employment changes.

Another problem is the endogeneity of  $\Delta E_m$ . Even assuming that firm  $j$  is of very small size,  $\Delta E_m$  is determined by local endogenous shocks. Therefore, as discussed in Section 3, in one of the research designs I use a standard Bartik instrument instead of  $\Delta E_m$ .

## 2.5 Workers' Heterogeneity

In the previous section, I assumed that all workers have the same probability of joining the national employer, which is proportional to its employment share  $\gamma_m^N$ . However, some workers are more likely to be hired by the national employer. For example, Le Barbanchon et al. (2020) showed the importance of distance to the workplace for workers' search intensity. Alternatively, Caldwell and Harmon (2019) demonstrated larger wage increases for workers connected to expanding firms through their past coworkers.

A simple way to analyze such heterogeneity in the model is to assume that, for some group of workers  $g$ , the probability of joining the national employer (given being matched),  $\gamma_{m,g}^N$ , is greater than the national employer's overall employment share  $\gamma_m^N$ . Obviously, such workers will receive higher wages simply by being more likely to join the better-paying national employer. Moreover, even if they stay with their baseline employer, their wage increase, as a spillover, would be:

$$\Delta \ln w_{j,m,g} = \alpha_1 \Delta y + \alpha_2 \Delta E_{o,m} + \alpha_3 \Delta OOI_{m,g}^N + \varsigma_{j,m,g}^W \quad (7)$$

Therefore, the testable model prediction is that the group more likely to be employed by

the national employer will receive higher wage increases and will be less likely to be employed by local employers.

### 3 Research Design

My research design aims to isolate national employers' idiosyncratic labor demand shocks and construct a measure of local labor markets' exposure to these shocks. The basic idea is straightforward: national employers that expand (or decline) in terms of wages and/or employment in large cities are likely to do the same in other locations. Moreover, such expansion (or decline) is likely independent of local labor market conditions.

Next, I use the constructed measure of local labor market exposure to national employer labor demand shocks to identify the labor markets that experienced a large increase in national employers' idiosyncratic labor demand. This approach allows me to study local employers' reactions to national employer expansions using the staggered event study methodology.

In another research design, I examine the general spillovers to national employers' wage policies, not limited to expansion periods. Specifically, I estimate the local employers' reactions to the outside option provided by national employers. For this purpose, I use the constructed measure of local labor market exposure as shift-share instruments.

Formally, I consider two non-intersecting sets of labor markets: those in large cities and those in the Estimation Region. I denote large cities by  $\mathcal{C}$ . As the labor markets are defined for each occupation, this set is denoted with the subscript  $\mathcal{C}_o$ .<sup>5</sup>

#### 3.1 Graphical Illustration of Identification Strategy

The intuition behind the identification strategy can be described in three steps depicted in Figure 2. Consider national employer A, a major supermarket chain with establishments

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<sup>5</sup>Importantly, the large cities set is the same for each occupation.

in multiple locations, including one large city and one medium-sized city. For simplicity, assume it is the only national employer in the medium-sized city.

First, as illustrated in the lower panel of Figure 2, suppose Employer A decides to increase the wages it offers to cashiers (and hire more cashiers). Ideally, this would suggest that A is experiencing an idiosyncratic increase in labor demand. Then, such a wage change decision might pressure smaller businesses like toolbox shop B, which also employs cashiers, to raise their wages. However, both employers could be responding to the same local productivity shock. This situation is shown in Appendix Figure C.1.

The middle panel in Figure 2 demonstrates the strategy to eliminate the effects of local shocks. If Employer A increases wages in both the large city and the medium-sized city, this increase is more likely the result of its idiosyncratic nationwide policy rather than a local labor market shock. Nevertheless, it's still possible that the wage increases at both Employer A and Employer B are due to a general nationwide demand for cashiers, as shown in Appendix Figure C.2.

To address the effects of nationwide shocks, I compare Employer A's wage increase in the large city with the wage changes of other employers in large cities, as shown in the upper panel of Figure 2. If Employer A's wage increase exceeds the average wage change of other employers and this increase is transmitted to A's wages in the medium-sized city, it is likely due to an idiosyncratic increase in Employer A's demand for cashiers. Consequently, the observed wage increase by Employer B could be a spillover effect from Employer A's policy.

### 3.2 Single National Employer Labor Demand Shocks

Before constructing the labor market exposure measure to national employers' labor demand changes, I compute the idiosyncratic changes for each single employer that operates in this labor market. Precisely, for each national employer, idiosyncratic wage and employment shocks are computed in two stages.

Initially, for each occupation  $o$  of employer  $k$  in the large city  $c_{bc}$  (from the set of large

cities where it operates,  $\mathcal{C}_{k,o,t}$ ) at time  $t$ , I estimate the following regression:

$$y_{k,o,c_{bc},t} = \zeta_{o,t} + \omega_{k,o,c_{bc},t}$$

Here,  $y_{k,o,c_{bc},t}$  denotes the employer's average wage or the logarithm of employment.<sup>6</sup>

Subsequently, the idiosyncratic wage or employment level for employer  $k$  is defined as the average of the regression residuals across all large cities where the employer operates:

$$Z_{k,o,t} = \frac{1}{|\mathcal{C}_{k,o,t}|} \sum_{c_{bc} \in \mathcal{C}_{k,o,t}} \omega_{k,o,c_{bc},t} \quad (8)$$

Similarly, I compute the idiosyncratic three-year wage and employment level changes:

$$\Delta Z_{k,o,t} = \frac{1}{|\mathcal{C}_{k,o,t}|} \sum_{c_{bc} \in \mathcal{C}_{k,o,t}} (\omega_{k,o,c_{bc},t+1} - \omega_{k,o,c_{bc},t-1}) \quad (9)$$

For the remainder of the paper, I denote these idiosyncratic wage changes as  $\Delta Z_{k,o,t}^W$  and employment changes as  $\Delta Z_{k,o,t}^E$ .

### 3.3 Local Labor Market Exposure to National Employer Labor Demand Shocks

Having computed the employer  $\times$  occupation-level shocks, I construct the measure of the labor market's exposure to national employers' idiosyncratic labor demand shocks. I weight the labor market exposure to these individual national employer shocks by their employment

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<sup>6</sup>Since this regression aims to identify idiosyncratic firm effects, I do not weight the estimation results by the employment of each job. Instead, I estimate the regression for jobs employing at least 10 workers continuously for 3 years.

shares from the previous year.

I compute the exposure measure both for national employers' wage and employment changes and for the wage level<sup>7</sup>. Equation 10 defines the level shift-share measure of exposure to national employers' wage or employment policies for the labor market  $m$  (occupation  $o \times$  commuting zone  $c$ ), and time  $t$ , which includes national employers indexed by  $1, 2, \dots, K_n$ . The employment share of individual national employer  $k$  from year  $t-1$  is denoted as  $\gamma_{k,m,t-1}^N$ , while  $\gamma_{m,t-1}^N$  represents the total employment share of national employers. Since the sum of national employers' weights is less than 1, I always use the measure scaled by the total national employers' share in the labor market:  $\gamma_{m,t-1}^N$ .

$$\gamma_{m,t-1}^N \hat{\Omega}_{m,t}^W = \sum_{k=1}^{K_n} \gamma_{k,m,t-1}^N Z_{k,o,t}^W \quad (10)$$

Similarly, I aggregate the single employers' relative wage and employment changes  $\Delta Z_{k,o,t}^W$ ,  $\Delta Z_{k,o,t}^E$ , to define the exposure measure of the local labor market to changes in national employer policies as Equations 11–12 depict:

$$\gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^E = \sum_{k=1}^{K_n} \gamma_{k,m,t-1}^N \Delta Z_{k,o,t}^E \quad (11)$$

$$\gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^W = \sum_{k=1}^{K_n} \gamma_{k,m,t-1}^N \Delta Z_{k,o,t}^W \quad (12)$$

The constructed measures are empirical counterparts to  $\Omega$  and  $\Delta\Omega$  from the model described in Section 2.2. Different from the theory section, there are two measures for employment and wage changes: this is to most precisely identify the real labor demand changes of national employers. Additionally, using two measures allows me to separate the labor

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<sup>7</sup>It is not informative to aggregate the idiosyncratic national employers' levels  $Z_{k,o,t}^E$  because employment size is already measured by employment shares in the local labor market. Conversely,  $\Delta Z_{k,o,t}^E$  provides information about national employers' *changes* in log employment in large cities, which can predict similar changes in other labor markets and is not provided by employment shares in the previous year.

demand change from worker selection (employment cuts simultaneous with wage increases). Empirical  $\hat{\Omega}$  also has a labor market index because there are many national employers operating in different cities, instead of one national employer in the model.

Additionally, I define the counterpart measure of national employers' wage level and wage and employment changes in the local labor market in the Estimation Region (outside large cities). The national employers' wage level measure is the aggregate outside option provided by the national employers:

$$\widehat{OOI}_{m,t}^N = \sum_{k=1}^{K_n} \gamma_{k,m,t-1}^N w_{k,m,t}^N \quad (13)$$

I also define the average level of wages on national employers in the local labor market as  $w_{m,t}^N = \frac{\widehat{OOI}_{m,t}^N}{\gamma_{m,t}^N}$

I also construct the measure of national employers' wage and employment changes in the local labor market in the Estimation Region:  $\Delta w_{m,t}^N$ ,  $\Delta \ln l_{m,t}^N$ :

$$\gamma_{m,t-1}^N \Delta w_{m,t}^N = \sum_{k=1}^{K_n} \gamma_{k,m,t-1}^N (w_{k,m,t+1}^N - w_{k,m,t-1}^N) \quad (14)$$

$$\gamma_{m,t-1}^N \Delta \ln l_{m,t}^N = \sum_{k=1}^{K_n} \gamma_{k,m,t-1}^N (\ln l_{k,m,t+1} - \ln l_{k,m,t-1}) \quad (15)$$

Lastly, the change in  $\widehat{OOI}_{m,t}^N$  is defined as the sum of changes in national employer wages and employment share:

$$\Delta \widehat{OOI}_{m,t}^N = \gamma_{m,t-1}^N \Delta w_{m,t}^N + (\gamma_{m,t+1} - \gamma_{m,t-1}) w_{m,t-1}^N \quad (16)$$

### 3.4 Main Research Design: Event Study of National Employers' Expansions

The main research design focuses on cases where a local labor market experiences a large positive change in national employers' labor demand, independent of local conditions. Specifically, I consider a Bernoulli variable that is independent of local labor market productivity shocks ( $\epsilon_{o,m,t}$ ) but is correlated with significant changes in the national employer's idiosyncratic labor demand shock ( $\Omega_t$ ), as specified in the model. According to Equations 5–6, this approach allows me to causally identify the spillovers from national employers' wage and vacancy expansions. However, the identified effect encompasses both the impact of increased labor market tightness (total employment) and the influence of national employers on workers' outside options.

In practice, I define national employer expansions using measures of their wage and employment changes estimated in large city regions:  $\Delta\hat{\Omega}_{m,t}^W$  and  $\Delta\hat{\Omega}_{m,t}^E$ , as defined in Equations 14–15. I specify non-negative cut-off levels for these measures such that local labor markets with values exceeding these thresholds are classified as experiencing national employers' expansion. These thresholds are chosen to capture large changes in national employers' policies and represent the top few percentiles of all market observations. Although the cut-offs are chosen arbitrarily, I conduct robustness checks to examine if the results depend on the exact threshold values.

In the model, for simplicity, I assumed that local employers are defined at the labor market level; that is, each local employer hires workers in one occupation. However, this is rarely the case. Therefore, instead of firm-level analysis, I provide results at the **job** level—that is, the portion of local employers' employment in a specific occupation  $o$  and commuting zone  $c$ . Analyzing at the job level allows me to estimate local employers' responses to national employers' expansions within a single labor market.

I estimate the outcomes of expansion not only at the job level but also at the worker level, specifically for a sample of workers who were employed by local employers in the

baseline period. Including the worker-level event study allows me not only to examine the worker gains/losses from the expansion but also to differentiate the effects of local employers' workers' selection (keeping only those with higher wages) from the real change in the local employers' policies. Lastly, it will allow me to inspect the mechanism described in Section 2.5: do groups with a higher probability of moving to national employers receive higher wages?

Because national employers' expansions are by definition rare, to increase the precision of estimates, I use the matched sample. To address identification issues that arise in conventional event studies with staggered treatments (Goodman-Bacon, 2021), I restrict controls to those that did not experience any national employer expansions in a longer time period (exactly between  $t_j^* - 5$  and  $t_j^* + 5$  if the expansion happens in the period  $t_j^*$ ).

Using the matched sample of paired treated and control jobs (local employer identifier and labor market combination  $m$ ), I estimate the following model for job  $j$  in labor market  $m$ , defined by occupation  $o$  and commuting zone  $c$ , in calendar year  $t$ , with time relative to the event denoted by  $\tau$ :

$$y_{j,m,t} = \sum_{\tau=-5}^4 \eta_\tau \mathbf{1}\{\tau = t - t_j^*\} \cdot \text{Tr}_{j,m} + \sum_{\tau=-5}^4 \zeta_\tau \mathbf{1}\{\tau = t - t_j^*\} \\ + \zeta_{o,t} + \zeta_{j,m} + u_{j,m,t}, \quad (17)$$

where  $t_j^*$  is the event year for job  $j$ , and  $\text{Tr}_{j,m}$  is an indicator variable equal to 1 if the job was treated. The model includes job fixed effects  $\zeta_{j,m}$  and occupation-by-time fixed effects  $\zeta_{o,t}$ . Additionally, I control for time relative to the event  $\zeta_\tau$  to ensure that treated and control jobs exhibit similar life-cycle and aggregate trends. To account for regional economic fluctuations, I also control for the GDP of the city, ensuring that the observed effects are not driven by regional economic booms. Standard errors are two-way clustered at the job and labor market levels. Because it is likely that the expansions of national employers began

before the observed event—for example, a firm might have started hiring in period  $t - 1$ , but the main wage increases are observed in period  $t$ —I set period  $t - 2$  as the baseline.<sup>8</sup>

For the sample of paired treated and control individuals, I estimate the following model for individual  $i$  in calendar year  $t$ , with time relative to the event denoted by  $\tau$ . The function  $\mathbf{O}(i, t)$  gives the identity of the unique occupation of worker  $i$  in year  $t$ .

$$y_{i,t} = \sum_{\tau=-5}^4 \eta_\tau \mathbf{1}\{\tau = t - t_i^*\} \cdot \text{Tr}_i + \sum_{\tau=-5}^4 \zeta_\tau \mathbf{1}\{\tau = t - t_i^*\} \\ + \zeta_{\mathbf{O}(i,t),t} + \zeta_i + u_{i,t}, \quad (18)$$

where  $t_i^*$  is the event year for individual  $i$ , and  $\text{Tr}_i$  indicates whether the worker was treated, that is, in the baseline period they worked for a local employer in the labor market where a national employer expanded in the period  $t_i^*$  ( $\tau = 0$ ). The model includes individual fixed effects  $\zeta_i$  and occupation-by-time fixed effects  $\zeta_{\mathbf{O}(i,t),t}$ . Similar to the job-level model, I control for time relative to the event  $\zeta_\tau$ . Additionally, I include a polynomial function of the worker's age to control for age-related trends. Standard errors are two-way clustered at the individual and labor market levels.

The main identifying assumption is that the matched control samples provide valid counterfactuals for the treated units, conditional on the control variables. The plausibility of this assumption depends on the identification of idiosyncratic labor demand shocks from national employers, as described in the previous section. Although this assumption cannot be directly tested, if it holds, the coefficients  $\{\eta_\tau\}_{\tau=-5}^{-3}$  for the pre-event periods should be parallel between treated and control groups. Another indirect test of the assumption's validity is the evolution of employment in treated jobs. As discussed in Section 2.2, simultaneous increases in both wage and employment for treated jobs would suggest a local productivity shock, potentially undermining the validity of the results.

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<sup>8</sup>I follow the approach of Helm et al. (2023) in their study on firms' employment expansions.

### 3.5 Shift-Share Regressions

In addition to the event study, I provide an additional research design to examine the general effect of national employers on spatial income inequalities, not limited to expansion periods: shift-share regressions.

In this design, I treat the exposure measures  $\Delta\hat{\Omega}_{m,t}^W$  and  $\Delta\hat{\Omega}_{m,t}^E$  as shift-share instruments for changes in the outside option level provided by national employers,  $\widehat{OOI}_{m,t}^N$ , defined in 10. Formally, the instrument relies on the identification results from Borusyak et al. (2021) regarding instruments with endogenous shares and exogenous shocks: identified idiosyncratic wage and employment changes of national employers are likely exogenous to local firms, whereas employment shares depend on local labor market conditions.

Specifically, I estimate the following regression equation for local employer  $j$ , operating in labor market  $m$ , defined by occupation  $o$  and commuting zone  $c$ , at time  $t$ , which directly corresponds to the theoretical equations 5–6:

$$\Delta y_{j,m,t} = \zeta_{o,t} + \zeta_1 \Delta B_{m,t}^E + \eta \Delta \widehat{OOI}_{m,t}^N + u_{j,o,m,t} \quad (19)$$

The coefficient of interest is  $\eta$ , which corresponds to  $\alpha_2$  or  $\beta_2$  in the model. It measures the effect of changes in the outside option provided by national employers,  $\widehat{OOI}_{m,t}^N$ , defined in 10. This term is measured as the sum of the change in their residualized wage,  $\gamma_{m,t-1}^N \Delta w_{m,t}^N$ , and the change in their employment share,  $(\gamma_{m,t+1} - \gamma_{m,t-1})w_{m,t-1}^N$ . The variable  $\Delta B_{m,t}^E$  denotes the classical Bartik instrument, defined for the three-year change in employment levels of industries,<sup>9</sup> and, for consistency, I compute the industry employment changes in the large city region.

I instrument  $\widehat{OOI}_{m,t}^N$  using the changes in national employers' wage policy,  $\gamma_{m,t-1}^N \hat{\Omega}_{m,t}^W$ , and the employment changes in local employers,  $\gamma_{m,t-1}^N \hat{\Omega}_{m,t}^E$ , multiplied by the national employers' wage level in the local labor market.

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<sup>9</sup>The weights are the employment shares of each industry in the labor market.

## 4 Empirical Implementation

In this section, I describe the mapping of the empirical strategy outlined in Section 3 to Brazilian administrative data. I begin with a brief description of the institutional context of the Brazilian labor market and the main data sources. Then, I detail the key variables, such as large cities, the estimation region, and the definition of a national employer. Next, I explain the construction of the exposure measures defined in Section 3.3. Lastly, I discuss the empirical implementation of the main research design: the event study of national employers' expansion.

### 4.1 Institutional Context

The Brazilian labor market differs from those in developed countries in two main ways: a higher rate of informality and a dual union structure. This section briefly outlines these differences and explains how they are addressed in the research design.

Unlike developed countries, Brazil has a significant informal sector. In this paper, I focus on the most developed South and Southeast regions, which have the lowest informality rates Engbom et al. (2022). According to Gerard et al. (2021), the informal sector constituted approximately 20% of total private-sector employment between 2005 and 2014. The RAIS dataset provides information only on the formal labor market, thus omitting about 20% of employer-employee relationships. To mitigate this issue, I focus on firms with more than five workers, which are less likely to hire informal workers Ulyssea (2018). Lastly, to control for possible worker selection into the informal sector during expansion events, I provide a worker-level event study for workers previously in the formal sector and show that they are not more likely to leave formal employment (i.e., move to the informal sector).

For formally employed workers, employer-employee relations in Brazil are mediated by unions and employers' associations (Menezes-Filho et al., 2008) what potentially lead to downward wage rigidity for incumbent workers. However, in the main research designs, I ac-

count for spillovers from both positive wage and employment changes of national employers. Therefore, positive wage shocks from national employers provide a positive outside option for workers, suggesting that wage spillovers should not be constrained by downward rigidity.

## 4.2 Data Sources

The primary data source is the Relação Anual de Informações Sociais (RAIS), a Brazilian matched employer-employee dataset collected by the Ministry of Labor and Employment (Ministério do Trabalho e Emprego). RAIS collects data from all formally registered employers, with fines imposed for incomplete, late, or unsubmitted reports. There are also positive incentives for accurate reporting, such as eligibility for social security programs for employees and random checks by the ministry for employers. While the RAIS dataset spans from 1986 to 2020, to ensure consistency in occupation coding and enhance the robustness of the study, I utilize data from 2007 to 2018.

For each employment spell in a given year, RAIS provides information on the average monthly wage, spell duration, average hours worked, and December wage. The dataset includes individual characteristics (occupation, education level, age, gender, and race), establishment characteristics (number of employed workers, sector), firm characteristics (legal nature), and job characteristics (contract type, occupation: Classificação Brasileira de Ocupações called henceforth CBO). RAIS also provides time-invariant, anonymized identifiers for workers, establishments, and firms, as well as non-anonymized municipality identifiers, which enable tracking of employer-employee relationships over time. Unlike other administrative datasets, RAIS allows the identification of establishments belonging to the same firm, facilitating the analysis of firms' wage and employment policies across different establishments. The firm and establishment identifiers are based on the National Registry of Legal Entities (Cadastro Nacional de Pessoas Jurídicas).

Additionally, I incorporate microregion and state characteristics from the Instituto de Pesquisa Econômica Aplicada to provide further contextual information.

#### 4.2.1 General Sample Restrictions

Consistent with the focus on regions with lower informality rates, I restrict the analysis to the South and Southeast regions of Brazil, which are the wealthiest regions with the lowest informality indexes and account for approximately half of the total population.

I exclude observations with incomplete or invalid worker, establishment, firm, or municipality identifiers, as well as those with invalid job spell or personal characteristics. The dataset is further restricted to individuals who worked more than two months in a year and more than 10 hours per week. Additionally, I exclude farm jobs and workers, as well as those with temporary or part-time contracts. Workers with wages lower than the minimum wage are also excluded

### 4.3 Variable Definitions

The primary variables of interest are hourly wage and employment. Following [Gerard et al. \(2021\)](#), the hourly wage for each employment spell is calculated by dividing the average monthly wage by the contractual number of hours worked per week, multiplied by 4.38 (the average number of weeks per month). Both variables are provided in the RAIS dataset.

The main unit of analysis is the firm's **job**, defined as a combination of the firm's identifier, a four-digit occupation code (according to the Brazilian CBO classification), and a commuting zone – microregion. Microregions are Brazilian administrative units that closely match the concept of commuting zones ([Dix-Carneiro and Kovak, 2017](#); [Tucker, 2017](#)). As a baseline, I define the **labor market** as a combination of four-digit occupation code and microregion. This relatively narrow definition allows for capturing groups of employees who perform similar tasks in the same commuting zone. This definition is similar to that used by [Berger et al. \(2023\)](#) and is consistent with the analysis of job switchers in Brazil conducted by [Felix \(2021\)](#).

### 4.3.1 Adjusting for Jobs' Worker Composition

Jobs within the same labor market may vary in terms of worker characteristics such as experience, education, and gender. To account for this variation in worker composition, I employ a residualization technique on employee wages. Specifically, I regress the log wage of each worker  $i$  in labor market  $m$  in year  $t$  on a set of controls:

$$\ln w_{i,m,t} = \zeta_t + X'_{i,m,t} \zeta_2 + u_{i,m,t},$$

Where  $X_{i,m,t}$  includes the worker's age  $\times$  occupation polynomial<sup>10</sup>, hours fixed effects, education  $\times$  gender interactions, and education  $\times$  occupation fixed effects.

I then define the wage residual  $\hat{w}_{i,o,m,t}^r$  as:

$$\hat{w}_{i,o,m,t}^r = \ln w_{i,o,m,t} - \hat{\zeta}_t - X'_{i,o,m,t} \hat{\zeta}_2.$$

Residualized wages allow me to isolate wage changes that are not due to firms adjusting their worker composition but rather reflect changes in the firm's wage policy for a given job.

### 4.3.2 Large Cities and Estimation Region

I differentiate between two types of microregions (commuting zones): large cities (used for estimating national employers' labor demand shocks) and estimation microregions (used for spillover estimations). Large city microregions are those containing at least one municipality with over 1 million residents, according to the 2010 Census. This includes São Paulo, Campinas, Osasco, Guarulhos, Rio de Janeiro, Belo Horizonte, Porto Alegre, and Curitiba.

The estimation region comprises all microregions in the South and Southeast regions of Brazil that do not qualify as large cities. To ensure that none of the commuting zones within the estimation region share the same local shocks as large cities, I exclude all microregions belonging to the same higher administrative unit (mesoregion) as any of the large cities or

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<sup>10</sup>Exactly, I use the quadratic polynomial  $a_{0,o} + a_{1,o}\text{Age} + a_{2,o}\text{Age}^2$

microregions that border large city. Additionally, I omit a few commuting zones that might undergo boundary changes due to new municipalities. Figure 1 illustrates the division of commuting zones, with large cities highlighted in red and estimation microregions in light blue.

#### 4.3.3 National and Local Employers

National employers are multi-establishment firms that often hire workers for the same occupation across multiple locations. In this study, a national employer in a particular occupation is defined as a firm that employs workers in that occupation in at least one large city and at least one commuting zone within the estimation region. To ensure consistency in identifying national employers, I also require that such a firm has employed a minimum of 10 workers continuously for three years in one of the large cities and at least five workers in the estimation region's labor market within the given occupation. Lastly, to ensure that national employers operate in large markets, I restrict them to those that operate in labor markets with more than 200 workers in large cities.

Local employers are firms that do not employ any workers in the large city region (across all occupations) and instead operate within the commuting zones belonging to the estimation region. For most of our analysis, I focus on jobs provided by local employers who have a workforce of at least five employees in the given labor market during the baseline period.

When analyzing the effects of national employers, I restrict attention to the labor markets where the national employers have between 2.5% to 70% of employment share (in the previous year) and that has more than 50 local employers' workers (also in the previous year). This allows to analyze relatively stable labor markets with not-marginal share of national employers, while also not analyzing the labor markets strongly dominated by them.

Table 1 compares local and national employers across four-digit occupations, pooled from 2006 to 2018. On average, national employers operate in 1.9 large city and approximately 2.8 less populous microregions. They tend to employ more workers in large cities (averaging

around 278 employees) compared to other commuting zones. While local employers might also be multi-establishment firms, this is unlikely; on average, they operate in 1.03 locations within the same occupation. Local employers tend to offer lower wages, with residualized wages approximately 14 log points lower than those of national employers. Additionally, local employers employ about 14.5 workers on average, compared to 104 workers for national employers.

## 4.4 Empirical Implementation of Local Labor Market Exposure Measure to National Employers Shocks

For both research design, the crucial part of implementation of empirical strategy are measures of local labor markets exposure to national employers idiosyncratic labor demand shifts;  $\hat{\Omega}_{m,t}^W, \hat{\Omega}_{m,t}^E$ . I follow the steps described in 3.3 using the large city and Estimation Region definitions from Section 4.3.2. Similarly, I compute changes in national employers wages and log employment in the Estimation Region's labor markets as defined in 14–15, and outside option index defined in 10. In each computation involving the national employers wages, I use the residualized wages as specified in 4.3.1.

To examine the comovements of national employers' wages and employment across regions more carefully, I estimate equations at the market level:

$$\Delta y_{m,t} = \zeta_{1,1} \gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^W + \zeta_{1,2} \gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^E + \zeta_{o,t} + \gamma_{m,t-1}^N + v_{o,m,t} \quad (20)$$

$$y_{m,t} = \zeta_{2,1} \gamma_{m,t-1}^N \hat{\Omega}_{m,t}^W + \zeta_{o,t} + \gamma_{m,t-1}^N + v_{o,m,t} \quad (21)$$

The variable of interest in Equation 20  $\Delta y_{m,t}$  represents the national employers' wage and employment changes (defined in 14–15). For the Equation 21 it is outside option index defined in 10. I control for occupation -time fixed effects and in some specifications for labor market fixed effects. Standard errors are clustered at the labor market level.

The results of the regressions, presented in Table 2, show a significant correlation between national employers' policies across regions. National employers who pay more in large cities also set higher wages in the estimation region. The correlation is also strong for employment or wage changes: a unit change in national employers' wage policies in large cities (measured by  $\gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^W$ ) is accompanied, on average, by a 0.6-unit residualized wage increase in the estimation region. National employers' employment policies in large cities (measured by  $\gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^E$ ) do not seem to affect wages; however, a one-unit increase in  $\gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^E$  is followed by about a 0.5 log point increase in national employers' employment in the estimation region. Overall, the results suggest that the change instruments effectively capture national employers' idiosyncratic labor demand shocks, as wage and employment changes of national employers robustly pass through from large cities to the estimation region.

In the Appendix Section B I provide the additional robustness for relationship between the national employers wages and employment in large cities and in Estimation region. In general, I found these relationships to be stable and robust to additional controls or subsample. In Section B I also discuss the distribution of the exposure measures and their performance in the expansion periods.

## 4.5 Empirical Implementation of Event Study

As outlined in Section 3.4, national employers expansion event is defined by set thresholds for exposure measures  $\hat{\Omega}_{m,t}^W$ ,  $\hat{\Omega}_{m,t}^E$ . Specifically, I require that  $\gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^W$  in period  $t$  exceeds 0.005. Although this threshold might seem moderate, it is important to note that it is normalized by the total share of national employers in the labor market. Since this average share is close to 10%, the event represents cases where national employers' relative wages increase by at least 5%. Many such increases result not from expansions by national employers but from reductions in employment, adjustments in worker selection, or alignment with previous wage cuts. Therefore, I also require that employment changes measured in the large city region are positive:  $\gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^E > 0$  and  $\gamma_{m,t-2}^N \Delta \hat{\Omega}_{m,t-1}^W > 0$ . Lastly, to ensure

that national employers might substantially impact the entire labor market, I restrict the events to markets where the national employers' share in period  $t - 1$  is at least 5%.

Additionally, I apply standard restrictions for the local labor market in the baseline period (two years before expansion): only markets with a national employers' share between 2.5% and 70%, and with more than 50 workers, are included.

## 4.6 Matched Samples

For the main specification, I select a set of treated jobs, defined as positions at local employers that employ at least five full-time-equivalent workers in the labor market where the event occurred. To ensure that the treated jobs persisted from the baseline period to the event, I restrict the sample to jobs that existed from period  $t - 2$  to  $t$ . In this specification, I allow the labor market—and jobs within it—to be treated multiple times. However, I also estimate the variant where I limit the analysis to jobs treated for the first time.

To find a reliable counterfactual for the treated jobs and workers at local employers, I employ matching methods. I match treated jobs based on their characteristics two years prior to the event (i.e., in period  $t - 2$  if treated in period  $t$ ). For jobs at local employers treated in period  $t$ , I restrict potential controls to those that meet the following criteria: they are located within the estimation region, belong to the same 4-digit occupation and broad industry as the treated job, employ at least five workers, and existed from period  $t - 2$  to  $t$ . Additionally, I match treated and control jobs within the same employment size quartile and labor market size quartile. The labor markets of the control jobs must also satisfy standard restrictions: they have a national employers' employment share between 2.5% and 70% and employ more than 50 workers. Finally, to address identification issues that arise in conventional event studies with staggered treatments (Goodman-Bacon, 2021), I restrict controls to those that did not experience any national employer expansions between  $t - 5$  and  $t + 5$ .<sup>11</sup> Next, to find the closest counterfactual to each treated job—a "statistical twin"—I

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<sup>11</sup>Specifically, I require that for each year between  $t - 5$  and  $t + 5$ , the shift-share measure of national

use Mahalanobis matching based on several observable variables<sup>12</sup>.

The results of the matching procedure at the job level are presented in Table 3. The matched and control groups are similar in terms of the matched characteristics, such as employment size, national employers' employment share, and wages. They are also not statistically different in terms of non-matched characteristics like average residualized wages and average wages. As shown in Table 3, the matched sample is also similar to all potentially treated jobs—that is, jobs with more than five workers operating in labor markets with substantial national employers' employment shares.

In total, I matched approximately 65% of the treated jobs. The matched sample includes treated observations from 420 events. Figure C.3 shows that the spatial distribution of treated jobs reflects the population size of the microregions. Figure C.4 presents the number of treated jobs in the microregions by year. Most of the expansion episodes occurred between 2010 and 2014, during years of rapid economic growth in Brazil. The subsequent economic downturn was correlated with fewer expansions by national employers.

For the workers' sample, I focus on individuals who were employed for at least five months by local employers in period  $t - 2$ , in jobs that satisfy the same restrictions as the matched sample of jobs.

I restrict the potential control pool of workers to individuals of the same gender and tenure bin. I also apply the same restrictions to their jobs as when constructing the matched sample of jobs. From all possible counterfactual individuals, given these restrictions, I select controls using a caliper matching method (Stepner and Garland, 2017). I set the calipers as follows: for the logarithm of the job's employment size, a maximum difference of 15 log points; for the logarithm of the labor market's employment size, a maximum difference of 15 log points; for the national employers' employment share, a maximum difference of 5 percentage points; and for tenure, a difference of less than three years.

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employers' policy  $\gamma_{n,o,m,t-1}\Omega_{n,o,m,t}^W$  was smaller than 0.003.

<sup>12</sup>These variables include job and labor market employment sizes, the proportion of hired workers to the total job workforce, national employers' employment share, and shift-share measures.

Table 4 compares the treated sample to the control sample and to all potentially treated individuals. As with the job-level design, the matching method closely aligned the targeted characteristics (such as job employment size) and untargeted worker characteristics (such as wage). In total, approximately 32% of the treated workers were matched.

The relatively low matching rate is explained by the lack of potential counterfactuals for large local employers in smaller labor markets, as depicted in Table 4. In terms of average job size, the matched sample has about 28 workers, whereas the total potentially treated sample has almost 100 workers. Similarly, the labor market size is about 17% smaller in the total potentially treated sample than in the matched sample. Therefore, the matched sample is more representative of larger labor markets with smaller local employers. For instance, in the subsample of treated individuals employed in jobs with fewer than 50 full-time workers and in labor markets with more than 1,000 workers, the matching rate increases to 65%.

## 5 Results

In this section, I estimate the effects of national employer expansion on job-level and worker-level outcomes. I use the matched panel of jobs and workers described in Section 4.6.

### 5.1 National Employer Expansions in Large City and Estimation Region

Figure 3 presents event studies for national employers' residualized wages in large city and estimation region: the exposure measure to national employers wage policy in a large city, denoted as  $\hat{\Omega}_{m,t}^W$  (solid red line), and the national employers wage level in the treated labor market,  $w_{m,t}^N$  (dashed red line). On average, the expansion of national employers increased  $\hat{\Omega}_{m,t}^W$  by 8 log points, reflecting large wage increase relative to other employers operating in large cities. Between periods -1 and 1,  $w_{m,t}^N$  increased by about 5 log points compared to the control labor market.

As shown in Figure ??, national employers' expansions also led to significant increases in their employment and number of establishments in the estimation region. In the treated labor market, the total employment of national employers rose by approximately 25 log points, and the number of establishments grew by 15 log points. This growth resulted in an employment share increase of about 2 percentage points relative to control labor markets, as depicted in Figure 4. Although employment and employment share slightly decreased in the later period, they remained significantly higher than their baseline levels.

I interpret these event study results for national employers as a validation of the empirical strategy used. The findings demonstrate that national employer expansions are likely driven by decisions at the national level and are characterized by substantial employment growth and significant wage increases. Moreover, even if some pretrends can be observed, the expansion period is characterized by much more rapid and strong national employers' wage and employment increases.

## 5.2 National Employer Expansions Effects on Local Jobs

Figure 5 compares the estimates from Equation 17 for the average residualized wage of national employers' jobs,  $w_{m,t}^N$ , with residualized wages of local employers' jobs in the Estimation Region. In response to the expansions by national employers, local employers increase their wages; specifically, the average wage for local jobs rises by 2 log points relative to the control group. However, this wage adjustment by local employers is much slower than the wage growth in national firms.

Figure 6 presents the coefficients from an event study regression for the residualized wages and employment of local employers' jobs. Employment among local employers drops quickly in response to the expansion by national employers, decreasing by about two log points during the event period. In the worker-level analysis, I demonstrate that this decline is driven by incumbent workers transitioning to national employers. Additionally, as shown in Figure 7, the total labor market employment—which includes all workers employed in the

labor market—stays in the same level.

Importantly, after the period of most intense hiring by national employers, employment among local employers recovers and eventually stabilizes at a level approximately 1.5 log points lower than in the pre-event periods. Thus, employment trends in the opposite direction to wages, suggesting that local employers do not experience any unobserved productivity shocks, as discussed in Section 2.2.

### 5.2.1 Additional Robustness

I conduct several robustness checks on the baseline event study specification to demonstrate that the results are robust to different definitions of the expansion event and various choices made in the research design.

First, I examine the robustness of the results to alternative definitions of the expansion event. Panels b and c in Figure C.9 compares the baseline event study coefficients with those obtained using less and more restrictive definitions of national employer expansion. In the less restrictive case, all event conditions remain the same except that the threshold for the interaction term is set at  $\gamma_{m,t-1}^N \Omega_{m,t}^W > 0.0045$  (instead of 0.005); in the more restrictive case, the threshold is set at  $\gamma_{m,t-1}^N \Omega_{m,t}^W > 0.0055$ . In both cases, the magnitude of wage and employment spillovers is similar to that in the baseline definition, indicating that the results are not sensitive to the specific threshold.

Furthermore, I incorporate two additional sets of fixed effects to address potential concerns about the validity of the previous results. First, I add two digit industry-year fixed effects. This adjustment accounts for industry-level shocks that may not be fully captured by the occupation-year controls. Second, I consider the possible influence of state-level minimum wage changes<sup>13</sup> or other state-level shocks I add the state-year fixed effects.

Panels d and e in Figure C.9 plot the coefficients from the event study regressions for the residualized wages of local employers' jobs across different specifications: the baseline, one

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<sup>13</sup>Five of the seven states in the South-East and South regions introduced minimum wage policies during the study period, however their enforcement is disputable (Saltiel and Urzúa, 2022).

that includes industry effects, and one that includes state-year fixed effects. Reassuringly, all specifications yield similar results that are not statistically different from each other. In the most restrictive specification with state-year fixed effects point estimates are two time lower for wages, but remain significant. In addition, panel a of Figure C.9 shows that the regression results are also consistent when using the logarithm of real wages instead of residualized wages.

For the final robustness check, I compare the baseline event study regression with one that includes only the subsample of jobs treated for the first time. Panels a and b of Figure ?? present the estimates from both event studies, where the dependent variable is either the local employers' residualized wage or the logarithm of employment. Again, the results are not statistically different.

### 5.3 National employer expansions effects on workers

Event study regressions at the job level indicate that expansions by national employers lead to average wage increases for jobs at local employers. However, these wage increases may not be a direct result of changes in local employers' wage policies; they might stem from worker selection effects or apply only to new hires. Therefore, examining worker-level results can help determine whether the job-level increases were due to changes in local employers' wage policies.<sup>14</sup>

Figure 8 presents the event study for the residualized wages of workers who were employed by local employers in the baseline period. The estimates connected by the solid blue line represent the wage effects for all workers, while the dashed black line corresponds to the wage effects for workers who stayed with their local employer since the baseline period. For both groups, the residualized wage increases by about 1.5 log-points. This increase is comparable to the job-level results and suggests that job-stayers benefit from the expansions by national employers.

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<sup>14</sup>Figures C.5 and C.6 show that despite differences between the matched datasets, the first stage of worker-level analysis is consistent with the job-level analysis.

Furthermore, workers from local employers are more likely to join national employers. Figure 10 presents the coefficients from an event study regression where the dependent variable is either the probability of joining a national employer (connected blue line) or the probability of leaving the firm (dashed blue line). Incumbent workers at treated local employers are about 1 percentage point more likely to join national employers and almost 1.5 percentage points more likely to leave their current employers, although these results are not statistically significant.

Despite the increased likelihood of workers leaving local employers, Figure 9 demonstrates that expansions by national employers have no significant effect on formal private labor market participation. This result suggests that the decline in employment at local employers does not have adverse consequences for their workers. Additionally, there is no evidence that workers were persuaded by their employers to leave the formal labor market and work informally.

## 5.4 Worker-Level Heterogeneity Analysis

In the previous sections, I presented the results for all matched workers who were employed by local employers before the expansion of national employers. However, as described in Section 2.5, certain groups of workers are more likely to join national employers and should benefit more from the surge in labor demand. Moreover, wages of this group should increase stronger both through worker reallocation (moving to national employers) and through changes in local employers' wage policies. In this section, I consider two cases of local employers' workers who are more likely to join national employers: (1) workers who, in the baseline period, worked in locations (municipalities) closer to expanding national employers, and (2) workers connected to national employers through their past coworkers. For both cases, I divide the total sample of matched treated workers—that is, workers of local employers in the baseline period, employed in labor markets where the national employers expand—into two subgroups: one that is more likely to join the national employers and another that is

less likely to do so. Then, I run the event study for each subgroup separately, keeping for each treated worker the previously matched non-treated worker as a control.

To investigate the first type of heterogeneity more thoroughly, I now focus on municipalities—the smaller geographic units within each microregion. Since each microregion consists of approximately five to ten municipalities, this detailed approach allows me to identify workers within specific labor market sub-units defined by both occupation and municipality. This enables me to categorize workers in commuting zones where national employers have expanded into two groups: those who, during the baseline period, were employed in municipalities where national employers' expansion was above the labor market average, and those who were employed in municipalities without national employers or where expansion was below average. For example, if national employers primarily expand in a commuter municipality, workers in that municipality are likely to be more affected than those in the urban center of the commuting zone.

Specifically, I defined the exposure measure  $\gamma_{muni,t-1}^N \Delta \hat{\Omega}_{muni,t}^W$  at the municipality level, where *muni* denotes combination of municipality and occupation index. Then, I split the treated workers into two groups: those for which the municipality level of exposure measure  $\gamma_{muni,t-1}^N \Delta \hat{\Omega}_{muni,t}^W$ , was higher than at the microregion level, and those not satisfying this condition. As a result, I obtained two subgroups, with the first one covering about 30% of treated individuals.<sup>15</sup> To simplify the description, I will call the first subgroup “workers from more-treated municipalities” and the second group “workers from less-treated municipalities.”

Figure 12 shows that individuals closer to expanding national employers are more likely to move to a national employer by about 2 percentage points. Figure 11 compares the event study regression coefficients for wage outcomes in the two subgroups. For both all workers and job-stayers, the wage increases are higher by about 2 log points for the workers who were working in the baseline period closer to expanding employers. These results are consistent

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<sup>15</sup>The subgroups are not split equally because, for a substantial number of municipalities, there were no national employers.

with the model analysis from Section 2.5.

The second heterogeneity I investigate is the workers' connection to national employers through their past coworkers' network. As demonstrated by Caldwell and Harmon (2019), access to informal channels of learning about employment opportunities has a significant impact on workers' transition decisions and wage renegotiations. I develop a simplified measure of connections to employment opportunities through past coworkers, following Caldwell and Harmon (2019).

I split the treated workers into two groups. The first subgroup consists of connected local employer workers—individuals who, in periods  $\tau = -3$ ,  $\tau = -2$ , or  $\tau = -1$ , at least once worked in the same establishment with an individual who, in period  $\tau = 0$ , was working for a national employer. The second subgroup—non-connected workers—includes all treated individuals who do not satisfy this condition. Overall, about 10% of treated workers were classified into the first connected subgroup.

Figure 14 compares the coefficients from an event study regression of the probability of working for national employers for the connected and non-connected subgroups. While for the connected subgroup the probability of joining a national employer jumps to almost 4 percentage points during the first periods of expansion, for the non-connected workers it slowly grows, reaching up to a 2 percentage point increase compared to the control group. Similarly, as presented in 13, wages for connected workers increase by almost 4 log points, while for the non-connected ones they slowly increase to a level about 2 log points higher than the control group, consistent with the model. Given the small sample size of connected workers, I do not have enough statistical power to study the wages of connected workers who stayed with their baseline employer.

## 6 Beyond Expansion Events: The Effect of National Employers on Local Employers' Policies

The previous section provides evidence that expansions by national employers pressure local employers to increase wages and reduce hiring. In this section, I examine how these expansion event results can be generalized: to what extent do national employers' wage policies determine the variation in local employers' wages? Specifically, how much of this effect can be attributed to the relatively high wages offered by national employers, thereby providing a valuable outside option for workers employed by local employers?

Importantly, at levels, there is substantial variation in national employers' wage policy,  $\gamma_{m,t}^N$ , as shown in the lower panel of Figure 15. Moreover, one standard deviation corresponds to a 4.5 log-point difference in the shift-share measure. At the same time, changes in the wage policy are rare and concentrated near zero. Thus, the expansion events studied above do not capture the total impact of national employers on the local labor markets. Therefore, in this section, I estimate  $\alpha_2$  from Equation 5, which represents the general effect of the outside option provided by national employers on local employers' wages.

For this research design, I pool all local employers' job observations that meet the general sample restrictions: specifically, those employers that had at least five workers in the previous period and operate in an Estimation Region labor market where national employers had an employment share between 5%<sup>16</sup> and 70% in the previous year, and where a total of more than 50 local full-time workers were employed.<sup>17</sup> To construct the Bartik instrument, I used the 5-digit industry codes. In addition to the specification described in Equation 19, I also control for state or microregion-year fixed effects.

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<sup>16</sup>To increase the precision of predicting changes in national employers' employment share, I focused on cases with higher shares.

<sup>17</sup>To avoid overlapping periods (as I use 3-year changes), I restrict the analysis to the years 2007, 2009, 2011, 2013, 2015, and 2017.

## 6.1 Results

Columns 3 and 4 of Table 5 present the estimates of the coefficient  $\eta$  from Equation 19 when the change in local employers' wages is the outcome variable. In both specifications, the estimates are significant, with point values ranging between 0.4 and 0.6. This indicates a strong effect of the outside option provided by national employers on the wage policies of local employers. By substituting these estimates into wage equation 3 (specifically, coefficient  $\alpha_3$ ), I find that a one standard deviation increase in national employers' wages within the local labor market—equivalent to 4.5 log points—leads to an increase in local employers' wages by 1.8 to 2.7 log points. Although the estimated spillover magnitudes are substantial and significantly larger than the estimates of Derenoncourt and Weil (2024) spillovers from large retailers' minimum wages, they are similar to the results of Beaudry et al. (2012).

These results demonstrate that national employers significantly impact local employers' wage policies, and this influence is not confined to periods of economic expansion. Moreover, the outside option offered by national employers can explain a substantial portion of spatial wage inequalities. This finding reinforces the argument made by Hazell et al. (2021): national employers affect spatial income inequalities not only through their national wage policies but also due to the spillover effects of these policies. In a broader sense, the  $\eta$  estimates show that the outside option plays an important role in individual firms' wage-setting decisions.

Interestingly, when the change in log-employment is used as the outcome variable—as shown in columns 5 and 6 of Table 5—the  $\eta$  estimates are not significant, although the point estimates are negative, consistent with the event study results. A possible explanation for this insignificance is the high variability in local employers' employment levels, which was also observed in the event study. This suggests that local employers' employment decreases only in cases of a strong positive change in the outside option.

## 7 Conclusions

In this paper, I develop a empirical strategy that leverages variation in national employers' idiosyncratic labor demand changes identified in large Brazilian cities to causally estimate how local employers respond to national employers' expansions. First, building on the work of Hazell et al. (2021) and Schubert et al. (2021), I demonstrate that national employers' wages and employment strongly co-move across regions, which allows me to construct shift-share measures of their idiosyncratic labor demand changes. Second, I conduct an event study for jobs and workers in labor markets that experienced substantial shift-share increases. Consistent with the search and bargaining model, I find significant positive wage spillovers and negative employment spillovers at the job level. At the worker level, I observe positive wage spillovers for individuals employed by local employers during the baseline period, which also holds for those who remained with their local employers. Third, a full-sample analysis shows that the effects of national employers extend beyond periods of expansion: national employers wage polices significantly impact the spatial wage inequality.

My results have important implications for place-based policies. They suggest that labor market spillovers are equally valuable as product market spillovers: national employers' wage and employment increases lead to wage growth for all workers in the labor market. Furthermore, workers largely benefit from intensified labor market competition, and wage gains do not jeopardize employment prospects. Local employers lose workers, but this appears to be primarily due to employees transitioning to better-paying national employers. Therefore, the benefits of attracting new labor demand from large, well-paying firms extend beyond the direct number of jobs created. Importantly, such policies can be equally effective for both tradable and non-tradable sectors.

Lastly, my findings have implications for understanding firms' wage-setting behavior. I argue that large, multi-location firms make wage and employment decisions at the national level. Moreover, the outside options available to workers—defined for similar groups of employees—are important for medium-sized or smaller firms when setting their wages.

This paper suggests several avenues for future research. First, I analyzed the responses of mostly small or medium-sized employers to national employers' expansions. The spillovers to large employers might be smaller, as suggested by Derenoncourt and Weil (2024). Second, I focused on relatively large labor markets with many small firms. An interesting extension of my study would be to look at the spillovers in highly concentrated markets. The extension of the developed model that allows for granular local employers (Jarosch et al., 2019) suggests smaller wage and employment spillovers. Applying my empirical strategy to strongly concentrated markets would allow to evaluate labor market concentration effects.

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## 8 Figures

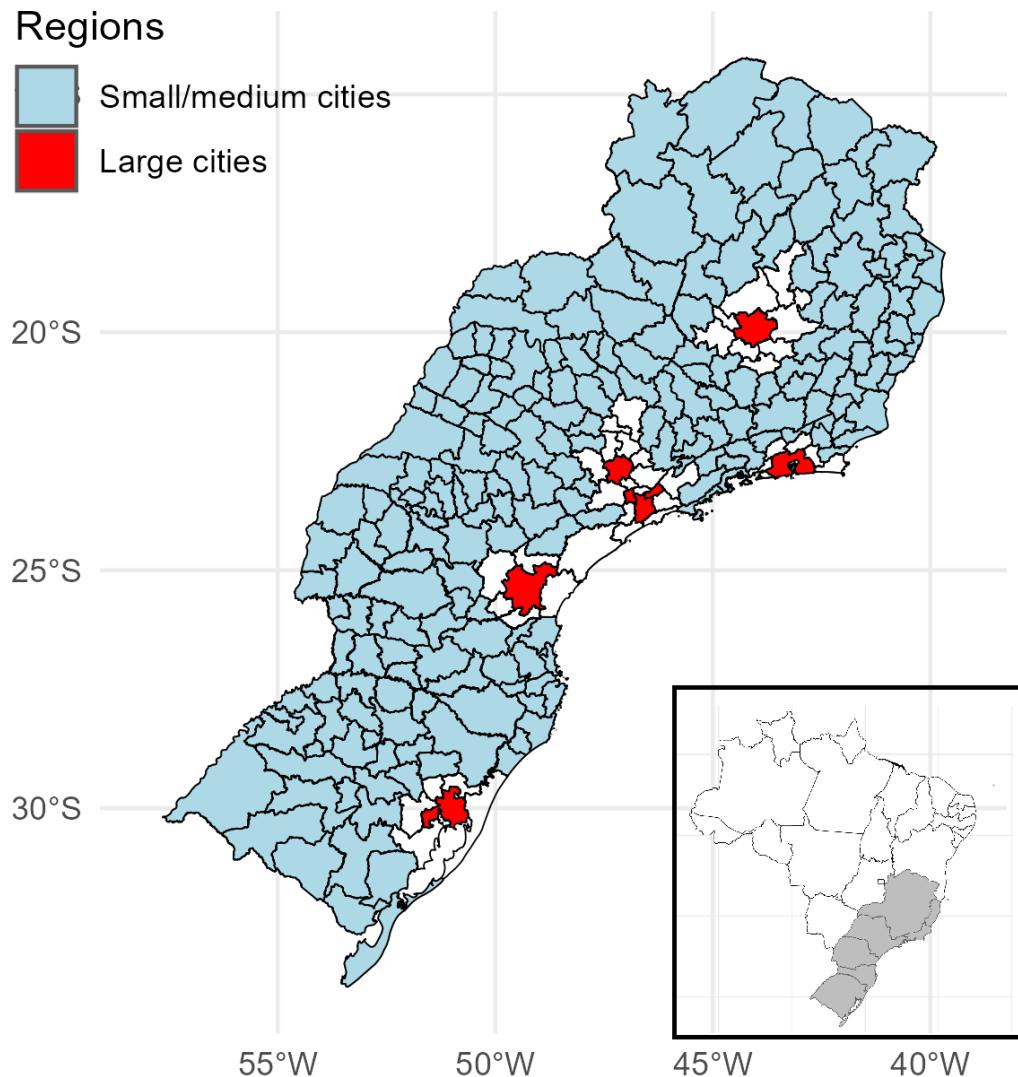


Figure 1: This figure shows the microregions (commuting zones) of Brazil's Southeast and South regions. Large cities (in red) and the estimation (small/medium city) region (in light blue). The microregions that share the same mesoregion as one of the large cities or borders large city (not included in estimation region) are shown in white.

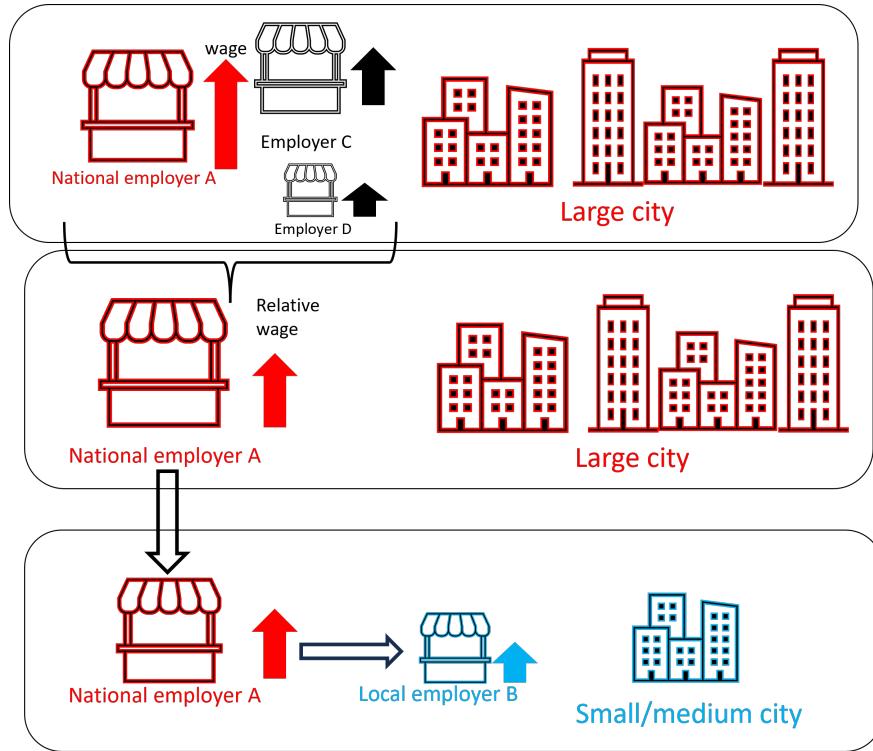


Figure 2: This figure illustrates the identification strategy. In the first step, the wage increases of Employer A are compared with those of other employers in a large city, calculating a relative wage increase that eliminates potential national labor demand shocks. Subsequently, as Employer A's relative wage increase transfers to a medium city, it should reflect changes in A's idiosyncratic labor demand. This allows for the estimation of the spillover effect, unconfounded by local labor market conditions.



Figure 3: This figure plots the event study coefficients from Equation 17. The connected red line represents the estimates when the outcome variable is the shift-share measure of national employers' relative wage for jobs in the large city region,  $\hat{\Omega}_{n,o,m,t}^W$ , as defined by Equation 10. The dashed red line corresponds to the estimates when the outcome variable is the average wage for national employers' jobs from the estimation region,  $w_{n,o,m,t}$ , defined by Equation 13. The model includes fixed effects for job and year-by-occupation. Standard errors are two-way clustered: by job and by labor market.

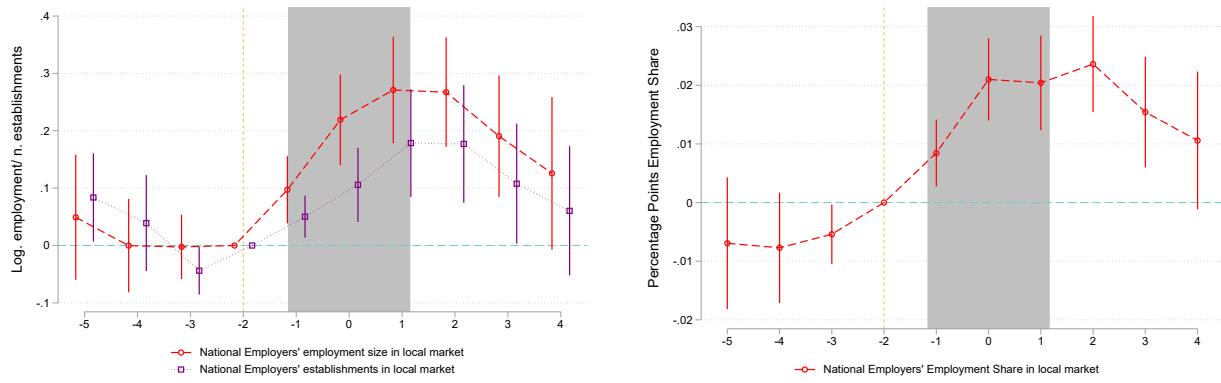


Figure 4: This figure plots the event study coefficients from Equation 17. The left panel shows the estimates when the outcome variable is the national employers' log-employment (red line) and logarithm of the number of establishments (purple dotted line) in the matched labor market. The right panel shows the estimates when the outcome variable is the national employers' employment share in the matched labor market. The model includes fixed effects for job and year-by-occupation. Standard errors are two-way clustered: by job and by labor market.

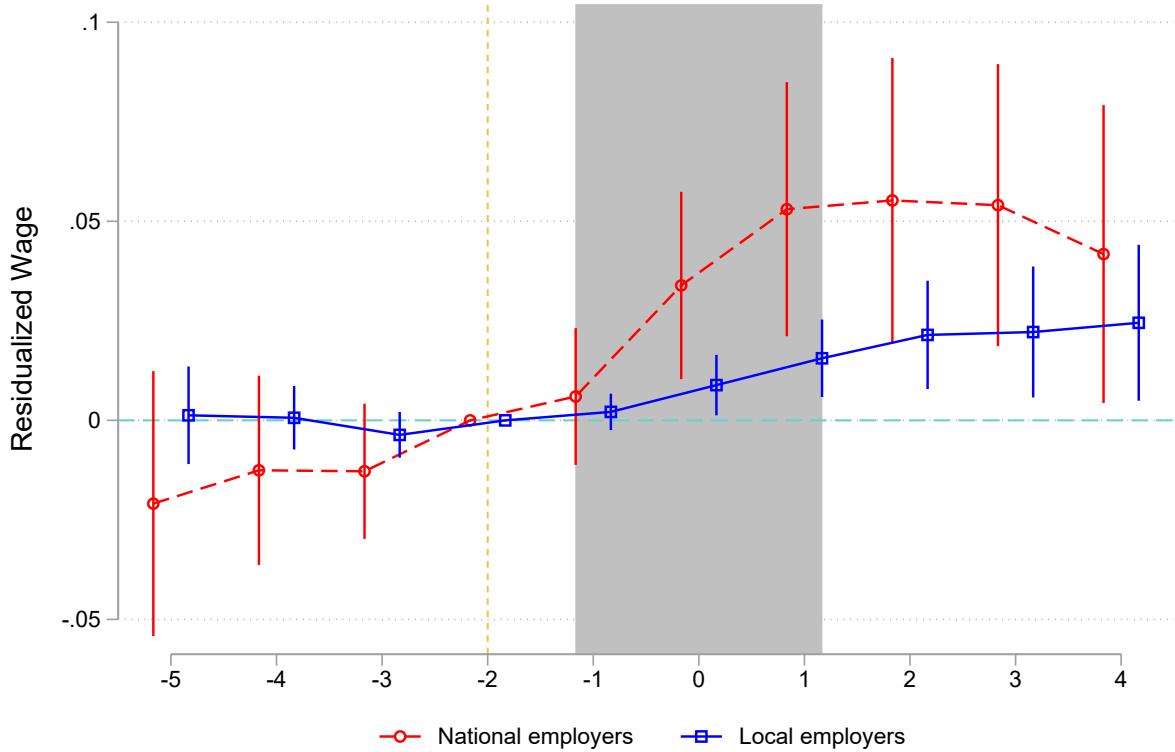


Figure 5: This figure plots the event study coefficients from Equation 17. The dashed red line represents the estimates when the outcome variable is the average wage for national employers' jobs in the matched labor market from the estimation region,  $w_{n,o,m,t}$ , defined by Equation 13. The connected blue line represents the estimates when the outcome variable is the local employer's average residual wage. The model includes fixed effects for job and year-by-occupation. Standard errors are two-way clustered: by job and by labor market.

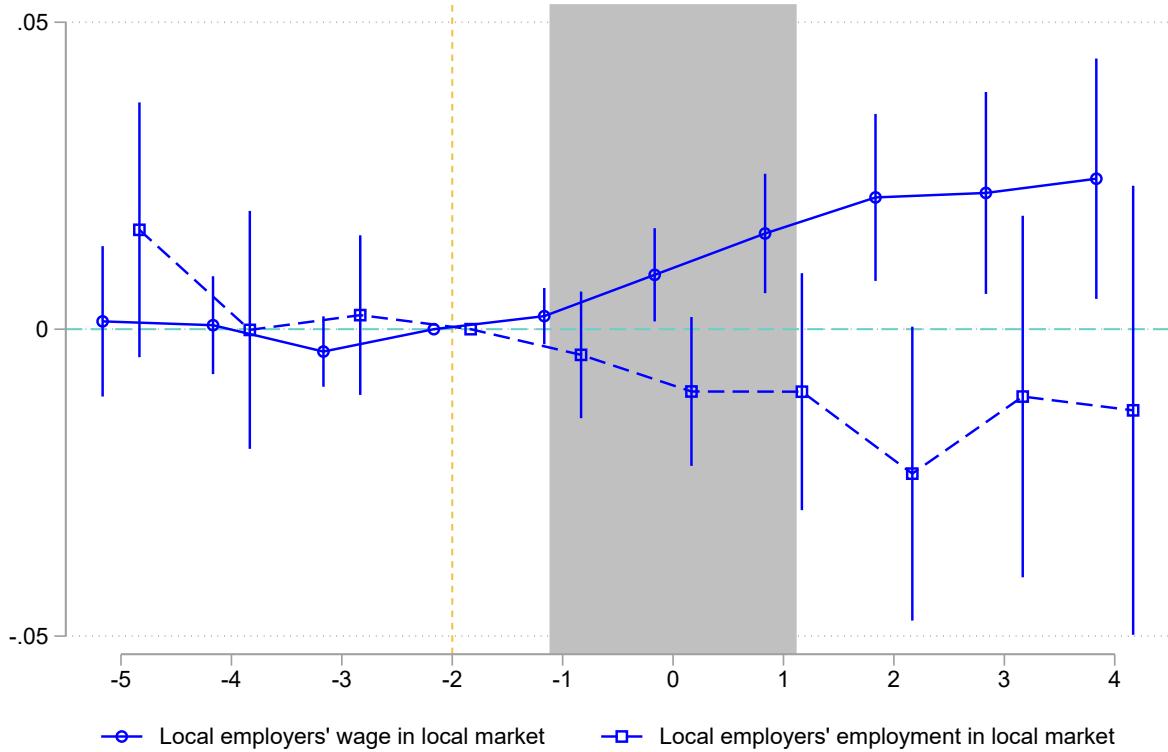


Figure 6: This figure plots the event study coefficients from Equation 17. The connected blue line represents the estimates when the outcome variable is the local employer's job's average residual wage. The dashed blue line represents the estimates when the outcome variable is the local employer's job's log employment. The model includes fixed effects for job and year-by-occupation. Standard errors are two-way clustered: by job and by labor market.

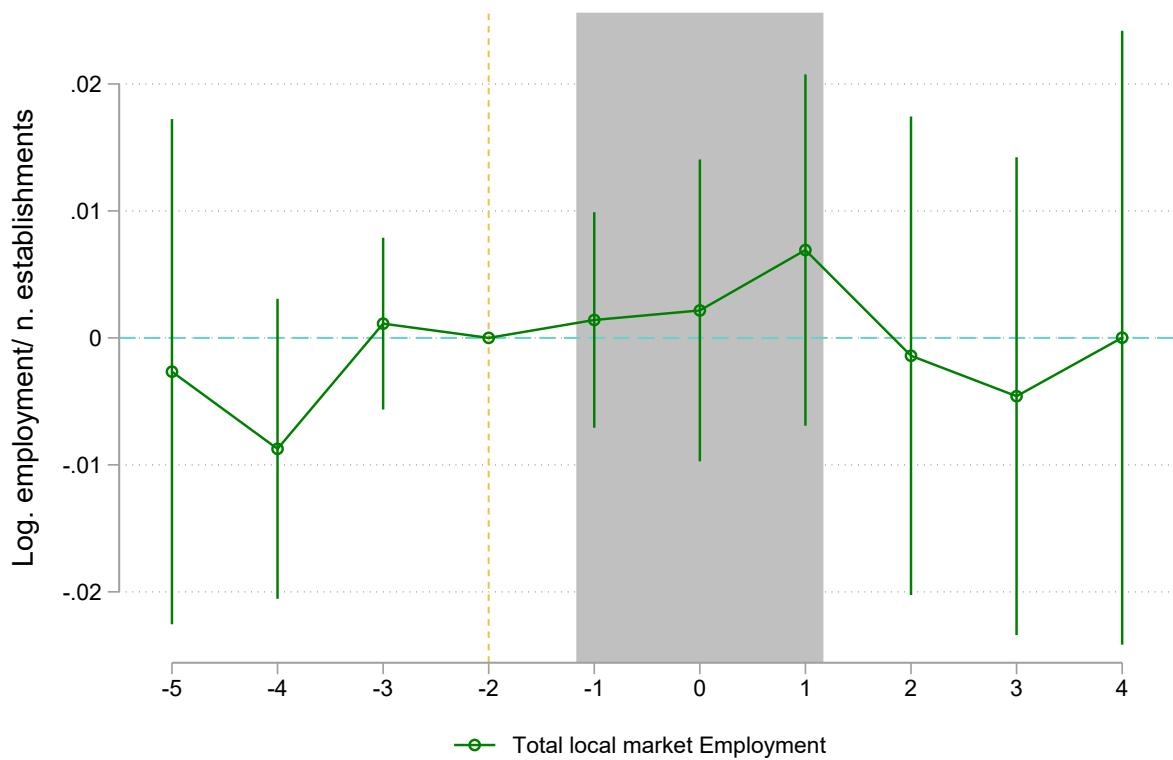


Figure 7: This figure plots the event study coefficients from Equation 17. The connected green line represents the estimates when the outcome variable is the total local labor market log employment. The model includes fixed effects for job and year-by-occupation. Standard errors are two-way clustered: by job and by labor market.

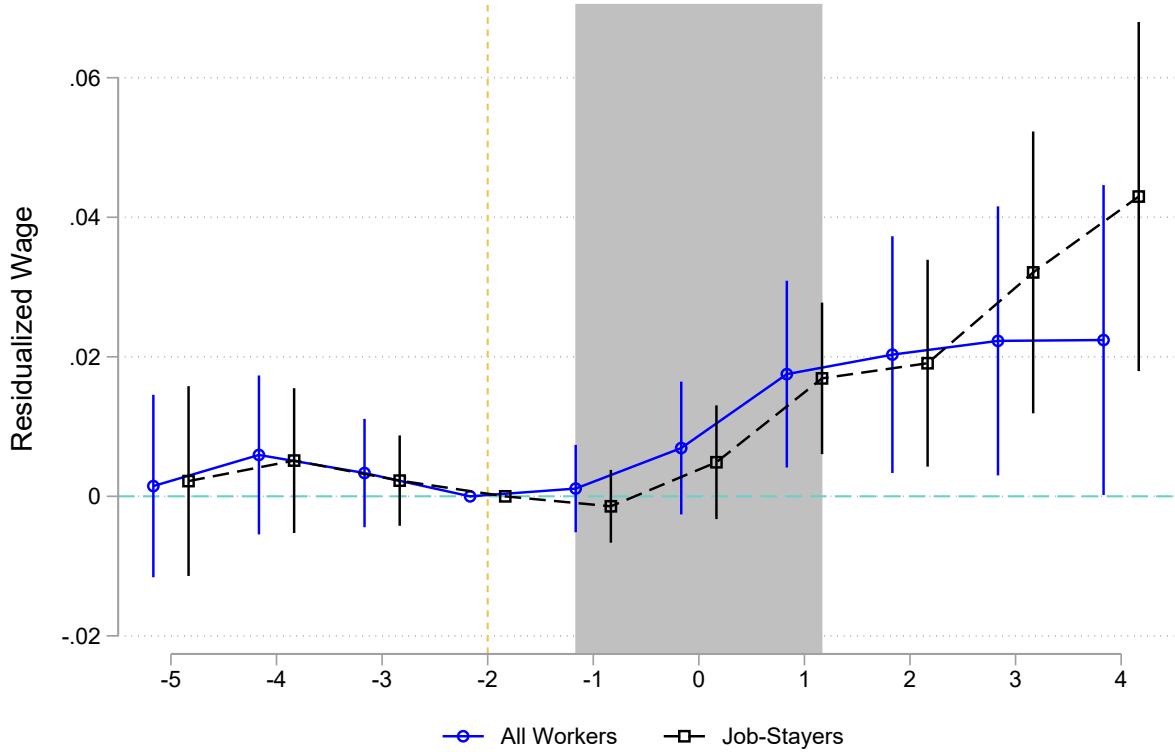


Figure 8: This figure plots the event study coefficients from Equation 18. The connected blue line represents the estimates for the outcome variable, which is the residualized wage of the workers who were employed by the local employer in the baseline period. The connected black line represents the estimates for the outcome variable, which is the residualized wage of the workers who were employed by the local employer in the baseline period and stayed with their employer. The model includes fixed effects for worker and year-by-occupation. Standard errors are two-way clustered: by worker and by labor market.

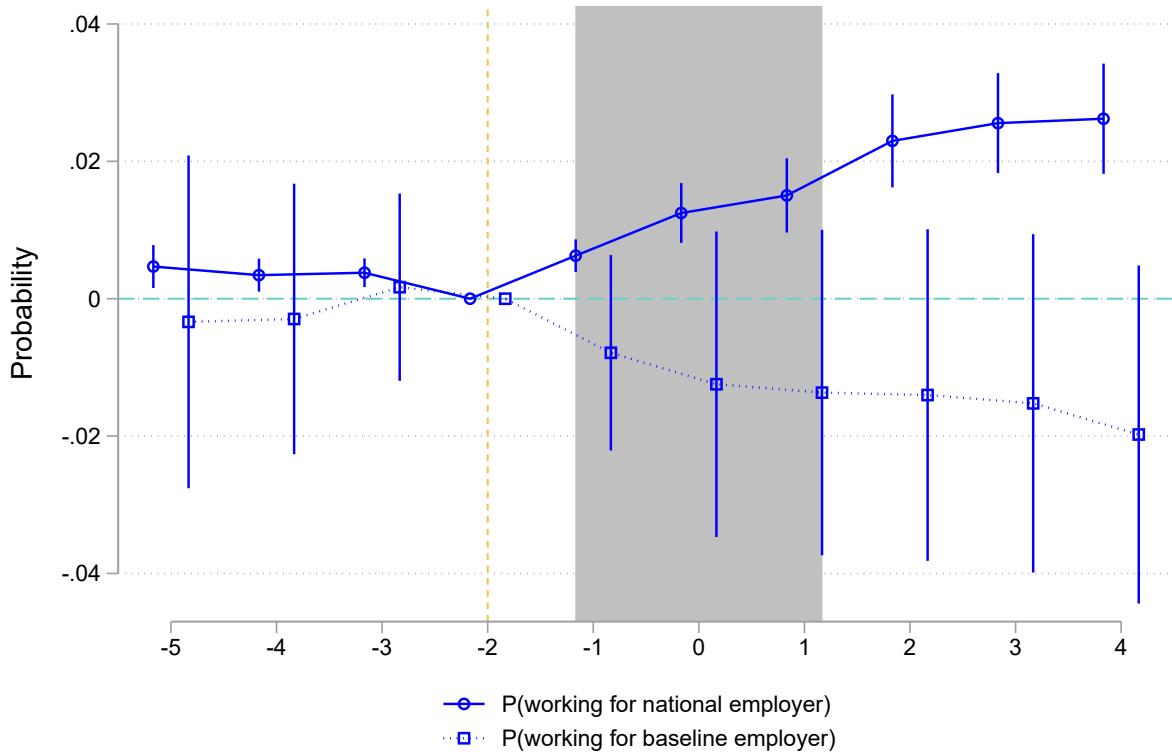


Figure 9: This figure plots the event study coefficients from Equation 18. The connected blue line represents the estimates for the outcome variable, which is the probability of leaving their employer, for workers who were employed by the local employer in the baseline period. The dashed blue line represents the estimates for the outcome variable, which is the probability of working for a national employer, for workers who were employed by the local employer in the baseline period. The model includes fixed effects for worker and year-by-occupation. Standard errors are two-way clustered: by worker and by labor market.

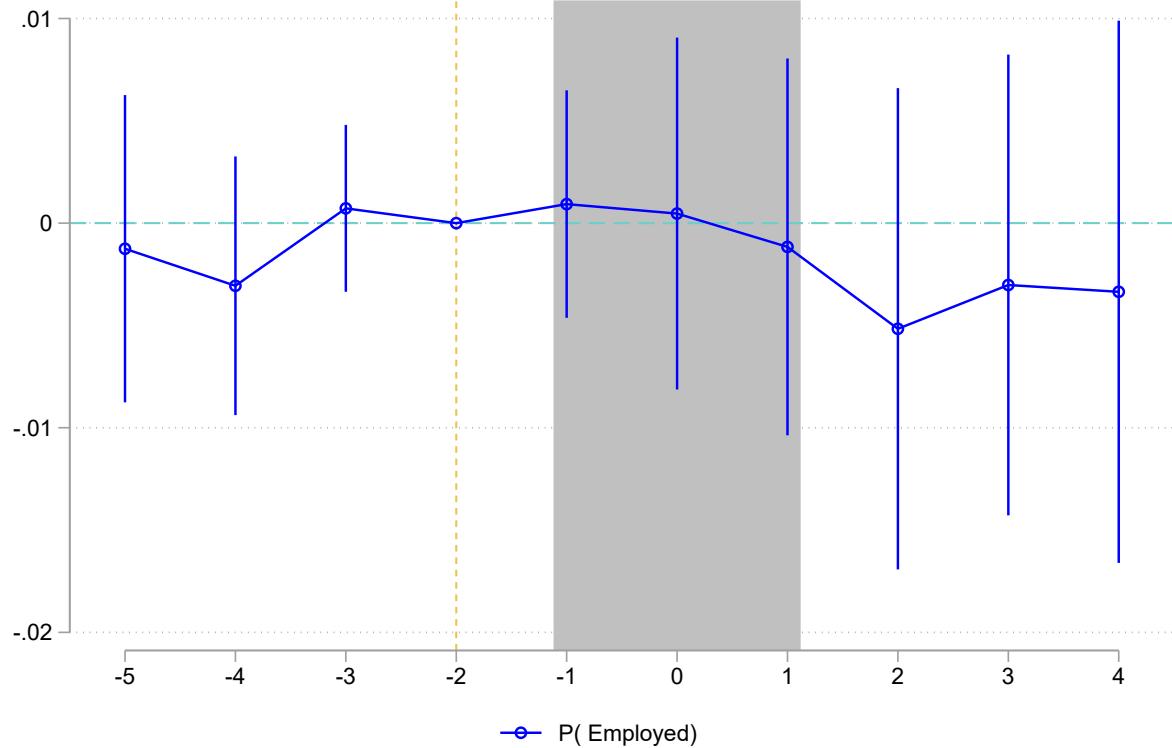


Figure 10: This figure plots the event study coefficients from Equation 18. The outcome variable is the probability of being employed in private sector for workers who were employed by the local employer in the baseline period. The model includes fixed effects for worker and year-by-occupation. Standard errors are two-way clustered: by the worker and by the matched labor market.

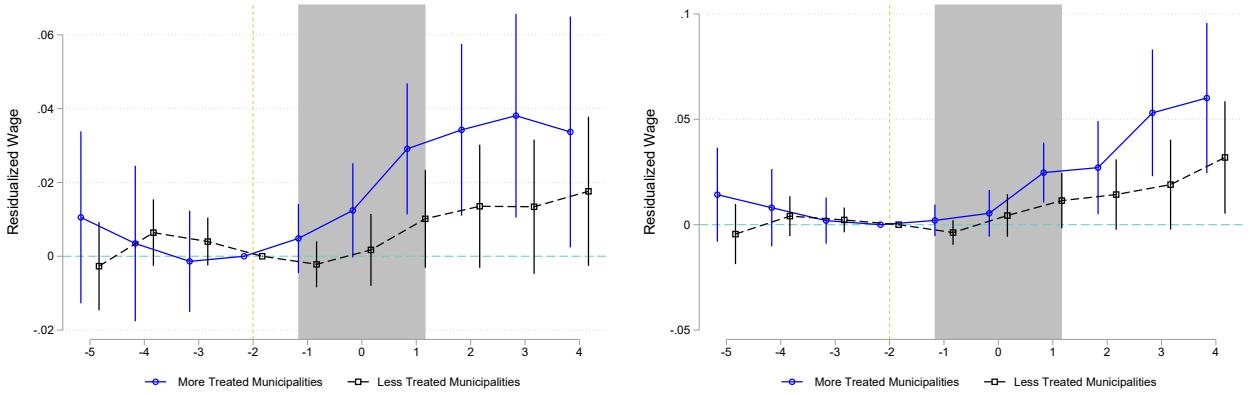


Figure 11: This figure plots the event study coefficients from Equation 18. The left panel displays the coefficients when the outcome variable is the residualized wage of workers employed by the local employer in the baseline period. The right panel displays the coefficients when the outcome variable is the residualized wage of workers who stayed with the baseline local employer. The connected blue line displays coefficients for a subsample of matches where treated workers worked in municipalities with stronger national employers' expansion. The dashed black line displays coefficients for a subsample of matches where treated workers worked in municipalities with weaker national employers' expansion. The model includes fixed effects for worker and year-by-occupation. Standard errors are two-way clustered: by the worker and by the labor market.

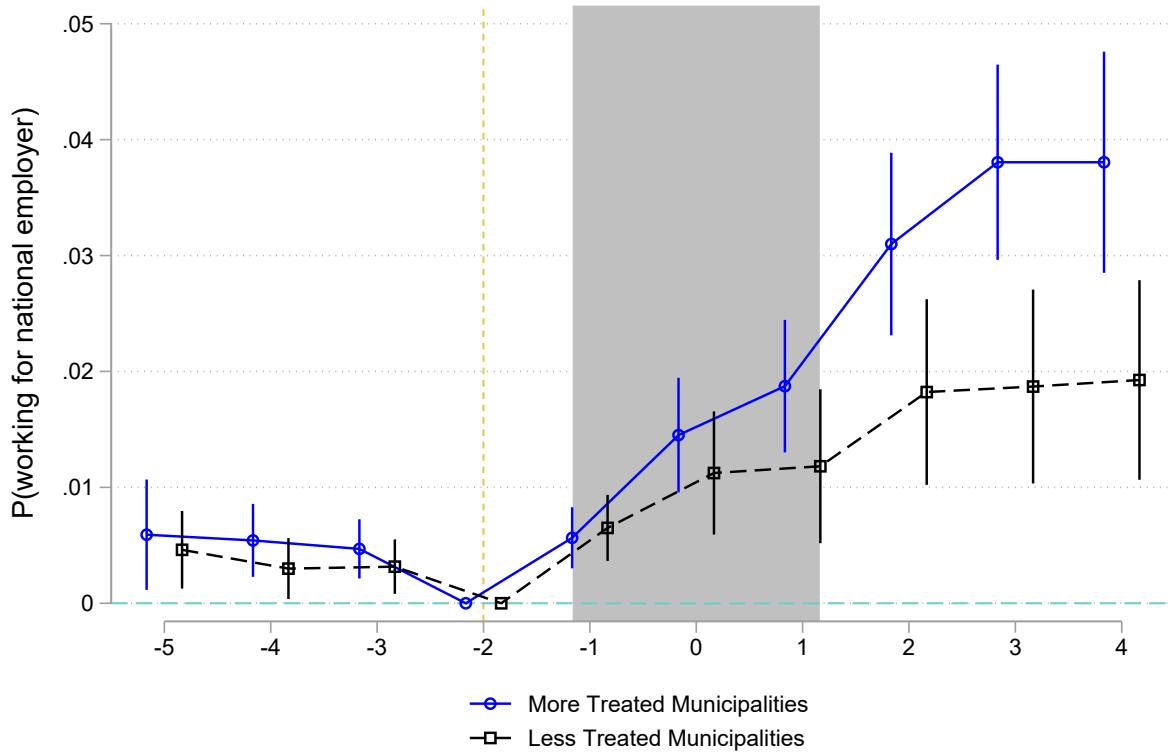


Figure 12: This figure plots the event study coefficients from Equation 18 where the outcome variable is the probability of being employed by national employer for workers employed by the local employer in the baseline period. The connected blue line displays coefficients for a subsample of matches where treated workers worked in municipalities with stronger national employers' expansion. The dashed black line displays coefficients for a subsample of matches where treated workers worked in municipalities with weaker national employers' expansion. The model includes fixed effects for worker and year-by-occupation. Standard errors are two-way clustered: by the worker and by the labor market.

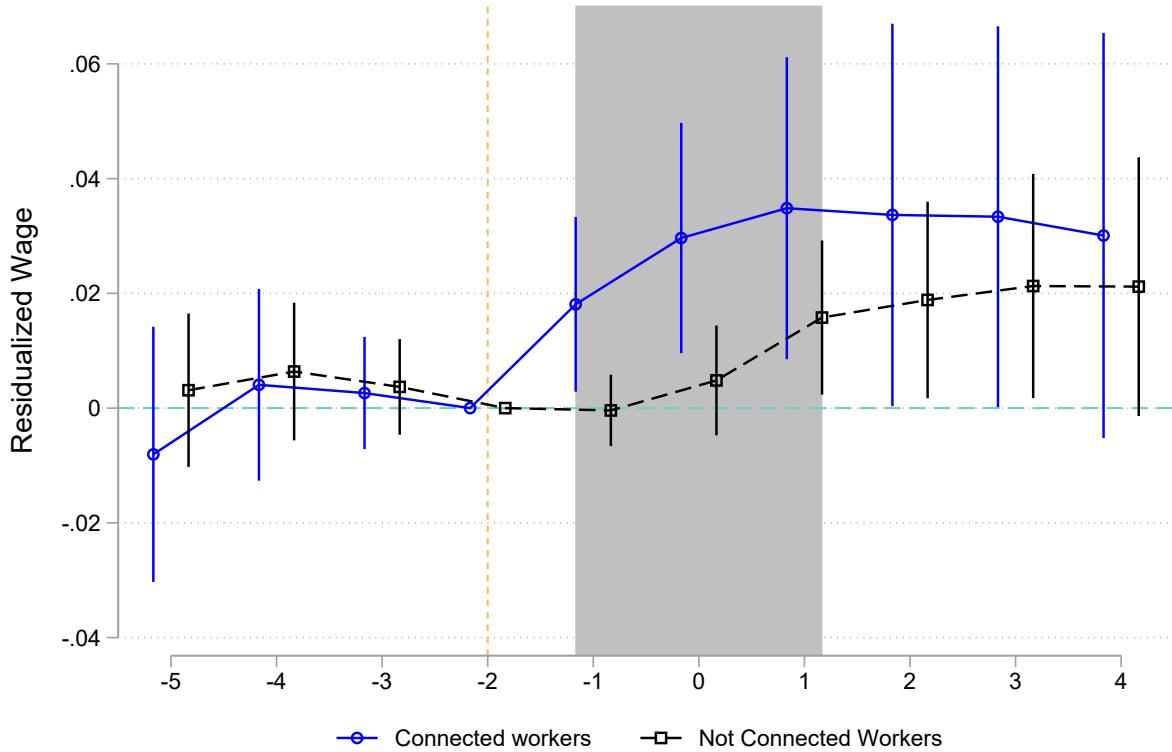


Figure 13: This figure plots the event study coefficients from Equation 18 where the outcome variable is the residualized wage of workers employed by the local employer in the baseline period. The connected blue line displays coefficients for a subsample of matches where treated workers had a co-worker working for a national employer in period 0. The dashed black line displays coefficients for a subsample of matches treated workers without a co-worker working for a national employer in period 0. The model includes fixed effects for worker and year-by-occupation. Standard errors are two-way clustered: by the worker and by the labor market.

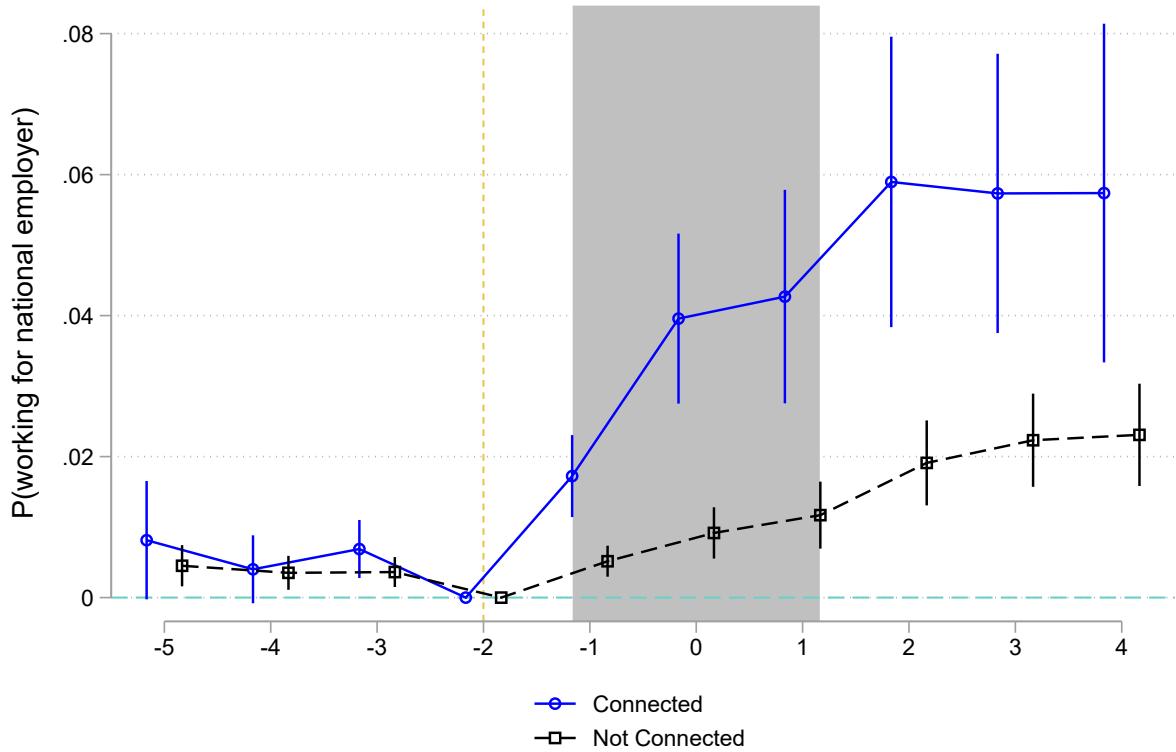


Figure 14: This figure plots the event study coefficients from Equation 18 where the outcome variable is the probability of working for a national employer, for workers who were employed by the local employer in the baseline period. The connected blue line displays coefficients for a subsample of matches where treated workers had a co-worker working for a national employer in period 0. The dashed black line displays coefficients for a subsample of matches treated workers without a co-worker working for a national employer in period 0. The model includes fixed effects for worker and year-by-occupation. Standard errors are two-way clustered: by the worker and by the labor market.

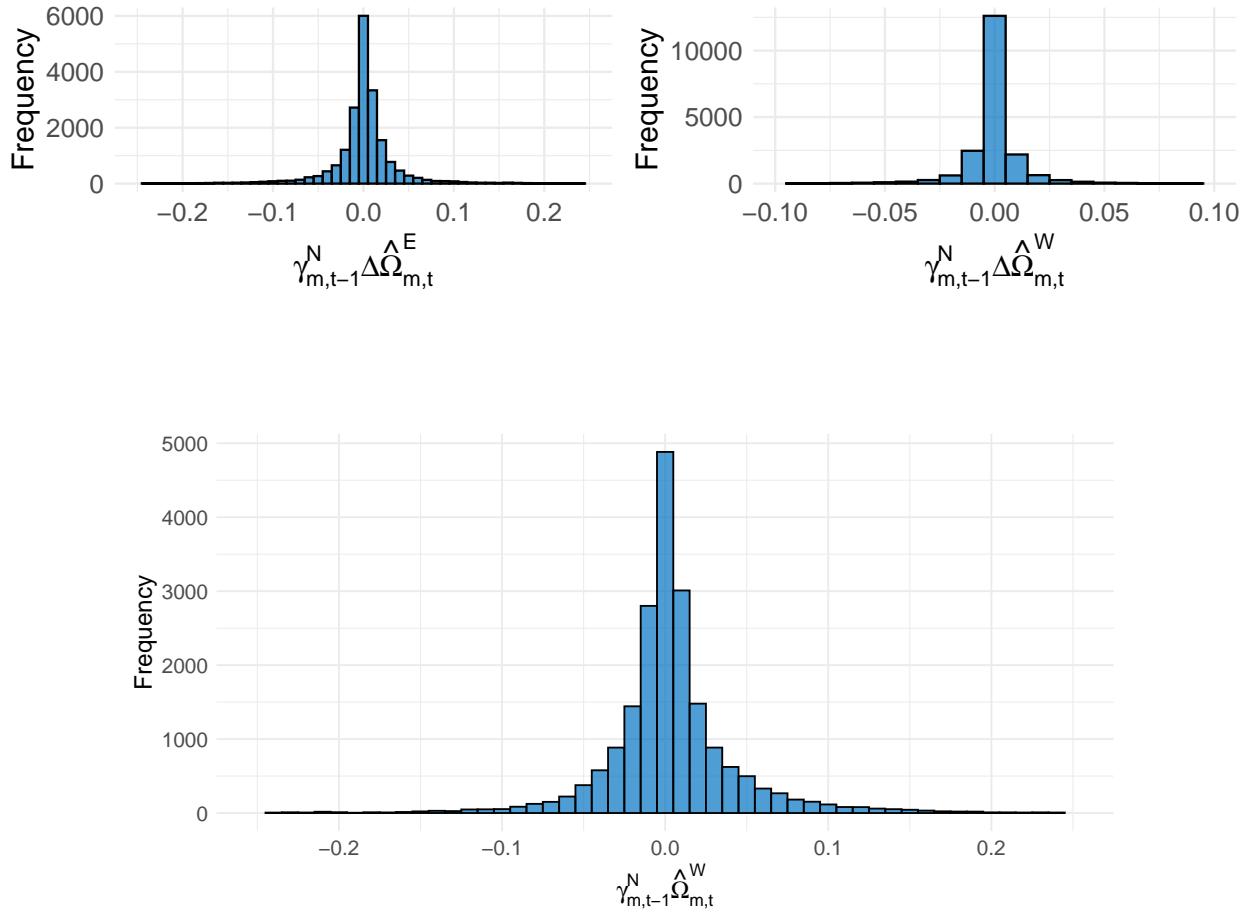


Figure 15: This figure displays the distributions of the shift-share measures for national employers across all labor market (occupation  $\times$  microregion) - year observations within the estimation regionm, weighted by number of workers in the previous year (t-1). The upper-left panel shows the histogram of national employers' wage changes instrument normalized by national employers employment share ( $\gamma_{n,o,m,t-1}^N \Delta \hat{\Omega}_{o,m,t}^W$ , defined in 10), the upper-right panel shows the histogram of national employers' employment changes instrument normalized by national employers employment share ( $\gamma_{n,o,m,t-1}^N \Delta \hat{\Omega}_{o,m,t}^E$ , defined in 12), and the bottom panel displays the histogram of national employers' employment level instrument normalized by national employers employment share ( $\gamma_{n,o,m,t-1}^N \hat{\Omega}_{n,o,m,t}^W$ , defined in 11). Observations restricted to the labor markets with in the previous year, 2.5-70% national employers employment share and more than 50 local employers' workers.

## 9 Tables

	National Employers	Local Employers
Number of locations in estimation region	2.83 (5.21)	1.03 (0.28)
Large cities locations	1.9 (1.62)	0.0
Total Employment in estimation region	103.6 (296.3)	14.57 (37.7)
Total Employment in large cities	278.9 (810.2)	0.0
Average hourly wage in estimation region	16.3 (16.7)	9.22 (6.06)
Residualized hourly wage in estimation region	0.13 (0.34)	-0.01 (0.27)
Number of Employer $\times$ Occupation	7327	253,793
Number of Employer $\times$ Occupation $\times$ year obs.	32,217	616,739

Table 1: This table presents descriptive statistics for firms' employment in the 4-digit occupations in my sample. The first column includes jobs provided by national employers that have establishments in both the large city region and the estimation region within the same occupation. The second column lists jobs provided by local employers that do not have establishments in the large city region. The analysis only includes jobs from labor markets where national employers hold 2.5%-70% employment share and jobs that employ at least five workers in the previous year. Hourly wage in terms of 2018 Brazilian Real. Source: RAIS

Large City Region Variables	Estimation Region Outcomes			
	$\widehat{OOI}_{m,t}^N$	$\Delta \text{Wage}$ $\gamma_{m,t-1} \Delta w_{m,t}^N$	$\Delta \text{Wage}$ $\gamma_{m,t-1} \Delta w_{m,t}^N$	$\Delta \text{Log. Employment}$ $\gamma_{m,t-1}^N \Delta \ln l_{m,t}^N$
$\gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^W$		0.61*** (0.04)	0.60*** (0.04)	-0.18 (0.15)
$\gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^E$		-0.00 (0.01)	-0.00 (0.01)	0.48*** (0.05)
$\gamma_{m,t-1}^N \hat{\Omega}_{m,t}^W$	0.61*** (0.03)	0.62*** (0.03)		0.49*** (0.08)
Observations	9,285	9,285	9,285	9,285
R-squared	0.87	0.87	0.55	0.55
F-stat	261.21	261.31	72.68	108.03
Year × Occupation FE		✓	✓	✓
Labor Market FE		✓	✓	✓
Weighted:			✓	✓

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 2: This table shows the coefficients and associated standard errors from regressions described in Equations 20 and 21.  $OOI_{m,t}^N$  represents the average national employers' wage level in the estimation region multiplied by the national employers' employment share  $\gamma_{m,t-1}^N$ , defined in 13.  $\gamma_{m,t-1}^N \Delta w_{m,t}^N$  represents a three-year change in the measure of national employers' average wage, as defined in Equation 14.  $\gamma_{m,t-1}^N \Delta \ln l_{m,t}^N$  represents a three-year change in the national employers' log-employment measure, as defined in Equation 14.  $\gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^W$ ,  $\gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^E$ , and  $\gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^W$  stand for the shift-share instruments defined in 11, 12, and 10, respectively. All regressions control for national employers employment share. Standard errors are clustered at the labor market level.

	Potentially Treated	Matched Sample	Treated	Control	Difference
Labor market size (local employers)	4,768 (5251)	5,179 (4,706)	5,234 (4,677)	-56 (1,242)	
Job size	14.2 (35)	15.2 (44)	15.0 (44)	0.20 (0.86)	
Average Hourly Log Wage	2.14 (0.40)	2.09 (0.40)	2.10 (0.41)	-0.01 (0.04)	
Average Residualized Hourly Wage	0.00 (0.27)	0.02 (0.30)	0.02 (0.29)	-0.00 (0.03)	
Average Tenure (years)	2.56 (2.39)	2.33 (2.27)	2.36 (2.20)	-0.03 (0.14)	
National Employers' Employment Share	0.08 (0.08)	0.12 (0.07)	0.11 (0.07)	0.01* (0.07)	
National Employers' Residualized Wage	0.14 (0.21)	0.18 (0.18)	0.16 (0.18)	-0.02 (0.04)	
University Education	0.09 45	0.11 0.47	0.11 0.48	0.00 -0.005	
Female					
Number of Observations	377,381	8,138	8,138		

Table 3: This table presents descriptive statistics of the matched job-level sample. The first column show all the potentially treated jobs-year observations. The second column reports the characteristics of the treated jobs, while the third column shows the characteristics of the matched control jobs. The fourth column reports the difference between the treated and control jobs, with standard errors two-way clustered by job and labor market shown in parentheses.

	Potentially Treated	Matched Sample	
	Treated	Control	Difference
Labor market size (local employers)	4,409 (5155)	5,668 (4,630)	5,607 (4,559)
Job size	101.1 (268)	27.8 (51)	27.7 (51) 0.08 (3.76)
Hourly Wage	11.27 (11.07)	10.04 (9.48)	10.12 (8.79) -0.08 (0.54)
Residualized Hourly Wage	0.01 (0.37)	0.03 (0.42)	0.03 (0.42) -0.00 (0.045)
Average Tenure (years)	3.30 (3.2)	3.05 (3.55)	3.03 (3.59) 0.01 (0.15)
National Employers' Employment Share	0.10 (0.10)	0.10 (0.04)	0.09 (0.05) 0.017** (0.007)
National Employers' Residualized Wage	0.15 (0.2)	0.18 (0.16)	0.20 (0.20) -0.02 (0.04)
University Education	0.09 46	0.08 0.50	0.09 0.50 -0.01 0
Female			
Number of Observations	3,093,583	45,403	45,403

Table 4: This table presents descriptive statistics of the matched worker-level sample. The first column show all the potentially treated workers-years observations. The second column reports the characteristics of the treated workers, while the third column shows the characteristics of the matched control workers. The fourth column reports the difference between the treated and control, with standard errors two-way clustered by worker and labor market shown in parentheses. Hourly wage in terms of 2018 Brazilian Real.

	First Stage		Local Employers' Outcomes	
	N.E. Outside option change		$\Delta$ Wage	$\Delta$ Log. Employment
$\gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^W$	0.44*** (0.049)	0.44*** (0.047)		
$\gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^E \times \text{N.E wage}$	0.15* (0.08)	0.15*** (0.066)		
N.E. Outside option change $\Delta \widehat{O\Omega}_{m,t}^N$			0.60*** (0.14)	0.40*** (0.13)
Bartik Ind. Instrument	0.002 (0.005)	-0.003 (0.005)	0.000 (0.008)	0.003 (0.01)
Observations	126,687	126,687	126,687	126,687
R-squared	0.41	0.52		
Year $\times$ Occupation FE	✓	✓	✓	✓
Year $\times$ State FE		✓	✓	✓
Year $\times$ Micro-region FE		✓	✓	✓

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 5: This table shows the coefficients and associated standard errors from regressions described in Equation 19.  $\Delta$  N.E. wage represents a three-year change in the measure of national employers' average log-wage, as defined in Equation 14.  $\gamma_{n,o,m,t-1} \Delta \hat{\Omega}_{n,o,m,t-1}^W$ ,  $\gamma_{n,o,m,t-1} \Delta \hat{\Omega}_{n,o,m,t-1}^W$ , stand for the shift-share instruments defined in 11 and 12, respectively. All regressions control for national employers employment share and average wage of national employers in period  $t - 1$ . Standard errors two-way clustered by job and labor market shown in parentheses.

## A Details on steady state linear approximation

The steady-state equilibrium is represented by a system of equations 22–28 for each local firm’s wages and employment, taking the national employers’ wages and vacancy postings as given <sup>18</sup>:

$$w_{j,o,m} = A_1 y_o + A_2(\text{ER}_{o,m}) b_{o,m} + A_3(\text{ER}_{o,m}) \left( \gamma_{n,o,m} w_{n,o,m} + \sum \gamma_{j,o,m} w_{j,o,m} \right) \quad (22)$$

$$+ A_1(\epsilon_{o,m} + \varepsilon_{j,o,m}) \quad (23)$$

$$\frac{\delta}{p_{o,m,t}} l_{j,o,m} = V_{j,o,m} = \tilde{\rho}_1 \frac{q_{o,m}}{c} (y_o + \epsilon_{o,m} + \varepsilon_{j,o,m} - w_{j,o,m}) \quad (24)$$

$$p_{o,m,t} = \frac{\delta \text{ER}_{o,m}}{1 - \text{ER}_{o,m}} \quad (25)$$

$$q_{o,m,t} = \left( \frac{1 - \text{ER}_{o,m}}{\delta \text{ER}_{o,m}} \right)^{\frac{\sigma}{1-\sigma}} \quad (26)$$

$$\text{ER}_{o,m} = \frac{\sum l_{j,o,m} + l_{n,o,m}}{L_{o,m}} = \frac{E_{o,m}}{L_{o,m}} \quad (27)$$

$$\gamma_{j,o,m} = \frac{V_{j,o,m}}{V_{n,o,m} + \sum V_{j,o,m}} \quad (28)$$

Wage and vacancies of each local employer are the same up to zero-sum  $\varepsilon_{j,o,m}$  (as I assume that all local employers are small). Hence, first two equations can be transformed to expression:

$$w_{j,o,m} = \frac{A_1}{1 - (1 - A_3(\text{ER}_{o,m})\gamma_{n,o,m})} y_o + \frac{A_2(\text{ER}_{o,m})}{1 - (1 - A_3(\text{ER}_{o,m})\gamma_{n,o,m})} b_{o,m} + \quad (29)$$

$$+ \frac{A_3(\text{ER}_{o,m})}{1 - (1 - A_3(\text{ER}_{o,m})\gamma_{n,o,m})} \gamma_{n,o,m} w_{n,o,m} + \frac{A_1((2 - \gamma_{n,o,m})\epsilon_{o,m} + \varepsilon_{j,o,m})}{1 - (1 - A_3(\text{ER}_{o,m})\gamma_{n,o,m})}$$

$$l_{j,o,m} = \frac{p_{o,m,t}}{\delta} \tilde{\rho}_1 \frac{q_{o,m}}{c} (y_o + \epsilon_{o,m} + \varepsilon_{j,o,m} - w_{j,o,m}) \quad (30)$$

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<sup>18</sup>Where:  $\tilde{\rho}_1 = \frac{1}{1-\rho(1-\delta)}$ ,  $\tilde{\rho}_2(\text{ER}_{o,m}) = \frac{1}{1-\rho(1-p_{o,m})}$ ,  $A_1 = \kappa \tilde{\rho}_1$ ,  $A_2 = (1-\kappa)(1-\rho \tilde{\rho}_1) \frac{\tilde{\rho}_2(\text{ER}_{o,m})}{1-\rho^2 \delta p_{o,m} \tilde{\rho}_1 \tilde{\rho}_2(\text{ER}_{o,m})}$  and  $A_3 = \rho p_{o,m} \tilde{\rho}_1 A_2$ . By  $E_{o,m}$  I denote the total employment.

Therefore, local employers wage and employment is defined by set of variables

$$\mathbf{x} = (E_{o,m}, L_{o,m}, \gamma_{n,o,m} w_{n,o,m}, y_o, \gamma_{n,o,m}, b_{o,m}, \epsilon_{o,m}, \varepsilon_{j,o,m}).$$

To examine the first order effects, I take a linear approximation of equations 5–6 around the point  $\mathbf{x}_0 = (E, L, \gamma_n w_n, y, \gamma_n, b, 0, 0)$ , that is the point where each local employers exists in the market in the labor market with the same employment rate, national employer having the same wage and employment share and  $\epsilon_{o,m} = \varepsilon_{j,o,m} = 0$ . To account for first-order effects, I follow Tschopp (2017) and take the first order log-linear approximation of  $\ln w(\mathbf{x}) \approx (\mathbf{x}_0) + \nabla \ln w(\mathbf{x}_0)(\mathbf{x} - \mathbf{x}_0)$  and  $\ln l(\mathbf{x}) = \ln l(\mathbf{x}_0) + \nabla \ln l(\mathbf{x}_0)(\mathbf{x} - \mathbf{x}_0)$ .

$$\nabla \ln w(\mathbf{x}_0) = \frac{1}{w(\mathbf{x}_0)} \times \left( \begin{array}{c} \frac{\left[ A'_2(\text{ER})A_3(\text{ER}) + A'_3(\text{ER})A_3(\text{ER}) - A'_3(\text{ER})(y + A_2(\text{ER} + A_3(\text{ER})) \right]}{\gamma_n A_3^2(\text{ER})} \frac{\partial \text{ER}}{\partial E} \\ \frac{\left[ A'_2(\text{ER})A_3(\text{ER}) + A'_3(\text{ER})A_3(\text{ER}) - A'_3(\text{ER})(y_0 + A_2(\text{ER} + A_3(\text{ER})) \right]}{\gamma_n A_3^2(\text{ER})} \frac{\partial \text{ER}}{\partial L} \\ \frac{A_3(\text{ER})}{1 - (1 - A_3(\text{ER}))\gamma_n} \\ \frac{A_1}{1 - (1 - A_3(\text{ER}))\gamma_n} \\ - \frac{A'_3(\text{ER})}{A_3^2(\text{ER})} (y_0 + A_2(\text{ER} + A_3(\text{ER})) \\ \frac{A_2(\text{ER})}{1 - (1 - A_3(\text{ER}))\gamma_n} - \\ \frac{A_1(2 - \gamma_n)}{1 - (1 - A_3(\text{ER}))\gamma_n} \\ \frac{A_1}{1 - (1 - A_3(\text{ER}))\gamma_n} \end{array} \right)$$

Then the steady state wage for labor market with values  $\mathbf{x}$  is:

$$\begin{aligned} \ln w(\mathbf{x}) &\approx \ln w(\mathbf{x}_0) + \alpha_1 ((y_o - y) + (2 - \gamma_n)\epsilon_{o,m} + \varepsilon_{j,o,m}) + \alpha_{2,E}(E_{o,m} - E) + \alpha_{2,L}(L_{o,m} - L) \\ &+ \alpha_3 (\gamma_{n,o,m} w_{n,o,m} - \gamma_n w_n) + \alpha_4 (\gamma_{n,o,m} - \gamma_n) + \alpha_5 (b_o - b) \\ &= \alpha_0 + \alpha_1 (y_o + \epsilon_{o,m} + \varepsilon_{j,o,m}) + \alpha_{2,E}E_{o,m} + \alpha_3 \gamma_{n,o,m} w_{n,o,m} + \alpha_4 \gamma_{n,o,m} + \alpha_5 b_o + \alpha_{2,L}L_{o,m} \end{aligned}$$

Where:

$$\begin{aligned}
\alpha_0 &= \ln w(\mathbf{x}_0) - \alpha_1 y - \alpha_{2,E} E - \alpha_{2,L} L - \alpha_3 \gamma_n w_n - \alpha_4 \gamma_n - \alpha_5 b \\
\alpha_1 &= \frac{1}{w(\mathbf{x}_0)} \frac{A_1}{1 - (1 - A_3(\text{ER}))\gamma_n} \\
\alpha_{2,E} &= \frac{1}{w(\mathbf{x}_0)} \frac{\left[ A'_2(\text{ER})A_3(\text{ER}) + A'_3(\text{ER})A_3(\text{ER}) - A'_3(\text{ER})(y_0 + A_2(\text{ER} + A_3(\text{ER}))) \right]}{\gamma_n A_3^2(\text{ER})} \frac{\partial \text{ER}}{\partial E} \\
\alpha_{2,L} &= \frac{1}{w(\mathbf{x}_0)} \frac{\left[ A'_2(\text{ER})A_3(\text{ER}) + A'_3(\text{ER})A_3(\text{ER}) - A'_3(\text{ER})(y_0 + A_2(\text{ER} + A_3(\text{ER}))) \right]}{\gamma_n A_3^2(\text{ER})} \frac{\partial \text{ER}}{\partial L} \\
\alpha_3 &= \frac{1}{w(\mathbf{x}_0)} \frac{A_3(\text{ER})}{1 - (1 - A_3(\text{ER}))\gamma_n} \\
\alpha_4 &= -\frac{1}{w(\mathbf{x}_0)} \frac{A'_3(\text{ER})}{A_3^2(\text{ER})} (y_0 + A_2(\text{ER} + A_3(\text{ER}))) \\
\alpha_5 &= \frac{1}{w(\mathbf{x}_0)} \frac{A_2(\text{ER})}{1 - (1 - A_3(\text{ER}))\gamma_n}
\end{aligned}$$

The term  $\alpha_4 \gamma_{n,o,m}$  in the above equation governs strength of changes of the "feedback effect", that is the larger is the share of local employers, the stronger they react to each others wages, increasing each other outside option. This effect is a consequence of the assumption of the national employers first-mover advantage and national employers wage posting. In practice, it is likely to be negligible so I drop<sup>19</sup> it from the main specification 3–4. Similarly, I assume that unemployment benefit evolves along the  $y_o$  so i also drop it from the main specification. Lastly, I consider the rather medium time changes (3-6 years) for the shock effects. Therefore, I assume that population of labor market workers does not change.

Taking the difference operator  $\Delta$  between two steady states, when the labor market experienced differences in  $\Delta y_o, \Delta \gamma_{n,o,m}, \Delta \ln w_{n,o,m}, \Delta E_{o,m}$  and  $\Delta \epsilon_{o,m}$  and local employer  $\Delta \varepsilon_{j,o,m}$ , I receive:

---

<sup>19</sup>I can add it for controls later.

$$\begin{aligned}\Delta \ln w_{j,o,m} = & \alpha_1 \Delta y_o + \alpha_{2,E} \Delta E_{o,m} + \alpha_3 (\Delta \gamma_{n,o,m} w_{n,o,m} + \gamma_{n,o,m} \Delta w_{n,o,m}) \\ & + \alpha_1 ((2 - \gamma_n) \Delta \epsilon_{o,m} + \Delta \varepsilon_{j,o,m})\end{aligned}$$

In the same way, (using the previous approximation for  $\Delta \ln w_{j,o,m}$ ), I receive that:

$$\begin{aligned}\Delta \ln l_{j,o,m} = & \beta_1 \Delta y_o + \beta_{2,E} \Delta E_{o,m} + \beta_3 (\Delta \gamma_{n,o,m} w_{n,o,m} + \gamma_{n,o,m} \Delta w_{n,o,m}) \\ & + \beta_1 ((2 - \gamma_n) \Delta \epsilon_{o,m} + \Delta \varepsilon_{j,o,m})\end{aligned}$$

## B Additional Results on national wage and employment setting

Figure 15 shows that while the wage-level instruments  $\gamma_{n,o,m,t-1} \hat{\Omega}_{n,o,m,t}^W$  exhibit relatively large variation, the wage and employment change shift-share instruments  $\gamma_{n,o,m,t-1} \Delta \hat{\Omega}_{n,o,m,t}^W$  and  $\gamma_{n,o,m,t-1} \Delta \hat{\Omega}_{n,o,m,t}^E$  are concentrated near zero; only 10% of observed  $\gamma_{n,o,m,t-1} \Delta \hat{\Omega}_{n,o,m,t}^W$  are greater than 0.005.

In this paper, I particularly study periods of national employers' expansions—times when they significantly increased their wages and employment across different regions. Figure C.8 displays binscatter plots of the national employers' wages and employment in the estimation region during major changes in national employers' wage policies in large cities, specifically when  $\gamma_{n,o,m,t-1} \Delta \hat{\Omega}_{n,o,m,t}^W > 0.005$  and  $\gamma_{n,o,m,t-1} \Delta \hat{\Omega}_{n,o,m,t}^E > 0.0$  (constituting about 3.2% of all observations). In such cases, the national employers' wage levels and employment increase significantly in the estimation region, demonstrating that large, positive instrument changes are good predictors of national employers' nationwide expansions.

### B.0.1 Discussion

The identification method described faces two significant threats. The primary concern is the direction of the observed co-movements of wages and employment among national employers in the estimation region. For instance, a local productivity shock in the estimation region could influence the wage policies of national employers operating in major cities. Such movements have been documented by [Giroud and Mueller \(2019\)](#). To mitigate this concern, I limit the analysis to local labor markets that are not too close to large cities.

The secondary threat involves the potential oversight of industry-level shocks when focusing solely on eliminating national occupation-level shocks. It is possible that the observed increases in wages and employment by national employers were responses to a national-level demand surge in their industries rather than the result of idiosyncratic changes in labor demand. To address this concern, I rerun regressions for occupations in relatively non-tradable industries such as retail, services, and administrative roles (CBO occupation groups 4 and 5). The pass-through observed was similar to that in the comprehensive occupational analysis, as shown in columns (2) and (4) of Table [6](#).

My approach builds on the findings of [Hazell et al. \(2021\)](#) regarding national wage-setting in the U.S. Echoing their results, I observe significant co-movement in wages set by the same employers across different locations. Additionally, my method for constructing instruments for employment changes aligns with the approach used by [Schubert et al. \(2021\)](#), which is based on hiring variations among multi-establishment employers. The results indicate that, similar to the United States, national employers in Brazil also tend to determine wages and employment at a national level. This finding marks the first time such a pattern has been documented using administrative data outside the U.S., suggesting that it may be a general characteristic of multi-establishment firms.

## C Appendix Figures

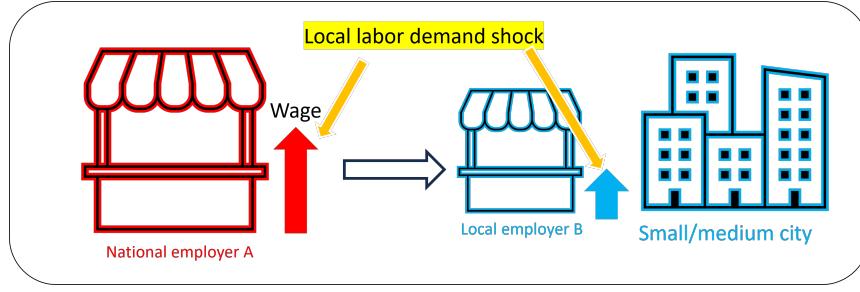


Figure C.1: This figure illustrates the possible identification problem in the spillover identification. Wage increases of both local and national employers are influenced by the local labor demand shock, which confounds the spillover effect.

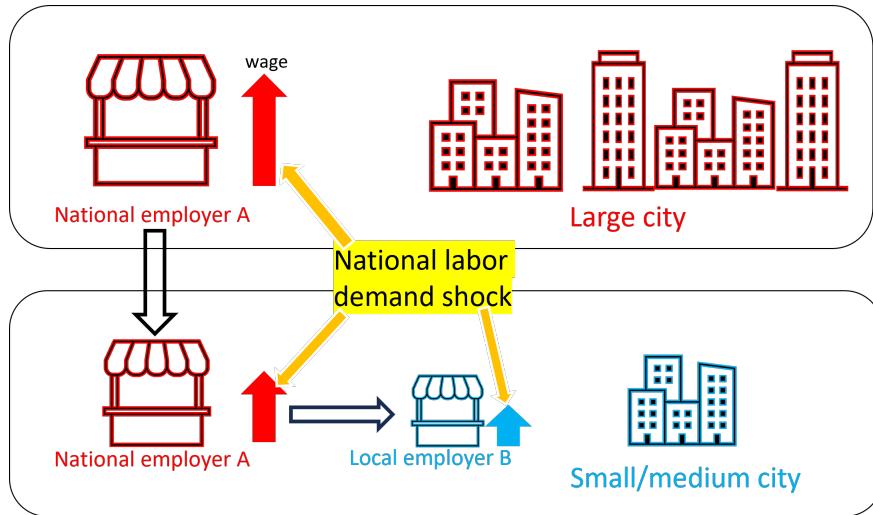


Figure C.2: This figure illustrates the possible identification problem in the spillover identification after eliminating the local employment labor demand shocks. Wage increases of both local and national employers are influenced by the national labor demand shock, which confounds the spillover effect.

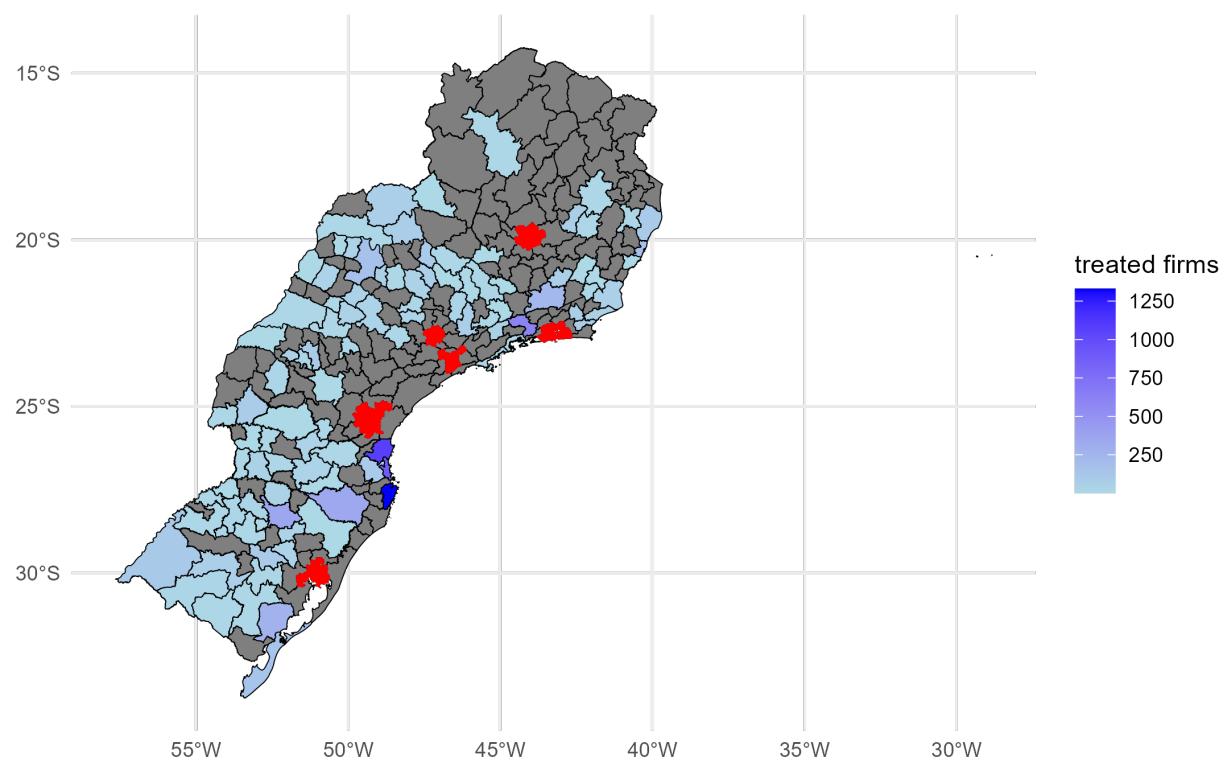


Figure C.3: This figure shows the matched treated jobs by microregions (commuting zones) of Brazil's Southeast and South regions. The red color depicts the large city region. The microregions in gray have no matched treated jobs.

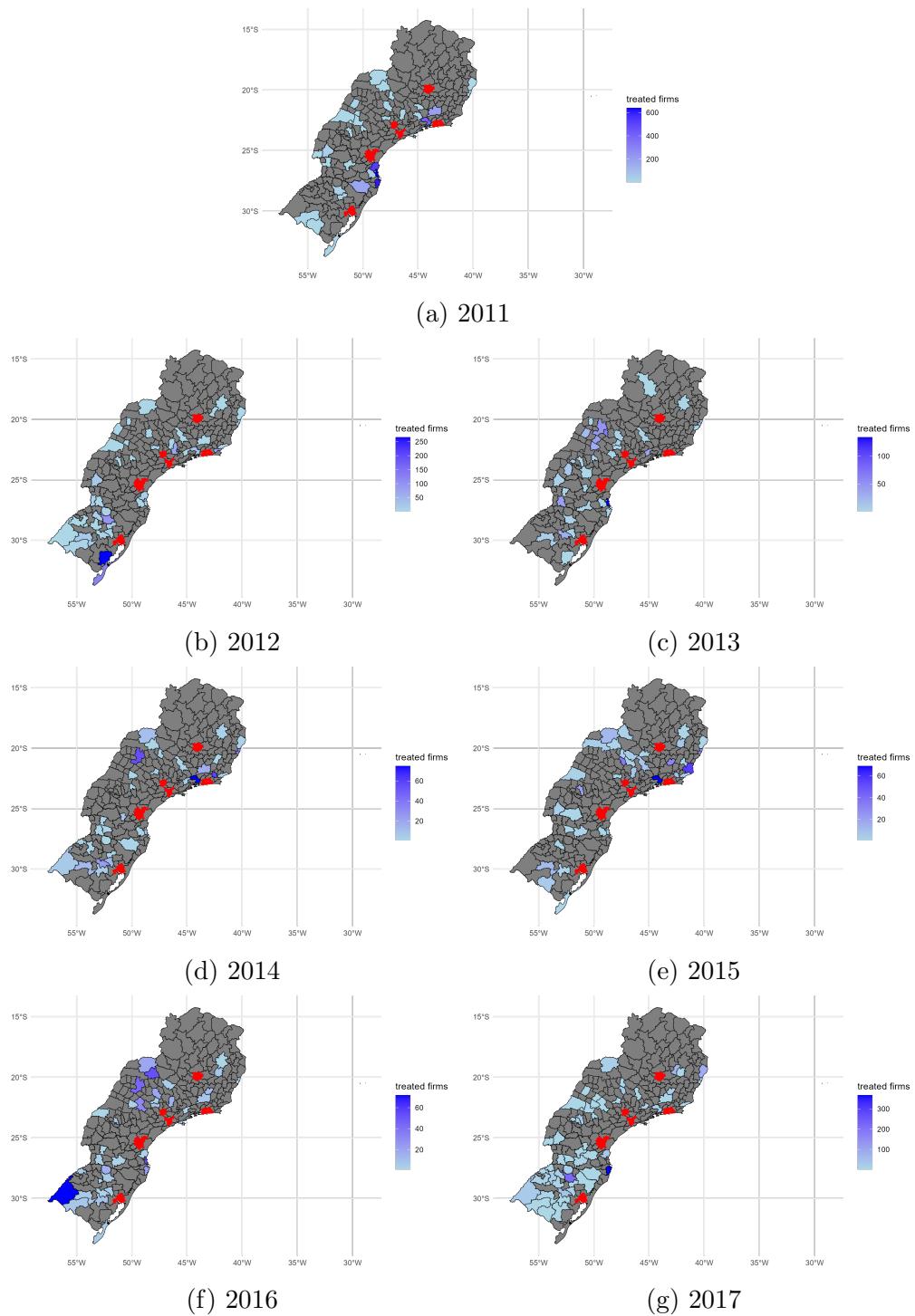


Figure C.4: This figure shows the number of matched treated jobs by microregions (commuting zones) of Brazil's Southeast and South regions by year of the event. The red color depicts the large city region. The microregions in gray have no matched treated jobs.

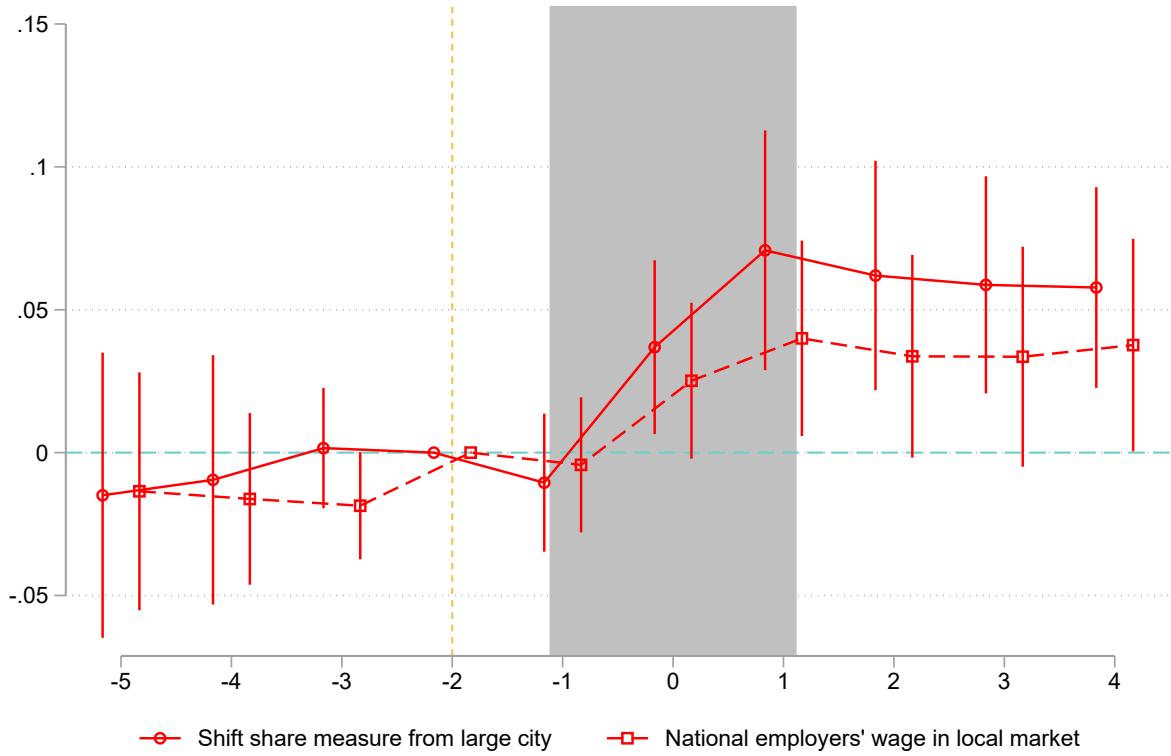


Figure C.5: This figure plots the event study coefficients from Equation 18. The connected red line represents the estimates when the outcome variable is the shift-share measure of national employers' relative wage for jobs in the large city region,  $\hat{\Omega}_{n,o,m,t}^W$ , as defined by Equation 10. The dashed red line corresponds to the estimates when the outcome variable is the average wage for national employers' jobs from the estimation region,  $w_{n,o,m,t}$ , defined by Equation 13. The model includes fixed effects for job and year-by-occupation. Standard errors are two-way clustered: by job and by labor market.

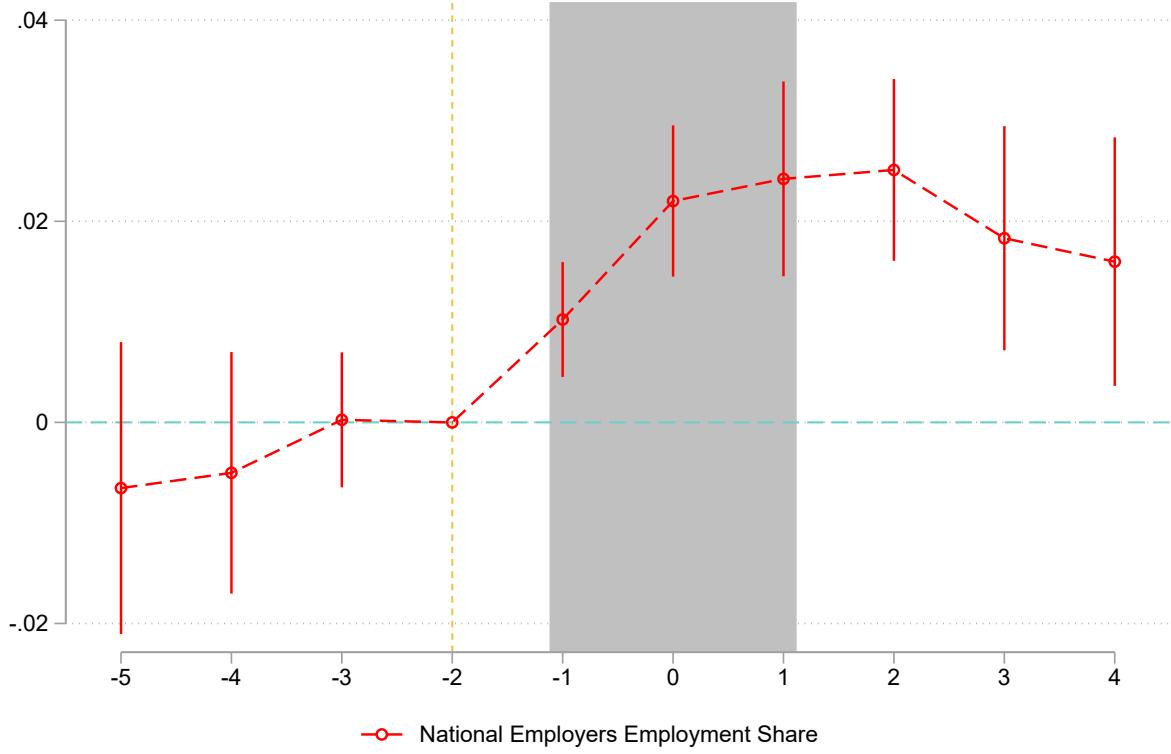


Figure C.6: This figure plots the event study coefficients from Equation 18. The dashed right line shows the estimates when the outcome variable is the national employers' employment share in the matched labor market. The model includes fixed effects for job and year-by-occupation. Standard errors are two-way clustered: by job and by labor market.

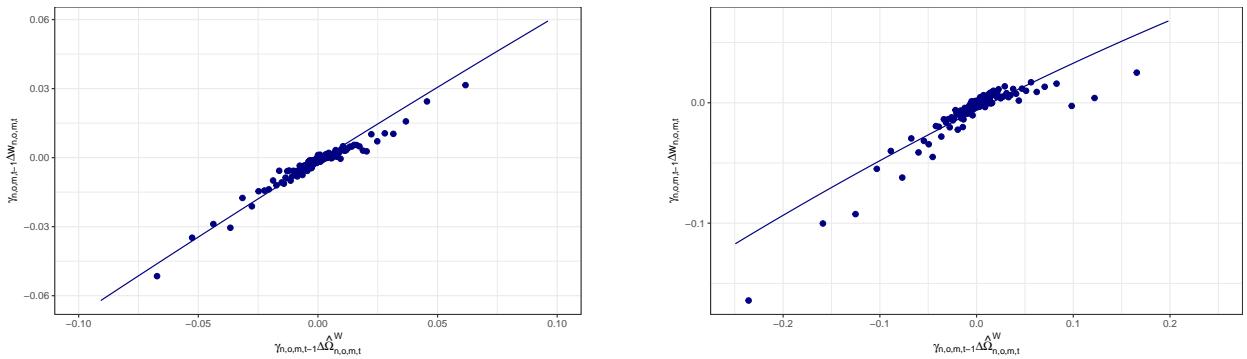


Figure C.7: The bin scatterplots illustrate the relationship between the measure of national employers' wage and employment policies in the large city region ( $\Delta\hat{\Omega}_{n,o,m,t}^W$ ,  $\Delta\hat{\Omega}_{n,o,m,t}^E$ ) and their policies in the labor market of the estimation region. The left panel displays the relationship with the measure of residualized wages ( $\gamma_{n,o,m,t-1}\Delta w_{n,o,m,t}$ ) of national employers in the estimation region. The right panel depicts the relationship with the logarithm of employment ( $\gamma_{n,o,m,t-1}\Delta \ln E_{n,o,m,t}$ ) of national employers in the estimation region.

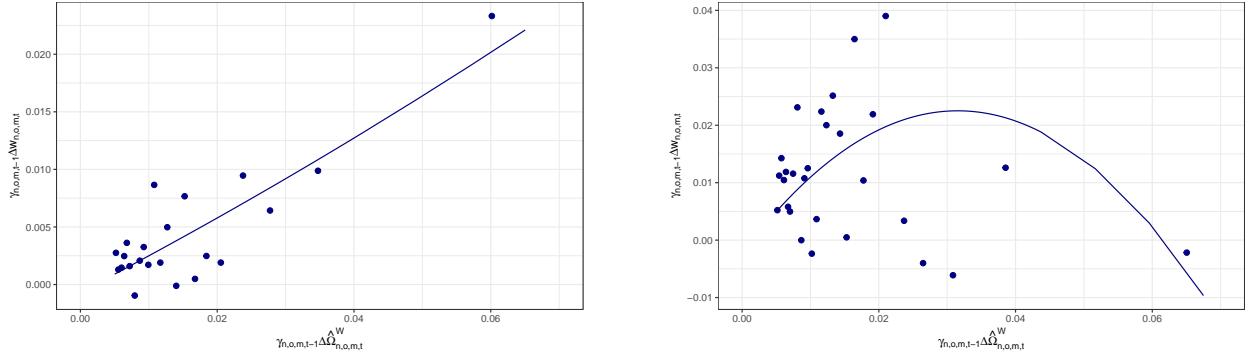
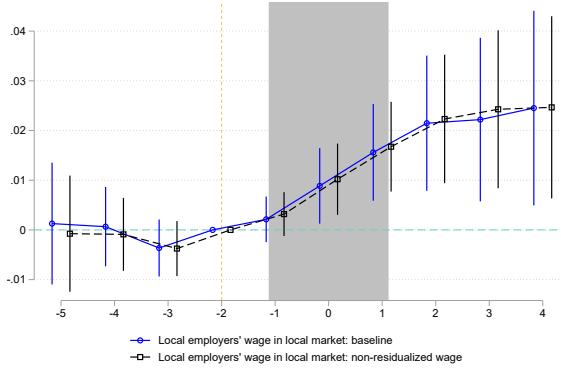
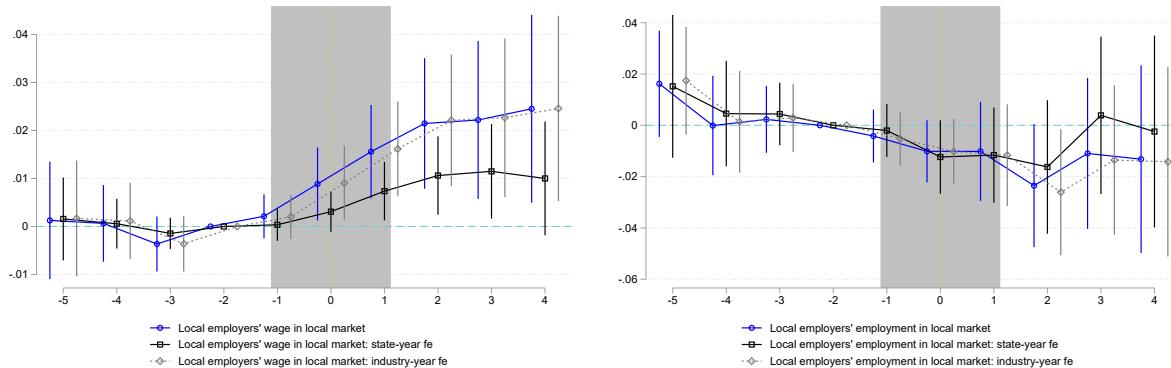


Figure C.8: The bin scatterplots illustrate the relationship between the measure of national employers' wage policies in the large city region ( $\gamma_{n,o,m,t-1} \Delta \hat{\Omega}_{n,o,m,t}^W$ ) and their policies in the labor market of the estimation region, specifically in cases of national employers' expansion ( $\gamma_{n,o,m,t-1} \Delta \hat{\Omega}_{n,o,m,t}^W > 0.005$  and  $\Delta \hat{\Omega}_{n,o,m,t}^E > 0$ ). The left panel displays the relationship with the measure of residualized wages ( $\gamma_{n,o,m,t-1} \Delta w_{n,o,m,t}$ ) of national employers in the estimation region. The right panel depicts the relationship with the logarithm of employment ( $\gamma_{n,o,m,t-1} \Delta \ln E_{n,o,m,t}$ ) of national employers in the estimation region.

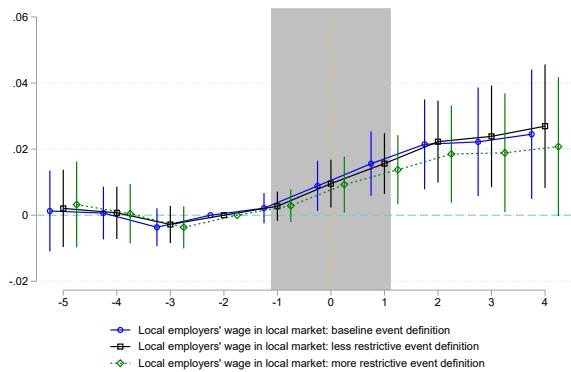


(a) Residualized vs. Real Wages

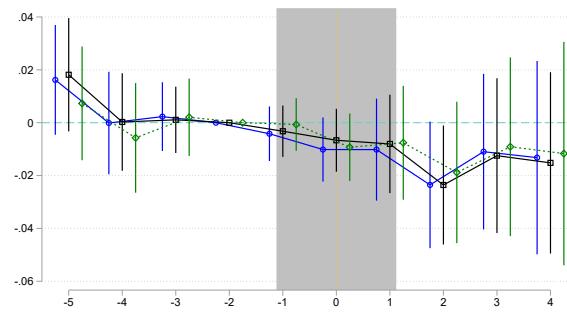


(b) Baseline vs. Not Bordering Microregions

(c) Baseline vs. Not Bordering Microregions



(d) Baseline vs. More or Less Restrictive



(e) Baseline vs. More or Less Restrictive

Figure C.9: This figure plots the event study coefficients from Equation 17. On the left side the outcome variable is residualized wage, on right log employment, in the first center panel, the outcome is residualized wage (blue line), and logarithm of real wage (black dashed line). The connected blue line represents the coefficient for baseline event study. In panel b and c the dashed black line represents the estimates with state-year fixed effects controls, while dotted green line represents the estimates with industry-year fixed effects. In panel d and e, Connected black line represents the estimates when for less strict definition of the event  $\gamma_{m,t-1}^N \hat{\Omega}_{m,t} > 0.0045$ . Connected green line represents the estimates when for more strict definition of the event  $\gamma_{m,t-1}^N \hat{\Omega}_{m,t} > 0.0055$ . All the models include fixed effects for job and year-by-occupation. Standard errors are two-way clustered: by job and by labor market.

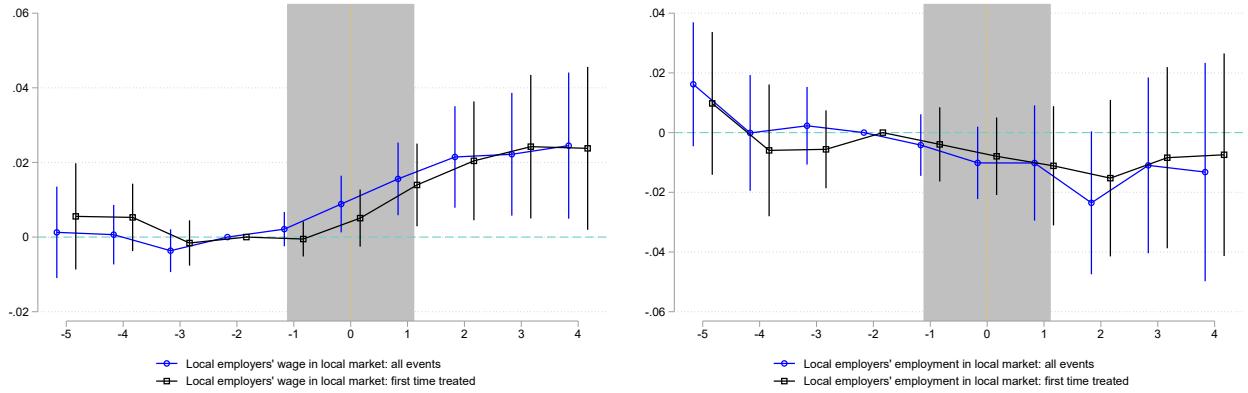


Figure C.10: This figure plots the event study coefficients from Equation 17. On the left side the outcome variable is residualized wage, on right log employment. The connected blue line represents the coefficient for baseline event study, the black line the estimates only for first-time treated jobs. All the models include fixed effects for job and year-by-occupation. Standard errors are two-way clustered: by job and by labor market.

## D Appendix Tables

VARIABLES	(1)	(2)	(3)	(4)
	$\gamma_{n,o,m,t-1} \Delta w_{n,o,m,t}$	$\gamma_{n,o,m,t-1} \Delta \ln E_{n,o,m,t}$		
$\gamma_{n,o,m,t-1} \hat{\Omega}_{n,o,m,t-1}^W$	0.64*** (0.04)	0.46*** (0.05)	-0.19 (0.16)	0.05 (0.33)
$\gamma_{n,o,m,t-1} \hat{\Omega}_{n,o,m,t-1}^E$	0.00 (0.01)	0.01 (0.01)	0.48*** (0.05)	0.50*** (0.08)
Observations	9,285	4,756	9,285	4,756
R-squared	0.55	0.40	0.53	0.48
Year $\times$ Occupation FE	YES	YES	YES	YES

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 6: This table shows the coefficients and associated standard errors from regressions described in Equations 20.  $\gamma_{n,o,m,t-1} \Delta w_{n,o,m,t}$  represents a three-year change in the measure of national employers' average log-wage, as defined in Equation 14.  $\gamma_{n,o,m,t-1} \Delta \ln E_{n,o,m,t}$  represents a three-year change in the national employers' log-employment measure, as defined in Equation 14.  $\gamma_{n,o,m,t-1} \Delta \hat{\Omega}_{n,o,m,t-1}^W$ ,  $\gamma_{n,o,m,t-1} \Delta \hat{\Omega}_{n,o,m,t-1}^E$ , and stand for the shift-share instruments defined in 11 and 12, respectively. All regressions control for national employers' employment share. Standard errors are clustered at the labor market level.