National Firms, Local Effects:

Spillovers from Multi-Establishment Employers' Expansions*

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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. Although these expansions are firms' independent decisions, understanding their spillover effects is important for evaluating policies that aim to attract new large employers. Using administrative data from Brazil that cover firms' wages and employment across different locations and occupations, I conduct a matched event study to assess how local employers respond to significant, idiosyncratic labor demand shifts by national employers. 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 because they reallocate to the expanding national employers.

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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 probable 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 previously described, my empirical strategy involves tracking the wages and employment levels of national employers across Brazil's major cities, where labor markets for specific occupations are well-developed, stable, and robust.[1] To illustrate this approach, imagine a large supermarket chain operating in multiple locations—including Rio de Janeiro and São Paulo—that decides to increase wages and employment for cashiers as part of a national-level expansion. This decision could be driven by factors like securing new financing, shifts in national strategy, or cost-effective adjustments in its supply chain. Importantly, this decision is unique to the national firm and is not influenced by retail booms in specific non-metropolitan areas. As a result, observed supermarket wages and employment increases in other locations are exogenous to local employers. I isolate this idiosyncratic change in labor demand for cashiers by this particular chain by comparing its wage and employment increases to those of other firms employing cashiers in the labor markets of major cities.

Subsequently, I construct a measure of the exposure of local labor markets (outside large cities) to the idiosyncratic labor demand shocks of national employers. Specifically, the measure weights the computed national employers' relative three-year[2] wage and employment changes in large cities by their employment shares in the local labor market (outside large cities).

[1] Moretti and Yi (2024) suggests that large and dense labor markets facilitate worker-firm matching, minimizing search frictions.

[2] I use three-year changes to isolate the relatively long-term changes in national employers' policies

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 co-movements are highly significant and robust across many specifications. Consequently, the strength of these co-movements confirms that the constructed exposure measures effectively capture the idiosyncratic labor demand shocks of national employers.

After confirming the validity of the constructed local labor market exposure measures, I proceed to the main research design: a matched event study of national employers' expansions. I define an expansion event as a significant increase in the constructed exposure measures. The analysis reveals that such expansions trigger an outflow of incumbent workers from local employers who are unable to replace these workers with new hires, resulting in approximately a 2 log point decrease in employment among smaller employers. In response, local employers 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 increases by about 2 log points at the job level (including both new hires and incumbent workers) and by approximately 1.5 log points for incumbent workers. This suggests that local firms respond to heightened labor market competition not by selecting workers but by adjusting their wage policies. Importantly, the expansions of national employers do not reduce the employment prospects of workers; the employment probability for workers employed by local employers during the baseline period remains unchanged following the expansion. Consequently, these 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 higher wage increases than workers without such a connection.

The last set of results explores the general impact of national employers on spatial wage inequalities. Using a larger dataset, not limited to only expansion periods, I document 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 potentially much more widespread. Using the 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 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

I define the *local labor market* m as a combination of occupation o and commuting zone c. In period-year t, there are K local employers (denoted by subscript j) and one national employer[3] (denoted by superindex N). A measure $L_{m,t}$ of workers is either employed and receiving wages or unemployed and receiving unemployment income $b_{m,t}$. Matches are destroyed with an exogenous probability δ. Time is discrete, and both employers and workers discount the future at rate ρ.

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 productivity. When an employer j's vacancy is filled, the match produces $y_t + \epsilon_{j,m,t}$, where $y_{o,t}$ is the average output level in occupation o. Local firms inherit $(1-\delta)l_{j,m,t-1}$ matches from the previous period and post $V_{j,m,t}$ new vacancies. The national employer posts wage $w^N_{m,t}$, inherits $(1-\delta)l^N_{m,t-1}$ matches, and posts vacancies $V^N_{m,t}$. 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 $M(u_{m,t}L_{m,t}, \sum_{j=1}^{K} V_{j,m,t} + V^N_{m,t})$, where $u_{m,t}$ is the unemployment rate. Under standard assumptions, the probability that an unemployed worker finds a job, $p_{m,t}$, and the probability that a vacancy is filled, $q_{m,t}$, depend on the market tightness $\theta_{m,t} = \frac{\sum_{j=1}^{K} V_{j,m,t} + V^N_{m,t}}{u_{m,t}L_{m,t}}$. Conditional on being matched, the probability that a worker is matched with a specific local employer j or the national employer depends on

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

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 Ω_t and the market-level productivity $\epsilon_{m,t}$:

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

$$V_{m,t}^{N} = \phi_{2,E}\Omega_t + \phi_{2,\epsilon}\epsilon_{m,t}. \tag{2}$$

   All coefficients ϕ are positive.

3. Local employers take the national employer's wage and vacancy levels 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.

The assumption that national employers are wage posters is plausible given the national wage-setting patterns and the fact that they typically pay well above the labor market average, as discussed in 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:

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

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

$$\max_{V_{j,m,t}} Y^f_{j,m,t} \left((1-\delta)l_{j,m,t-1} + q_{m,t}V_{j,m,t}\right) - c(V_{j,m,t}).$$

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 $U_{m,t+1}$:

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

Finally, the value of unemployment depends on the unemployment income $b_{m,t}$[4], the probability of being matched with an employer $p_{m,t}$, and the expected value of the job provided by an employer, denoted as $\mathbf{E}W_{k,m,t}$:

$$U_{m,t} = b_{m,t} + \rho \left(p_{m,t}\mathbf{E}W_{k,m,t} + (1-p_{m,t})U_{m,t+1}\right),$$
$$\mathbf{E}W_{k,m,t} = \sum_{j=1}^{K} \gamma_{j,m,t}W_{j,m,t} + \gamma^N_{m,t}W^N_{m,t}.$$

Local employers' wages are set via a re-bargaining process after matching takes place: that is, they cannot commit to next period's wages and (re-)negotiate wages with both new and incumbent employees. The bargaining process splits the surplus between the firm's value of a filled vacancy (relative to producing nothing; hiring costs are defined as a sunk cost) and the worker's value of being employed by j over being unemployed:

$$\kappa Y^f_{j,m,t} = (1-\kappa)\left(W_{j,m,t} - U_{m,t}\right).$$

Where κ is a Nash-bargaining parameter.

[4]The unemployment income represents both income from informal jobs and the unemployment benefits "Seguro-Desemprego" provided by the Brazilian government.

2.3 Linear Steady-State Approximation

In this subsection, I focus on the determination of steady-state wages and employment. To simplify the notation, I omit the time subscript from the steady-state equations. Additionally, I assume that the vacancy creation cost function is given by $c(V) = cV_{j,m}^2$.

Furthermore, in the steady state, the tightness—and thus the probability of a worker matching with an employer and the probability of filling a vacancy—is a function of the employment rate ER_m, separation rate δ, and matching function parameter σ, 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 ER_m is defined as:

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

As defined in Equation 2.2, the wages of local employers depend on their own productivity, the productivity of the labor market, the wages of other local employers, the wage of national employers, and the probability of an unemployed worker finding a job. In the steady state, this leads to a recursive relationship of local employers' wages, given national employers' wage, probability of employment, and local labor market productivity.[5]

By solving this recursive relationship, as demonstrated in Appendix A, I find that local employers' wages are determined as a function of these three factors: national employers' wage, probability of employment, and local labor market productivity. Moreover, the linear approximation of steady-state local employers' wages and employment is given by the fol-

[5]Because local employers are assumed to be atomistic and idiosyncratic productivity $\varepsilon_{j,o,m}$ is zero-sum, $\varepsilon_{j,o,m}$ matters for individual local employer wages but does not influence other employers' wages.

lowing expressions:[6]

$$\ln w_{j,m} \approx \alpha_0 + \alpha_1 y_o + \alpha_{2,E}\mathrm{E}_m + \alpha_{2,L}\mathrm{L}_m + \alpha_3\gamma_m^N w_m^N + \alpha_1\left(\epsilon_m + \varepsilon_{j,m}\right), \tag{3}$$

$$\ln l_{j,m} \approx \beta_0 + \beta_1 y_o + \beta_{2,E}\mathrm{E}_m + \beta_{2,L}\mathrm{L}_m + \beta_3\gamma_m^N w_m^N + \beta_1\left(\epsilon_m + \varepsilon_{j,m}\right). \tag{4}$$

Both expressions depend on $\gamma_m^N w_m^N$, which I denote as the national employer's outside option index OOI_m^N:

$$\mathrm{OOI}_m^N = \gamma_m^N w_m^N.$$

2.4 Endogeneity Issues

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

$$\Delta \ln w_{j,m} = \alpha_1 \Delta y_o + \alpha_2 \Delta \mathrm{E}_m + \alpha_3 \Delta \mathrm{OOI}_m^N + \varsigma_{j,m}^W \tag{5}$$

$$\Delta \ln l_{j,m} = \beta_1 \Delta y_o + \beta_2 \Delta \mathrm{E}_m + \beta_3 \Delta \mathrm{OOI}_m^N + \varsigma_{j,m}^E \tag{6}$$

where I define the Δx operator as the difference in x values between two steady states. For example, let variable x have value x_{t_1} in time t_1 in steady state 1 and x_{t_2} 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 $\Delta\epsilon_m$ and $\Delta\varepsilon_{j,m}$. 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.

[6] I assume that the population of workers is constant and ignore the "feedback effect size," which is the wage effect of changes in local employers' share (i.e., changes in the fraction of employers responding to each other's wages through wage bargaining).

ΔOOI_m^N can be decomposed as:

$$\Delta\text{OOI}_m^N = \Delta\gamma_m^N w_m^N + \gamma_m^N \Delta w_m^N.$$

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 ΔOOI_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. 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 ΔE_m. Even assuming that firm j is of very small size, ΔE_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 ΔE_m.

2.5 Workers' Heterogeneity

Previously, I assumed that all workers have an equal probability of joining the national employer, proportional to its employment share γ_m^N. However, some workers are more likely to be hired by the national employer. For example, Le Barbanchon et al. (2020); Azar et al. (2022) showed the importance of distance to the workplace for workers' search intensity. Similarly, 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), $\gamma_{m,g}^N$, and the change in the national employer's employment share for this group, $\Delta\gamma_{m,g}^N$, are greater than the national employer's overall employment share and share change, γ_m^N and $\Delta\gamma_m^N$, respectively. 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:

$$\Delta \ln w_{j,m,g} = \alpha_1 \Delta y + \alpha_2 \Delta \mathrm{E}_m + \alpha_3 \Delta \mathrm{OOI}_{m,g}^N + \varsigma_{j,m,g}^W. \tag{7}$$

Observe that:

$$\Delta \mathrm{OOI}_{m,g}^N = \gamma_{m,g}^N \Delta w_m^N + \Delta \gamma_{m,g}^N w_m^N.$$

In the above equation, the first term on the right-hand side will be greater than for the rest of the workers because $\gamma_{m,g}^N > \gamma_m^N$. Moreover, the second term is also greater since $\Delta\gamma_{m,g}^N > \Delta\gamma_m^N$.[7]

Therefore, the model predicts that groups more likely to be employed by the national employer will receive higher wage increases, regardless of whether they stay with their initial employer or move to the national employer.

3 Research Design

The objective of my research design is to isolate idiosyncratic labor demand shocks from national employers and to construct a measure of local labor markets' exposure to these shocks. The basic idea is straightforward: national employers that expand or contract their wages and/or employment in large cities are likely to do the same in other locations. Importantly, such expansions or contractions are independent of local labor market conditions.

First, I construct a measure of local labor market exposure to national employers' labor demand shocks. Using this measure, I identify labor markets that have experienced signifi-

[7] The assumption that for some group of workers both $\gamma_{m,g}^N$ and $\Delta\gamma_{m,g}^N$ are greater is plausible, as it denotes a group already "closer" to the national employer in terms of location or other preferences/information. Such workers are already more likely to join the national employer and, due to its expansion, are the first to fill the new vacancies.

cant increases in national employers' idiosyncratic labor demand. This approach allows me to study how local employers react to national employer expansions using a staggered event study methodology.

Additionally, I employ another research design to examine the spillover effects of national employers' wage policies in a more general setting, not limited to large expansions. Specifically, I estimate regression equations for local employers' wage and employment changes that correspond to the theoretical Equations 5–6. For this purpose, I use the constructed measures of local labor market exposure to national employers' labor demand shocks as shift-share instruments.

Formally, I consider two non-overlapping sets of labor markets: those located in large cities and those in the Estimation Region. I denote the set of large cities by $\mathcal{C}$. Since labor markets are defined for each occupation, this set is further denoted with the subscript $\mathcal{C}_o$.[8]

3.1 Graphical Illustration of the Identification Strategy

This identification strategy can be illustrated in three steps, as shown in Figure 2. Consider a national employer A—a major supermarket chain with establishments in multiple locations, including both a large city and a medium-sized city. For simplicity, suppose that A is the only national employer operating in the medium-sized city.

The goal of this procedure is to identify A's idiosyncratic labor demand changes—that is, changes resulting from the firm's independent, national-level decision to increase (or decrease) employment in a specific occupation. Such decisions might be driven by factors like securing new financing, shifts in national strategy, or cost-effective adjustments in the supply chain. Essentially, these changes are unique to A and are not dependent on local or national trends.

First, as illustrated in the lower panel of Figure 2, suppose Employer A decides to increase the wages it offers to cashiers (and to hire more cashiers) in the medium-sized city. Ideally,

[8] Importantly, the large cities set is the same for each occupation.

this would suggest that A is experiencing an idiosyncratic increase in labor demand, and this wage increase might pressure smaller businesses like toolbox shop B, which also employs cashiers, to raise their wages. Yet, both employers could be responding to the same local productivity shock, as depicted 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 the result of its nationwide policy, not local labor market conditions. 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, I assume that it is due to an idiosyncratic surge in A's demand for cashiers. While this claim cannot be proved directly, if A's wage increase in the medium-sized city occurs simultaneously with that in the large city—far from each other—it provides suggestive evidence that A is expanding at the national level, not because of local factors. Consequently, the observed wage increase by Employer B is 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, $\mathcal{C}_{k,o,t}$) in year t, I estimate the following regression:

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

Here, $y_{k,o,c_{bc},t}$ denotes the employer's average wage or the logarithm of employment.[9]

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:

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

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

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

For the remainder of the paper, I denote these idiosyncratic wage changes as $\Delta Z^W_{k,o,t}$ and employment changes as $\Delta Z^E_{k,o,t}$ (and $Z^W_{k,o,t}$ for idiosyncratic wage level).

3.3 Local Labor Market Exposure to National Employers' Labor Demand Shocks

After calculating the employer-by-occupation-level shocks, I develop a measure of each labor market's exposure (in the Estimation Region) to the idiosyncratic labor demand shocks from national employers. To determine this exposure, I weight each individual national employer's shock by its employment share from the previous year.

[9]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.

I compute the exposure measure both for national employers' wage and employment changes, as well as for the wage level.[10] Equation 10 defines the level of exposure to national employers' wage policies for labor market m (occupation o × commuting zone c) at time (year) t, which includes national employers indexed by $k = 1, 2, \ldots, K_n$.

$$\gamma^N_{m,t-1}\widehat{\Omega}^W_{m,t} = \sum_{k=1}^{K_n} \gamma^N_{k,m,t-1} Z^W_{k,o,t} \tag{10}$$

Where the employment share of individual national employer k from year $t-1$ is denoted as $\gamma^N_{k,m,t-1}$, while $\gamma^N_{m,t-1}$ represents the total employment share of national employers:

$$\gamma^N_{m,t-1} = \sum_{k=1}^{K_n} \gamma^N_{k,m,t-1} \tag{11}$$

Similarly, I aggregate the individual employers' relative wage and employment changes, $\Delta Z^W_{k,o,t}$ and $\Delta Z^E_{k,o,t}$, to define the exposure measure of the local labor market to changes in national employer policies, as shown in Equations 12 and 13:

$$\gamma^N_{m,t-1}\Delta\widehat{\Omega}^E_{m,t} = \sum_{k=1}^{K_n} \gamma^N_{k,m,t-1} \Delta Z^E_{k,o,t} \tag{12}$$

$$\gamma^N_{m,t-1}\Delta\widehat{\Omega}^W_{m,t} = \sum_{k=1}^{K_n} \gamma^N_{k,m,t-1} \Delta Z^W_{k,o,t} \tag{13}$$

These constructed measures are empirical counterparts to Ω and $\Delta\Omega$ from the model described in Section 2.2. Unlike in the theoretical section, there are two distinct measures of labor demand changes: one for employment changes and one for wage changes. This approach allows for a more precise identification of national employers' actual labor demand

[10]It is not informative to aggregate the idiosyncratic levels $Z^E_{k,o,t}$ of national employers because employment size is already accounted for by employment shares in the local labor market. Conversely, $\Delta Z^E_{k,o,t}$ provides information about national employers' *changes* in log employment in large cities, which can predict similar changes in other labor markets and is not captured by employment shares from the previous year.

changes. Additionally, using two measures enables me to separate labor demand changes from worker selection effects (such as employment cuts simultaneous with wage increases). The empirical $\widehat{\Omega}$ also includes a labor market index because, in the empirical context, many national employers operate in different cities rather than a single national employer as in the model.

The exposure measures are constructed to identify the labor demand shifts of national employers. Nevertheless, local employers react to national employers' wage and employment changes not in the large cities but in the labor markets where they operate (in the Estimation Region). Therefore, I define counterpart measures of national employers' wage levels and wage and employment changes in the local labor market within the Estimation Region (outside large cities).

Firstly, I provide the measure of the outside option offered by national employers, which, as shown in Equations 5–6, influences local employers' wages:

$$\widehat{OOI}^{N}_{m,t} = \sum_{k=1}^{K_n} \gamma^{N}_{k,m,t-1} w^{N}_{k,m,t} \tag{14}$$

I also define the average level of wages at national employers in the local labor market as

$$w^{N}_{m,t} = \frac{\widehat{OOI}^{N}_{m,t}}{\gamma^{N}_{m,t}} \tag{15}$$

I construct measures of national employers' wage and employment changes in the local labor market in the Estimation Region, denoted as $\Delta w^{N}_{m,t}$ and $\Delta \ln l^{N}_{m,t}$, respectively:

$$\gamma^{N}_{m,t-1} \Delta w^{N}_{m,t} = \sum_{k=1}^{K_n} \gamma^{N}_{k,m,t-1} \left(w^{N}_{k,m,t+1} - w^{N}_{k,m,t-1} \right) \tag{16}$$

$$\gamma^{N}_{m,t-1} \Delta \ln l^{N}_{m,t} = \sum_{k=1}^{K_n} \gamma^{N}_{k,m,t-1} \left(\ln l_{k,m,t+1} - \ln l_{k,m,t-1} \right) \tag{17}$$

Finally, the change in $\widehat{OOI}^N_{m,t}$ is defined as the sum of the changes in national employer wages and employment shares.

$$\Delta\widehat{OOI}^N_{m,t} = \gamma^N_{m,t-1}\Delta w^N_{m,t} + \left(\gamma^N_{m,t+1} - \gamma^N_{m,t-1}\right) w^N_{m,t-1} \tag{18}$$

3.4 Main Research Design: Event Study of National Employers' Expansion

In this section, I discuss the estimating equations and identifying assumptions of the main research design—an event study of national employers' expansion. The exact empirical implementation is detailed in Sections 4.5 and 4.6.

The main research design examines situations where a local labor market experiences a significant positive change in the labor demand of nnational employers that is independent of local conditions. Specifically, I consider an indicator variable that is independent of local labor market productivity shocks ($\epsilon_{m,t}$) but is correlated with significant changes in national employers' idiosyncratic labor demand shocks (Ω_t), as specified in the model. According to Equations 5–6, this approach allows me to causally identify the spillover effects from national employers' wage and vacancy expansions. However, the estimated effect captures 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: $\gamma^N_{m,t-1}\Delta\widehat{\Omega}^W_{m,t}$ and $\gamma^N_{m,t-1}\Delta\widehat{\Omega}^E_{m,t}$, as defined in Equations 16–17. I specify non-negative cutoff levels that represent roughly the 97th percentile of the joint distribution of these measures. Local labor markets with exposure measures exceeding these thresholds are classified as experiencing a national employer expansion. Additionally, I conduct robustness checks to examine whether the results depend on the exact threshold values.

In the model, for simplicity, I assume 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 national employers' expansions not only at the job level but also at the worker level, focusing on a sample of workers who were employed by local employers in the baseline period. Including the worker-level event study allows me to examine both the gains and losses experienced by workers due to the expansion and to differentiate the effects of worker selection (local employers retaining only those with higher wages) from actual changes in local employers' policies. Lastly, this approach enables me to investigate 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 rare by definition, I use a matched sample to increase the precision of the estimates. That is, for each local job in a labor market where national employers expand, I match, based on observable characteristics, a control job in a market that has not experienced such an expansion. Similarly, for each worker who was employed by a local employer in the baseline period in a labor market where national employers expand, I match a control worker in a market that has not experienced such an expansion.

I discuss the construction of the matched samples in detail in Section 4.6. Here, I emphasize two features important for identification. First, 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 during a longer time period (specifically, between $t_j^* - 5$ and $t_j^* + 5$, where t_j^* is the year when the expansion occurs). Second, importantly for testing the pre-trends assumption, I do not match on the main outcome variable: local employers' wages.

Using the matched sample of treated and control jobs, 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 τ:

$$y_{j,m,t} = \sum_{\tau=-5}^{4} \eta_\tau \, \mathbb{I}\{\tau = t - t_j^*\} \cdot \mathrm{Tr}_{j,m} + \sum_{\tau=-5}^{4} \zeta_\tau \, \mathbb{I}\{\tau = t - t_j^*\}$$
$$+ \lambda_{\mathbf{O}(m),t} + \lambda_{j,m} + u_{j,m,t}, \tag{19}$$

where t_j^* is the event year for job j, and $\mathrm{Tr}_{j,m}$ is an indicator variable equal to 1 if the job was treated. The function $\mathbf{O}(m)$ gives the identity of the occupation that defines labor market m. The model includes job fixed effects $\lambda_{j,m}$ and occupation-by-time fixed effects $\lambda_{\mathbf{O}(m),t}$. Additionally, I control for time relative to the event ζ_τ to account for jobs' life-cycle trends. To consider 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 probable 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, following the approach of Helm et al. (2023) in their study on firms' employment expansions.

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

$$y_{i,t} = \sum_{\tau=-5}^{4} \eta_\tau \, \mathbb{I}\{\tau = t - t_i^*\} \cdot \mathrm{Tr}_i + \sum_{\tau=-5}^{4} \zeta_\tau \, \mathbb{I}\{\tau = t - t_i^*\}$$
$$+ \lambda_{\mathbf{O}(i,t),t} + \lambda_i + u_{i,t}, \tag{20}$$

where t_i^* is the event year for individual i, and Tr_i indicates whether the worker was treated—that is, whether in the baseline period they worked for a local employer in a labor market where a national employer expanded in period t_i^* ($\tau = 0$). The model includes individual fixed effects λ_i and occupation-by-time fixed effects $\lambda_{\mathbf{O}(i,t),t}$. Similar to the job-level model, I control for time relative to the event ζ_τ. 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 close to zero, indicating parallel trends 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.

3.5 Shift-Share Regressions

In addition to the event study, I employ a shift-share regression design to examine the general effect of national employers on spatial income inequalities, not limited to expansion periods.

In this design, I treat the exposure measures $\gamma_{m,t-1}^N \Delta\widehat{\Omega}_{m,t}^W$ and $\gamma_{m,t-1}^N \Delta\widehat{\Omega}_{m,t}^E$ as shift-share instruments for changes in the outside option level provided by national employers, $\widehat{OOI}_{m,t}^N$, as defined in Equation 10. Formally, the instrument relies on the identification results from Borusyak et al. (2021) regarding instruments with endogenous shares and exogenous shocks. Specifically, the identified idiosyncratic wage and employment changes of national employers are exogenous to local firms—assumed to be outcomes of national employers' labor demand shifts—while the employment shares depend on local labor market conditions.

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. This equation directly corresponds to the theoretical Equations 5–6. The function $\mathbf{O}(m)$ gives the identity of the unique occupation that defines labor market m:

$$\Delta y_{j,m,t} = \lambda_{\mathbf{O}(m),t} + \zeta_1 \Delta B^E_{m,t} + \eta \Delta \widehat{OOI}^N_{m,t} + u_{j,m,t} \tag{21}$$

The coefficient of interest is η, which corresponds to α_2 or β_2 in the model. It measures the effect of changes in the outside option provided by national employers, $\Delta\widehat{OOI}^N_{m,t}$, as defined in Equation 10. This term is measured as the sum of the change in their residualized wage, $\gamma^N_{m,t-1}\Delta w^N_{m,t}$, and the change in their employment share, $(\gamma^N_{m,t+1} - \gamma^N_{m,t-1})w^N_{m,t-1}$. The variable $\Delta B^E_{m,t}$ denotes the Bartik instrument, defined for the three-year change in employment levels of industries,[11] computed using industry employment changes in the large city region. The rationale is similar to that for identifying national employers' labor demand changes: in large and thick markets, employment changes efficiently capture industry productivity changes.

I instrument $\Delta\widehat{OOI}^N_{m,t}$ using the changes in national employers' wage policy, $\gamma^N_{m,t-1}\widehat{\Omega}^W_{m,t}$, and the employment changes in local employers, $\gamma^N_{m,t-1}\widehat{\Omega}^E_{m,t}$, multiplied by the national employers' wage level (from the previous period) in the local 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 and definitions, 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

[11] The weights are the employment shares of each industry in the labor market.

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 examine a 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) that potentially lead to downward wage rigidity for incumbent workers. However, in the main research designs, I account 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, 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

To focus on regions with lower informality rates, the analysis is limited to Brazil's South and Southeast regions. These areas are the wealthiest, have the lowest informality indexes, and collectively represent approximately half of the country's total population.

Observations are excluded if they have incomplete or invalid identifiers for workers, establishments, firms, or municipalities, or if they contain invalid job spells or personal characteristics. This exclusion removes only 0.1% of the observations. Following Gerard et al.

(2021), farm jobs and workers, as well as those with temporary or part-time contracts, are also excluded. Due to Brazilian labor market regulations during the study period, this criterion leads to the exclusion of only 1–2% of urban worker observations, depending on the occupation.

Additionally, to eliminate very short-term and unstable employment relationships, the dataset includes only individuals who worked more than two months per year and more than 10 hours per week. Workers with an average monthly wage below the minimum wage are also excluded, accounting for approximately 3% of the sample.

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 and are compared for the year time period.

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 Worker Composition in Jobs

Jobs within the same labor market may vary in worker characteristics such as experience, education, and gender. To account for this variation in worker composition, I employ a residualization technique on workers' wages using the entire sample[12]. Specifically, I regress the log wage of each worker i in labor market m in year t on a set of control variables:

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

where $X_{i,m,t}$ represents individual characteristics. Since most of my analysis is conducted at the job (occupation) level, I focus on controlling for occupation-related characteristics, such as occupation-specific wage profiles and interactions between occupation, education, and gender. Specifically, the control variables include an age-by-occupation quadratic polynomial[13], hours fixed effects, education-by-gender interactions, and education-by-occupation fixed effects.

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

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

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. As a robustness check, I also perform analyses using the actual log wages.

[12]Due to computational burden, I use a 10% sample, which includes about 100 million observations

[13]Specifically, I use a quadratic polynomial of the form $a_{0,o} + a_{1,o}\text{Age} + a_{2,o}\text{Age}^2$

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 that belong to the same higher administrative unit (mesoregion) as any of the large cities, as well as microregions that border large cities. Additionally, I omit a few commuting zones that might undergo boundary changes due to new municipalities[14]. 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 hire workers 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.

[14]Specifically, these microregions are: Tubarão, Criciúma, Caxias do Sul, Januária, Montes Claros, Bom Despacho, and Piuí.

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% and 70% of employment share (in the previous year) and that have more than 50 local employers' workers (also in the previous year). This allows us to analyze relatively stable labor markets with significant but not dominant shares of national employers, while avoiding the analysis of 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 cities 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 Measures to National Employers' Shocks

For both research designs, a crucial part of implementing the empirical strategy involves measuring local labor markets' exposure to idiosyncratic labor demand shifts by national employers, specifically constructing the measures $\gamma^N_{m,t-1}\hat{\Omega}^W_{m,t}$ and $\gamma^N_{m,t-1}\hat{\Omega}^E_{m,t}$. I follow the steps described in Section 3.3, utilizing the definitions of large cities and the Estimation Region 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 Equations 16–17, as well as the outside option index defined in Equation 10. In all computations involving national employers' wages, I use the residualized wages as specified in Section 4.3.1.

To examine the co-movements of national employers' wages and employment across regions, I estimate Equations 22 and 23 at the market level. Since the share of national employers in previous periods can influence future wage or employment changes, I control for the national employers' share in the previous year and, in some specifications, include labor market fixed effects.

$$\Delta y_{m,t} = \zeta_{1,1}\gamma^N_{m,t-1}\Delta\hat{\Omega}^W_{m,t} + \zeta_{1,2}\gamma^N_{m,t-1}\Delta\hat{\Omega}^E_{m,t} + \lambda_{o,t} + \gamma^N_{m,t-1} + \upsilon_{m,t}, \quad (22)$$

$$y_{m,t} = \zeta_{2,1}\gamma^N_{m,t-1}\hat{\Omega}^W_{m,t} + \lambda_{o,t} + \gamma^N_{m,t-1} + \upsilon_{m,t}. \quad (23)$$

In Equation 22, the dependent variable $\Delta y_{m,t}$ represents changes in national employers' wages and employment (as defined in Equations 16–17). In Equation 23, the dependent variable $y_{m,t}$ is the outside option index defined in Equation 10. Standard errors are clustered at the labor market level.

The regression results, presented in Table 2, show a significant relationship between national employers' policies across regions. National employers that pay higher wages in large cities also set higher wages in the Estimation Region. Similarly, there is a relationship for employment and wage changes: a unit change in national employers' wage policies in large cities (measured by $\gamma^N_{m,t-1}\Delta\hat{\Omega}^W_{m,t}$) is associated, on average, with a 0.6-unit increase in residualized wages in the Estimation Region. While national employers' employment policies in large cities (measured by $\gamma^N_{m,t-1}\Delta\hat{\Omega}^E_{m,t}$) do not seem to affect wages, a one-unit increase in $\gamma^N_{m,t-1}\Delta\hat{\Omega}^E_{m,t}$ is followed by approximately a 0.5 log-point increase in national employers' employment in the Estimation Region. Overall, these results suggest that the change instruments effectively capture national employers' idiosyncratic labor demand shocks, as wage and employment changes by national employers robustly pass through from large cities to the Estimation Region.

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

4.5 Empirical Implementation of Event Study

As outlined in Section 3.4, national employers' expansion events are defined by a set of thresholds for the exposure measures $\gamma^N_{m,t-1}\hat{\Omega}^W_{m,t}$ and $\gamma^N_{m,t-1}\hat{\Omega}^E_{m,t}$. Specifically, I require that $\gamma^N_{m,t-1}\Delta\hat{\Omega}^W_{m,t}$ 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 employment reductions, worker selection adjustments, or alignment with previous wage cuts. Therefore, I also require that employment changes measured in the large city region are positive: $\gamma^N_{m,t-1}\Delta\hat{\Omega}^E_{m,t} > 0$ and $\gamma^N_{m,t-2}\Delta\hat{\Omega}^W_{m,t-1} > 0$. Lastly, to ensure that national employers can substantially impact the entire labor market, I restrict the events in local labor 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 prior to 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 $t+5$.[15] Next, to find the closest counterfactual to each treated job—a "statistical twin"—I use Mahalanobis matching based on several observable variables[16].

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

[15]Specifically, I require that for each year between $t-5$ and $t+5$, the expsoure measure of national employers' policy $\gamma^N_{m,t-1}\Omega^W_{m,t}$ was smaller than 0.003.

[16]These variables include job and labor market employment sizes, the proportion of hired workers to the total job workforce, national employers' employment share, and exposure measures.

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 60% of the treated jobs. The matched sample includes treated observations from 404 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.

Importantly, approximately 66% of the matched treated jobs are in the retail industry, a similar proportion observed among the expanding national employers. However, only 10% of the matched treated jobs belong to the same 3-digit industry sector as the most expanding national employer (the one contributing the most to the change in Ω). This indicates that local employers' adjustments were primarily responses to changes in the labor market rather than to shifts in the product market.

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.

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 Cities and the Estimation Region

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

As shown in Figure 4, 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 the control labor markets, as depicted in the left panel of 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 driven by decisions at the national level: wage increases observed in large cities are simultaneous with wage and employment increases in the Estimation Region. Moreover, even if some pretrends can be observed, the expansion period is characterized by much more rapid and stronger national employers' wage and employment increases.

5.2 National Employer Expansion Effects on Local Jobs

Figure 5 compares the estimates from Equation 19 for the average residualized wage of national employers' jobs, $w^N_{m,t}$, with the 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. This might be a reason for the slower nature of the renegotiation process: in the model, I assumed that renegotiations occur in each annual period, but it might take longer. Another explanation is workers' information: even if renegotiation occurs every year, workers might gradually learn about changes in their outside options, which might lead to slower wage adjustments. While I cannot directly verify the role of information, in Section 5.4, I provide some initial evidence that knowledge obtained through past coworkers' networks might be important.

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 at 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 are in the opposite direction to wages, suggesting that local employers do not experience substantial unobserved productivity shocks, as discussed in Section 2.2. Interestingly, the estimates suggest labor demand elasticity to be about -1, close to the estimates by Beaudry et al. (2018) and Karabarbounis et al. (2022).

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 compare 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 $\gamma^N_{m,t-1}\Omega^W_{m,t} > 0.0045$ (instead of 0.005); in the more restrictive case, the threshold is set at $\gamma^N_{m,t-1}\Omega^W_{m,t} > 0.0055$. Although such changes in the threshold might look small, they substantially change the size of the treated group due to the rare nature of the expansion events: in the more restrictive case, it is about 15% smaller, while in the less restrictive case it is about 13% larger. Nevertheless, in both cases, the magnitude of wage and employment spillovers is very similar to those in the baseline definition, indicating that the results are not sensitive to the specific threshold.

In the main specification, I match on the jobs' characteristics and the characteristics of the labor market that the treated job is part of. As shown in the above section, treated and control jobs experience similar wage trajectories. Nevertheless, 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 or general industry groups[17]. Second, I consider the possible influence of state-level minimum wage changes[18] or other state-level shocks, and I add state-year fixed effects. This last specification is very demanding given that expansions are rare and typically do not occur in many states simultaneously, as can be observed in Figure 4. Therefore, I treat the results of this specification as lower-bound estimates.

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 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 times 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

[17] There are 18 general industry groups (e.g., retail) and 99 second-digit industry groups (e.g., wholesale retail, car retail).

[18] Five of the seven states in the Southeast and South introduced minimum wage policies during the study period; however, their enforcement is disputable (Saltiel and Urzúa, 2022).

C.10 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 Expansion 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.[19]

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.

Furthermore, workers from local employers 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 (solid 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 mar-

[19]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.

ket participation. This result suggests that the decline in employment at local employers does not have adverse consequences for their workers. Moreover, 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, the wages of this group should increase more strongly 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 national employers expand—into two subgroups: one that is more likely to join 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 $\gamma^N_{muni,t-1}\Delta\hat{\Omega}^W_{muni,t}$ at the municipality level, where *muni* denotes a combination of municipality and occupation index. Then, I split the treated workers into two groups: those for whom the municipality-level exposure measure $\gamma^N_{muni,t-1}\Delta\hat{\Omega}^W_{muni,t}$ 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.[20] 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 residualized wages increase by about 2 log points for the workers who were working in the baseline period closer to expanding employers. These results are consistent with the model analysis from Section 2.5.

The second heterogeneity I investigate is the workers' connection to national employers through their past coworkers' networks. 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

[20]The subgroups are not split equally because, for a substantial number of municipalities, there were no national employers.

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 Figure 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 results can be generalized: to what extent do national employers' wage policies influence 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 firms?

Importantly, there is substantial variation in national employers' wage policies, $\widehat{OOI}^{N}_{m,t}$, as shown in the lower panel of Figure 15. To provide concrete statistics, one standard deviation corresponds to a 4.5 log-point difference in the shift-share measure. At the same time, changes in wage policy are rare and concentrated near zero. Estimating the parameter α_3 from Equation 5 based solely on the expansion events study is challenging because expansions are accompanied by tightness changes. Therefore, in this section, I focus on estimating α_3, using the alternative shift-share design, and controlling for tightness changes by Bartik instrument.

For this research design, I pool all observations of local employers' jobs that meet the general sample restrictions. Specifically, these are 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%[21] and 70% in the previous year, and where a total of more than 50 local full-time workers were employed.[22] To construct the Bartik instrument, I use the 5-digit industry codes. In addition to the specification described in Equation 21, I also control for state or microregion-year fixed effects.

6.1 Results

Columns 3 and 4 of Table 5 present the estimates of the coefficient η from Equation 21 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 α_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. The estimated spillover magnitudes are substantial, significantly larger than the estimates of Derenoncourt and Weil (2024) on spillovers from large retailers' minimum wages. The results show that workers treat the wages of well-paying, large employers as a reference point; therefore, even though these employers employ a minority of

[21] To increase the precision of predicting changes in national employers' employment share, I focused on cases with higher shares.

[22] To avoid overlapping periods (as I use three-year changes), I restrict the analysis to the years 2007, 2009, 2011, 2013, 2015, and 2017.

workers, they have a large effect on the total labor market wage policy. In this dimension, my results are similar to the estimates of Beaudry et al. (2012).

These findings 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 reinforces the argument made by Hazell et al. (2021) that 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 η 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 η 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 an 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 exposure measures of their idiosyncratic labor demand changes. Second, I conduct an event study for jobs and workers in labor markets that experienced substantial exposure 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 policies significantly impact 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 me to evaluate labor market concentration effects.

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8 Figures

Large Cities and the Estimation Region

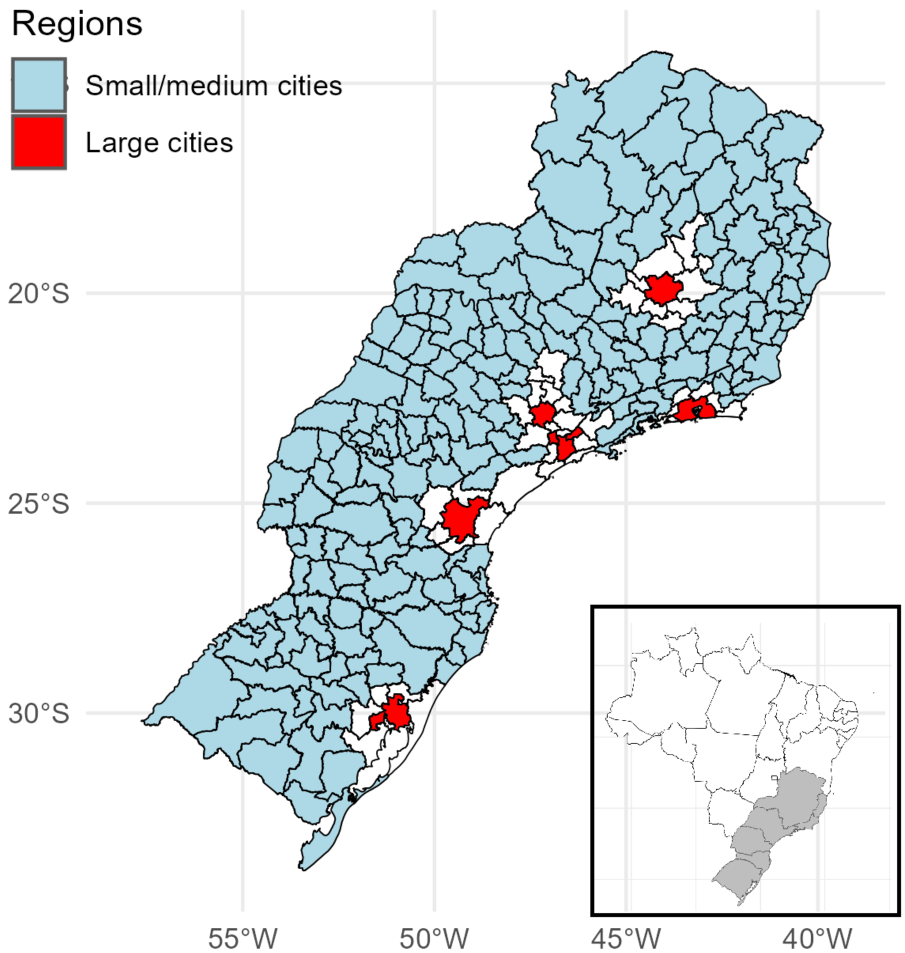


Figure 1: This figure shows the microregions (commuting zones) of Brazil's Southeast and South regions. Large cities are marked in red, while the Estimation Region (small and medium cities) is shown in light blue. Microregions that either share the same mesoregion as one of the large cities or border a large city (and are not included in the Estimation Region) are shown in white.

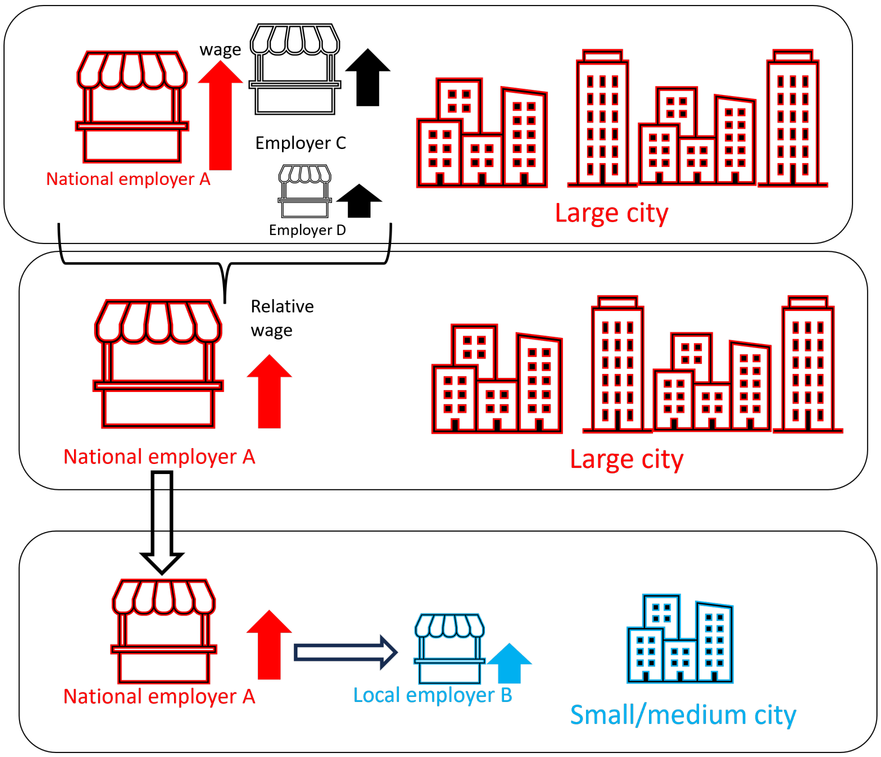


Figure 2: This figure illustrates the identification strategy. In the first step, the wage increases of Employer A are compared with those of other employers in a large city, calculating a relative wage increase that eliminates potential national labor demand shocks. Subsequently, as Employer A's relative 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 coefficients from the event-study regression in Equation 19. The connected red line represents the estimates when the outcome variable is the measure of national employers' relative wage in the large city region, $\hat{\Omega}^{W}_{m,t}$, as defined in Equation 10. The dashed red line corresponds to the estimates when the outcome variable is the average residualized wage for national employers' jobs in the Estimation Region, $w^{N}_{m,t}$, as defined in Equation 14. The model includes fixed effects for job and year-by-occupation. The X-axis indicates years relative to the expansion. Standard errors are two-way clustered by job and by labor market.

National Employers' Employment Growth in the Estimation Regions

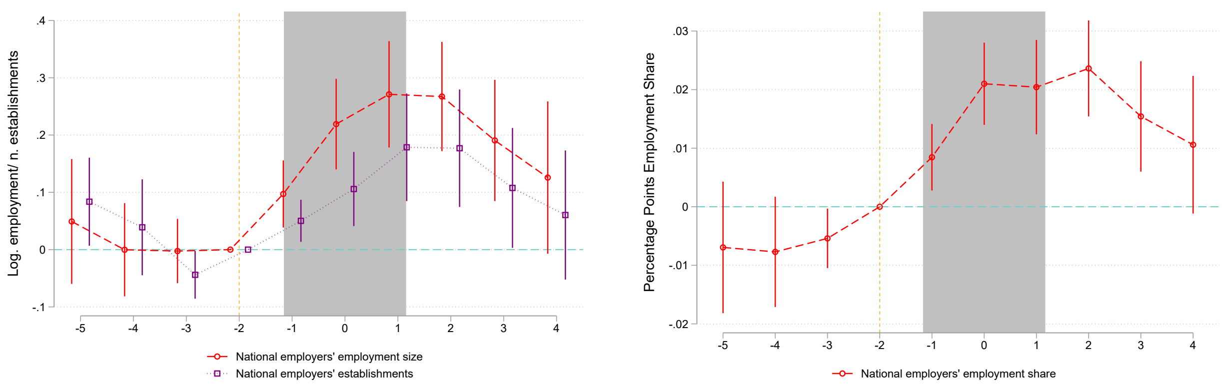


Figure 4: This figure plots coefficients from the event-study regression in Equation 19. The left panel shows the estimates when the outcome variable is the national employers' log-employment (red line) and logarithm of the number of establishments (purple dotted line) in the matched labor market in the Estimation Region. The right panel shows the estimates when the outcome variable is the national employers' employment share in the matched labor market in the Estimation Region. The X-axis indicates years relative to the expansion. The model includes fixed effects for job and year-by-occupation. Standard errors are two-way clustered: by job and by labor market.

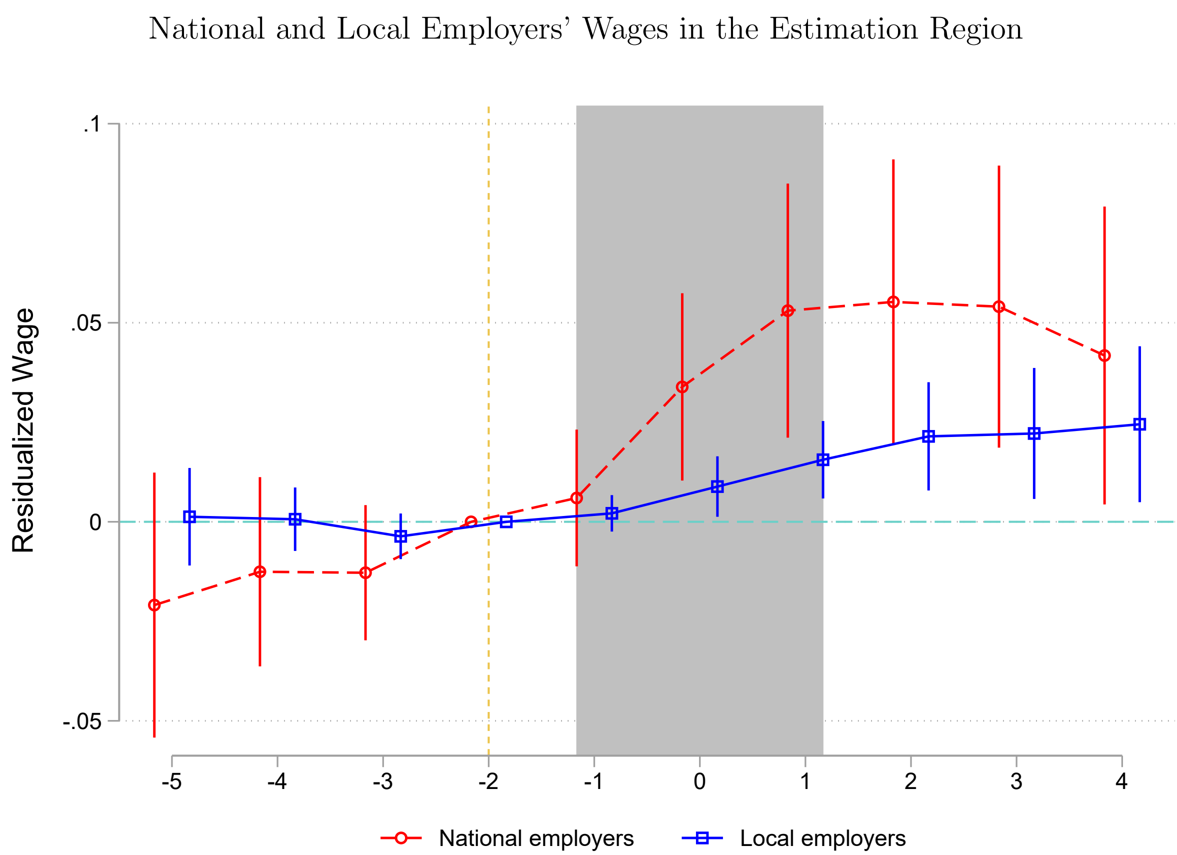


Figure 5: This figure plots coefficients from the event-study regression in Equation 19. The dashed red line represents the estimates when the outcome variable is the average wage for national employers' jobs in the matched labor market from the Estimation Region, $w^{N}_{m,t}$, defined by Equation 15. The connected blue line represents the estimates when the outcome variable is the local employer's average residual wage (in the Estimation Region). The X-axis indicates years relative to the expansion. The model includes fixed effects for job and year-by-occupation. Standard errors are two-way clustered: by job and by labor market.

Local Employers' Wages and Employment

Figure 6: This figure plots coefficients from the event-study regression in Equation 19. The connected blue line represents the estimates when the outcome variable is the local employer's job's average residual wage (in the Estimation Region). The dashed blue line represents the estimates when the outcome variable is the local employer's job's log employment (in the Estimation Region). The model includes fixed effects for job and year-by-occupation. The X-axis indicates years relative to the expansion. Standard errors are two-way clustered: by job and by labor market.

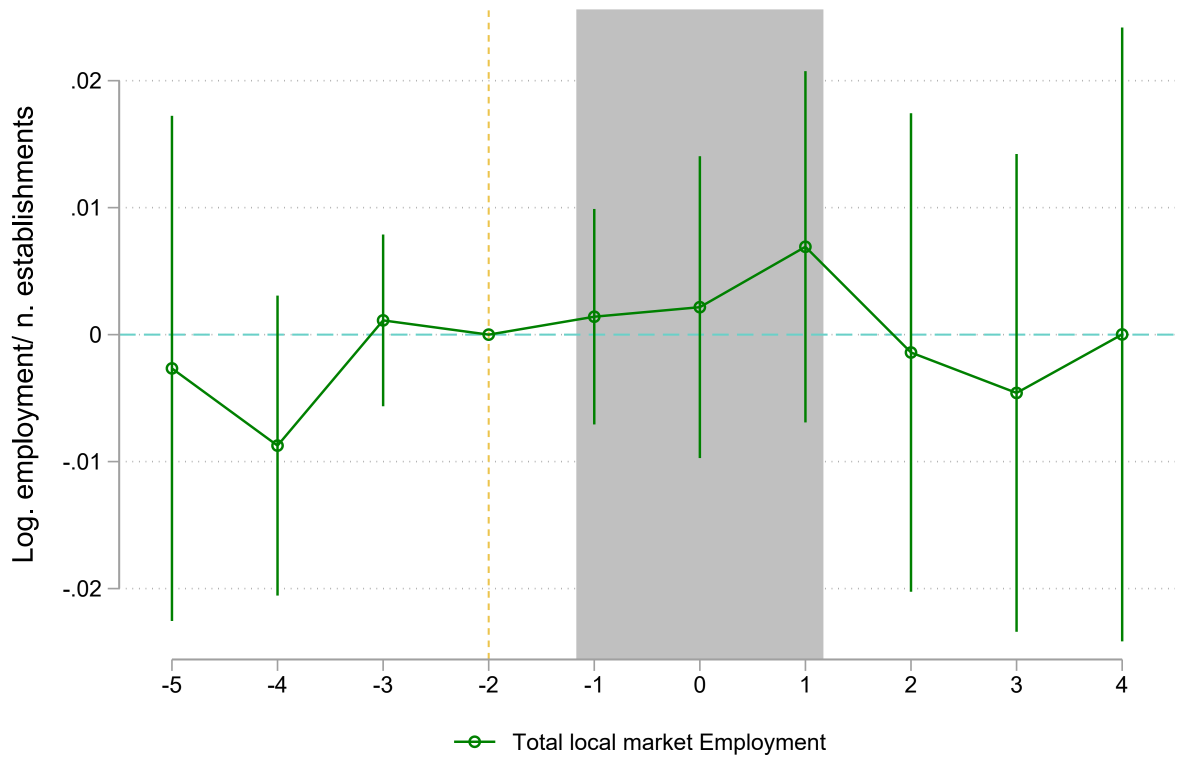


Figure 7: This figure plots coefficients from the event-study regression in Equation 19. The connected green line represents the estimates when the outcome variable is the total local labor market log employment (in the Estimation Region). The model includes fixed effects for job and year-by-occupation. The X-axis indicates years relative to the expansion. Standard errors are two-way clustered: by job and by labor market.

Incumbent Workers' Wages

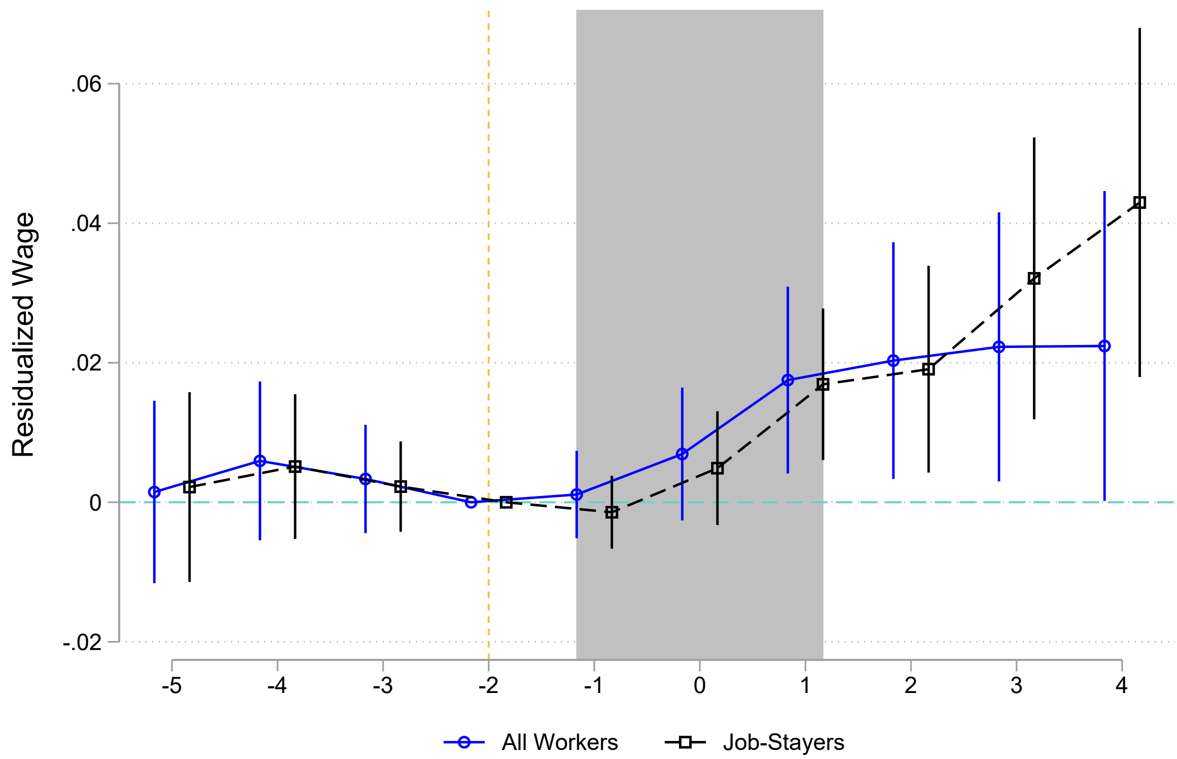


Figure 8: This figure plots coefficients from the event-study regression in Equation 20. The connected blue line represents the estimates for the outcome variable, which is the residualized wage of workers who were employed by the local employer (in the Estimation Region) in the baseline period. The connected black line represents the estimates for the outcome variable, which is the residualized wage of workers who were employed by the local employer in the baseline period and remained with their employer. The model includes fixed effects for worker and year-by-occupation.The X-axis indicates years relative to the expansion. Standard errors are two-way clustered by worker and by labor market.

Incumbent Workers' Transitions

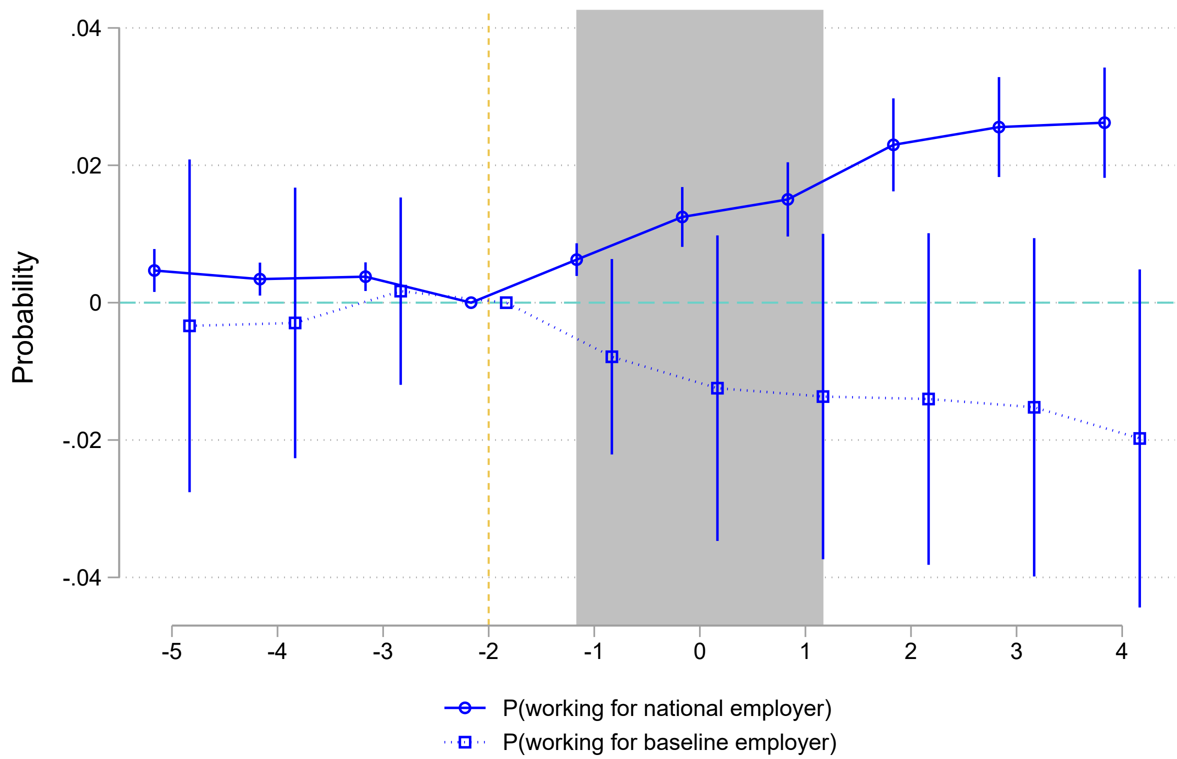


Figure 9: This figure plots coefficients from the event-study regression in Equation 20. The connected blue line represents the estimates for the outcome variable, which is the probability of leaving their employer, for workers who were employed by the local employer in the baseline period (in the Estimation Region). 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. The X-axis indicates years relative to the expansion. Standard errors are two-way clustered: by worker and by labor market.

Incumbent Workers' Employment

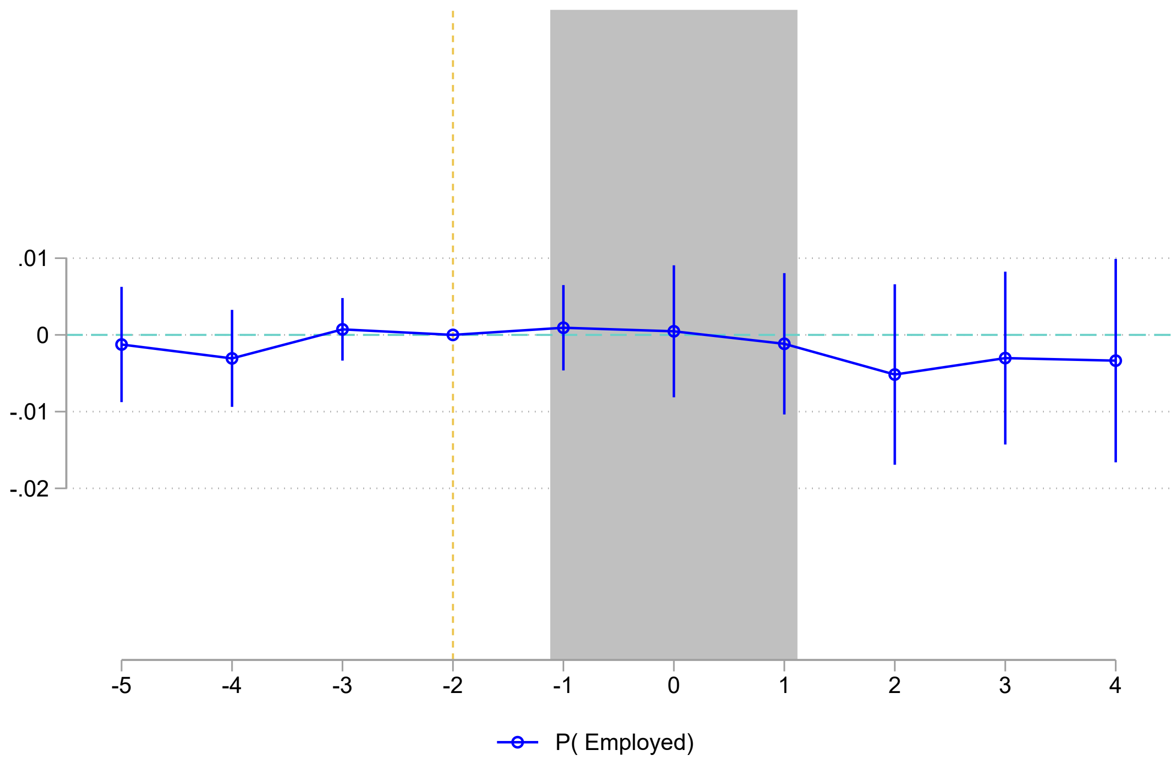


Figure 10: This figure plots coefficients from the event-study regression in Equation 20. The outcome variable is the probability of being employed in private sector for workers who were employed by the local employer in the baseline period (in the Estimation Region). The model includes fixed effects for worker and year-by-occupation. The X-axis indicates years relative to the expansion. Standard errors are two-way clustered: by the worker and by the matched labor market.

Incumbent Workers' Wages: Location Heterogeneity

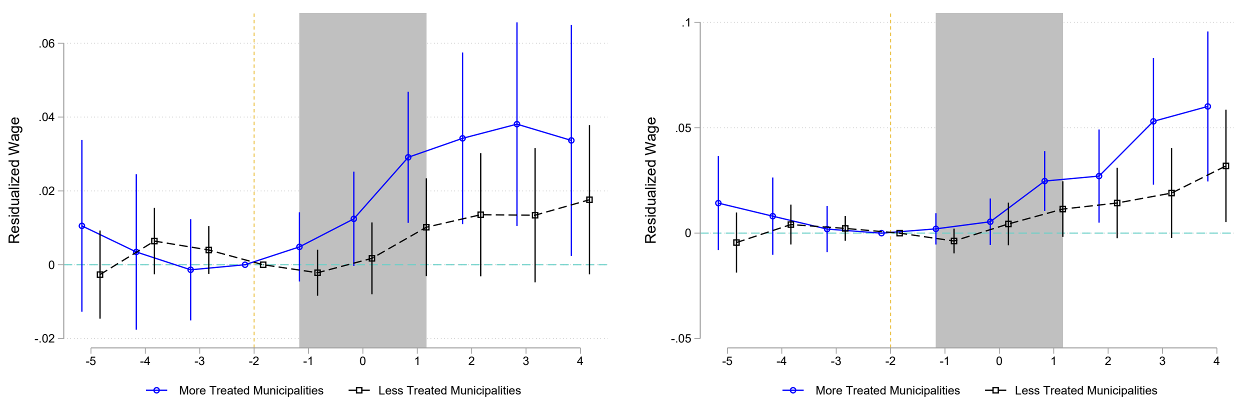


Figure 11: This figure plots coefficients from the event-study regression in Equation 20. The left panel displays the coefficients when the outcome variable is the residualized wage of workers employed by the local employer in the baseline period (in the Estimation Region). The left panel displays the 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 X-axis indicates years relative to the 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.

Incumbent Workers' Transitions: Location Heterogeneity

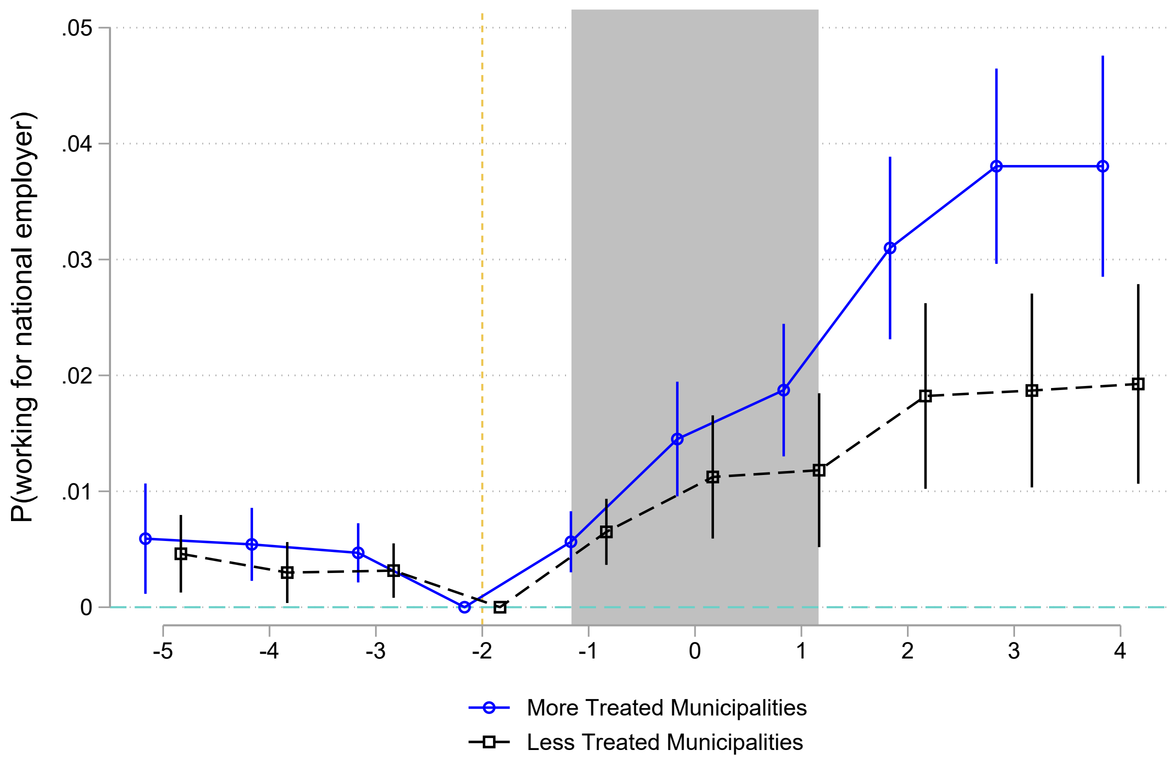


Figure 12: This figure plots coefficients from the event-study regression in Equation 20 where the outcome variable is the probability of being employed by the national employer for workers employed by the local employer in the baseline period (in the Estimation Region). The connected blue line displays 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 X-axis indicates years relative to the 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.

Incumbent Workers' Wages: The Role of Coworker Connections

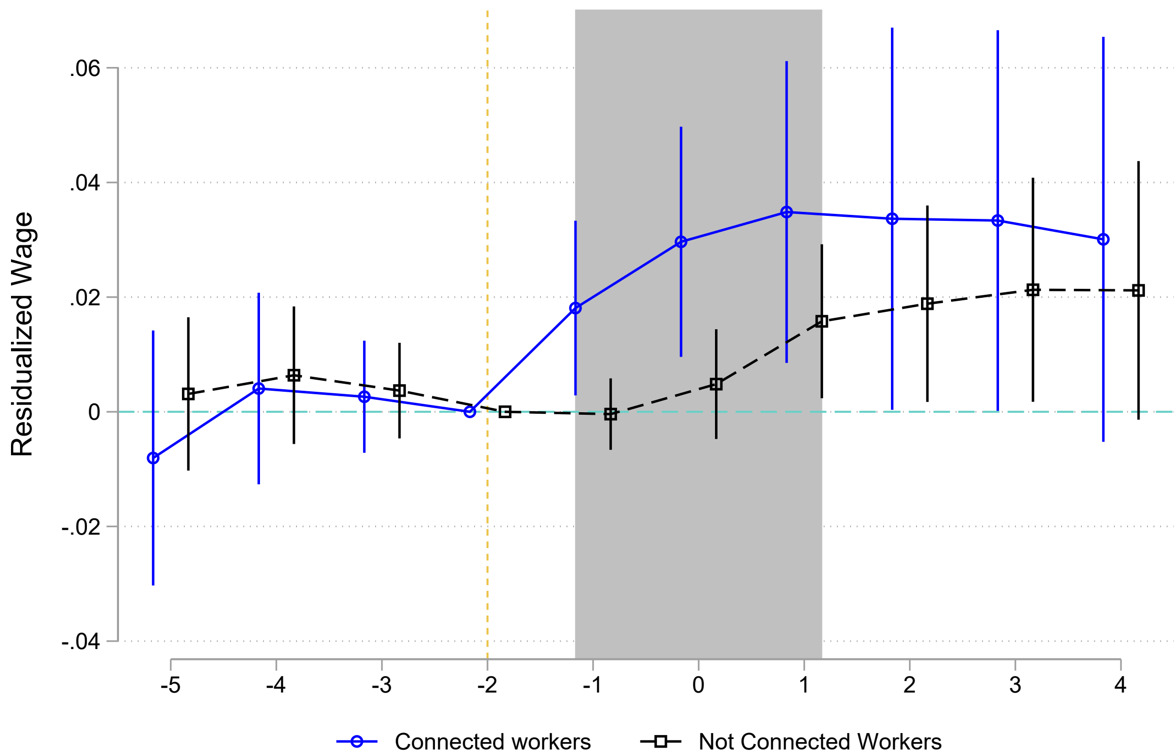


Figure 13: This figure plots coefficients from the event-study regression in Equation 20 where the outcome variable is the residualized wage of workers employed by the local employer in the baseline period (in the Estimation Region). The connected blue line displays coefficients for a subsample of matches 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 X-axis indicates years relative to the 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.

Incumbent Workers' Transitions: The Role of Coworker Connections

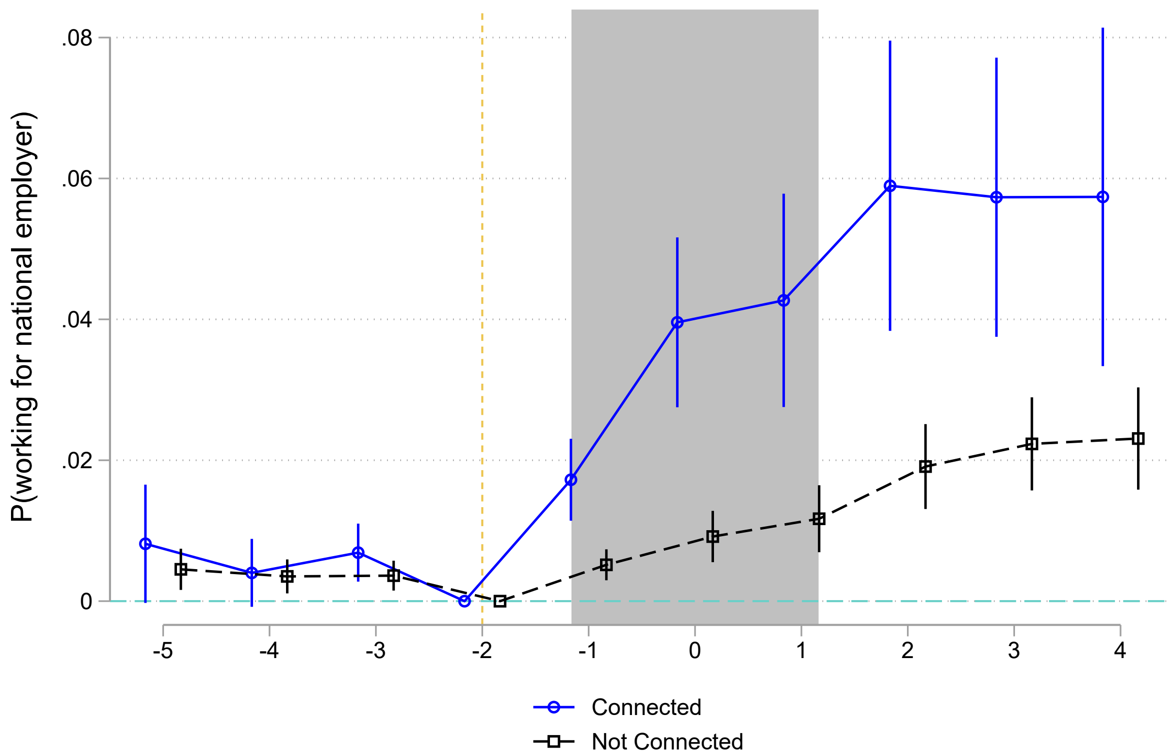


Figure 14: This figure plots coefficients from the event-study regression in Equation 20 where the outcome variable is the probability of working for a national employer, for workers who were employed by the local employer in the baseline period (in the Estimation Region). The connected blue line displays coefficients for a subsample of matches where treated workers had a co-worker working for a national employer in the period-year 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-year 0. The X-axis indicates years relative to the 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.

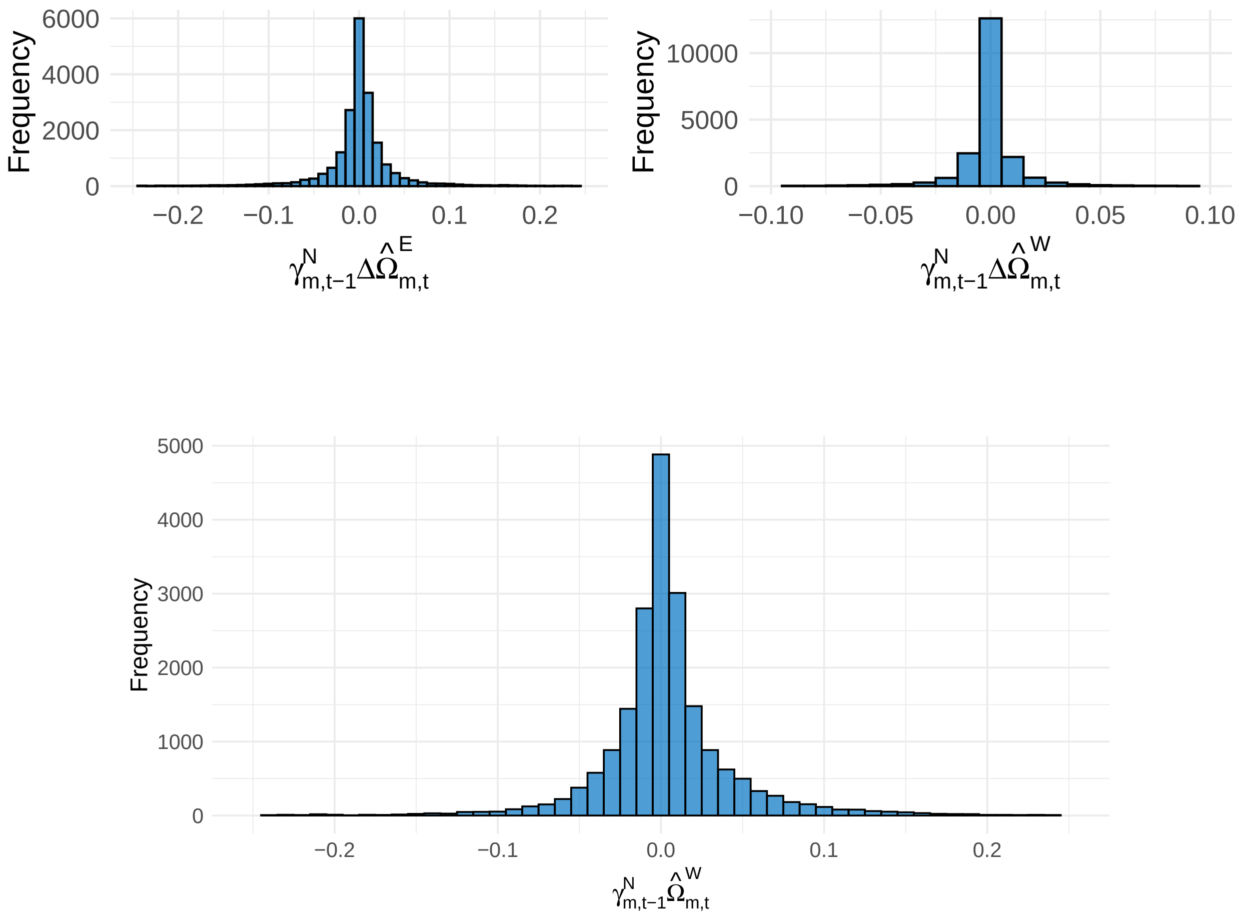


Figure 15: This figure displays the distributions of the exposure measures for national employers across all labor markets (occupation × microregion) - year observations within the Estimation Region, weighted by a number of workers in the previous year (t-1). The upper-left panel shows the histogram of national employers' wage changes instrument normalized by national employers employment share ($\gamma^N_{m,t-1}\Delta\hat{\Omega}^W_{m,t}$, defined in 10), the upper-right panel shows the histogram of national employers' employment changes instrument normalized by national employers employment share ($\gamma^N_{m,t-1}\Delta\hat{\Omega}^E_{m,t}$, defined in 13), and the bottom panel displays the histogram of national employers' employment level instrument normalized by national employers employment share ($\gamma^N_{m,t-1}\hat{\Omega}^W_{m,t}$, defined in 12). Observations restricted to the labor markets within 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 the Estimation Region	2.83	1.03
	(5.18)	(0.28)
Large cities locations	1.94	0.0
	(1.64)	
Total Employment in the Estimation Region	103.2	14.57
	(296.4)	(37.7)
Total Employment in large cities	281.4	0.0
	(815.7)	
Average hourly wage in the Estimation Region	16.4	9.26
	(16.7)	(6.10)
Residualized hourly wage in the Estimation Region	0.14	-0.01
	(0.33)	(0.27)
Number of Employer× Occupation	5771	179,502
Number of Employer× Occupation × year obs.	25,467	607,168

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

	Estimation Region Outcomes							
Large City Region	Wage		Δ Wage			Δ Log. Employment		
Variables	$\widehat{OOI}^N_{m,t}$		$\gamma_{m,t-1}\Delta w^N_{m,t}$			$\gamma^N_{m,t-1}\Delta \ln l^N_{m,t}$		
$\gamma^N_{m,t-1}\Delta\hat{\Omega}^W_{m,t}$			0.61***	0.60***	0.63***	-0.18	-0.03	-0.18
			(0.04)	(0.04)	(0.04)	(0.15)	(0.21)	(0.16)
$\gamma^N_{m,t-1}\Delta\hat{\Omega}^E_{m,t}$			-0.00	-0.00	-0.00	0.48***	0.49***	0.48***
			(0.01)	(0.01)	(0.01)	(0.05)	(0.08)	(0.05)
$\gamma^N_{m,t-1}\hat{\Omega}^W_{m,t}$	0.61***	0.62***						
	(0.03)	(0.03)						
Observations	9,285	9,285	9,285	9,285	9,285	9,285	9,285	9,285
R-squared	0.87	0.87	0.55	0.57	0.55	0.53	0.54	0.55
F-stat	261.21	261.31	72.68	78.90	108.03	37.50	33.16	57.23
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 22 and 23. $OOI^N_{m,t}$ represents the average national employers' wage level in the Estimation Region multiplied by the national employers' employment share $\gamma^N_{m,t-1}$, defined in 14.$\gamma^N_{m,t-1}\Delta w^N_{m,t}$ represents a three-year change in the measure of national employers' average wage, as defined in Equation 16. $\gamma^N_{m,t-1}\Delta \ln l^N_{m,t}$ represents a three-year change in the national employers' log-employment measure, as defined in Equation 16. $\gamma^N_{m,t-1}\Delta\hat{\Omega}^W_{m,t}$, $\gamma^N_{m,t-1}\Delta\hat{\Omega}^E_{m,t}$, and $\gamma^N_{m,t-1}\Delta\hat{\Omega}^W_{m,t}$ stand for the exposure measures defined in 12, 13, 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	5,179	5,234	-53
	(5251)	(4,706)	(4,677)	(1,239)
Job size	14.2	14.55	14.4	0.14
	(35)	(44)	(44)	(0.82)
Average Hourly Log Wage	2.14	2.09	2.10	-0.01
	(0.40)	(0.40)	(0.41)	(0.04)
Average Residualized Hourly Wage	0.00	0.02	0.02	-0.005
	(0.27)	(0.29)	(0.27)	(0.03)
Average Tenure (years)	2.56	2.33	2.36	-0.03
	(2.39)	(2.27)	(2.20)	(0.14)
National Employers' Employment Share	0.08	0.12	0.11	0.01*
	(0.08)	(0.07)	(0.07)	(0.07)
National Employers' Residualized Wage	0.14	0.16	0.18	-0.02
	(0.21)	(0.18)	(0.18)	(0.04)
University Education	0.09	0.11	0.11	0.00
Female	45	0.47	0.48	-0.005
Number of Observations	377,381	7,767	7,767	

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	5,668	5,607	61
	(5155)	(4,630)	(4,559)	(1,364)
Job size	101.1	27.8	27.7	0.08
	(268)	(51)	(51)	(3.76)
Hourly Wage	11.27	10.04	10.12	-0.08
	(11.07)	(9.48)	(8.79)	(0.54)
Residualized Hourly Wage	0.01	0.03	0.03	-0.00
	(0.37)	(0.42)	(0.42)	(0.045)
Average Tenure (years)	3.30	3.05	3.03	0.01
	(3.2)	(3.55)	(3.59)	(0.15)
National Employers' Employment Share	0.10	0.10	0.09	0.017**
	(0.10)	(0.04)	(0.05)	(0.007)
National Employers' Residualized Wage	0.15	0.18	0.20	-0.02
	(0.2)	(0.16)	(0.20)	(0.04)
University Education	0.09	0.08	0.09	-0.01
Female	46	0.50	0.50	0
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		Δ Wage		Δ Log. Employment	
$\gamma^N_{m,t-1}\Delta\hat{\Omega}^W_{m,t}$	0.44***	0.44***				
	(0.049)	(0.047)				
$\gamma^N_{,m,t-1}\Delta\hat{\Omega}^E_{m,t}\times$ N.E wage	0.15*	0.15***				
	(0.08)	(0.066)				
N.E. Outside option change $\Delta\widehat{OOI}^N_{m,t}$			0.60***	0.40***	-0.17	-0.30
			(0.14)	(0.13)	(0.47)	(0.50)
Bartik Ind. Instrument	0.002	-0.003	0.000	0.003	0.04	0.04
	(0.005)	(0.005)	(0.008)	(0.01)	(0.03)	(0.03)
Observations	126,687	126,687	126,687	126,687	126,687	126,687
R-squared	0.41	0.52				
Year × Occupation FE	✓	✓	✓	✓	✓	✓
Year × State FE	✓		✓		✓	
Year × 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 21. Δ N.E. wage represents a three-year change in the measure of national employers' average log-wage, as defined in Equation 16. $\gamma^N_{m,t-1}\Delta\hat{\Omega}^W_{m,t}$, $\gamma^N_{m,t-1}\Delta\hat{\Omega}^W_{m,t}$, stand for the shift-share instruments defined in 12 and 13, 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 24–30 for each local firm's wages and employment, taking the national employers' wages and vacancy postings as given [23]:

$$w_{j,m} = A_1 y_o + A_2(\mathrm{ER}_m) b_m + A_3(\mathrm{ER}_m) \left(\gamma_m^N w_m^N + \sum \gamma_{j,m} w_{j,m}\right) \tag{24}$$

$$+ A_1(\epsilon_m + \varepsilon_{j,m}) \tag{25}$$

$$\frac{\delta}{p_{m,t}} l_{j,m} = V_{j,m} = \tilde{\rho}_1 \frac{q_m}{c} \left(y + \epsilon_m + \varepsilon_{j,m} - w_{j,m}\right) \tag{26}$$

$$p_m = \frac{\delta \mathrm{ER}_m}{1 - \mathrm{ER}_m} \tag{27}$$

$$q_m = \left(\frac{1 - \mathrm{ER}_m}{\delta \mathrm{ER}_m}\right)^{\frac{\sigma}{1-\sigma}} \tag{28}$$

$$\mathrm{ER}_m = \frac{\sum l_{j,m} + l_m^N}{L_m} = \frac{\mathrm{E}_m}{L_m} \tag{29}$$

$$\gamma_{j,m} = \frac{V_{j,m}}{V_m^N + \sum V_{j,m}} \tag{30}$$

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

$$w_{j,m} = \frac{A_1}{1 - (1 - A_3(\mathrm{ER}_m)\gamma_m^N)} y_o + \frac{A_2(\mathrm{ER}_m)}{1 - (1 - A_3(\mathrm{ER}_m)\gamma_m^N)} b_m + \tag{31}$$

$$+ \frac{A_3(\mathrm{ER}_m)}{1 - (1 - A_3(\mathrm{ER}_m)\gamma_m^N)} \gamma_m^N w_m^N + \frac{A_1((2 - \gamma_m^N)\epsilon_m + \varepsilon_{j,m})}{1 - (1 - A_3(\mathrm{ER}_m))}$$

$$l_{j,m} = \frac{p_{m,t}}{\delta} \tilde{\rho}_1 \frac{q_m}{c} \left(y + \epsilon_m + \varepsilon_{j,m} - w_{j,m}\right) \tag{32}$$

[23] Where: $\tilde{\rho}_1 = \frac{1}{1-\rho(1-\delta)}$, $\tilde{\rho}_2(\mathrm{ER}_m) = \frac{1}{1-\rho(1-p_m)}$, $A_1 = \kappa\tilde{\rho}_1$, $A_2 = (1-\kappa)(1-\rho\tilde{\rho}_1)\frac{\tilde{\rho}_2(\mathrm{ER}_m)}{1-\rho^2\delta p_m \tilde{\rho}_1 \tilde{\rho}_2(\mathrm{ER}_m)}$ and $A_3 = \rho p_m \tilde{\rho}_1 A_2$. By E_m I denote the total employment.

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

$$\mathbf{x} = \left(E_m, L_m, \gamma_m^N w_m^N, y_o, \gamma_m^N, b_m, \epsilon_m, \varepsilon_{j,m}\right).$$

To examine the first order effects, I take a linear approximation of equations 5–6 around the point $\mathbf{x}_0 = \left(E, L, , \gamma^N w^N, y, \gamma^N, b, 0, 0\right)$, 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 $\epsilon_m = \varepsilon_{j,m} = 0$. To account for first-order effects, I flow 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 $\ln l(\mathbf{x}) = \ln l(\mathbf{x}_0) + \nabla \ln l(\mathbf{x}_0)(\mathbf{x} - \mathbf{x}_0)$.

$$\nabla \ln w(\mathbf{x}_0) = \frac{1}{w(\mathbf{x}_0)} \times \begin{pmatrix} \frac{\left[A_2'(\text{ER})A_3(\text{ER}) + A_3'(\text{ER})A_3(\text{ER}) - A_3'(\text{ER})(y + A_2(\text{ER} + A_3(\text{ER}))\right]}{\gamma^N A_3^2(\text{ER})} \frac{\partial \text{ER}}{\partial \text{E}} \\ \frac{\left[A_2'(\text{ER})A_3(\text{ER}) + A_3'(\text{ER})A_3(\text{ER}) - A_3'(\text{ER})(y_0 + A_2(\text{ER} + A_3(\text{ER}))\right]}{\gamma^N A_3^2(\text{ER})} \frac{\partial \text{ER}}{\partial \text{L}} \\ \frac{A_3(\text{ER})}{1 - (1 - A_3(\text{ER}_) \gamma^N)} \\ \frac{A_1}{1 - (1 - A_3(\text{ER})\gamma^N)} \\ -\frac{A_3'(\text{ER})}{A_3^2(\text{ER})} \left(y_0 + A_2(\text{ER} + A_3(\text{ER})\right) \\ \frac{A_2(\text{ER}}{1 - (1 - A_3(\text{ER})\gamma^N)} - \\ \frac{A_1(2 - \gamma^N)}{1 - (1 - A_3(\text{ER})\gamma^N)} \\ \frac{A_1}{1 - (1 - A_3(\text{ER})\gamma^N)} \end{pmatrix}$$

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

$$\begin{aligned} \ln w(\mathbf{x}) \approx \ln w(\mathbf{x}_0) &+ \alpha_1 \left((y - y) + (2 - \gamma^N)\epsilon_m + \varepsilon_{j,m}\right) + \alpha_{2,E}(\text{E}_m - \text{E}) + \alpha_{2,L}(\text{L}_m - \text{L}) \\ &+ \alpha_3 \left(\gamma_m^N w_m^N - \gamma^N w^N\right) + \alpha_4(\gamma_m^N - \gamma^N) + \alpha_5(b_o - b) \\ &= \alpha_0 + \alpha_1 \left(y + \epsilon_m + \varepsilon_{j,m}\right) + \alpha_{2,E}\text{E}_m + \alpha_3 \gamma_m^N w_m^N + \alpha_4 \gamma_m^N + \alpha_5 b_o + + \alpha_{2,L}\text{L}_m \end{aligned}$$

Where:

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

The term $\alpha_4\gamma_m^N$ 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 it from the main specification 3–4. Similarly, I assume that unemployment benefit evolves along the y 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 Δ between two steady states, when the labor market experienced differences in $\Delta y_o, \Delta\gamma_m^N, \Delta \ln w_m^N$, $\Delta \mathrm{E}_m$ and $\Delta\epsilon_m$ and local employer $\Delta\varepsilon_{j,m}$, I receive:

$$
\begin{aligned}
\Delta \ln w_{j,m} =& \alpha_1 \Delta y_o + \alpha_{2,E}\Delta \mathrm{E}_m + \alpha_3\left(\Delta\gamma_m^N w_m^N + \gamma_m^N \Delta w_m^N\right) \\
&+ \alpha_1((2-\gamma^N)\Delta\epsilon_m + \Delta\varepsilon_{j,m})
\end{aligned}
$$

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

$$\Delta \ln l_{j,m} = \beta_1 \Delta y_o + \beta_{2,E} \Delta \mathrm{E}_m + \beta_3 \left(\Delta \gamma_m^N w_m^N + \gamma_m^N \Delta w_m^N \right) \\ + \beta_1 ((2 - \gamma^N) \Delta \epsilon_m + \Delta \varepsilon_{j,m})$$

B Additional Results on national wage and employment setting

Figure 15 shows that while the wage-level instruments $\gamma_{m,t-1}^N \hat{\Omega}_{m,t}^{w\ N}$ exhibit relatively large variation, the wage and employment expsure measures $\gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^W$ and $\gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^E$ are concentrated near zero; only 10% of observed $\gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^W$ 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 $\gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^W > 0.005$ and $\gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^E > 0.0$ (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 Further 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

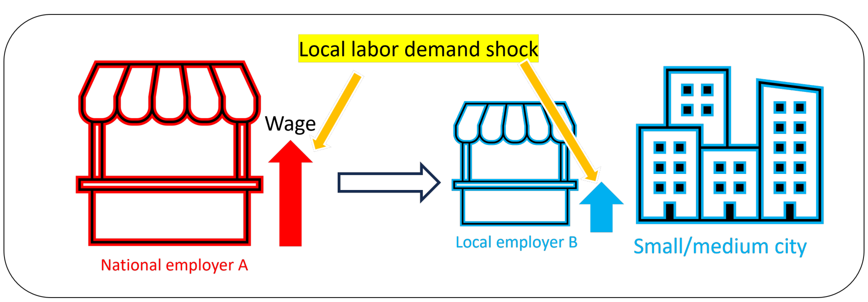


Figure C.1: This figure illustrates the possible identification problem in the spillover identification. Wage increases of both local and national employers are influenced by the local labor demand shock, which confounds the spillover effect.

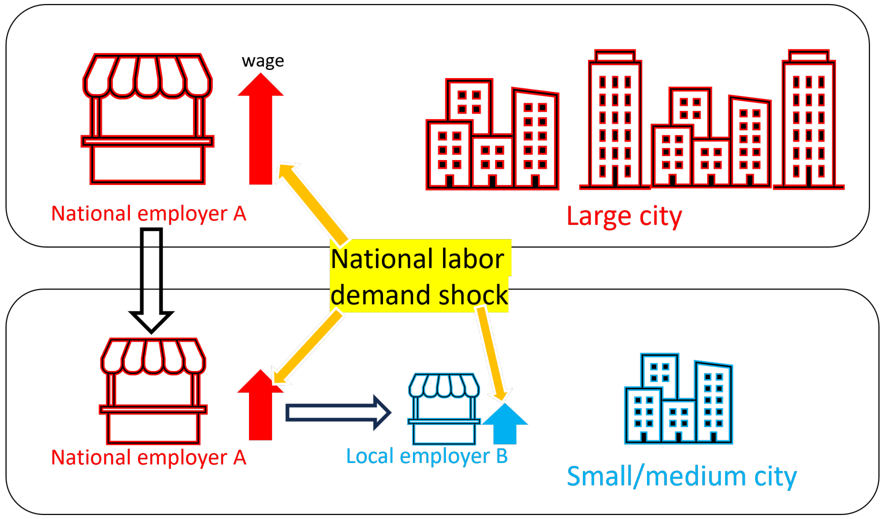


Figure C.2: This figure illustrates the possible identification problem in the spillover identification after eliminating the local employment labor demand shocks. Wage increases of both local and national employers are influenced by the national labor demand shock, which confounds the spillover effect.

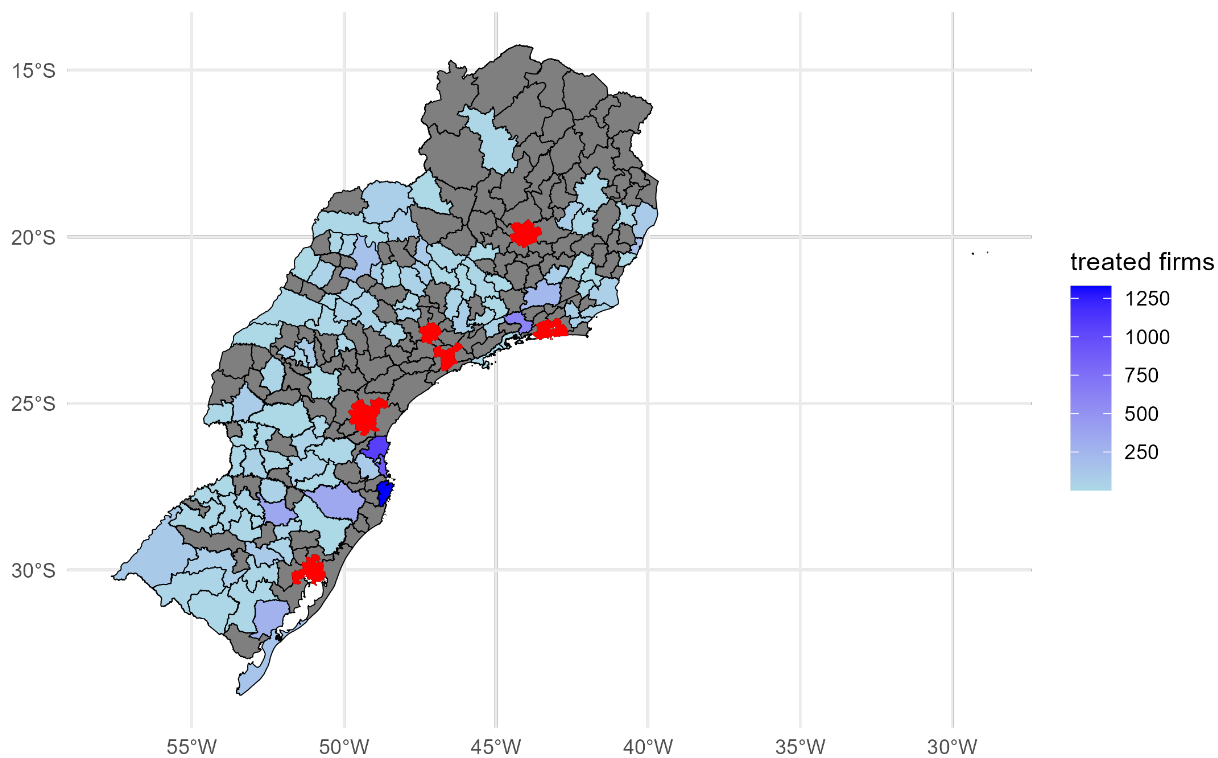
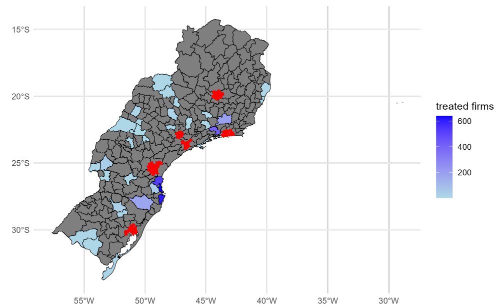
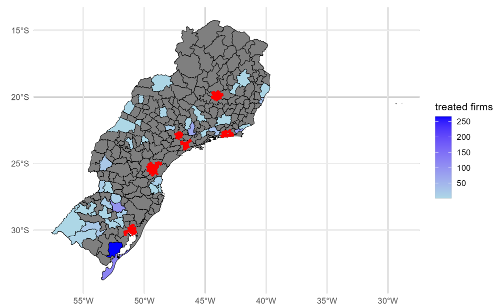


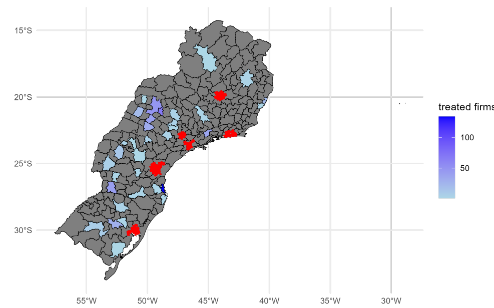
Figure C.3: This figure shows the matched treated jobs by microregions (commuting zones) of Brazil's Southeast and South regions. The red color depicts the large city region. The microregions in gray have no matched treated jobs.



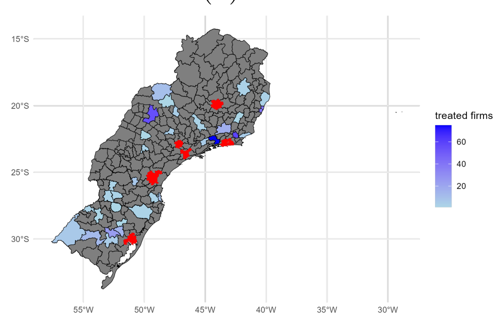
(a) 2011



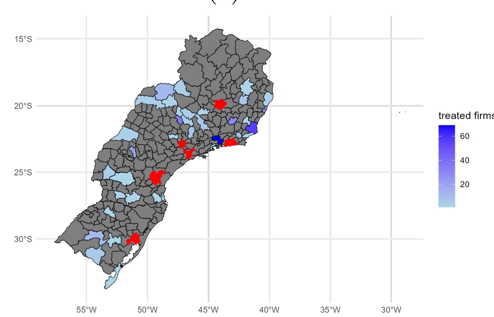
(b) 2012



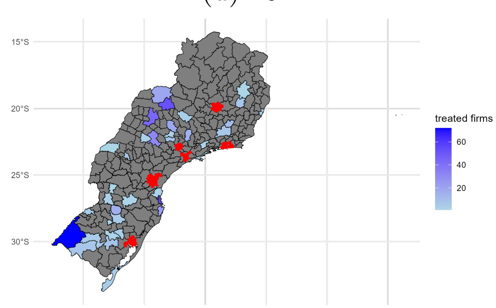
(c) 2013



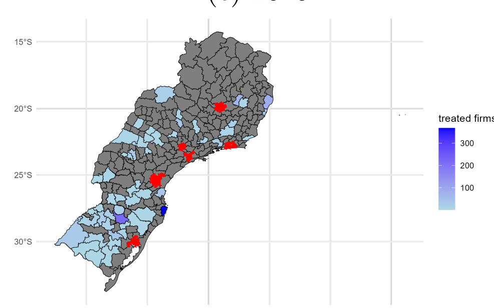
(d) 2014



(e) 2015



(f) 2016



(g) 2017

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.

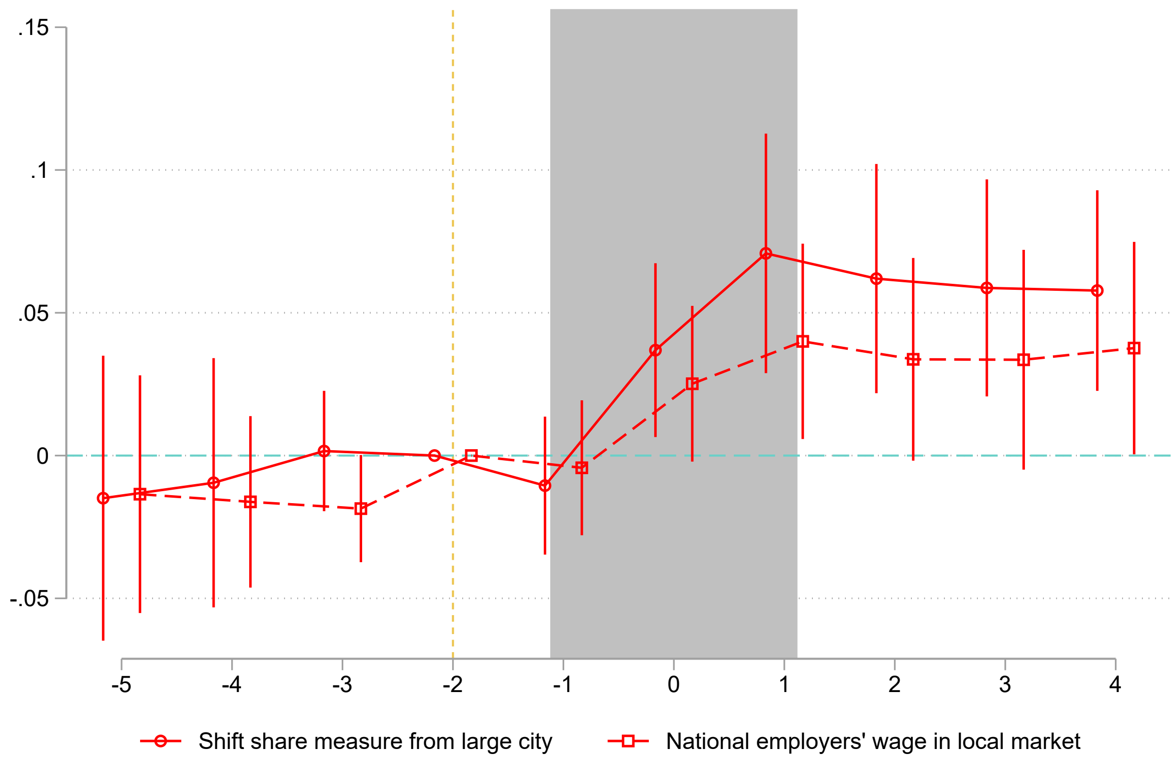


Figure C.5: This figure plots coefficients from the event-study regression in Equation 20. The connected red line represents the estimates when the outcome variable is the measure of exposure to national employers' relative wage policy based on their wages in the large city region, $\hat{\Omega}^{W}_{m,t}$, 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, $w^{N}_{m,t}$, defined by Equation 15. The model includes fixed effects for job and year-by-occupation. The X-axis indicates years relative to the expansion. Standard errors are two-way clustered: by job and by labor market.

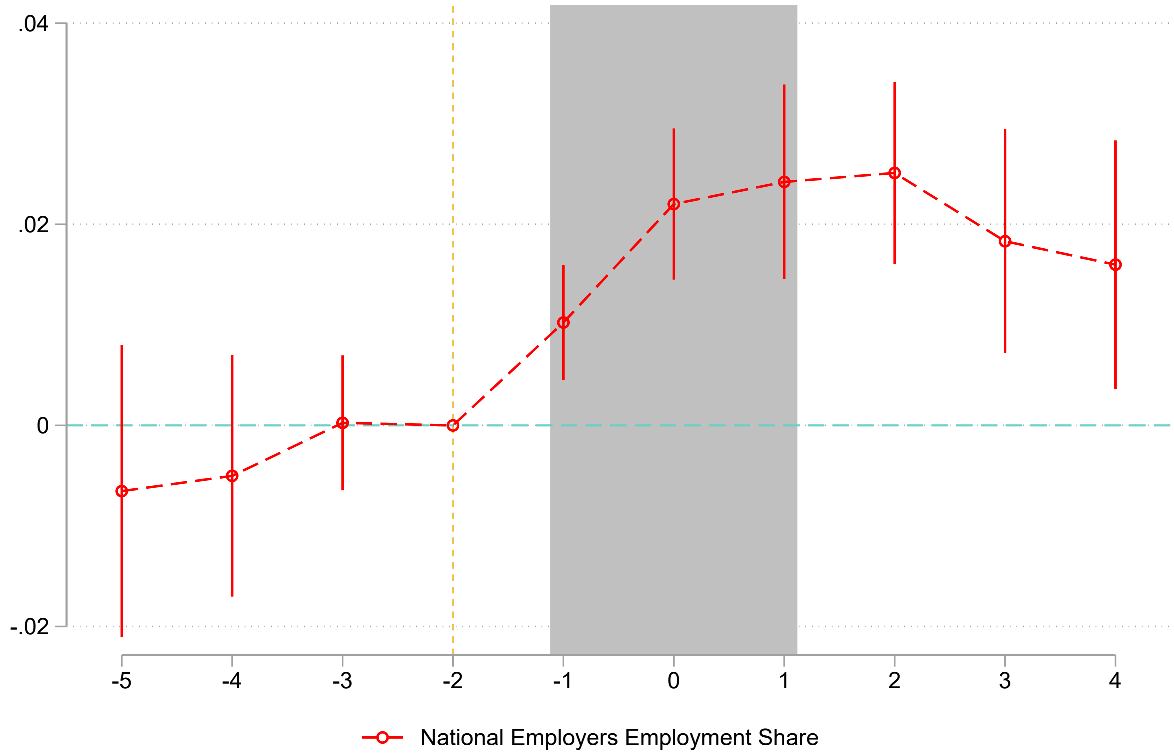


Figure C.6: This figure plots coefficients from the event-study regression in Equation 20. The dashed right line shows the estimates when the outcome variable is the national employers' employment share in the matched labor market. The model includes fixed effects for job and year-by-occupation. The X-axis indicates years relative to the expansion. Standard errors are two-way clustered: by job and by labor market.

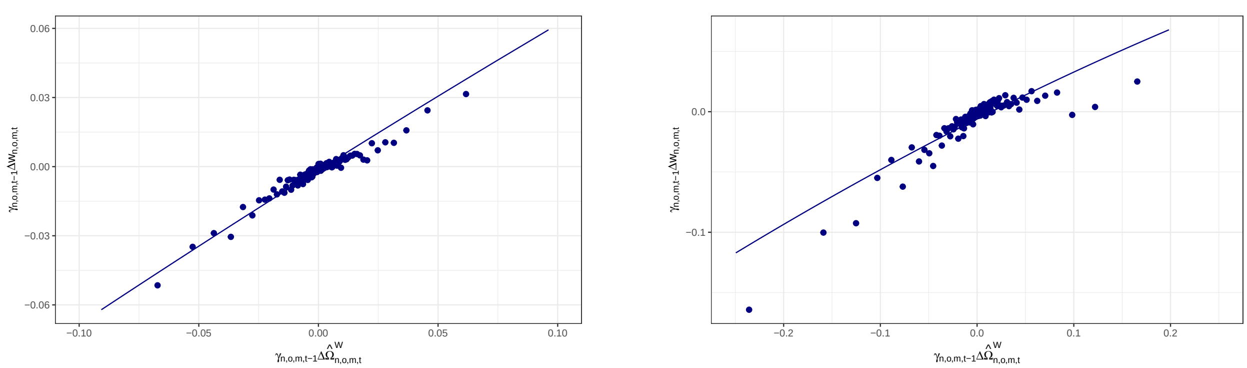


Figure C.7: The bin scatterplots illustrate the relationship between the measure of national employers' wage and employment policies in the large city region ($\Delta\hat{\Omega}^W_{m,t}$, $\Delta\hat{\Omega}^E_{m,t}$) and their policies in the labor market of the Estimation Region. The left panel displays the relationship with the measure of residualized wages ($\gamma^N_{m,t-1}\Delta w^N_{m,t}$) of national employers in the Estimation Region. The right panel depicts the relationship with the logarithm of employment ($\gamma^N_{m,t-1}\Delta \ln l^N_{m,t}$) of national employers in the Estimation Region.

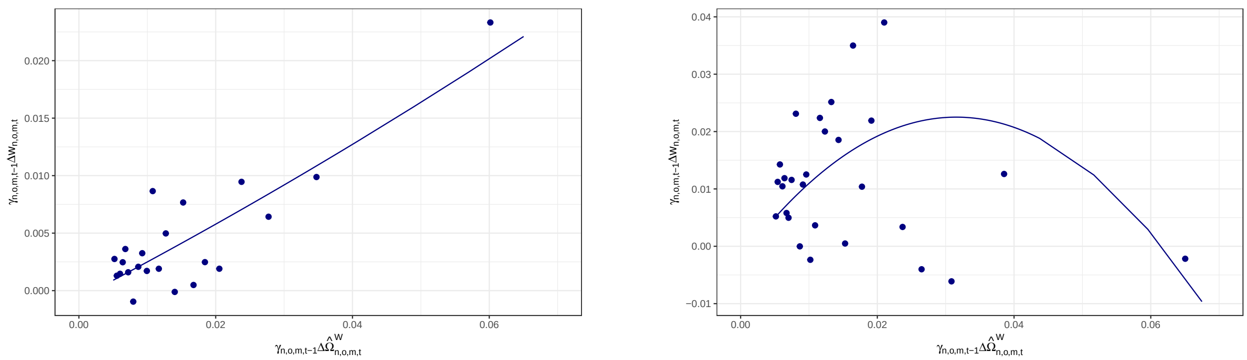
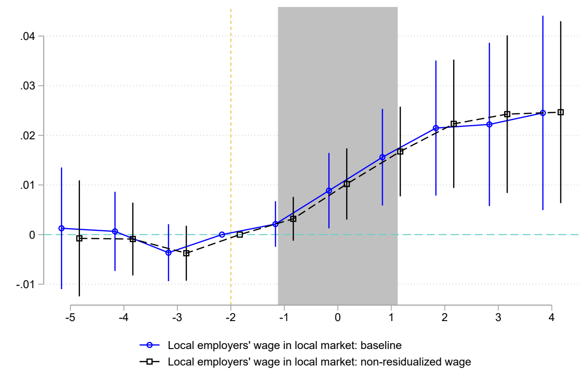
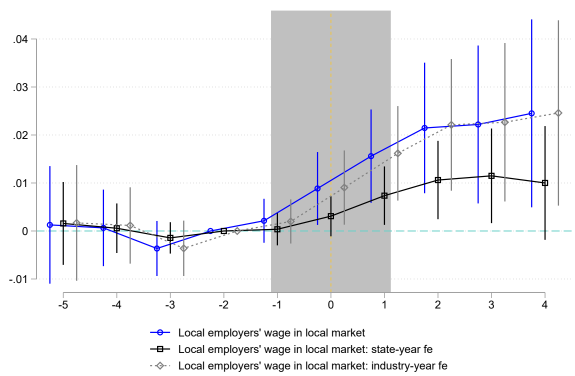


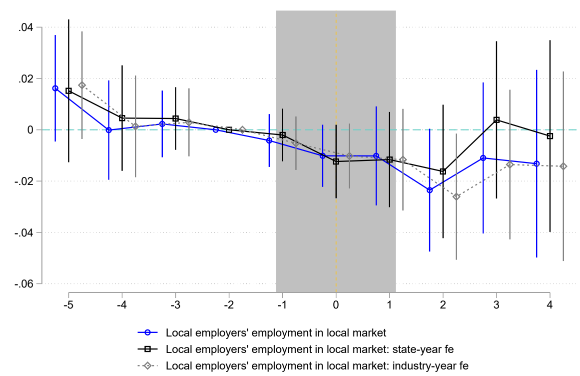
Figure C.8: The bin scatterplots illustrate the relationship between the measure of national employers' wage policies in the large city region ($\gamma^N_{m,t-1}\Delta\hat{\Omega}^W_{m,t}$) and their policies in the labor market of the Estimation Region, specifically in cases of national employers' expansion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



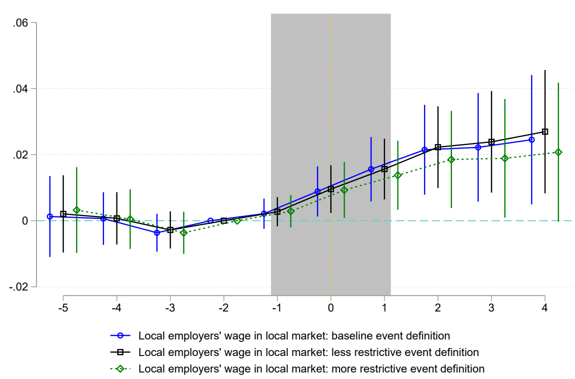
(a) Residualized vs. Real Wages



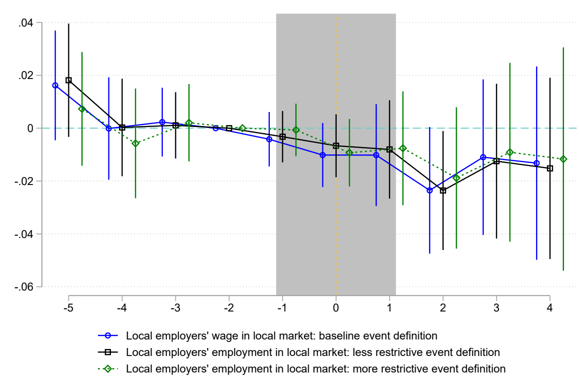
(b) Baseline vs. Additional FE



(c) Baseline vs. Additional FE



(d) Baseline vs. More or Less Restrictive



(e) Baseline vs. More or Less Restrictive

Figure C.9: This figure plots coefficients from the event-study regression in Equation 19. On the left side the outcome variable is residualized wage, on right log employment, in the first center panel, the outcome is resdiualized 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 strcit definition of the event $\gamma^N_{m,t-1}\hat{\Omega}_{,m,t} > 0.0045$. Connected green line represents the estimates when for more strcit definition of the event $\gamma^N_{m,t-1}\hat{\Omega}_{m,t} > 0.0055$. The X-axis indicates years relative to the expansion. All the models include fixed effects for job and year-by-occupation. Standard errors are two-way clustered: by job and by labor market.

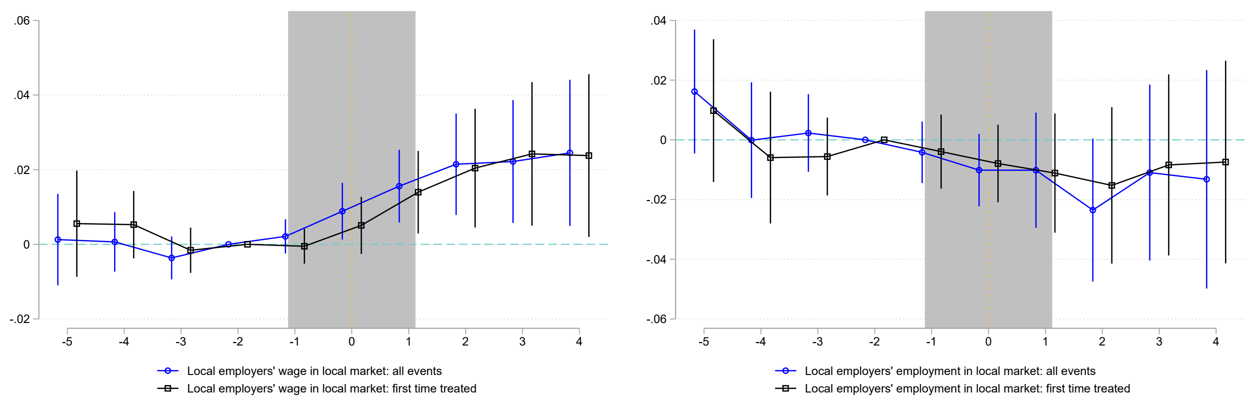


Figure C.10: This figure plots coefficients from the event-study regression in Equation 19. On the left side the outcome variable is residualized wage, on right log employment. The connected blue line represents the coefficient for baseline event study, the black line the estimates only for first-time treated jobs. The X-axis indicates years relative to the expansion. 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

	(1)	(2)	(3)	(4)
VARIABLES	$\gamma^N_{m,t-1}\Delta w^N_{m,t}$		$\gamma^N_{m,t-1}\Delta \ln l^N_{m,t}$	
$\gamma^N_{m,t-1}\hat{\Omega}^W_{m,t}$	0.64***	0.46***	-0.19	0.05
	(0.04)	(0.05)	(0.16)	(0.33)
$\gamma^N_{m,t-1}\hat{\Omega}^E_{m,t}$	0.00	0.01	0.48***	0.50***
	(0.01)	(0.01)	(0.05)	(0.08)
Observations	9,285	4,756	9,285	4,756
R-squared	0.55	0.40	0.53	0.48
Year × 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 22.$\gamma^N_{m,t-1}\Delta w^N_{m,t}$ represents a three-year change in the measure of national employers' average log-wage, as defined in Equation 16. $\gamma^N_{m,t-1}\Delta \ln l^N_{m,t}$ represents a three-year change in the national employers' log-employment measure, as defined in Equation 16. $\gamma^N_{m,t-1}\Delta\hat{\Omega}^W_{m,t}$, $\gamma^N_{m,t-1}\Delta\hat{\Omega}^W_{m,t}$, and stand for the shift-share instruments defined in 12 and 13, respectively. All regressions control for national employers' employment share. Standard errors are clustered at the labor market level.