National Firms, Local Effects:

Spillovers from Multi-Establishment Employers' Expansions*

Jan Rosa

UBC

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Abstract

This paper investigates how expansions of large multi-establishment (national) employers—characterized by intense hiring activity and wage increases—affect the wage and hiring policies of smaller (local) employers. To distinguish spillover effects from local productivity changes, I develop an empirical strategy that leverages the activities of national employers in large cities, which are likely unaffected by labor market dynamics in less populous areas. This approach allows me to construct shift-share instruments that identify local labor market exposure to idiosyncratic labor demand shocks of national employers. Implementing this strategy using Brazilian administrative data and combining matching with an event study design, I examine the long-term effects of significant positive change in the shift-share measure. I find that a rapid 10% increase in the shift-share wage measure corresponds with national employers increasing wages by 5.5% and employment by 30% in labor markets outside the large cities. This expansion pressures local employers to raise wages by 3%, resulting in a 1.5% wage growth at the worker level. Although local employers reduce employment by about 2%, this does not adversely affect workers' employment prospects, as they reallocate to the expanding employers. I argue that labor market wage spillovers are an important factor in evaluating place-based policies.

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1 Introduction

Local governments in both developed (Bartik, 2019) and developing countries (Duranton and Venables, 2021) frequently offer tax breaks or subsidies to attract new employers. When implementing such policies, it is essential to consider not only the jobs directly created by these new employers but also the spillover effects—the responses of the broader local economy. While much of the literature (Greenstone et al., 2010; Moretti, 2010; Bartik and Sotherland, 2019) has focused on product market spillovers—such as new firms purchasing from or selling to incumbent businesses or competing for consumers—labor market spillovers can be equally significant. For example, a new employer might poach workers from incumbent firms, reducing the net increase in employment. Additionally, in an imperfectly competitive labor market, a new source of labor demand can influence not only the quantity of jobs at existing firms but also their quality, specifically wages.

Analyzing spillovers from new sources of labor demand poses challenges when using standard datasets. First, the expansion of an employer into a region may itself be driven by changes in local labor market productivity. Consequently, attributing wage increases solely to the new employer's entry could lead to an overestimation of wage spillovers. Prior studies (Wiltshire, 2021; Derenoncourt and Weil, 2024) avoid this problem by concentrating on patterns of individual large employers, narrowing the effects to only specific industries or occupations. Second, studies utilizing aggregate or selective data (Neumark et al., 2008; Wiltshire, 2021; Derenoncourt and Weil, 2024) often cannot disentangle the initial labor demand shock from subsequent labor market responses, making it difficult to isolate the spillover effects or to estimate spillovers specifically for a narrow group of large employers.

This paper examines spillovers from large multi-establishment employers—henceforth referred to as *national employers*—to the wage and hiring policies of other, *local* employers. Specifically, I address two key questions: Do national employers poach workers from incumbent firms, thereby reducing net employment effects? Does increased competition for workers pressure other employers to raise wages? To address these questions, I develop a new empirical strategy based on national employers' wage and employment policy changes in large cities. Building on recent literature on national wage and employment setting (Hazell et al., 2021; Schubert et al., 2021), I show that observed national employers' behavior indicates similar changes beyond the large cities, reflecting idiosyncratic changes in their labor demand. Consequently, to identify local labor market exposure to various national employers labor demand shocks, I construct a shift-share measure of their wage and employment changes in the large cities. By utilizing a rich Brazilian administrative dataset, I develop a matched event study to estimate local employers' response to large positive changes in the shift-share measures. I demonstrate strong positive wage spillovers both at the employer (job) and worker level. Importantly, I show that national employer expansions are unambiguously beneficial for workers: while local employers reduce employment, this does not adversely affect workers' employment, as they reallocate to the expanding employers.

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 combined with precise location data. Furthermore, the dataset provides detailed information on the occupations of employed workers. This allows me to track the employment and wages of multi-establishment employers for specific occupations. Moreover, it enables the estimation of spillovers within narrowly defined labor markets.

I begin with a simple random search model, which I later use to derive the empirical specification[1]. I introduce two types of employers: local and national. National employers post wages and vacancies based on their idiosyncratic labor demand factor and local labor market conditions. Local employers set wages through continuous bargaining and post vacancies according to a convex posting cost function. I show that local employers' wage and employment changes can be decomposed into their own productivity changes, changes in local labor market productivity, changes in labor market tightness, and changes in outside

[1] In this, I follow the structural approach of the outside option studies (Beaudry et al., 2012, 2018; Caldwell and Danieli, 2021).

options. The effects of national employers' wage and vacancy changes impact both tightness and outside options but are also correlated with local labor market productivity. Therefore, it is impossible to distinguish national employers' shocks from local labor market productivity changes based solely on national employers' wage changes in one location.

The model suggests that a valid identification strategy for estimating spillover effects is to identify changes in the national employers' idiosyncratic factors—their idiosyncratic labor demand shocks. Thus, examining national employers' entries—a seemingly natural way of investigating the effects of their expansions—would be biased unless the entry is motivated purely by the national employer's idiosyncratic labor demand changes. However, entries are difficult to model and instrument, as many regional characteristics might influence firms' location choices, especially if the research is not limited to one specific company. Moreover, their impact might be concentrated in a relatively small area. Therefore, I propose a new empirical strategy that exploits the expansions of multi-location firms, which are decided at the national level and focused on the locations where those firms are already present, providing a likely exogenous shock.

Specifically, I develop a portable quasi-experimental strategy based on recent research on national wage-setting (Hazell et al., 2021). Using rich Brazilian administrative employer-employee data, I track the wages and employment of national employers across Brazil's major cities, computing their relative changes in wages and employment. These defined shocks allow me to develop a novel shift-share instrument to measure the exposure of local labor markets beyond the largest urban centers to idiosyncratic employment and wage shifts of national employers.

Consistent with (Hazell et al., 2021) and (Schubert et al., 2021), my findings reveal that a 1% wage increase by national employers in major city regions (relative to other large-city employers) is accompanied by approximately a 0.6% wage increase by national employers in smaller labor markets within the same occupation. Similarly, a 1% relative increase in employment by national employers is matched by a 0.5% increase in employment in less populous locations. The strength of these co-movements confirms that the shift-share instrument effectively captures the idiosyncratic labor demand shocks of national employers.

Next, I proceed to the main research design: a matched event study of national employers' expansions, defined as large increases in the constructed shift-share instrument. The analysis reveals that such expansions trigger an outflow of incumbent workers from local employers, who cannot replace these workers with new hires, leading to about a 2% decrease in employment. Local employers subsequently raise wages for both remaining and newly hired employees. I observe positive, though slowly increasing, wage spillovers at the job and worker level, which rise to about 3% at the job level and about 1.5% at the worker level. Importantly, incumbent workers who remain with their employers also experience wage increases that converge to the same level as for all workers. This suggests that local firms adapt to more intense labor market competition not by selecting workers but by changing their wage policy.

The theoretical analysis also provides guidance on who, or what types of workers, would 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 50% 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 found that workers with past co-workers now working for national employers are three times more likely to join the national employer and experience two times higher wage increases than other workers.

The last set of results measures the general spillovers of national employers' policies, not restricted to the expansion periods. Using an instrumental variables regression derived from the model, I estimate spillover effects from outside option changes originating from national employers' labor demand changes. I find strong wage spillovers from the national employers determined by outside option changes. However, the results do not support the existence of tightness effects. Lastly, in the whole sample, the employment spillovers are insignificant.

My work contributes to the literature that estimates 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), while I use variation at the individual employer level. In this dimension, my paper is similar to the recent work of Bassier (2021) and Green et al. (2022). Unlike these papers, I do not base my outside option measure on changes in union contracts but on the expansions of large employers.

This paper is also related to studies of outside option shocks at the individual worker level (Caldwell and Harmon, 2019; Lachowska et al., 2022; Urena et al., 2021), which aim to identify workers' renegotiation. I view my paper as complementary; whereas these studies focus only individual changes in worker's outside option, I estimate the total effects from the large market-level shock, which, potentially, is not only limited to outside option shocks.

I estimate a different margin of adjustment than the related paper by Derenoncourt and Weil (2024). While they study large employer wage changes that lead to decreased separations and lower hiring, I estimate the effects of a more standard labor demand shock, with large employers increasing wages but even more so increasing their employment levels and hiring intensity. Moreover, I focus more on labor market exposure to different national employers than on specific firms' policies.

My work is also related to the local multipliers literature (Bartik, 1991; Moretti, 2010; Bartik and Sotherland, 2019; Bartik, 2019, 2021). Unlike these papers, I focus on a single labor market defined by occupation and commuting zone, rather than on the entire local economy (defined as state, commuting zone, or county). My approach allows for precise identification of wage spillovers, which were typically ignored by this literature. Conversely, I do not account for possible product market spillovers, which likely extend beyond the occupation-defined labor market (Dhyne et al., 2022). I leave this research direction for future work.

Lastly, in constructing large firm expansion shocks, I build on research that examines multi-location employers' decisions. In particular, the related work of Hazell et al. (2021) defines the concept of national employers: firms that plan their wages at the national level, making their wage decisions likely exogenous to the labor market conditions in a particular location. Similar to Hazell et al. (2021), I find that the wages and employment of multi-location firms are strongly correlated across locations. Therefore, wage and employment shocks observed in large cities (with the most flexible labor markets) are likely to represent the firms' idiosyncratic labor demand shocks. A similar approach was also used by Schubert et al. (2021).

2 Theoretical Framework

This section develops a simple model of a search and continuous bargaining labor market. The model combines the wage-setting mechanism from Beaudry et al. (2012) with the employment model of convex vacancy costs from Lise and Robin (2017). The aim of this section is twofold. First, I derive the estimating equation for the wage and employment spillovers resulting from changes in national employers' wages and vacancies. This helps clarify the identification issues and distinguishes between the effects of a labor market productivity shock and the spillovers from national employer expansions.

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

2.1 Model Setup

In the labor market for occupation o and commuting zone m in period t, there are $n-1$ local employers (denoted by subscript j) and one national employer[2] (denoted by n). A measure $L_{o,m,t}$ of workers is either employed and receiving wages or unemployed and receiving unemployment benefits $b_{o,m,t}$. Matches are destroyed with exogenous probability δ. Time is discrete, and both employers and workers discount the future at rate ρ.

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

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 $w_{n,o,m,t}$ and vacancies $V_{n,o,m,t}$ according to its id-

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

iosyncratic productivity $\Omega^w_{n,o,m,t}, \Omega^E_{n,o,m,t}$, and the market-level productivity $\epsilon_{o,m,t}$:

$$w_{n,o,m,t} = \Omega^w_{n,o,m,t} + \psi^w \epsilon_{o,m,t} \tag{1}$$

$$V_{n,o,m,t} = \Omega^E_{n,o,m,t} + \psi^E \epsilon_{o,m,t} \tag{2}$$

3. Local employers take the national employer's wages and vacancies level as given and choose the vacancy level $V_{j,o,m,t}$.

4. Unemployed workers match with employers.

5. Local employers bargain wages with their workers.

2.2 Local Employers' Vacancy and Wage Determination

Here, I describe the value functions. I assume that $n-1$ is large, so local employers take $\theta_{o,m,t}$ as given. The value of a match $Y^f_{j,o,m,t}$ for a local employer j is given by:

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

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

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

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

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

Finally, the value of unemployment depends on the benefit $b_{o,m,t}$, the probability of being matched with an employer $p(\theta_{o,m,t+1})$, and the expected value of the job provided by an employer, denoted as $\mathbf{E}W_{k,o,m,t}$:

$$U_{o,m,t} = b_{o,m,t} + \rho \left(p_{o,m,t} \mathbf{E} W_{k,o,m,t} + (1 - p_{o,m,t}) U_{o,m,t+1} \right)$$
$$\mathbf{E} W_{k,o,m,t} = \sum_{j=1}^{n-1} \gamma_{j,o,m,t} W_{j,o,m,t} + \gamma_{n,o,m,t} W_{n,o,m,t}$$

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

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

2.3 Linear Steady-State Approximation

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

For simplicity, I assume that the vacancy creation cost function is given by $c(V) = cV^2_{j,o,m}$. Moreover, the tightness — and thus the probability of matching with an employer for workers and the probability of filling a vacancy — is a function of the employment rate $\mathrm{ER}_{o,m}$, separation rate δ, and matching function parameter σ, given by:

$$p_{o,m} = \frac{\delta \mathrm{ER}_{o,m}}{1 - \mathrm{ER}_{o,m}}$$
$$q_{o,m} = \left(\frac{1 - \mathrm{ER}_{o,m}}{\delta \mathrm{ER}_{o,m}} \right)^{\frac{\sigma}{1-\sigma}}$$

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

$$
\mathrm{ER}_{o,m} = \frac{\sum l_{j,o,m} + l_{n,o,m}}{L_{o,m}} = \frac{\mathrm{E}_{o,m}}{L_{o,m}}
$$

In Appendix A, I show that the linear approximation of steady-state local employers' wages and employment is given by the following expressions[3]:

$$
\ln w_{j,o,m} \approx \alpha_0 + \alpha_1 y_o + \alpha_{2,E}\mathrm{E}_{o,m} + \alpha_{2,L}\mathrm{L}_{o,m} + \alpha_3\gamma_{n,o,m}w_{n,o,m} + \alpha_1\left(\epsilon_{o,m} + \varepsilon_{j,o,m}\right) \tag{3}
$$

$$
\ln l_{j,o,m} \approx \beta_0 + \beta_1 y_o + \beta_{2,E}\mathrm{E}_{o,m} + \beta_{2,L}\mathrm{L}_{o,m} + \beta_3\gamma_{n,o,m}w_{n,o,m} + \beta_1\left(\epsilon_{o,m} + \varepsilon_{j,o,m}\right) \tag{4}
$$

2.4 Endogeneity Issues

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

$$
\Delta \ln w_{j,o,m} = \alpha_1\Delta y_o + \alpha_2\Delta\mathrm{E}_{o,m} + \alpha_3\left(\Delta\gamma_{n,o,m}w_{n,o,m} + \gamma_{n,o,m}\Delta w_{n,o,m}\right) + \varsigma^W_{j,o,m} \tag{5}
$$

$$
\Delta \ln l_{j,o,m} = \beta_1\Delta y_o + \beta_2\Delta\mathrm{E}_{o,m} + \beta_3\left(\Delta\gamma_{n,o,m}w_{n,o,m} + \gamma_{n,o,m}\Delta w_{n,o,m}\right) + \varsigma^E_{j,o,m} \tag{6}
$$

where I define the Δx operator as the difference in x values between two steady states. For example, let x be at time t_1 in steady state 1 and at time t_2 in steady state 2. Then, $\Delta x = x_{t_2} - x_{t_1}$. The unobservables $\varsigma^W_{j,o,m}$ and $\varsigma^E_{j,o,m}$ are linear combinations of $\epsilon_{o,m}$ and $\varepsilon_{j,o,m}$.

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 shocks. Therefore, using only national employers' wage changes in the local labor market, it is impossible to identify the causal effects of $\Delta\gamma_{n,o,m}w_{n,o,m}+\gamma_{n,o,m}\Delta w_{n,o,m}$ on local employers' wage and employment policies.

[3] I assume that the population of workers is not rapidly changing and ignore the "feedback effect size."

To address this issue, I propose a novel shift-share measure based on results elaborated in Section 4 from Hazell et al. (2021). The strategy hinges on national employers' wage and employment shocks in large labor markets, isolating the exogenous components $\Delta\Omega^W_{n,o}$ and $\Delta\Omega^E_{n,o}$ from national employers' wage and employment changes.

Another problem is the endogeneity of $\Delta \mathrm{E}_{o,m}$. Even assuming that the firm j is of very small size, $\Delta \mathrm{E}_{o,m}$ is determined by local endogenous shocks. Therefore, as discussed in Section 4, I will use a standard Bartik instrument instead of $\Delta \mathrm{E}_{o,m}$.

2.5 Workers' Heterogeneity

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

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

$$\Delta \ln w^g_{j,o,m} = \alpha_1 \Delta y_o + \alpha_2 \Delta \mathrm{E}_{o,m} + \alpha_3 \left(\Delta\gamma^g_{n,o,m} w_{n,o,m} + \gamma^g_{n,o,m} \Delta w_{n,o,m} \right) + \varsigma^{W,g}_{j,o,m} \tag{7}$$

Therefore, the testable model prediction is that the group more likely to be employed by the national employer will receive higher wage increases and will be less likely to be employed by local employers.

3 Data and Institutional Context

3.1 Institutional Context

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

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

For formally employed workers, employer-employee relations in Brazil are mediated by unions and employers' associations. Collective bargaining agreements define minimum working conditions and wage floors in specific industries. Unions represent all workers in a given industry within a defined region, which could be a municipality, a group of municipalities, or a state (Menezes-Filho et al., 2008). These agreements are automatically extended to all workers, regardless of union membership. Moreover, union members can engage in additional negotiations between the union and their workplace. As a result, regional agreements serve as a floor for union or individual negotiations, potentially leading 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.

3.2 Data Sources

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

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

Additionally, I incorporate microregion and state characteristics from the Instituto de

Pesquisa Econômica Aplicada to provide further contextual information.

3.2.1 General Sample Restrictions

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

I exclude observations with incomplete or invalid worker, establishment, firm, or municipality identifiers, as well as those with invalid job spell or personal characteristics. The dataset is further restricted to individuals who worked more than two months in a year and more than 10 hours per week.

Additionally, I exclude farm jobs and workers, as well as those with temporary or part-time contracts. Workers with wages lower than the minimum wage are also excluded. For analyses at the worker level, I include only workers between 24 and 53 years old.

3.3 Variable Definitions

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

The main unit of analysis is the firm's **job**, defined as a combination of the firm's identifier, a four-digit occupation code (according to the Brazilian CBO classification), and a microregion. Microregions are Brazilian administrative units that closely match the concept of metropolitan areas (Dix-Carneiro and Kovak, 2017; Tucker, 2017). As a baseline, I define the **labor market** as a four-digit occupation code within a 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). However, for robustness, I consider broader and narrower definitions, varying both the occupation codes (using two-digit and six-digit codes) and the geographic units (municipalities and mesoregions). I restrict attention to labor markets with more than 50 workers.

3.3.1 Adjusting for Jobs' Worker Composition

Jobs within the same labor market may vary in terms of worker characteristics such as experience, education, and gender. To account for this variation in worker composition, I employ a residualization technique on employee wages[4]. Specifically, I regress the log wage of each worker i in occupation o and microregion m in year t on a set of controls:

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

where $X_{i,o,m,t}$ includes the worker's age $\times$ occupation polynomial, hours fixed effects, education $\times$ gender interactions, and education $\times$ occupation fixed effects.

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

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

These 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.

3.3.2 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,

[4]The similar approch was used by Helm et al. (2023) when analyzing wage effects of the rapid firms employment growth.

Campinas, Osasco, Guarulhos, Rio de Janeiro, Belo Horizonte, Porto Alegre, and Curitiba. These large cities typically exhibit flexible labor markets, where firms' wage and employment policies are likely to reflect changes in their idiosyncratic labor demand.

The estimation region comprises all microregions in the South and Southeast regions of Brazil that do not qualify as large cities. To ensure that none of the commuting zones within the estimation region share the same local shocks as large cities, I exclude all microregions belonging to the same higher administrative unit (mesoregion) as any of the large cities. Additionally, I omit a few commuting zones that might undergo boundary changes due to new municipalities. In a few cases, the non-excluded microregions border the large city. In the Appendix, I show that the empirical results are robust to dropping such adjacent microregions.

Figure 1 illustrates the division of commuting zones, with large cities highlighted in red and estimation microregions in light blue. The right panel displays the population of each microregion. While large cities are significantly more populous than the rest of the microregions, the estimation microregions range from sparsely populated agricultural areas to medium-sized cities like Florianopolis or Joinville.

3.4 National and Local Employers

National employers are multi-establishment firms that often hire workers for the same occupation across multiple locations. In this study, a national employer in a particular occupation is defined as a firm that employs workers in that occupation in at least one large city and at least one commuting zone within the estimation region. To ensure consistency in identifying national employers, I also require that such a firm has employed a minimum of 10 workers continuously for three years in one of the major 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.

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

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

Table 1 compares local and national employers across four-digit occupations, pooled from 2006 to 2018. On average, national employers operate in 1.9 large city and approximately 2.4 less populous microregions. They tend to employ more workers in large cities (averaging around 254 employees) compared to other commuting zones. While local employers might also be multi-establishment firms, this is unlikely; on average, they operate in 1.13 locations within the same occupation. Local employers tend to offer lower wages, with residualized wages approximately 15 log points lower than those of national employers. Additionally, local employers employ about 19 workers on average, compared to 110 workers for national employers.

4 Empirical Strategy

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

Next, I use the constructed shift-share measure, to identify the labor markets which experienced large increase in national employers idosyncratic labor demand. This allow me to develop the matched event study for local employers' jobs and for individuals who were working for local employers in the baseline period.

4.1 Graphical Illustration of Identification Strategy

The intuition behind the identification strategy can be described in three steps. Consider national employer A, a major supermarket chain with establishments in multiple locations, including one large city and one medium-sized city. For simplicity, assume it is the only national employer in the medium-sized city.

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

Figure 3 demonstrates the strategy to eliminate the effects of local shocks. If Employer A increases wages in both the large city and the medium-sized city, this increase is more likely the result of its idiosyncratic nationwide policy rather than a local labor market shock. Nevertheless, it's still possible that the wage increases at both Employer A and Employer B are due to a general nationwide demand for cashiers.

To address the effects of nationwide shocks, Icompare Employer A's wage increase in the large city with the wage changes of other employers in large cities, as shown in Figure 4. If Employer A's wage increase exceeds the average wage change of other employers and this increase is transmitted to A's wages in the medium-sized city, it is likely due to an idiosyncratic increase in Employer A's demand for cashiers. Consequently, the observed wage increase by Employer B could be a spillover effect from Employer A's policy.

4.2 Single National Employer Labor Demand Shocks

For each national employer, idiosyncratic wage and employment shocks are computed in two stages.

Initially, for each occupation o of employer j in the large city m_{bc} (from the set of large cities where it operates, $\mathcal{M}_{j,o,t}$) at time t, I estimate the following regression:

$$y_{j,o,m_{bc},t} = \zeta_{o,t} + \omega_{j,o,m_{bc},t}$$

Here, $y_{j,o,m_{bc},t}$ denotes the employer's average residualized wage or the logarithm of employment.[5]

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

$$Z_{j,o,t} = \frac{1}{|\mathcal{M}_{j,o,t}|} \sum_{m_{bc} \in \mathcal{M}_{j,o,t}} \omega_{j,o,m_{bc},t} \tag{8}$$

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

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

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

[5]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.

4.3 Shift-Share Instrument Construction

Having estimated the employer $\times$ occupation-level shocks, I construct the shift-share instrument to identify the labor market's exposure to national employers' idiosyncratic labor demand shocks. I weight the labor market exposure to these individual national employer shocks by their employment shares from the previous year. Formally, the instrument relies on the identification results from Borusyak et al. (2021) on instruments with endogenous shares and exogenous shocks: identified idiosyncratic wage and employment changes of national employers are likely exogenous to local firms, whereas employment shares depend on local labor market conditions.

Equation 10 defines the level shift-share measure of exposure to national employers' wage or employment policies for the labor market in occupation o, microregion m, and time t, which includes national employers indexed by $n_1, n_1+1, \ldots, n_2$. The employment share of individual national employer j from year $t-1$ is denoted as $\gamma_{j,o,m,t-1}$, while $\gamma_{n,o,m,t-1}$ represents the total employment share of national employers. Since the sum of national employers' weights is less than 1, I always use the measure scaled by the total national employers' share in the labor market (o,m): $\gamma_{n,o,m,t-1}$.

$$\gamma_{n,o,m,t-1}\hat{\Omega}^{W}_{n,o,m,t} = \sum_{j=n_1}^{n_2} \gamma_{j,o,m,t-1} Z^{W}_{j,o,t} \tag{10}$$

Similarly, I define the change in the shift-share measure of national employer policies as:

$$\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{E}_{n,o,m,t} = \sum_{j=n_1}^{n_2} \gamma_{j,o,m,t-1} \Delta Z^{E}_{j,o,t} \tag{11}$$

$$\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{W}_{n,o,m,t} = \sum_{j=n_1}^{n_2} \gamma_{j,o,m,t-1} \Delta Z^{W}_{j,o,t} \tag{12}$$

Figure 5 shows that while the wage-level instruments $\gamma_{n,o,m,t-1}\hat{\Omega}^{W}_{n,o,m,t}$ exhibit relatively large variation, the wage and employment change shift-share instruments $\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{W}_{n,o,m,t}$ and $\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{E}_{n,o,m,t}$ are concentrated near zero; only 10% of observed $\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{W}_{n,o,m,t}$ are greater than 0.005.

The relationship between national employers' policies in large cities and in the estimation region is strong and positive, as shown in Figure **??**. To examine the comovements of national employers' wages and employment across regions more carefully, I estimate equations at the market level:

$$\Delta y_{o,m,t} = \zeta_{1,1}\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{W}_{o,m,t} + \zeta_{1,2}\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{E}_{o,m,t} + \zeta_{o,t} + \gamma_{n,o,m,t-1} + v_{o,m,t} \tag{13}$$

$$y_{o,m,t} = \zeta_{2,1}\gamma_{n,o,m,t-1}\hat{\Omega}^{W}_{o,m,t} + \zeta_{o,t} + \gamma_{n,o,m,t-1} + v_{o,m,t} \tag{14}$$

The variable of interest $y_{n,o,m,t}$ represents the national employers' average residualized wage ($\hat{w}^{r}_{n,o,m,t}$), defined as $\gamma_{n,o,m,t-1}w_{n,o,m,t}$:

$$\gamma_{n,o,m,t-1}w_{n,o,m,t} = \sum_{j=n_1}^{n_2}\gamma_{j,o,m,t-1}\hat{w}^{r}_{j,o,m,t} \tag{15}$$

The other two variables of interest, $\gamma_{n,o,m,t-1}\Delta y_{o,m,t}$, are defined for three-year changes as the national employers' average residualized wage change ($\Delta\hat{w}^{r}_{j,o,m,t}$) and the national employers' employment change $\Delta\ln E_{n,o,m,t}$:

$$\gamma_{n,o,m,t-1}\Delta w_{n,o,m,t} = \sum_{j=n_1}^{n_2}\gamma_{j,o,m,t-1}(\hat{w}^{r}_{j,o,m,t+1} - \hat{w}^{r}_{j,o,m,t-1}) \tag{16}$$

$$\gamma_{n,o,m,t-1}\Delta\ln E_{n,o,m,t} = \sum_{j=n_1}^{n_2}\gamma_{j,o,m,t-1}(\ln E_{j,o,m,t+1} - \ln E_{j,o,m,t-1}) \tag{17}$$

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

In this paper, I particularly study periods of national employers' expansions—times when they significantly increased their wages and employment across different regions. Figure 24 displays binscatter plots of the national employers' wages and employment in the estimation region during major changes in national employers' wage policies in large cities, specifically when $\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{W}_{o,m,t} > 0.005$ and $\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{E}_{o,m,t} > 0.0$ (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.

4.3.1 Discussion

The identification method described faces two significant threats. The primary concern is the direction of the observed co-movements of wages and employment among national employers in the estimation region. For instance, a local productivity shock in the estimation region could influence the wage policies of national employers operating in major cities. Such movements have been documented by Giroud and Mueller (2019). To mitigate this concern, I limit the analysis to local labor markets that are not too close to large cities (i.e., they are in different mesoregions). Additionally, in columns (2) and (4) of Table 6, I rerun the regression excluding commuting zones bordering the large cities and obtain almost identical results.

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.

4.4 Spillovers from National Employer Expansions

The main research design examines cases where a national firm's idiosyncratic expansion event is identified. Specifically, I consider the Bernoulli variable, which is independent of local labor market productivity ($\epsilon_{o,m,t}$) but correlated with significant changes in the national employer's idiosyncratic labor demand shocks ($\Omega^E_{n,o,m,t}, \Omega^W_{n,o,m,t}$) as specified in the model.

According to Equations 5–6, this approach allows us to causally identify the spillovers from national employers' wage and vacancy expansions. However, the identified effect combines the impact of increased labor market tightness (total employment) and the impact of national employers on workers' outside options.

In practice, I define national employer expansions using shift-share measures of their wage and employment changes estimated in large city regions: $\Delta\hat{\Omega}^{W}_{n,o,m,t}$ and $\Delta\hat{\Omega}^{E}_{n,o,m,t}$, as defined in Equations 16–17.

Specifically, I require that the shift-share wage measure $\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{W}_{n,o,m,t}$ 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 reductions in employment, adjustments in worker selection, or alignment with previous wage cuts. Therefore, I also require that employment changes measured in the large city region are positive: $\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{E}_{n,o,m,t} > 0$ and $\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{W}_{n,o,m,t} > 0$. Lastly, to ensure that national employers might substantially impact the entire labor market, I restrict the events to markets where the national employers' share in period $t-1$ is at least 5%.

It is likely that the expansions of national employers began before the observed event—for example, a firm might have started hiring in period $t-1$, but the main wage increases are observed in period t. Therefore, following the study by Helm et al. (2023) on firms' employment expansions, I set period $t-2$ as the baseline. Additionally, I apply standard restrictions for the local labor market in the baseline period: only markets with a national employers' share between 2.5% and 70%, and with more than 50 workers, are included.

I estimate the effects of the national employers' expansion for both the local employers' jobs and for the individuals who worked for local employers in the baseline period. Including the worker-level event study allows me not only to examine the worker gains/losses from the expansion but also to differentiate the effects of local employers' workers' selection (keeping only the ones with higher wages) from the real change in the local employers' policies. Lastly, it will allow us to inspect the mechanism described in Section 2.5: do groups with a higher probability of moving to national employers receive higher wages? In the last subsection, I estimate the national employers' expansion effects for groups that are likely to move to the national employers (workers who used to work close to the expanding employer or are connected to the national employers through their past coworkers network).

4.5 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, in the Appendix, 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 $t + 5$.[6]

Next, to find the closest counterfactual to each treated job—a "statistical twin"—I use Mahalanobis matching. This method identifies the counterfactual that is closest in terms of Mahalanobis distance, which accounts for the covariance among matching variables, effectively weighting the Euclidean distance by the inverse of the covariance matrix. The matching variables include job and labor market employment sizes, the proportion of hired workers to the total job workforce, national employers' employment share, and shift-share measures.

The results of the matching procedure at the job level are presented in Table 4. The matched and control groups are similar in terms of the matched characteristics, such as employment size, national employers' employment share, and wages. They are also not statistically different in terms of non-matched characteristics like average residualized wages and average wages. As shown in Table 4, the matched sample is also similar to all potentially treated jobs—that is, jobs with more than five workers operating in labor markets with substantial national employers' employment shares.

In total, I matched approximately 65% of the treated jobs. The matched sample includes treated observations from 420 events. Figure 7 shows that the spatial distribution of treated jobs reflects the population size of the microregions. Figure 8 presents the number of treated jobs in the microregions by year. Most of the expansion episodes occurred between 2010 and 2014, during years of rapid economic growth in Brazil. The subsequent economic downturn was correlated with fewer expansions by national employers.

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

I restrict the potential control pool of workers to individuals of the same gender and tenure bin. I also apply the same restrictions to their jobs as when constructing the matched

[6]Specifically, I require that for each year between $t - 5$ and $t + 5$, the shift-share measure of national employers' policy $\gamma_{n,o,m,t-1}\Omega^{W}_{n,o,m,t}$ was smaller than 0.003.

sample of jobs. From all possible counterfactual individuals, given these restrictions, I select controls using a caliper matching method. This method matches treated workers to controls within specified "calipers," meaning that for each matching variable, the absolute difference between the treated worker and control must fall within a predefined range. 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, less than three years of difference.

Table **??** 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 **??**. 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%.

4.6 Estimation Models

Using the sample of paired treated and control jobs, I estimate the following model for job j in occupation o, microregion m, and calendar year t, with time relative to the event denoted by τ:

$$y_{j,o,m,t,\tau} = \sum_{\tau=-5}^{5} \eta_\tau 1\{\tau = t - t_j^*\}\mathrm{Tr}_{j,o,m,t,\tau} + \sum_{\tau=-5}^{5} \zeta_\tau 1\{\tau = t - t_j^*\} \\ + \zeta_{o,t} + \zeta_{j,o,m} + u_{j,o,m,t,\tau} \tag{18}$$

where t_j^* is the event year for job j, and $\mathrm{Tr}_{j,o,m,t,\tau}$ is an indicator variable equal to 1 if the job was treated. The model includes job fixed effects $\zeta_{j,o,m}$ and occupation-by-time fixed effects $\zeta_{o,t}$. Additionally, I control for time relative to the event ζ_τ to ensure that treated and control jobs exhibit similar life-cycle and aggregate trends. To account for regional economic fluctuations, I also control for the GDP of the microregion, 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.

For the sample of paired treated and control individuals, I estimate the following model for individual i in occupation o, microregion m, and calendar year t, with time relative to the event denoted by τ:

$$y_{i,o,m,t,\tau} = \sum_{\tau=-5}^{5} \eta_\tau 1\{\tau = t - t_i^*\}\mathrm{Tr}_{i,o,m,t,\tau} + \sum_{\tau=-5}^{5} \zeta_\tau 1\{\tau = t - t_i^*\} \\ + \zeta_t + \zeta_{i,o,m} + u_{i,o,m,t,\tau} \tag{19}$$

where t_i^* is the event year for individual i, and $\mathrm{Tr}_{i,o,m,t,\tau}$ indicates whether the worker was treated. The model includes individual fixed effects $\zeta_{i,o,m}$ and year fixed effects ζ_t. I do not include occupation-by-time fixed effects because changes in occupation may be an outcome for the worker.[7] 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

[7]Occupation-by-time fixed effects are omitted since a change in occupation could be an outcome variable for the worker.

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 relies on the identification of idiosyncratic labor demand shocks from national employers, as described in the previous section. Although this assumption cannot be tested directly, if it holds true, the coefficients $\{\eta_\tau\}_{\tau=-5}^{-3}$ for unmatched wage levels should be parallel between treated and control groups. Another indirect test of the assumption's validity is the evolution of employment in treated jobs. As discussed in Section 2.2, simultaneous increases in both wage and employment for treated jobs would suggest a local productivity shock, potentially undermining the validity of the results. In the results section, I show that employment and wage levels of treated jobs move in opposite directions, suggesting that the estimated coefficients $\{\eta_\tau\}_{\tau=-1}^{5}$ indeed measure the spillover effects from the expansions of national employers.

5 Results

5.1 National employers expansions in large city and estimation region

1. Shift share measure increase pass-through to the national employers' wages in the estimation region: Figure 9

2. Event also changes the national employer's employment, and it is mainly driven by a number of establishment's growth: Figure 10

3. This leads to an increase in national employers' employment share: Figure 11

5.2 National employer expansions effects on local jobs

1. Local employers' wages increase: Figure 12

2. Local employers' employment drop: Figure 13

3. Total labor market increase (counting all employers, national/ not existing/ small in baseline period), so the total effect is positive, however I also found some pre-trend: Figure 14. In appendix I added an additional figure for total market not-national employers' employment (counting all employers that are not national: including not existing/ small in baseline period): Figure 23.

5.3 National employer expansions effects on workers

1. Wage increases for both all workers (employed by local employers in the baseline period) and for job-stayers: Figure 15.

2. Probability of leaving an employer increases about 1.5 percentage points, while the probability of moving to a national employer increases about 1 percentage point 16.

3. Total employment effects for workers previously employed are close to 0: it does not seem to be a large surge of workers transitioning to the informal sector 17.

5.4 Worker level heterogeneity analysis

1. Wage effects are stronger for workers that initially worked for in the same municipality as booming national employers (exactly, I define a shift-share on municipality level and choose such treated municipality that shift-share increase was above average): Figure 18 (wage effects) and Figure 19 (transitions)

2. Connected workers: Workers who in period 0 had a past coworker now working for the national employer. Strong wage effects: Figure 20 and reallocation: Figure 21. I do not have enough power to study job-stayers.

5.4.1 Additional analysis and robustness (not included)

Here I will add additional results, including event study just for first time treated, from regions more distant to national employers, same industry etc.

6 Beyond the expansion events: national employers influence on the local employers' wages

7 Conclusions

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

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

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

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

8 Figures

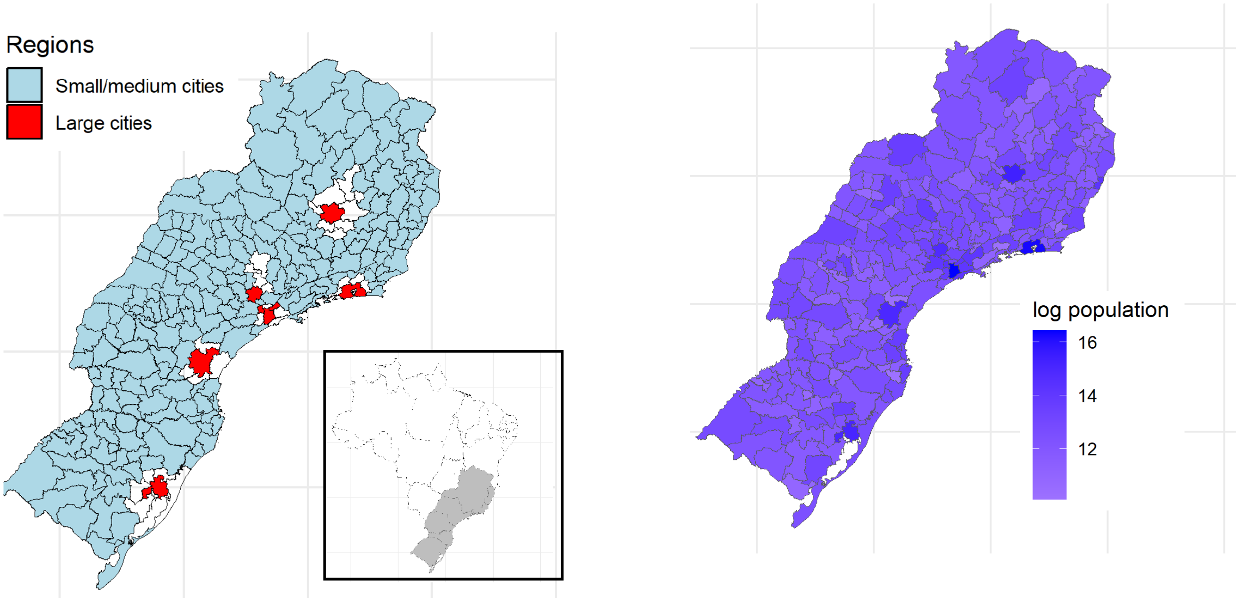


Figure 1: This figure shows the microregions (commuting zones) of Brazil's Southeast and South regions. The right panel depicts the large cities (in red) and the estimation (small/medium city) region (in light blue). The microregions that share the same mesoregion as one of the large cities are shown in white. The left panel plots the logarithm of the population for each microregion. The population data are taken from the 2010 Brazil Population Census.

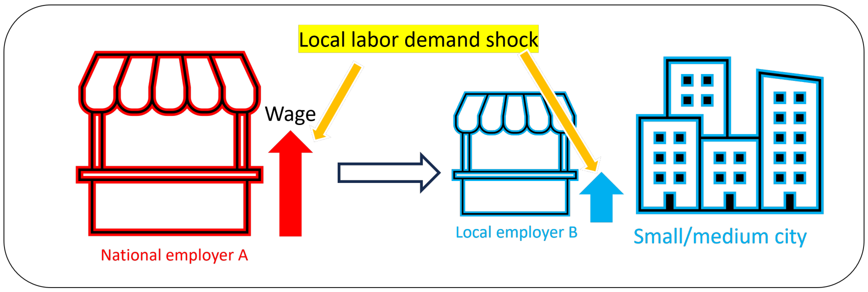


Figure 2: This figure illustrates the possible identification problem in the spillover identification. Wage increases of both local and national employers are influenced by the local labor demand shock, which confounds the spillover effect.

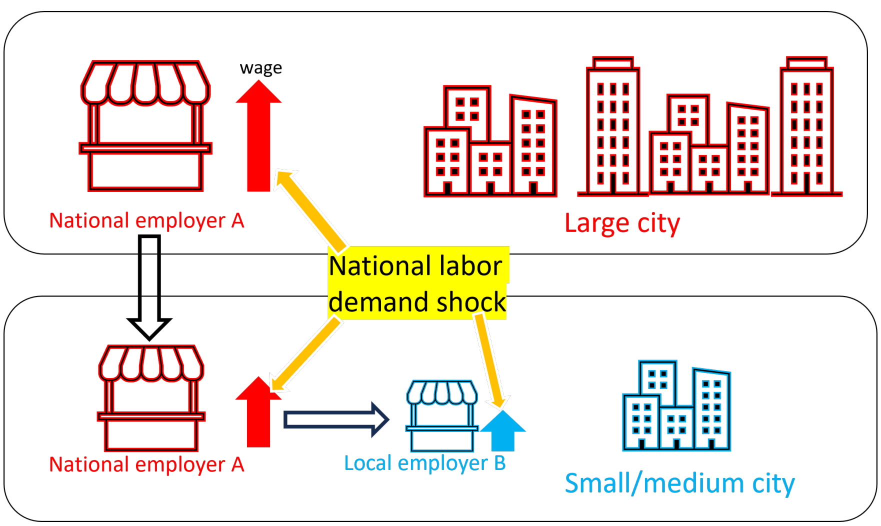


Figure 3: This figure illustrates the possible identification problem in the spillover identification after eliminating the local employment labor demand shocks. Wage increases of both local and national employers are influenced by the national labor demand shock, which confounds the spillover effect.

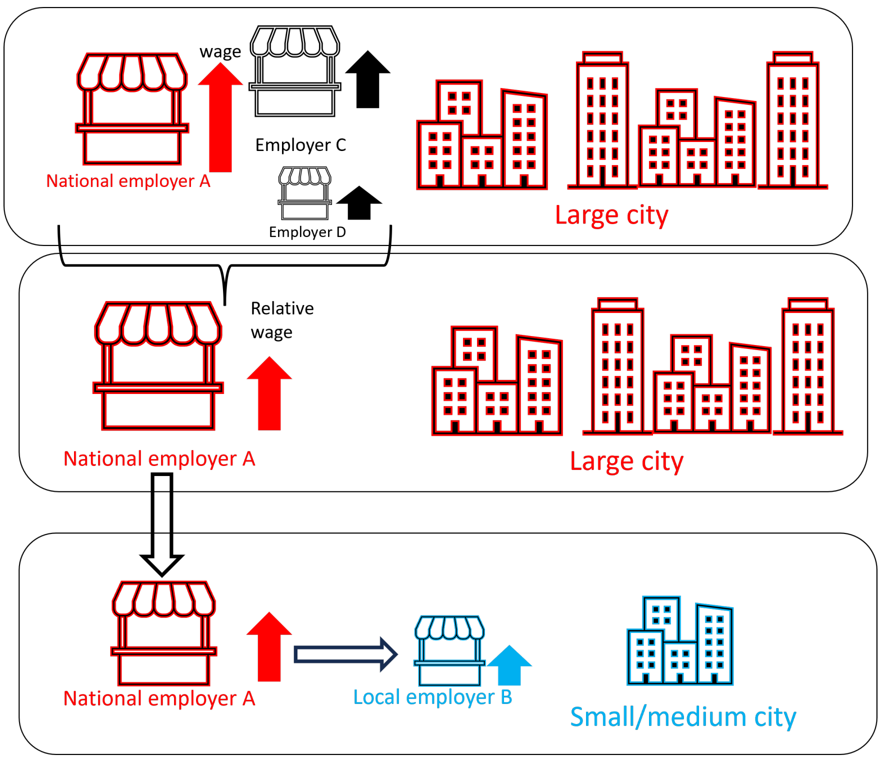


Figure 4: This figure illustrates the identification strategy. In the first step, the wage increases of Employer A are compared with those of other employers in a large city, calculating a relative wage increase that eliminates potential national labor demand shocks. Subsequently, as Employer A's relative 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.

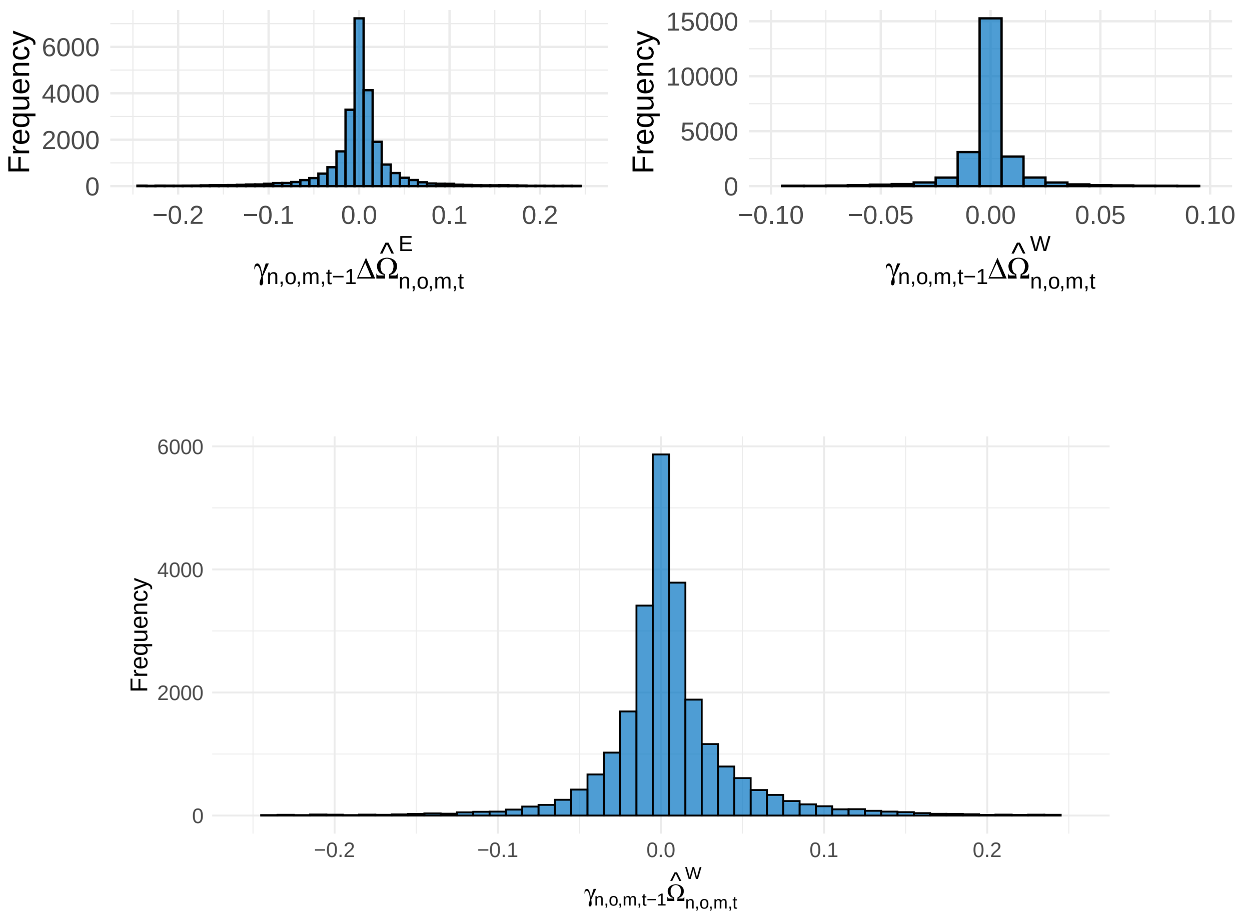


Figure 5: This figure displays the distributions of the shift-share measures for national employers across all labor market (occupation $\times$ microregion) - year observations within the estimation regionm, weighted by number of workers in the previous year (t-1). The upper-left panel shows the histogram of national employers' wage changes instrument normalized by national employers employment share ($\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{W}_{o,m,t}$, defined in 10), the upper-right panel shows the histogram of national employers' employment changes instrument normalized by national employers employment share ($\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{E}_{o,m,t}$, defined in 12), and the bottom panel displays the histogram of national employers' employment level instrument normalized by national employers employment share ($\gamma_{n,o,m,t-1}\hat{\Omega}^{W}_{n,o,m,t}$, defined in 11).Observations restricted to the labor markets with in the previous year, 2.5-70% national employers employment share and more than 50 local employers' workers.

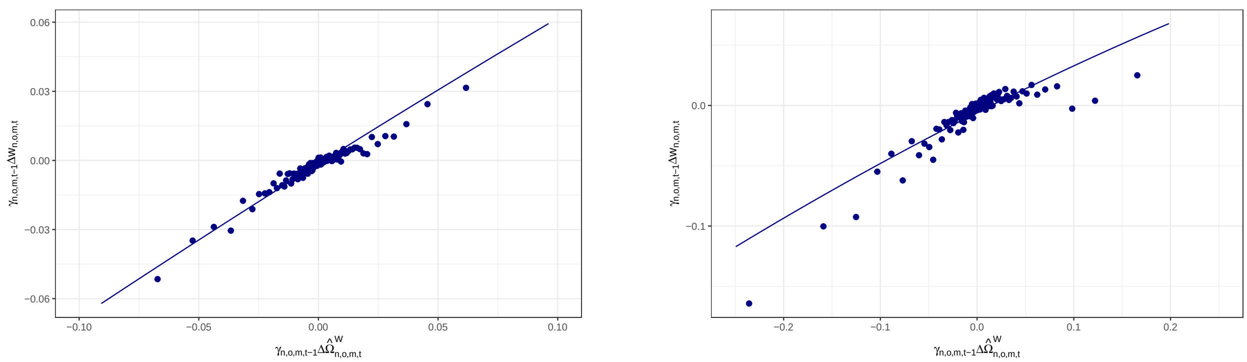


Figure 6: The bin scatterplots illustrate the relationship between the measure of national employers' wage and employment policies in the large city region ($\Delta\hat{\Omega}^{W}_{n,o,m,t}$, $\Delta\hat{\Omega}^{E}_{n,o,m,t}$) and their policies in the labor market of the estimation region. The left panel displays the relationship with the measure of residualized wages ($\gamma_{n,o,m,t-1}\Delta w_{n,o,m,t}$) of national employers in the estimation region. The right panel depicts the relationship with the logarithm of employment ($\gamma_{n,o,m,t-1}\Delta \ln E_{n,o,m,t}$) of national employers in the estimation region.

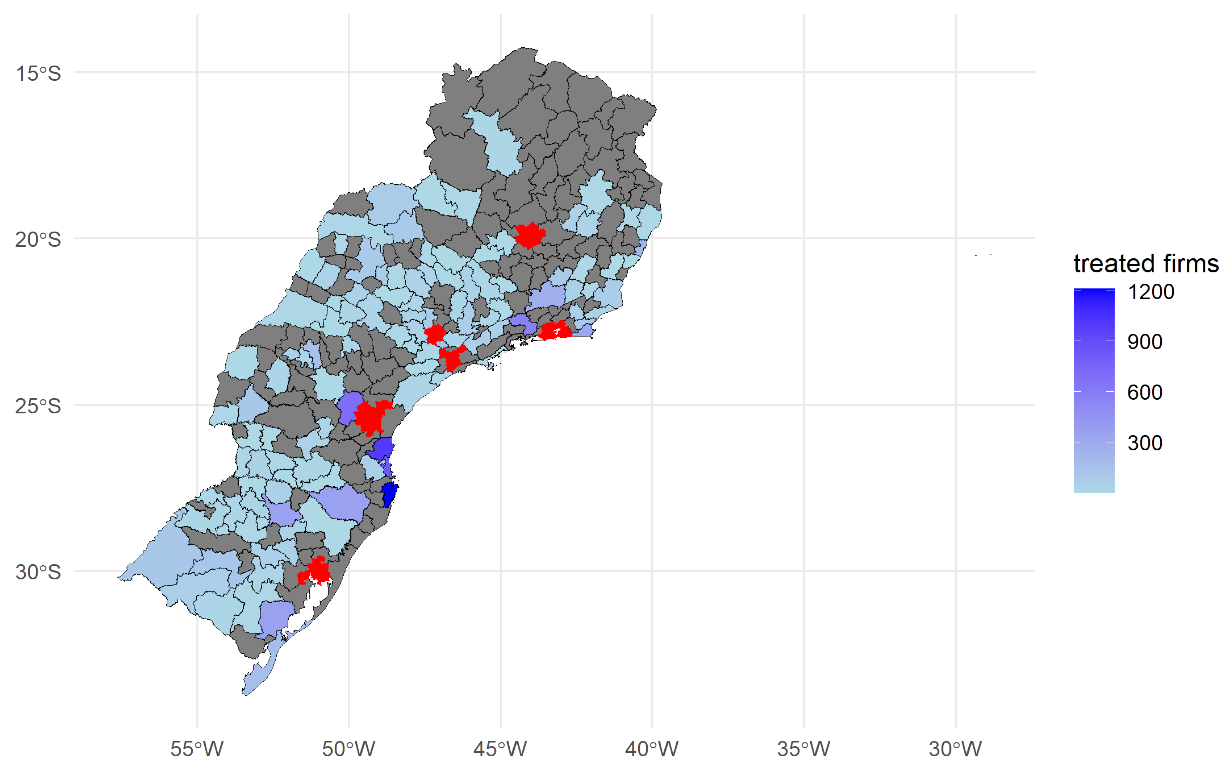
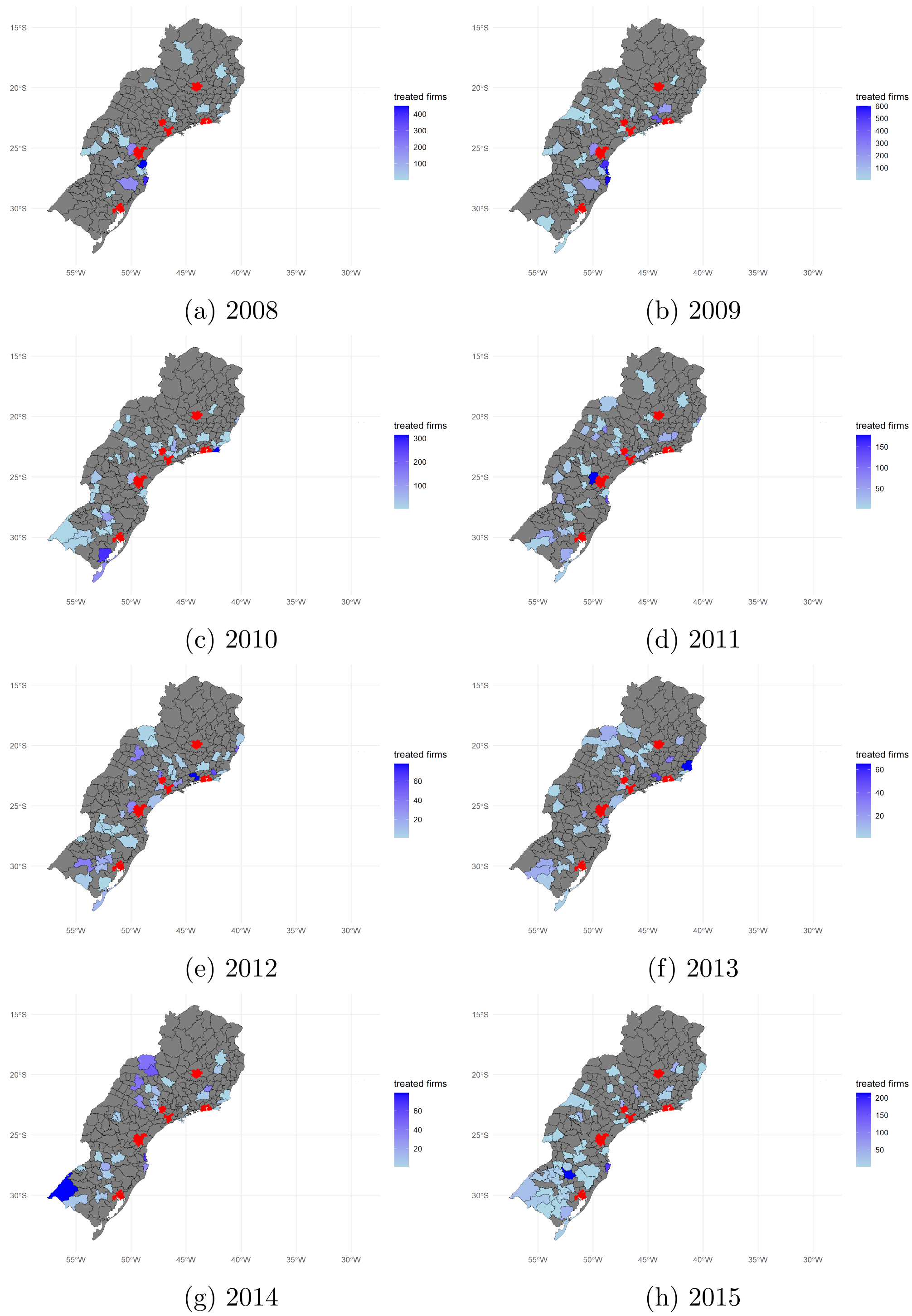


Figure 7: This figure shows the matched treated jobs by microregions (commuting zones) of Brazil's Southeast and South regions. The red color depicts the large city region. The microregions in gray have no matched treated jobs.



(a) 2008 (b) 2009

(c) 2010 (d) 2011

(e) 2012 (f) 2013

(g) 2014 (h) 2015

Figure 8: 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 9: This figure plots the event study coefficients from Equation 18. The connected red line represents the estimates when the outcome variable is the shift-share measure of national employers' relative wage for jobs in the large city region, $\hat{\Omega}^{W}_{n,o,m,t}$, 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, $w_{n,o,m,t}$, defined by Equation 15. The model includes fixed effects for job and year-by-occupation. Standard errors are two-way clustered: by job and by labor market.

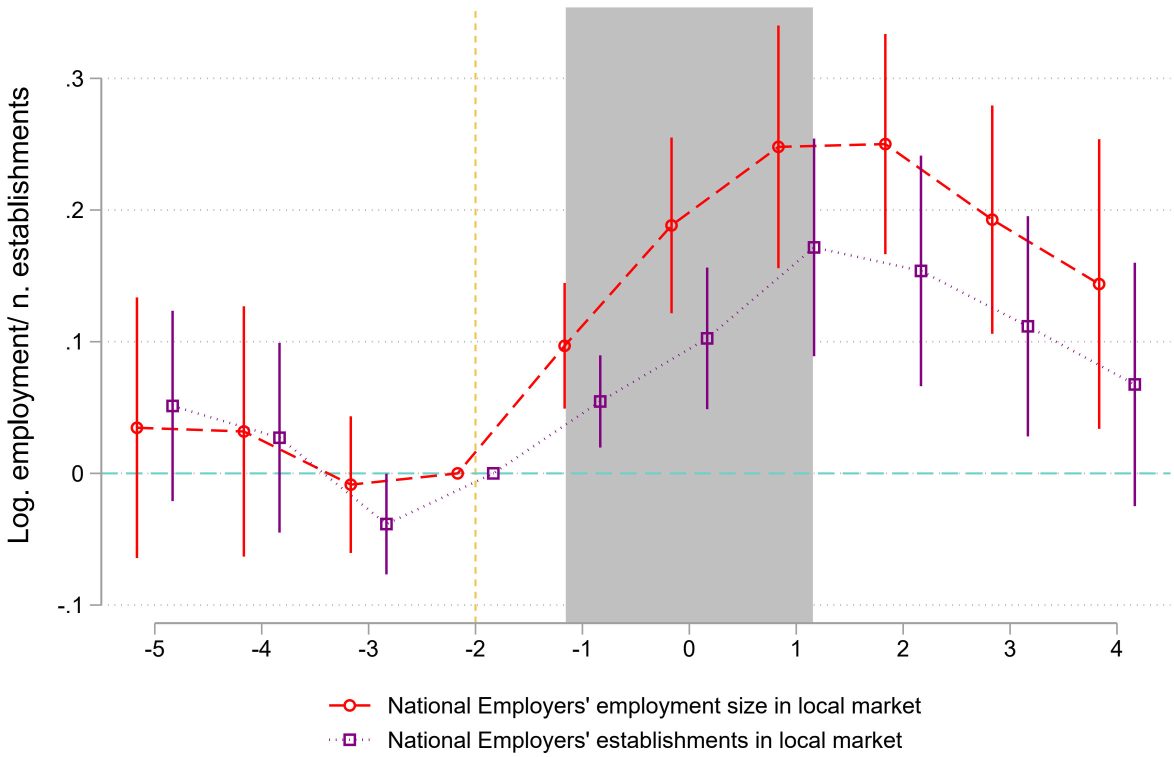


Figure 10: This figure plots the event study coefficients from Equation 18. The connected red line shows the estimates when the outcome variable is the national employers' log-employment. The dotted purple line shows the estimates when the outcome variable is the national employers' log number of establishments. The model includes fixed effects for job and year-by-occupation. Standard errors are two-way clustered: by job and by labor market.

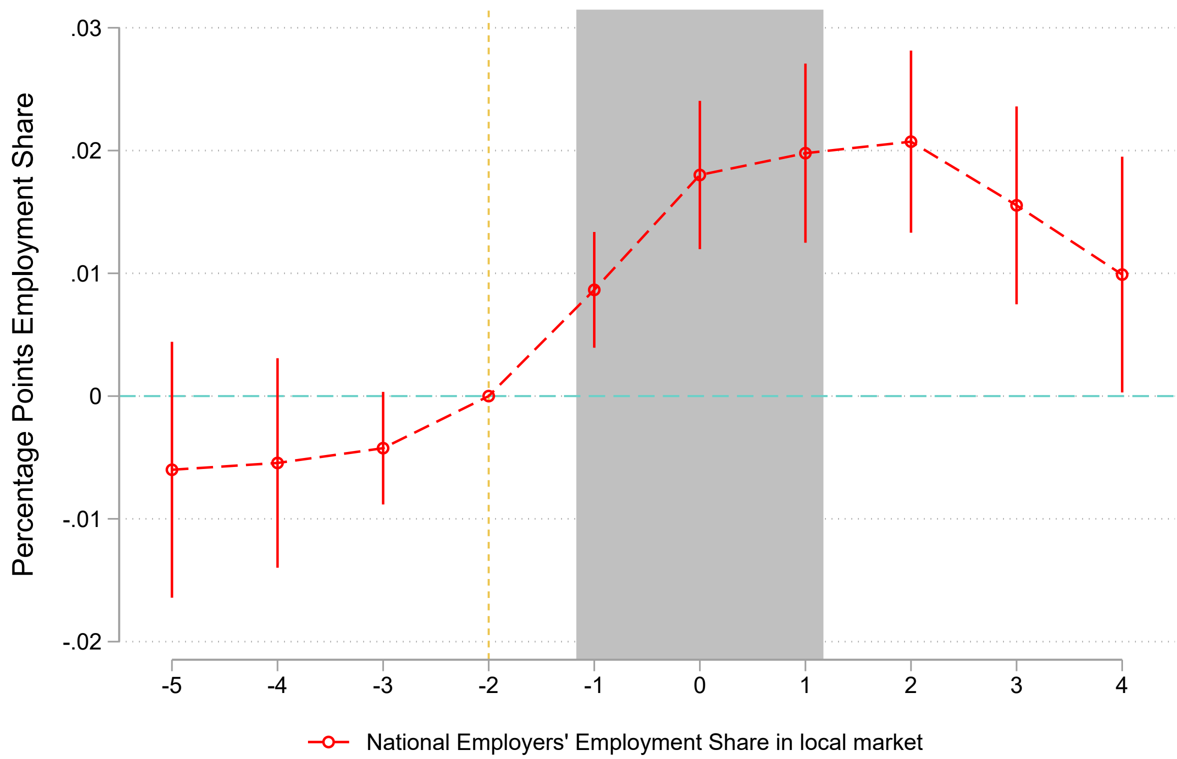


Figure 11: This figure plots the event study coefficients from Equation 18. The connected right line shows the estimates when the outcome variable is the national employers' employment share in the matched labor market. The model includes fixed effects for job and year-by-occupation. Standard errors are two-way clustered: by job and by labor market.

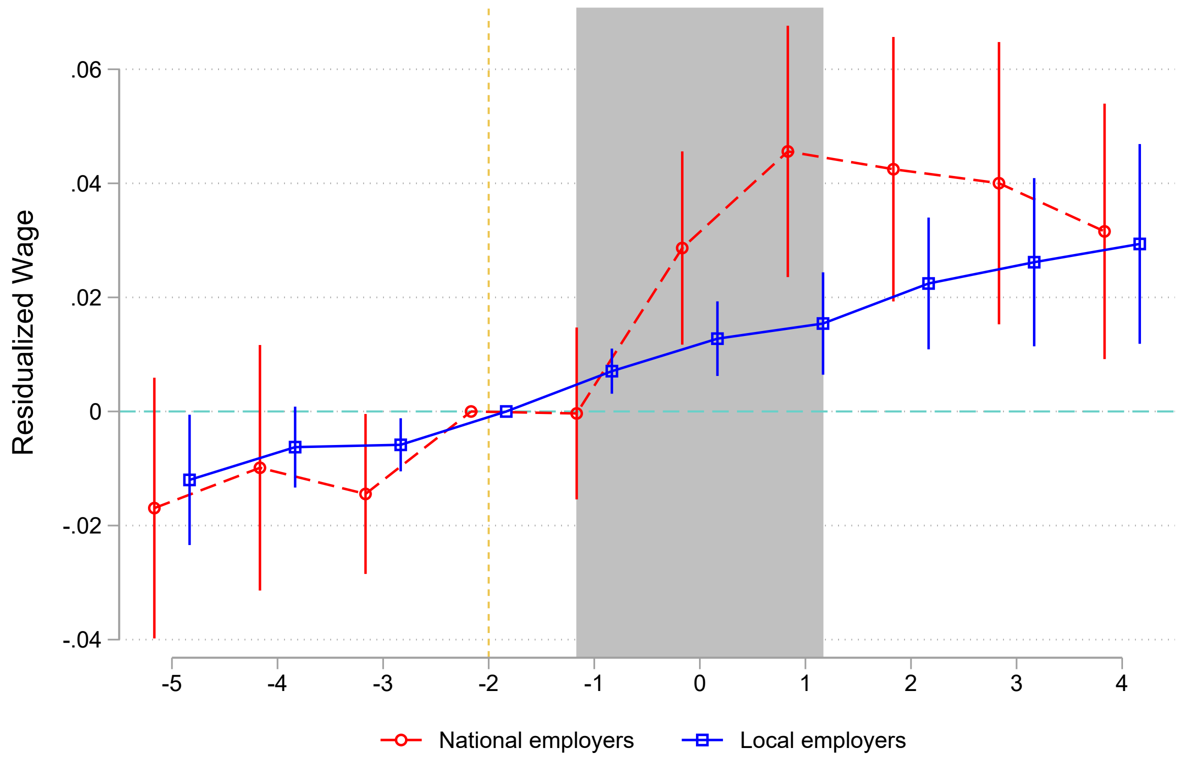


Figure 12: This figure plots the event study coefficients from Equation 18. The dashed red line represents the estimates when the outcome variable is the average wage for national employers' jobs in the matched labor market from the estimation region, $w_{n,o,m,t}$, defined by Equation 15. The connected blue line represents the estimates when the outcome variable is the local employer's average residual wage. The model includes fixed effects for job and year-by-occupation. Standard errors are two-way clustered: by job and by labor market.

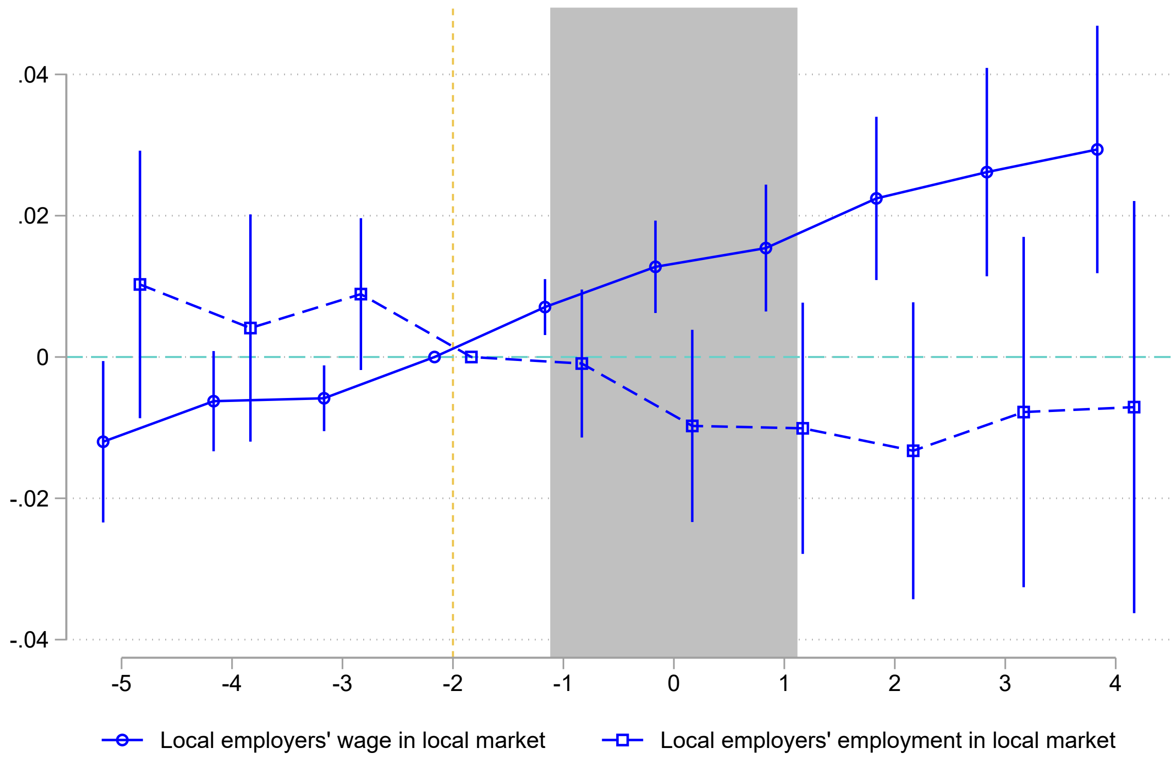


Figure 13: This figure plots the event study coefficients from Equation 18. The connected blue line represents the estimates when the outcome variable is the local employer's job's average residual wage. The dashed blue line represents the estimates when the outcome variable is the local employer's job's log employment. The model includes fixed effects for job and year-by-occupation. Standard errors are two-way clustered: by job and by labor market.

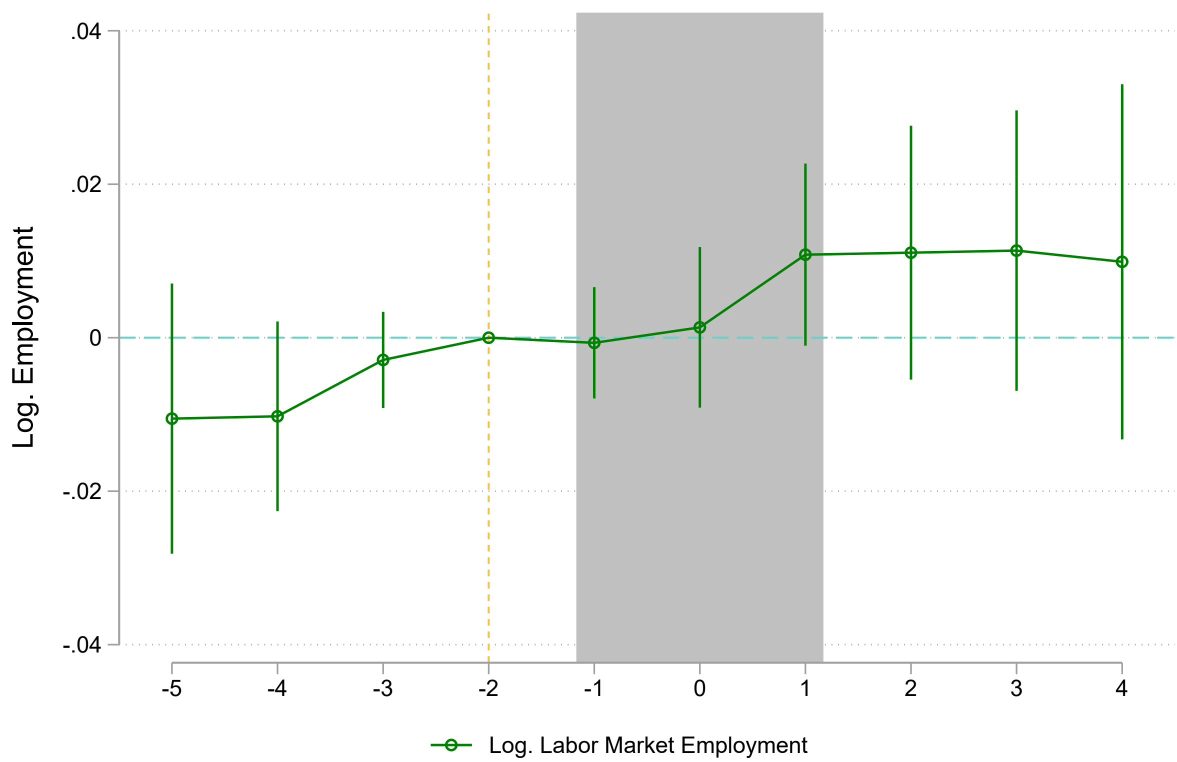


Figure 14: This figure plots the event study coefficients from Equation 18. The connected green line represents the estimates when the outcome variable is the total local labor market log employment. The model includes fixed effects for job and year-by-occupation. Standard errors are two-way clustered: by job and by labor market.

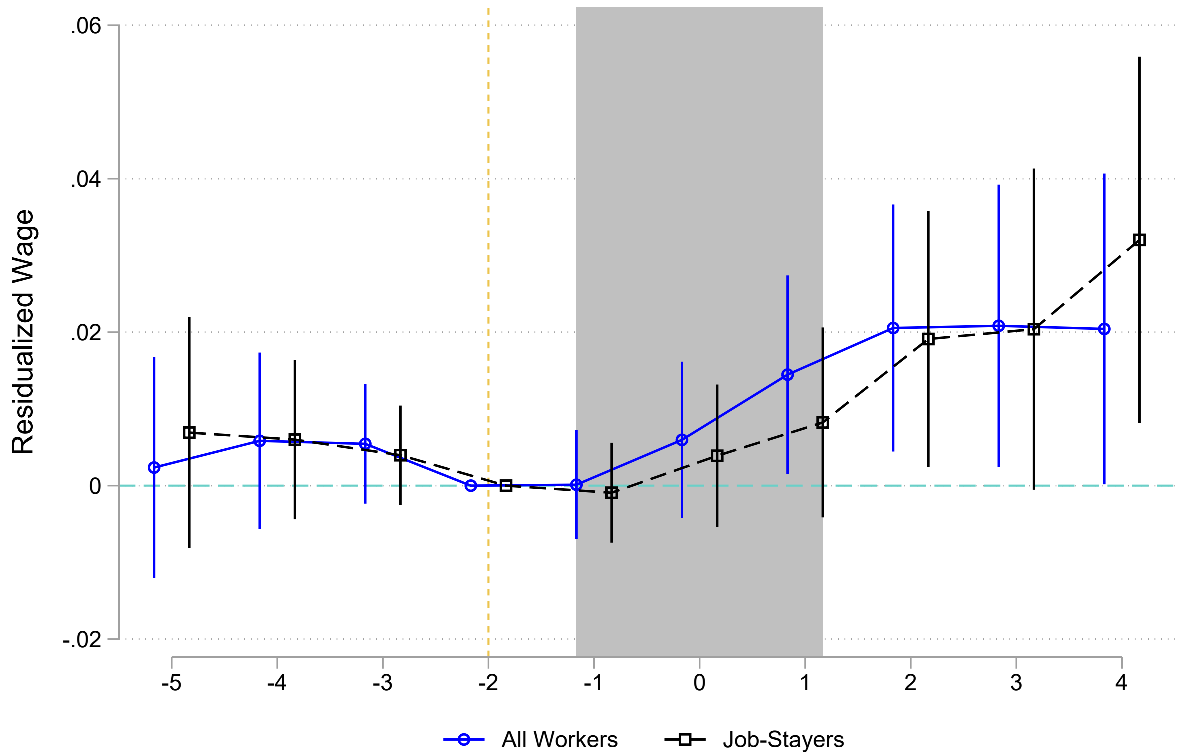


Figure 15: This figure plots the event study coefficients from Equation 19. The connected blue line represents the estimates for the outcome variable, which is the residualized wage of the workers who were employed by the local employer in the baseline period. The connected black line represents the estimates for the outcome variable, which is the residualized wage of the workers who were employed by the local employer in the baseline period and stayed with their employer. The model includes fixed effects for worker and year-by-occupation. Standard errors are two-way clustered: by worker and by labor market.

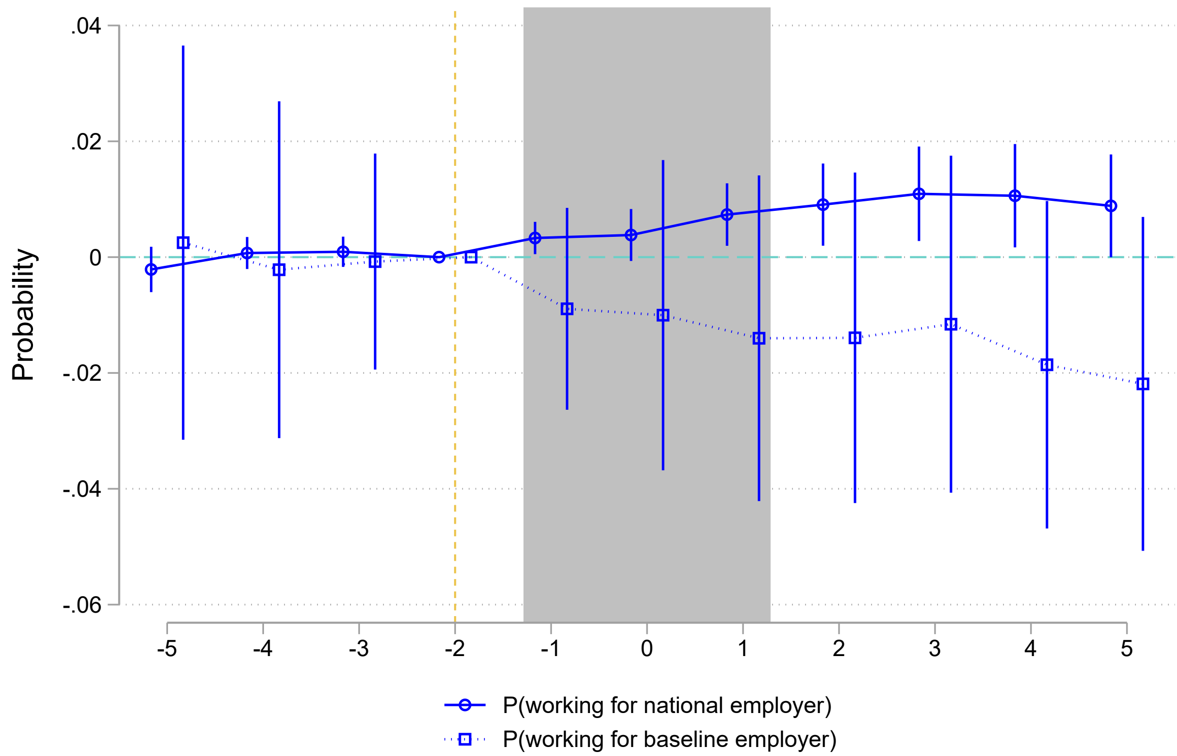


Figure 16: This figure plots the event study coefficients from Equation 19. The connected blue line represents the estimates for the outcome variable, which is the probability of leaving their employer, for workers who were employed by the local employer in the baseline period. The dashed blue line represents the estimates for the outcome variable, which is the probability of working for a national employer, for workers who were employed by the local employer in the baseline period. The model includes fixed effects for worker and year-by-occupation. Standard errors are two-way clustered: by worker and by labor market.

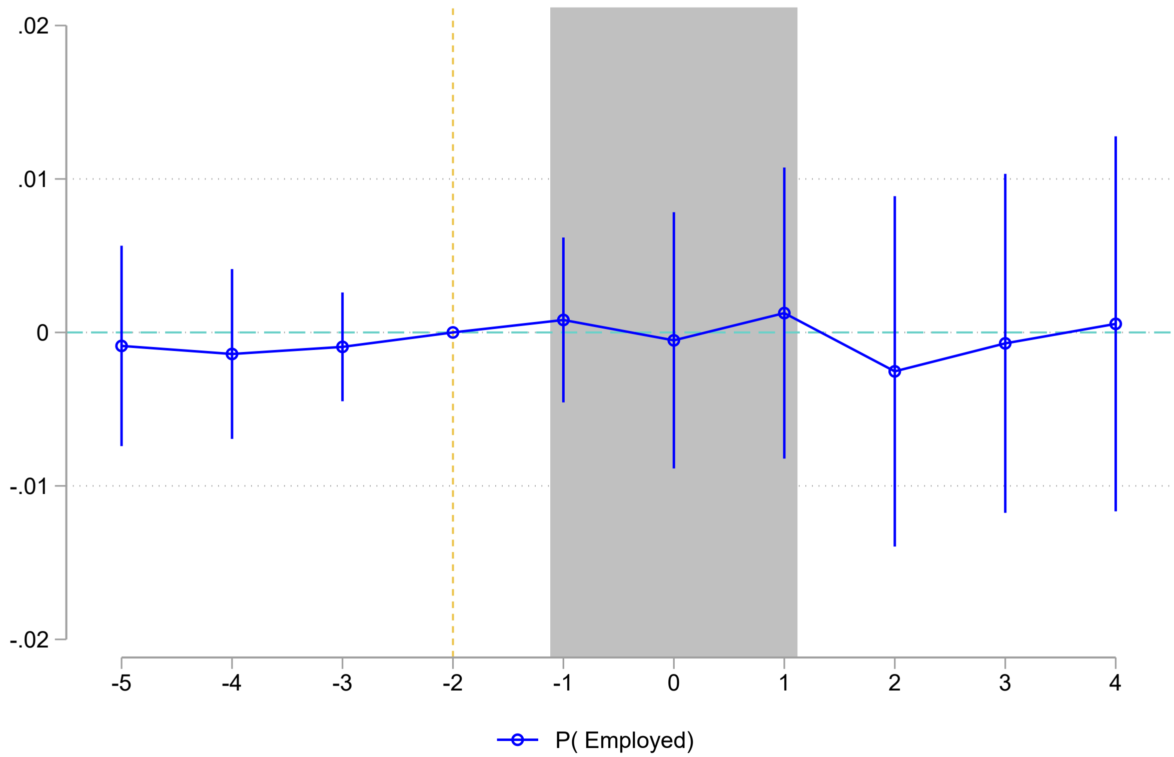


Figure 17: This figure plots the event study coefficients from Equation 19. The outcome variable is the probability of being employed in proivate sector for workers who were employed by the local employer in the baseline period. The model includes fixed effects for worker and year-by-occupation. Standard errors are two-way clustered: by the worker and by the matched labor market.

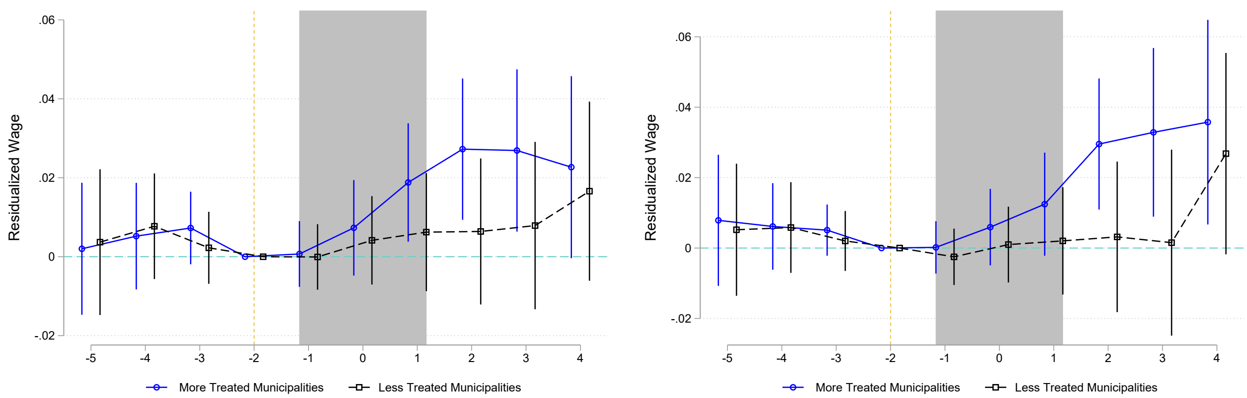


Figure 18: This figure plots the event study coefficients from Equation 19. The left panel displays the coefficients when the outcome variable is the residualized wage of workers employed by the local employer in the baseline period. The left panel displays the coefficients when the outcome variable 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 model includes fixed effects for worker and year. Standard errors are two-way clustered: by the worker and by the labor market.

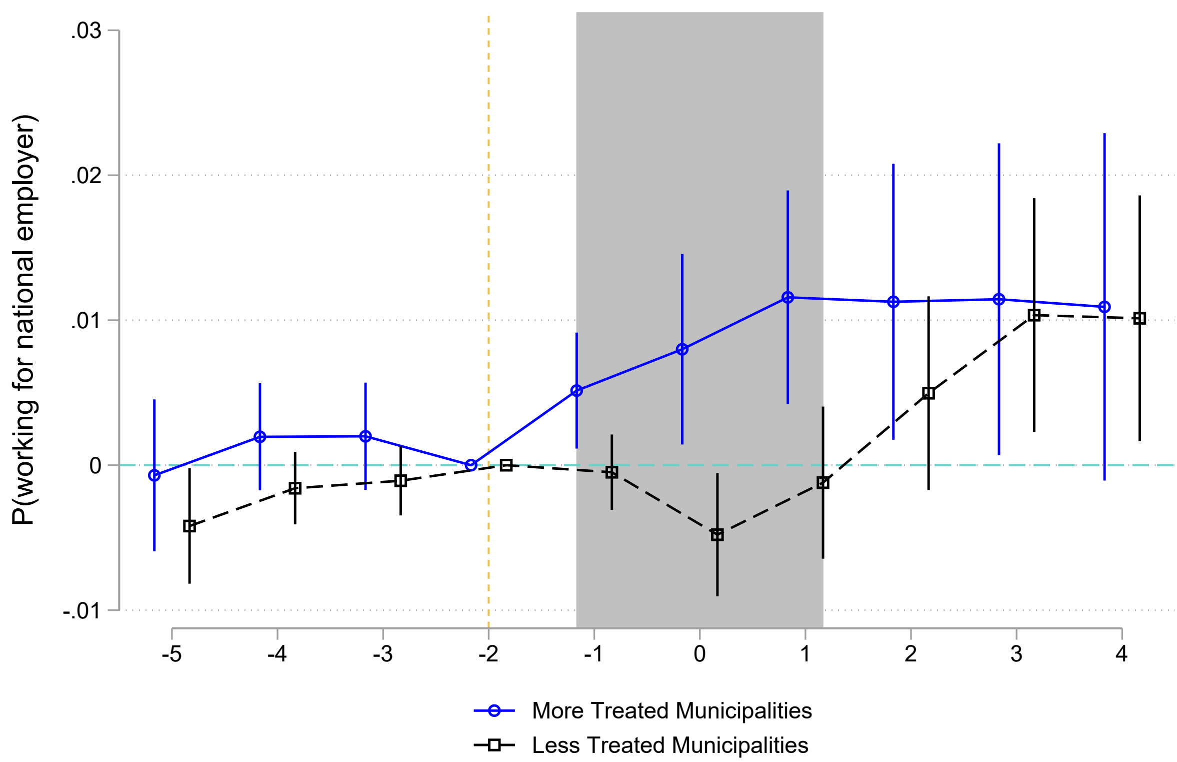


Figure 19: This figure plots the event study coefficients from Equation 19 where the outcome variable is the probability of being employed by national employer for workers employed by the local employer in the baseline period. The connected blue line displays coefficients for a subsample of matches where treated workers worked in municipalities with stronger national employers' expansion. The dashed black line displays coefficients for a subsample of matches where treated workers worked in municipalities with weaker national employers' expansion. The model includes fixed effects for worker and year. Standard errors are two-way clustered: by the worker and by the labor market.

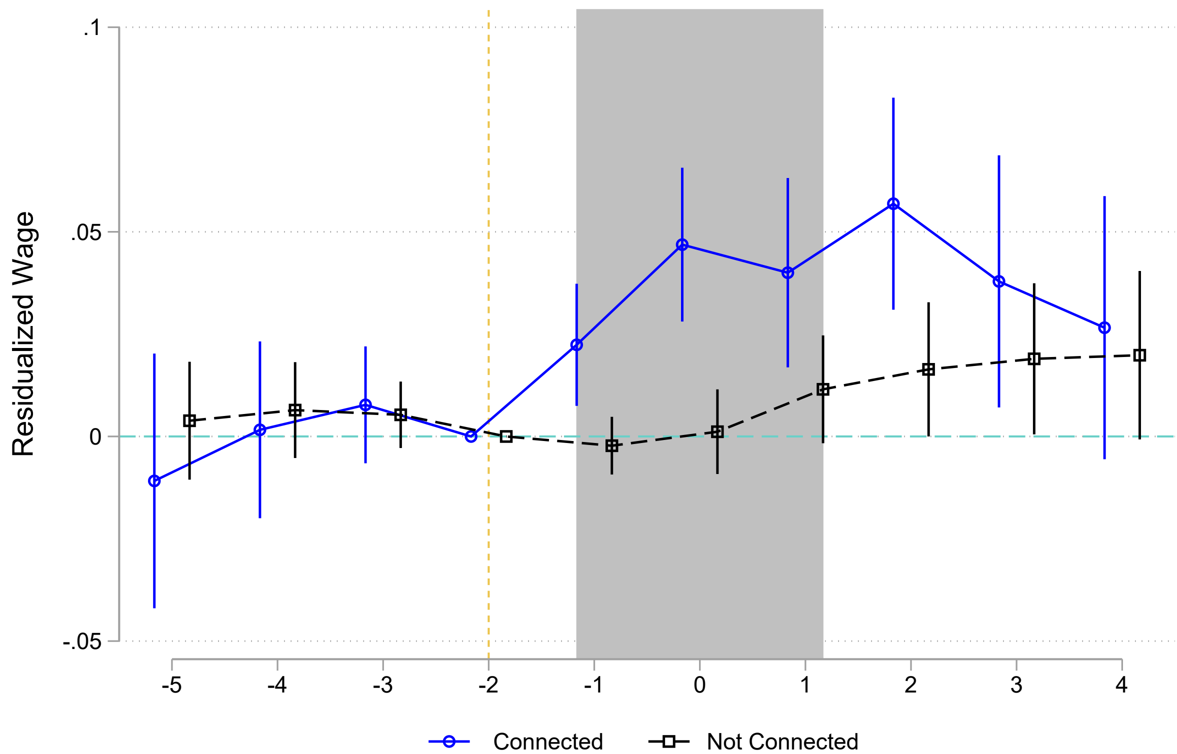


Figure 20: This figure plots the event study coefficients from Equation 19 where the outcome variable is the residualized wage of workers employed by the local employer in the baseline period. The connected blue line displays coefficients for a subsample of matches where treated workers had a co-worker working for a national employer in period 0. The dashed black line displays coefficients for a subsample of matches treated workers without a co-worker working for a national employer in period 0. The model includes fixed effects for worker and year. Standard errors are two-way clustered: by the worker and by the labor market.

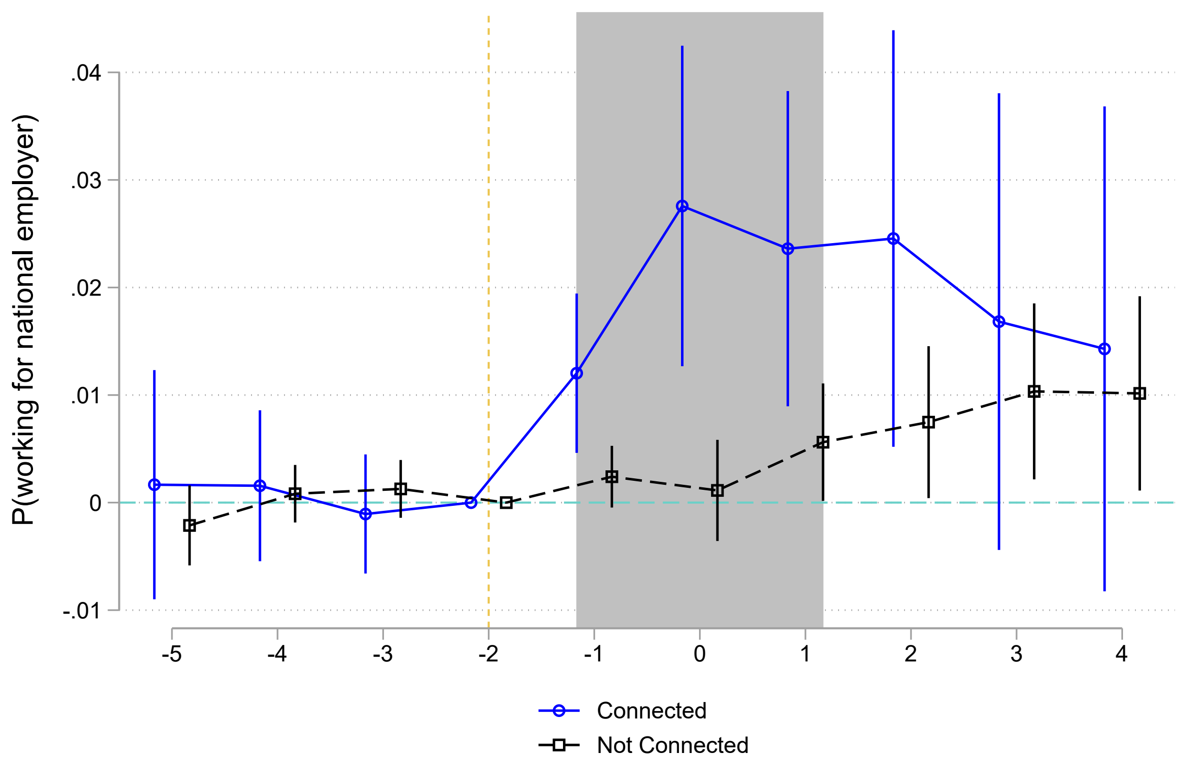


Figure 21: This figure plots the event study coefficients from Equation 19 where the outcome variable is the probability of working for a national employer, for workers who were employed by the local employer in the baseline period. The connected blue line displays coefficients for a subsample of matches where treated workers had a co-worker working for a national employer in period 0. The dashed black line displays coefficients for a subsample of matches treated workers without a co-worker working for a national employer in period 0. The model includes fixed effects for worker and year. Standard errors are two-way clustered: by the worker and by the labor market.

9 Tables

	National employers' job	Local employers' job
Number of locations in estimation region	2.87	1.13
	(5.44)	(1.34)
Large cities locations	1.9	0.0
	(1.57)	
Total Employment in estimation region	109.2	19.4
	(317.3)	(78.7)
Total Employment in large cities	254.6	0.0
	(771.2)	
Average hourly wage in estimation region	17.4	10.57
	(17.8)	(9.4)
Residualized hourly wage in estimation region	0.16	0.02
	(0.35)	(0.29)
Number of Employer× Occupation	7327	253,793
Number of Employer× Occupation × year obs.	32,217	888,543

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 Variables	Wage $\gamma_{n,o,m,t-1} w_{n,o,m,t}$		Δ Wage $\gamma_{n,o,m,t-1} \Delta \ln w_{n,o,m,t}$			Δ Log. Employment $\gamma_{n,o,m,t-1} \Delta \ln E_{n,o,m,t}$		
$\gamma_{n,o,m,t-1} \Delta \hat{\Omega}^W_{n,o,m,t}$			0.63***	0.60***	0.63***	-0.18	-0.11	-0.18
			(0.03)	(0.03)	(0.03)	(0.15)	(0.20)	(0.20)
$\gamma_{n,o,m,t-1} \Delta \hat{\Omega}^E_{n,o,m,t}$			-0.01	-0.01**	-0.01	0.48***	0.54***	0.47***
			(0.01)	(0.01)	(0.01)	(0.05)	(0.06)	(0.05)
$\gamma_{n,o,m,t-1} \hat{\Omega}^W_{n,o,m,t}$	0.64***	0.64***						
	(0.03)	(0.03)						
Observations	11,282	11,282	11,282	11,282	11,282	11,282	11,282	11,282
R-squared	0.87	0.87	0.55	0.57	0.55	0.53	0.58	0.55
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 13 and 14. $\gamma_{n,om,t-1} w_{n,o,m,t}$ represents the national employers' wage level in the estimation region, defined in 15, multiplied by the national employers' employment share $\gamma_{n,o,m,t-1}$.$\gamma_{n,o,m,t-1} \Delta w_{n,o,m,t}$ represents a three-year change in the measure of national employers' average log-wage, as defined in Equation 16. $\gamma_{n,o,m,t-1} \Delta \ln E_{n,o,m,t}$ represents a three-year change in the national employers' log-employment measure, as defined in Equation 16. $\gamma_{n,o,m,t-1} \Delta \hat{\Omega}^W_{n,o,m,t-1}$, $\gamma_{n,o,m,t-1} \Delta \hat{\Omega}^W_{n,o,m,t-1}$, and $\gamma_{n,o,m,t-1} \hat{\Omega}^W_{n,o,m,t-1}$ stand for the shift-share instruments defined in 11, 12, and 10, respectively. All regressions control for national employers employment share. Standard errors are clustered at the labor market level.

	Potentially Treated	Matched Sample		
		Treated	**Control**	**Difference**
Labor market size	4,998	4,848	5,395	-497
	(5031)	(4,430)	(5,098)	(1,186)
Job size	14.3	14.9	14.6	0.33
	(36)	(41.0)	(41.0)	(0.78)
Average Hourly Log Wage	2.17	2.09	2.11	-0.02
	(0.41)	(0.41)	(0.42)	(0.03)
Average Residualized Hourly Wage	0.02	0.02	0.03	-0.016
	(0.28)	(0.28)	(0.29)	(0.031)
Average Tenure (years)	2.57	2.33	2.37	-0.04
	(2.38)	(2.20)	(2.20)	(0.12)
National Employers' Employment Share	0.09	0.12	0.11	0.011
	(0.08)	(0.06)	(0.06)	(0.07)
National Employers' Residualized Wage	0.15	0.16	0.18	-0.03
	(0.2)	(0.17)	(0.18)	(0.03)
University Education	0.09	0.11	0.11	0.00
Female	46	0.48	0.49	-0.005
Number of Observations	488,452	9,919	9,919	

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	4,617	5,546	5,708	-162
	(5160)	(4,430)	(5,098)	(1,239)
Job size	99.7	28.5	28.3	0.22
	(262)	(48.6)	(47.4)	(3.80)
Hourly Wage	11.27	10.16	10.53	-0.36
	(11.07)	(9.86)	(15.46)	(0.60)
Residualized Hourly Wage	0.03	0.04	0.03	-0.00
	(0.37)	(0.42)	(0.42)	(0.035)
Average Tenure (years)	3.29	3.01	3.01	-0.04
	(3.2)	(3.50)	(3.51)	(0.12)
National Employers' Employment Share	0.10	0.11	0.09	0.015**
	(0.10)	(0.06)	(0.06)	(0.06)
National Employers' Residualized Wage	0.15	0.18	0.19	-0.01
	(0.2)	(0.16)	(0.20)	(0.03)
University Education	0.09	0.08	0.09	0.01
Female	46	0.49	0.49	0
Number of Observations	4,148,702	56,162	56,162	

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.

	Local Employers' Outcomes	
VARIABLES	Δ Wage	Δ Log. Employment
$\gamma_{n,o,m,t-1}(\Delta w_{n,o,m,t})$	0.799***	-0.500
	(0.125)	(0.430)
$\Delta\gamma_{n,o,m,t}w_{n,o,m,t-1}$	0.784**	0.172
	(0.398)	(1.334)
$\Delta(\gamma_{n,o,m,t}w_{n,o,m,t})$	0.784**	0.172
	(0.398)	(1.334)
$\Delta Z^{E}_{o,m,t}$	-0.00404	-0.0162
	(0.00746)	(0.0274)
Number of Observations	158,655	158,655
Year # Occupation 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 Equations **??** and **??**. All regressions control for national employers' employment share. Standard errors are clustered at the labor market level.

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A Details on steady state linear approximation

The steady-state equilibrium is represented by a system of equations 20–26 for each local firm's wages and employment, taking the national employers' wages and vacancy postings as given [8]:

$$
\begin{aligned}
w_{j,o,m} =& A_1 y_o + A_2(\mathrm{ER}_{o,m}) b_{o,m} + A_3(\mathrm{ER}_{o,m}) \left(\gamma_{n,o,m} w_{n,o,m} + \sum \gamma_{j,o,m} w_{j,o,m} \right) && (20)\\
& + A_1(\epsilon_{o,m} + \varepsilon_{j,o,m}) && (21)\\
\frac{\delta}{p_{o,m,t}} l_{j,o,m} =& V_{j,o,m} = \tilde{\rho}_1 \frac{q_{o,m}}{c} \left(y_o + \epsilon_{o,m} + \varepsilon_{j,o,m} - w_{j,o,m} \right) && (22)\\
p_{o,m,t} =& \frac{\delta \mathrm{ER}_{o,m}}{1 - \mathrm{ER}_{o,m}} && (23)\\
q_{o,m,t} =& \left(\frac{1 - \mathrm{ER}_{o,m}}{\delta \mathrm{ER}_{o,m}} \right)^{\frac{\sigma}{1-\sigma}} && (24)\\
\mathrm{ER}_{o,m} =& \frac{\sum l_{j,o,m} + l_{n,o,m}}{L_{o,m}} = \frac{\mathrm{E}_{o,m}}{L_{o,m}} && (25)\\
\gamma_{j,o,m} =& \frac{V_{j,o,m}}{V_{n,o,m} + \sum V_{j,o,m}} && (26)
\end{aligned}
$$

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

$$
\begin{aligned}
w_{j,o,m} =& \frac{A_1}{1 - (1 - A_3(\mathrm{ER}_{o,m}) \gamma_{n,o,m})} y_o + \frac{A_2(\mathrm{ER}_{o,m})}{1 - (1 - A_3(\mathrm{ER}_{o,m}) \gamma_{n,o,m})} b_{o,m} + && (27)\\
& + \frac{A_3(\mathrm{ER}_{o,m})}{1 - (1 - A_3(\mathrm{ER}_{o,m}) \gamma_{n,o,m})} \gamma_{n,o,m} w_{n,o,m} + \frac{A_1((2 - \gamma_{n,o,m}) \epsilon_{o,m} + \varepsilon_{j,o,m})}{1 - (1 - A_3(\mathrm{ER}_{o,m}} \\
l_{j,o,m} =& \frac{p_{o,m,t}}{\delta} \tilde{\rho}_1 \frac{q_{o,m}}{c} \left(y_o + \epsilon_{o,m} + \varepsilon_{j,o,m} - w_{j,o,m} \right) && (28)
\end{aligned}
$$

[8] Where: $\tilde{\rho}_1 = \frac{1}{1-\rho(1-\delta)}$, $\tilde{\rho}_2(\mathrm{ER}_{o,m}) = \frac{1}{1-\rho(1-p_{o,m})}$, $A_1 = \kappa \tilde{\rho}_1$, $A_2 = (1-\kappa)(1-\rho\tilde{\rho}_1) \frac{\tilde{\rho}_2(\mathrm{ER}_{o,m})}{1-\rho^2 \delta p_{o,m} \tilde{\rho}_1 \tilde{\rho}_2(\mathrm{ER}_{o,m})}$ and $A_3 = \rho p_{o,m} \tilde{\rho}_1 A_2$. By $\mathrm{E}_{o,m}$ I denote the total employment.

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

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

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

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

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

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

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 $\alpha_4\gamma_{n,o,m}$ in the above equation governs strength of changes of the "feedback effect", that is the larger is the share of local employers, the stronger they react to each others wages, increasing each other outside option. This effect is a consequence of the assumption of the national employers first-mover advantage and national employers wage posting. In practice, it is likely to be negligible so I drop[9] it from the main specification 3–4. Similarly, I assume that unemployment benefit evolves along the y_o so i also drop it from the main specification. Lastly, I consider the rather medium time changes (3-6 years) for the shock effects. Therefore, I assume that population of labor market workers does not change.

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

[9] I can add it for controls later.

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

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

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

B Appendix Figures

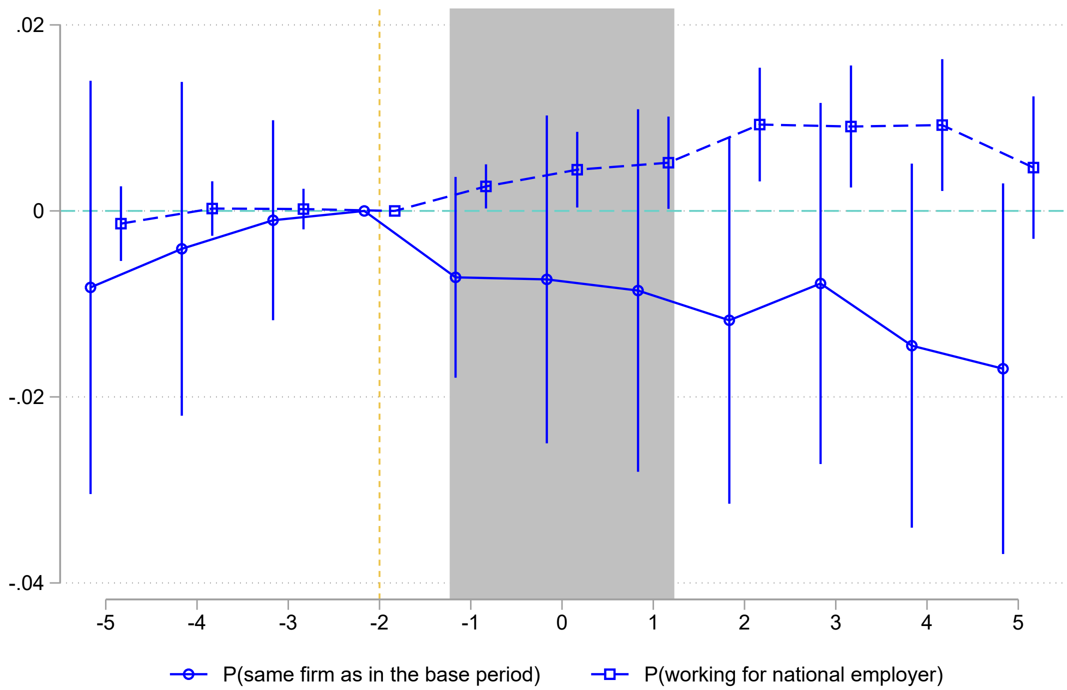

Figure 22: This figure plots the event study coefficients from Equation 19. The connected blue line represents the estimates for the outcome variable, which is the probability of leaving their employer, for workers who were employed by the local employer in the baseline period. The dashed blue line represents the estimates for the outcome variable, which is the probability of working for a firm that has a national employer status in any occupation in the given microregion, for workers who were employed by the local employer in the baseline period. The model includes fixed effects for worker and year-by-occupation. Standard errors are two-way clustered: by worker and by labor market.

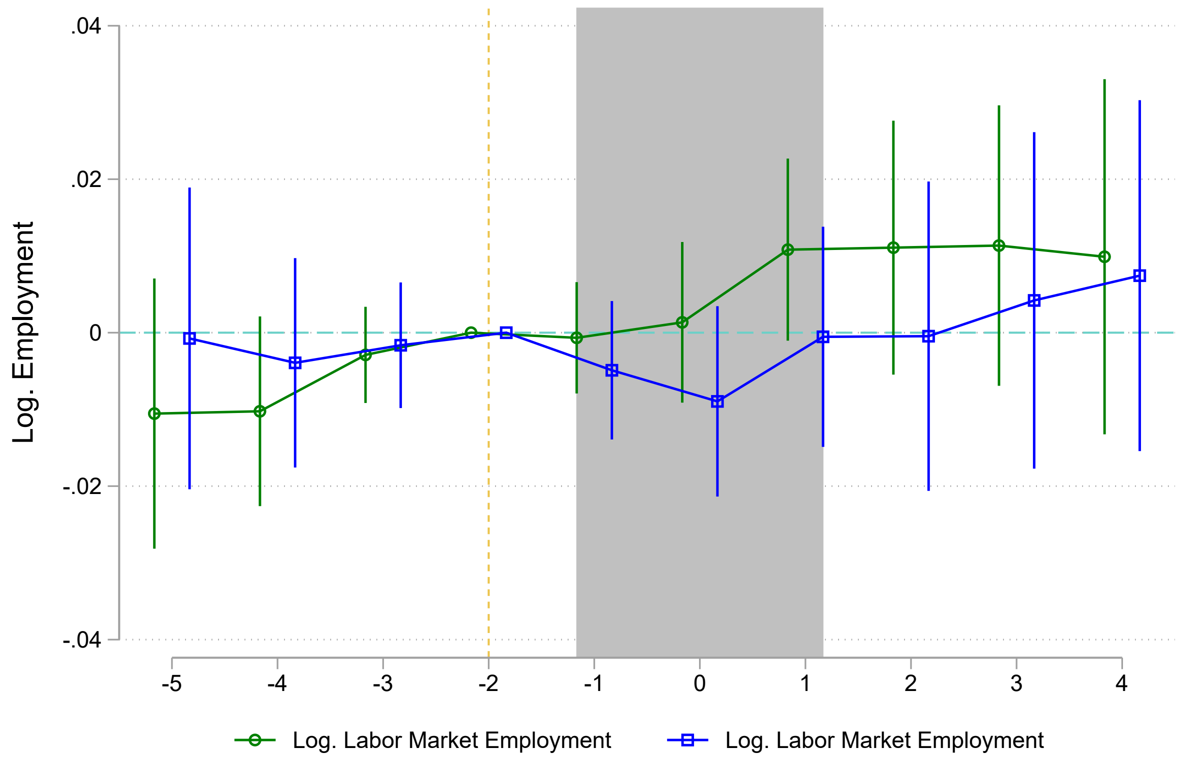

Figure 23: This figure plots the event study coefficients from Equation 18. The connected green line represents the estimates when the outcome variable is the total local labor market log employment. The connected green line represents the estimates when the outcome variable is the total local labor market log employment excluding national employers. The model includes fixed effects for job and year-by-occupation. Standard errors are two-way clustered: by job and by labor market.

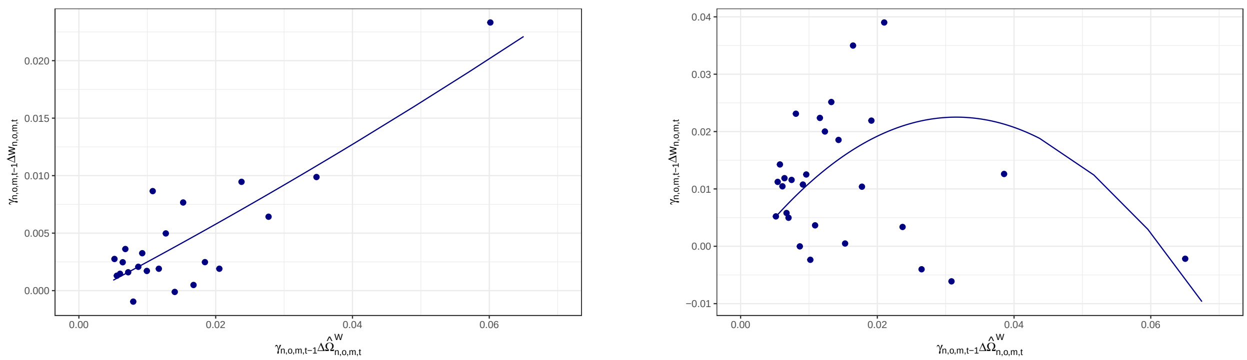

Figure 24: The bin scatterplots illustrate the relationship between the measure of national employers' wage policies in the large city region ($\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{W}_{n,o,m,t}$) and their policies in the labor market of the estimation region, specifically in cases of national employers' expansion ($\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{W}_{n,o,m,t} > 0.005$ and $\Delta\hat{\Omega}^{E}_{o,m,t} > 0$). The left panel displays the relationship with the measure of residualized wages ($\gamma_{n,o,m,t-1}\Delta w_{n,o,m,t}$) of national employers in the estimation region. The right panel depicts the relationship with the logarithm of employment ($\gamma_{n,o,m,t-1}\Delta \ln E_{n,o,m,t}$) of national employers in the estimation region.

C Appendix Tables

	(1)	(2)	(3)	(4)
VARIABLES	$\gamma_{n,o,m,t-1}\Delta w_{n,o,m,t}$		$\gamma_{n,o,m,t-1}\Delta \ln E_{n,o,m,t}$	
$\gamma_{n,o,m,t-1}\hat{\Omega}^W_{n,o,m,t-1}$	0.64***	0.46***	-0.19	0.05
	(0.04)	(0.05)	(0.16)	(0.33)
$\gamma_{n,o,m,t-1}\hat{\Omega}^E_{n,o,m,t-1}$	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 $\times$ Occupation FE	YES	YES	YES	YES

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

Table 6: This table shows the coefficients and associated standard errors from regressions described in Equations 13.$\gamma_{n,o,m,t-1}\Delta w_{n,o,m,t}$ represents a three-year change in the measure of national employers' average log-wage, as defined in Equation 16. $\gamma_{n,o,m,t-1}\Delta \ln E_{n,o,m,t}$ represents a three-year change in the national employers' log-employment measure, as defined in Equation 16. $\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^W_{n,o,m,t-1}$, $gamma_{n,o,m,t-1}\Delta\hat{\Omega}^W_{n,o,m,t-1}$, and stand for the shift-share instruments defined in 11 and 12, respectively. All regressions control for national employers' employment share. Standard errors are clustered at the labor market level.