Spillovers from National Employers' Expansions: Wage Increase or Dutch Disease?*

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Abstract

This paper investigates the influence of multi-location (national) employers on the policies of smaller (local) firms. Using Brazilian employer-employee data, I explore the spillover effects both on the job and worker levels. To distinguish spillover effects from local productivity changes, I develop a portable empirical strategy that relies on the national employers' activities in large cities, likely unaffected by labor market dynamics in small or medium-sized locations. Furthermore, by disaggregating the wage and employment changes of national firms, this strategy enables the identification of wage and employment changes specific to each national employer. Subsequently, I construct a shift-share measure of the labor market exposure to the national employers' labor demand shocks. Employing an event study design, I examine the long-term effects of substantial positive change in the shift-share measure. The findings reveal positive and slow-increasing wage effects on local employers and negative employment spillovers. Moreover, I show that both new hirers and incumbent local employers' workers experience the wage increases. To rationalize the findings, I develop a simple theoretical framework that generalizes the model proposed by Card et al. (2018).

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1 Introduction

In recent decades, the presence of large, multi-establishment employers—herein referred to as national employers—has notably increased in labor markets across both developed (Hsieh and Rossi-Hansberg, 2023) and developing (Atkin et al., 2018) countries. These employers influence the labor market in two significant ways: directly through their wage and hiring policies, and indirectly by providing alternative employment options that may affect wages and employment conditions at other companies.

To date, there are estimates of the effects of the expansions of national employers at the local market level, particularly in the context of their entry into new markets (Basker, 2002; Neumark et al., 2008; Greenstone et al., 2010; Wiltshire, 2021). However, there is no evidence on the impacts on other firms in those markets. It is important to determine the exact nature of these spillovers because they provide insight into the full effects of national firms and enhance our understanding of how labor markets operate[1].

In this paper, I examine how national employers' expansions—periods of intense hiring activity and wage increases—influence competition in the labor market. Do national employers bid workers away from other firms or attract potential hires of other firms, causing these firms to increase wages? Are these effects stronger in certain types of firms (e.g., those with closer ties to the national firm)? Do lower productivity firms, in particular, lose out when the national firm expands? One way to summarize these questions is to see this as a particular instance of Dutch Disease. National employers tend to be relatively high-wage employers in local labor markets, making it seem that their expansion is good for workers. However, if their impact on wages results in the closure or reduction of otherwise good employers, the new equilibrium might feature higher wages for some but fewer job opportunities overall.

To clarify these ideas, I developed a simple model of heterogeneous employers' Bertrand wage competition, based on Card et al. (2018) and Dustmann et al. (2021). I assume a

[1] For example, in many theoretical frameworks, employers are assumed to not affect each other's policies, at least in the short term (Card et al., 2018)

finite number of national employers with significant employment shares and a large number of small local employers. I show that in this setting, local employers' wage changes can be decomposed into their own productivity changes, changes in local labor market productivity, and effects of national employers' idiosyncratic labor productivity. Moreover, 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 theoretical setting suggests that examining national employers' entries—a seemingly natural way of investigating their expansions' effects—would be biased unless entry is motivated by reasons purely related to the national employer's idiosyncratic labor demand changes. Nevertheless, 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 multi-location firms' expansions, which are decided on the national level and focused on the locations where those firms are already present, providing a likely exogenous shock.

Specifically, to address potential confounding from unobserved changes in local labor demand, I've developed 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 policies of national employers across various locations and construct a measure of their idiosyncratic labor demand shocks. This measure is derived from relative changes in wages and employment of national employers in Brazil's major cities. Such defined shocks allow me to develop a novel shift-share instrument to measure the exposure to idiosyncratic employment and wage shifts of national employers in labor markets beyond the largest urban centers.

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 0.5% wage increase in smaller labor markets within the same occupation. Similarly, a 1% relative increase in employment by national employers is matched by a 0.6% 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 for 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 subsequently raise wages for both remaining and newly hired employees. I observe positive, though slowly increasing, wage spillovers at the job and worker level. Importantly, incumbent workers who remain with their employers also experience wage increases. I plan to extend the analysis by including a more detailed measure of workers' likelihood of moving to national employers and utilizing the (Caldwell and Harmon, 2019) measure of workers' awareness of job postings.

The event study analysis also highlights significant gender disparities. In the first years after the event, wage increases for males are nearly double those for females, a disparity that might stem from a higher likelihood of males transferring to expanding employers.

The last set of results measures the general spillovers of national employers' policies, not only restricted to the expansion periods. Using a standard instrumental variables design, I estimate spillover effects that are similar in direction to those observed in the event study but are quantitatively weaker.

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 sector and job characteristics variation), while I use individual employers' variation. 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. Lastly, this paper is related to studies of outside option shocks on 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 on individual worker wage renegotiation, I document the outside-option effects at both the job and worker level.

The rest of the paper is organized as follows. Section 2 presents data and discusses the institutional context. Section 3 presents the theoretical model and explains the reduced-form equations. Section 4 describes the national employers' wage and employment policies and discusses the shift-share construction. Section 5 presents the event study results. Section 6 presents the instrument variable regression results. Section 7 concludes.

2 Theoretical model

This section develops a simple model of an imperfectly competitive labor market, drawing on insights from Card et al. (2018). I categorize employers into two groups: national and local. National employers, holding a non-atomistic share of employment, set their wages based on both their idiosyncratic productivity and the productivity of the local labor market. Conversely, each local employer, with a relatively minor labor share, determines wages influenced by their own idiosyncratic productivity, local labor market conditions, and the wage policies of other firms.

The model allows me to derive reduced-form equations for the changes in wages and employment among local employers. In this setting, local employers' wage changes can be decomposed into their own productivity shocks, changes in local labor market productivity, and the effects of national employers' idiosyncratic labor productivity. Moreover, it is impossible to distinguish national employers' shocks from local labor market productivity changes based solely on national employers' wage changes in one location. This guides my choice of the identification strategy: focusing on the national employers' policies in different locations.

The model also provides a simple discussion of employment effects given different types of shocks. It allows for additional tests for the identification strategy.

2.1 Model setup

In the labor market defined by commuting zone m and occupation o, there are K firms indexed by j. Firms can hire in different occupations, but for simplification, I assume that their profits and wage decisions are independent between the occupations. First, N firms are national employers and set wages in an unknown process. Rest, N+1 to Kth employers are local employers. Employers The total labor supply on the market is $L_{o,m}$. The market structure is a version of Card et al. (2018). That is, workers value wages $W_{j,o,m}$ and have idiosyncratic preferences over different firms given by Type I extreme distribution. the indirect worker i utility from working for the firm j id:

$$V_{i,j,o,m} = \beta \ln W_{j,o,m} + v_{i,j,o,m}$$

Workers can also choose the outside-market option (unemployment of the informal sector) and receive the income $b_{o,m}$. In this case, the workers' utility is:

$$V_{i,b,o,m} = \beta b_{o,m} + v_{i,b,o,m}$$

2.2 Labor supply

Given the preference structure, workers choose firm j with probability $\gamma_{j,o,m}$, which is given by:

$$ln\gamma_{j,o,m} = \beta \ln W_{j,o,m} - \ln\left(\sum_{k=1}^{K} \exp(\beta \ln W_{k,o,m})\right)$$

While, the total employment for employer (j, o, m) is:

$$E_{j,o,m} = \gamma_{j,o,m} L_{o,m}$$

Therefore, the employers wage-labor supply elasticity $\epsilon_{j,j,o,m}$ is given by:

$$\epsilon_{j,j,o,m} = \frac{\partial \ln \gamma_{j,o,m}}{\partial \ln W_{j,o,m}} = \beta(1 - \gamma_{j,o,m})$$

While, the cross-employers wage-labor supply elasticity $\epsilon_{k,j,o,m}$ is given by:

$$\epsilon_{k,j,o,m} = \frac{\partial \ln \gamma_{j,o,m}}{\partial \ln W_{k,o,m}} = -\beta\gamma_{k,o,m}$$

I denote the fraction of the workers who choose outside-market option by $\gamma_{b,o,m}$;

$$1 - \gamma_{b,o,m} = \sum_{j=1}^{K} \gamma_{k,o,m}$$

Similarly, denote national firms' share:

$$\gamma_{n,o,m} = \sum_{j=1}^{N} \gamma_{k,o,m}$$

2.3 Labor demand

Both national and local employers productivity $A_{j,o,m}$ depend on the local labor market component $A_{o,m}$ and their idiosyncratic component $A_{j,o}$:

$$\ln A_{j,m} = \ln A_{j,o} + \ln A_{o,m}$$

2.3.1 National employers

Assume that national employers determine wages through an unknown process, which depends on both the local productivity shifter, $A_{o,m}$, and their idiosyncratic productivity level, $A_{j,o}$. National employers initially post wages simultaneously, followed by local employers who also set their wages simultaneously.

The sum of national employers' wage change $\Delta W^N_{o,m}$ is defined as:

$$\Delta W^N_{o,m} = \sum_{k=1}^{N} \frac{\gamma_{k,o,m}}{\gamma_{n,o,m}} \Delta \ln W_{k,o,m}$$

Moreover, I can decompose the national employers' wage changes to the part that depends on the local productivity shocks $\Delta\Theta_{o,m}$ and the one which depends on the sum of idiosyncratic national employers shocks denoted by $\Delta\Omega_{o,m}$:

$$\begin{aligned}
\Delta W^N_{o,m} &= \Delta\Theta_{o,m} + \Delta\Omega_{o,m} \approx \theta \Delta ln A_{o,m} + \Delta\Omega_{o,m} \\
\frac{\partial \Theta_{o,m}}{\partial \ln A_{o,m}} &= \theta > 0 \\
\frac{\partial \Omega_{o,m}}{\partial \ln A_{o,m}} &= 0
\end{aligned}$$

2.3.2 Local employers

Local employers maximize their profits, given the labor supply curve. They solve the maximization problem:

$$\max_{W_{j,o,m}} \frac{A_{j,o,m}}{1-\eta} (\gamma_{j,o,m} L_{o,m})^{1-\eta}$$
$$wrt: \ \ln \gamma_{j,o,m} = \beta \ln W_{j,o,m} - \ln \left(\sum_{k=1}^{K} W_{k,o,m}^{\beta} \right)$$

The solution to the employer's problem provides the wage equation:

$$\ln W_{j,o,m} = \ln A_{j,o} + \ln A_{o,m} - \eta \ln(\gamma_{j,o,m} L_{j,o,m}) + \ln \left(\frac{\epsilon_{j,j,o,m}}{1+\epsilon_{j,j,o,m}} \right) \tag{1}$$

Therefore, local employers' wages depend on their idiosyncratic productivity, local labor market productivity, and their markdown.

2.4 Effects of national employers expansion

In this subsection, I analyze the effects of national employers' wage change $\Delta W_{o,m}^{N}$ on the local employer's policies. First, I analyze the spillovers from $\Delta\Omega_{o,m}$, and next discuss the effects of $\Delta lnA_{o,m}$ and $\Delta\Theta_{o,m}$.

2.4.1 Spillovers from idiosyncratic national employers shocks

Total differentiating 1 by $\Omega_{o,m}$ (denoting $\dot{x} = \frac{\partial \ln X}{\partial \Omega}$), I receive the equation for all employers $j > N$:

$$\dot{w}_{j,o,m} = \beta\eta\gamma_{n,m}\Delta\Omega_{o,m} - \eta \sum_{k=N+1}^{K} \frac{\partial \ln \gamma_{j,o,m}}{\partial w_{k,o,m}} \dot{w}_{k,o,m} \tag{2}$$
$$- \frac{\gamma_{j,o,m}}{(1-\gamma_{j,o,m})(1+\beta(1-\gamma_{j,o,m}))} \left(\sum_{k=N+1}^{K} \frac{\partial \ln \gamma_{j,o,m}}{\partial w_{k,o,m}} \dot{w}_{k,o,m} \right)$$

Simplifying assumption

For traceability, I assume now that the labor market is populated by a large number of small local employers that individually cannot influence each wage policy and, therefore, have a constant markdown. Then:

$$\sum_{k=N+1}^{K} \frac{\partial \ln \gamma_{j,o,m}}{\partial w_{k,,om}} \dot{w}_{k,o,m} \approx -\beta \int \dot{w}_{k,o,m} d\gamma(k,o,m)$$

Moreover:

$$\frac{\gamma_{j,o,m}}{(1-\gamma_{j,o,m})(1+\beta(1-\gamma_{j,o,m}))} \left(\sum_{k=N+1}^{K} \frac{\partial \ln \gamma_{j,o,m}}{\partial w_{k,o,m}} \dot{w}_{k,o,m} \right) \approx 0$$

In this case, I can obtain the symmetric response for all the local employers:

$$\dot{w}_{j,o,m} = \frac{\beta\eta}{1+\beta\eta(\gamma_{n,o,m}+\gamma_{b,o,m})} \gamma_{n,o,m} \Delta\Omega_{o,m} \tag{3}$$

Therefore, the strength spillover effect depends on the national employers' employment share, the share of the outside-market option, and parameters of labor supply elasticity β and labor demand elasticity η.

Employment spillovers

Having the wage effects computed, the employment effects are:

$$\begin{aligned} \dot{\gamma}_{j,o,m} &= \beta(\gamma_{n,o,m}\dot{w}_{j,o,m} - \gamma_{n,o,m}\Delta\Omega_{m,o}) + \beta\gamma_{b,o,m}\dot{w}_{j,o,m} \\ &= -\frac{\beta\gamma_{n,o,m}\Delta\Omega_{o,m}}{1+\beta\eta(\gamma_{n,o,m}+\gamma_{b,o,m})} \end{aligned} \tag{4}$$

Therefore, the effects of employment are always negative.

2.4.2 Effects of the local productivity shock

As discussed above, the national employers' wage changes can also be an effect of local productivity shock. In this subsection, I analyze the effects of changes in local productivity level, denoted by $\Delta \ln A_{o,m}$.

Denoting again that denoting $\dot{x} = \frac{\partial \ln X}{\partial \ln A_{o,m}}$ and applying the same assumptions as before, I derive the effects:

$$\dot{w}_{j,o,m} = \frac{1}{1 + \beta\eta(\gamma_{n,o,m} + \gamma_{b,o,m})} \left(1 + \beta\eta\gamma_{n,o,m}\theta\right) \Delta \ln A_{o,m} \tag{5}$$

$$\dot{\gamma}_{j,m} = \beta \left(\frac{\gamma_{b,o,m} - \gamma_{n,o,m}(\theta - 1)}{1 + \beta\eta(\gamma_{b,o,m} + \gamma_{n,o,m}} \right) \Delta \ln A_{o,m} \tag{6}$$

Therefore, the wage effect is stronger than in the case of $\Delta\Omega_{o,m}$. The total employment effect should be positive as long as national employers do not respond much more strongly to the local productivity shock.

2.5 Reduced form equations

I start with the specification of the wage spillovers when having only the information on $\Delta W^N_{o,m}$. In such a case, the estimating equations are:

$$\dot{w}_{j,o,m} = \zeta_1 \Delta W^N_{o,m} + u_{1,j,o,m} \tag{7}$$

$$\dot{\gamma}_{j,m} = \zeta_2 \Delta W^N_{o,m} + u_{2,j,o,m} \tag{8}$$

The local employer can experience:

- National employer idiosyncratic shock $\Delta\Omega_{o,m}$
- Local productivity shock $\Delta \ln A_{o,m}$
- Firms own idiosyncratic wage shocks $\Delta \ln A_{j,o}$

Denoting $\dot{x} = \frac{\partial \ln X}{\partial \ln A_{o,m}} + \frac{\partial \ln X}{\partial \ln A_{j,o}} + \frac{\partial \ln X}{\partial \Omega_{o,m}}$, the total wage effect can be derived based on Equations 3, 4, 5 and 6. Then the estimating Equations 7 and 8 represents:

$$\dot{w}_{j,o,m} = \underbrace{\frac{\beta\eta}{1+\beta\eta(\gamma_{n,o,m}+\gamma_{b,o,m})}}_{\zeta_1} \underbrace{\gamma_{n,m}\left(\theta\Delta \ln A_{o,m} + \Delta\Omega_{o,m}\right)}_{\Delta W^N_{o,m}} + \underbrace{\frac{\Delta \ln A_{o,m}}{1+\beta\eta(\gamma_{n,o,m}+\gamma_{b,o,m})} + \Delta \ln A_{j,o}}_{u_{1,j,o,m}}$$

$$\dot{\gamma}_{j,o,m} = \underbrace{-\frac{\beta}{1+\beta\eta(\gamma_{n,o,m}+\gamma_{b,o,m})}}_{\zeta_2} \underbrace{\gamma_{n,m}\left(\theta\Delta \ln A_{o,m} + \Delta\Omega_{o,m}\right)}_{\Delta W^N_{o,m}} + \underbrace{\frac{\beta(1+\gamma_{b,o,m})\Delta \ln A_{o,m}}{1+\beta\eta(\gamma_{n,o,m}+\gamma_{b,o,m})} + \beta\Delta \ln A_{j,o}}_{u_{2,j,o,m}}$$

Such defined equations do not satisfy the exogenous constraints from decomposition. To address this issue, I propose a novel shift-share measure, $\Delta\Omega_m$, based on results elaborated in Section 4.2 from Hazell et al. (2021). This strategy primarily isolates the $\Delta\Omega_{o,m}$ component of $\Delta W^N_{o,m}$, thereby facilitating the identification of ζ_1 and ζ_2.

Equations 4 and 6 suggest a straightforward test for the validity of the identification of $\Delta\Omega_{o,m}$. If the identification strategy is correct, as per Equations 3 and 4, I should observe not only positive wage changes but also negative employment responses. Conversely, if the strategy is flawed—mistakenly capturing local labor market effects—then, as per Equations 5 and 6, both wage and employment effects should appear positive.

3 Data and institutional context

3.1 Institutional context

The Brazilian labor market differs from those in developed countries in two main dimensions: a high informality rate and a two-fold union structure. This section briefly outlines these differences and how they are addressed in the research design.

In contrast to developed countries, the Brazilian labor market has a significant informal sector. According to Engbom et al. (2022), the informal sector constituted approximately 40% of total employment in 2005, decreasing to around 25% by 2016. The RAIS dataset provides information only on the formal labor market, thus omitting between 40% to 25% of employer-employee relationships. Consequently, it is challenging to infer the employment status of new employees not present in the dataset, as they may have entered informal sector employment. Similarly, wage changes for workers in the informal sector cannot be observed. To mitigate these issues, I plan to provide results not only for the whole sample but also for the group of white males, for whom informal employment is less probable. Additionally, I intend to control for the size of the informal sector using population census data.

For formally employed workers, employer-employee relations in Brazil are mediated by unions and employers' representatives (trade unions). Bargaining agreements define minimum job increases and wage floors in specific industries. Unions represent all workers in a given industry within a defined region, which could be a municipality, group of municipalities, or a state (Menezes-Filho et al., 2008). These bargaining agreements are automatically extended to all workers, regardless of union membership. Additionally, union member workers can engage in secondary negotiations between the union and their workplace. Therefore, regional agreements can be viewed as a floor for union or individual negotiations, potentially leading to downward wage rigidity for incumbent workers. However, in all research designs, I account for spillovers from both positive and negative wage changes of national employers. Consequently, positive wage shocks from national employers constitute a positive outside option shock, suggesting that wage spillovers should not be constrained by downward rigidity.

3.2 Data Sources

The main data source is the Relação Anual de Informações Sociais (RAIS), the Brazilian matched employer-employee dataset. The Brazilian Ministry of Labor and Employment (Ministério do Trabalho e Emprego) collects data from all formally registered employers, imposing fines for incomplete, late, or unsubmitted reports. Additionally, there are positive incentives for both employees (e.g., eligibility for social security programs) and employers (e.g., random checks by the ministry) to accurately report information. The original RAIS dataset covers the period from 1986 to 2020. To enhance the robustness of my study and ensure consistency in occupation coding, I utilize data from the period 2005 to 2018.

For each year-employment spell pair, RAIS contains information on the average monthly wage, spell duration, average hours worked, and December wage. To track employer-employee relationships over time, RAIS provides time-invariant, anonymized worker, establishment, and firm identifiers, as well as non-anonymized municipality identifiers. It also 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).

Unlike other administrative datasets, RAIS allows the identification of establishments belonging to the same firm, enabling the tracking 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).

To control for the influence of the informal sector, I complement RAIS data with the Brazilian Population Census. Additionally, microregion and state characteristics from the Instituto de Pesquisa Econômica Aplicada are incorporated to provide further contextual information.

3.2.1 General Sample Restrictions

In the current version of the paper, attention is restricted to the South-East and South Brazilian regions, which are the richest Brazilian regions with the lowest informality index and contain approximately half of the total population. I plan to extend the analysis to cover the entire country.

I excluded all observations containing incomplete or invalid worker, establishment, firm, or municipality identifiers, as well as invalid job spell/personal or job characteristics. Additionally, the dataset was restricted to individuals who worked more than two months in a year and worked more than 10 hours per week.

Finally, farm jobs and workers, as well as those with temporary or part-time job contracts, were excluded. Workers with wages lower than the minimum wage were also excluded. The analyses on the worker level 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[2]. 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 assumed to most 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 equilibrium allows the capture of employees who conduct very similar tasks in the same commuting zone. This definition is similar to that used by Berger et al. (2023), and consistent with the analysis of job switchers in Brazil conducted by Felix (2021). However, for robustness, I plan to consider broader and narrower definitions in terms of occupation (1, 2, and 3-digit occupation codes, all low-skill workers in the given location) and location (municipalities and microregions).

3.3.1 Adjusting for Jobs' Worker Composition

Jobs within the same labor market may vary in terms of worker characteristics such as job experience, education, and gender. To account for this variation in worker composition, I employed a residualization technique on employee wages. Specifically, I conducted a regression

[2] This follows Gerard et al. (2021)

for each worker i in labor market in occupation o and microregion m, in year t:

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

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

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

$$\hat{w}^r_{i,o,m,t} = \ln W_{i,o,m,t} - \hat{\alpha}_t - X'_{i,o,m,t}\hat{\eta}$$

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

4 National employers

In this paper, I estimate the spillovers from jobs provided by multi-establishment employers (referred to here as national employers' jobs) to local employers. As discussed in the theory section, obtaining a simple OLS estimate of the wage or employment spillovers may introduce bias, as local productivity shocks could influence both errors and the wages of national employers. In this section, I outline the definition of national employers' jobs. Following that, I elaborate on the identification strategy, which enables us to isolate the idiosyncratic labor demand shock for a given job from national employers, and I describe the construction of the shift-share instrument. This instrument will be utilized to estimate the spillover effects.

4.1 Large Cities and Estimation Region

I differentiate between two types of microregions (commuting zones): large cities (utilized for estimating national employers' labor demand shocks) and estimation microregions (utilized for spillover estimations). Large cities' microregions are those containing at least one municipality with over 1 million residents, as per the 2010 Census. It includes São Paulo, 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 mirror changes in their idiosyncratic labor demand.

The estimation region encompasses all microregions in the South-East and South 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 excluded all microregions belonging to the same higher administrative unit (mesoregion) as any of the large cities. Additionally, I omitted a few commuting zones that might undergo boundary changes due to new municipalities.

The left panel of the 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 vary from sparsely populated agricultural areas to medium-sized cities like Florianopolis or Joinville.

4.2 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 5 workers in the estimated region labor market within the given occupation. The table provides descriptive statistics for employment by national employers across 4-digit occupations, pooled from 2006 to 2018. On average, national employers operate in 1 large cities and approximately 1.4 less populous microregions. Furthermore, they tend to employ more workers in large cities (averaging around 70) compared to other commuting zones.

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 the majority of our analysis, we 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 and operate within labor markets where national employers account for at least 5% of employment. The descriptive statistics in the second column of Table **??** compare local employers to national employers. Although local employers might also be multi-establishment firms, it is unlikely; on average, they operate in 1.09 locations within the same occupation. Additionally, they tend to offer lower wages, with the residualized wage for local employers being approximately 15 log points lower than that for national employers.

4.3 Identification: national employers idiosyncratic labor demand shock

The identification strategy aims to isolate national employers' idiosyncratic labor demand shocks and construct the Shift-share instrument that identifies the variation in the labor markets' exposure to such shocks. The basic idea is simple: national employers that expand (in terms of wages or/and employment) in large cities are likely to expand in other locations. Moreover such expansion is likely independent to local labor market conditions.

4.3.1 Graphical Illustration

The intuition for the identification strategy can be described in three steps. For example, consider national employer A, a major supermarket chain. This chain has 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.

Firstly, examine the scenario illustrated in Figure 2: Employer A decides to increase the wages it offers to cashiers. This decision might put pressure on smaller businesses like toolbox shop B, which also employs cashiers, to raise their wages. However, both employers could be influenced by the same local productivity shock.

Figure 3 depicts the strategy to eliminate the effects of local shocks. If national employer A increases wages in both the large city and the smaller one, this increase is more likely the result of its idosyncratic nationwide policy rather than a local labor market shock. Nonetheless, it's still possible that the wage increases at A and B are due to a rise in general, nationwide demand for cashiers.

To address the effects of nationwide shocks, I compare Employer A's wage increase in the large city with the wages offered to cashiers by other employers in the large cities, as shown in Figure 4. If Employer A's wage increase exceeds the average wage changes 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.

4.3.2 Single National Employer Labor Demand Shocks

For each national employer, idiosyncratic wage and employemnt 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 it operates, $\mathcal{M}_{j,o,t}$, at time t, I estimate a regression:

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

Here, $y_{j,o,m_{bc},t}$ denotes the employer's average residualized wage or logarithm of employment.[3]

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

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

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

$$\Delta Z_{j,o,t} = \frac{1}{|\mathcal{M}_{j,o,t}|} \sum_{m_{bc} \in \mathcal{M}_{j,o,t}} (\omega_{j,o,m_{bc},t+1} - \omega_{j,o,m_{bc},t-1}) \tag{10}$$

For the remainder of the paper, these idiosyncratic wage changes are denoted as $\Delta Z^W_{j,o,t}$ and employment changes as $\Delta Z^E_{j,o,t}$

4.3.3 Shift-share instrument construction

Having estimated the employer × occupation-level shocks, I construct the shift-share instrument to identify the labor market exposure to national employers' idiosyncratic labor demand shocks. I weight the labor market exposure to these single national employer shocks by their employment share 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 to be exogenous to the local firms, whereas employment shares depend on local labor market conditions.

[3] As this regression is aimed at identifying idiosyncratic firm effects, I do not weight the estimation results by the employment of each job. Instead, I estimate a regression for jobs employing at least 10 workers continuously for 3 years.

I define the level shift-share measure of exposure to national employers' wages or employment policies, for the labor market in occupation o, microregion m, and time t as:

$$\hat{\Omega}^{W}_{o,m,t} = \sum_{j=1}^{N} \frac{\gamma_{j,o,m,t-1}}{\gamma_{n,o,m,t-1}} Z^{W}_{j,o,t} \tag{11}$$

Where $\gamma_{j,o,m,t-1}$ is the national employer j employment share in the period $t-1$ while $\gamma_{n,o,m,t-1}$ is a total national employers employment share.

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

$$\Delta\hat{\Omega}^{E}_{o,m,t} = \sum_{j=1}^{N} \frac{\gamma_{j,o,m,t-1}}{\gamma_{n,o,m,t-1}} \Delta Z^{E}_{j,o,t} \tag{12}$$

$$\Delta\hat{\Omega}^{W}_{o,m,t} = \sum_{j=1}^{N} \frac{\gamma_{j,o,m,t-1}}{\gamma_{n,o,m,t-1}} \Delta Z^{W}_{j,o,t} \tag{13}$$

Importantly, from the theoretic description in subsection 2.5, the shift-share measure must be normalized by the total national employers' employment share $\gamma_{n,o,m,t-1}$ the sum of shares is less than 1, as the national employers' share in total employment is about 10% in the selected labor markets where they have at least 5% share. Following Borusyak et al. (2021), in the regressions results, I control for $\gamma_{n,o,m,t-1}$.

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

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

$$\Delta y_{o,m,t} = \nu_{1,1}\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{W}_{o,m,t} + \nu_{1,2}\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{E}_{o,m,t} + \alpha_{o,t} + \gamma_{n,o,m,t-1} + u_{o,m,t} \tag{14}$$

$$y_{o,m,t} = \nu_{2,1}\gamma_{n,o,m,t-1}\hat{\Omega}^{W}_{o,m,t} + \alpha_{o,t} + \gamma_{n,o,m,t-1} + u_{o,m,t} \tag{15}$$

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

$$W^{N}_{o,m,t} = \sum_{i=1}^{N} \frac{\gamma_{j,o,m,t-1}}{\gamma_{n,o,m,t-1}} \hat{w}^{r}_{j,o,m,t} \tag{16}$$

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

$$\Delta W^{N}_{o,m,t} = \sum_{j=1}^{N} \frac{\gamma_{j,o,m,t-1}}{\gamma_{n,o,m,t-1}} (\hat{w}^{r}_{j,o,m,t+1} - \hat{w}^{r}_{j,o,m,t-1}) \tag{17}$$

$$\Delta E^{N}_{o,m,t} = \sum_{j=1}^{N} \frac{\gamma_{j,o,m,t-1}}{\gamma_{n,o,m,t-1}} (\ln E_{j,o,m,t+1} - \ln E_{j,o,m,t-1}) \tag{18}$$

Results of the regressions, presented in panels (1)-(3) of 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 changes: a unit change in national employers' wage policies in large cities (measured by $\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{W}_{o,m,t}$), is accompanied by on average, a 0.5 unit residualized wage increase in the estimation region and a 0.3 log- point increase in employment. National employers' employment policies in large cities (measured by $\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{E}_{o,m,t}$) do not seem to affect the wages; however, a one-unit increase in $\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{E}_{o,m,t}$ is followed by about a 0.6 log point increase in national employers' employment in the estimation region. Overall, the results suggest that the change instruments effectively capture the 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 where they significantly increased their wages and employment across different regions. Figure 6 displays the binscatter plots of the national employers' wages and employment in the estimation region during major changes in the national employers' wage policy 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 5% of all observations). In such cases, the national employers' wage level and employment increase significantly in the estimation region, demonstrating that large, positive instrument changes are good predictors of national employers' nationwide expansions.

4.3.4 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. Possibility of such movements has been documented by Giroud and Mueller (2019). Firstly, I limit this concern by considering that the local labor markets are not too close to the large cities (in the different mesoregions). I plan to add as the robustness checks, the specification with national employers from different states. Moreover, in such scenarios, all employers in the estimation region (both national and local) should increase their wages and employment as discussed in section 2.5. This contradicts my findings: in response to wage increases by national employers, local employers raised their wages but reduced their employment, indicating the absence of positive labor demand shocks.

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 groups 4 and 5), the pass-through observed was similar to that in the comprehensive occupational analysis, as shown in columns (4) and (5) of Table 2.

My approach is building on the results of Hazell et al. (2021) regarding national wage-setting in the US. Echoing their findings, I observed significant co-movement in wages set by the same employers across various 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, akin to the United States, 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 outside the USA and suggest that it can be a general characteristics of multi-establishment firms.

I see my contribution as a novel use of the multi-establishment employers' national wage and employment policies. Best to my knowledge, only Derenoncourt et al. (2021) use the national employers wage policies to assess the effects of the outside option shocks. Different from their approach, I focus on the effects of regional-level exposure to the national employer's policies.

5 Spillovers from national employers expansions

Multi-establishment employer expansions put special pressure on other employers in the labor market. Wage increases and intensified hiring activity by national employers might make it more difficult for other employers to retain their staff or recruit new workers. This could also lead to more intense wage competition for workers or employment cuts and local employers' exits.

This section describes the empirical strategy and examines the effects of sharp wage and employment increases by national employers. Using a matched event study design, I demonstrate that expansions by national employers lead other employers to both cut their employment and increase their wages. The incumbent workers of the local employers also benefit from the expansions of national employers, even if they remain in their current jobs. The results are consistent with the model presented in the 2.5 section. However, they suggest very low labor demand elasticity.

5.1 Event definition

I aim to identify labor markets exposed to sharp increases in the idiosyncratic labor demand of national employers. Building on the results from the previous section, I identify the major increases in the constructed shift-share measure for the national employers' idiosyncratic wage changes in the large city region $\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{W}$.

For this event, I require that in the labor market of microregion m, for occupation o during period t, and with national employers employment share $\gamma_{n,o,m,t-1}$, the shift share measure $\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{W}_{o,m,t}$ exceeds 0.005. Although this threshold might appear moderate, it is important to note it is normalized by the total share of national employers in the labor market. As this average is close to 10%, the event represents cases where the national employers' relative wage increases are about 5%. Many such increases result not from the national employers' expansions but from reductions in employment and 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: $\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{E}_{o,m,t} > 0$ and $\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{W}_{o,m,t-1} > 0$. Additionally, I limit the events to labor markets that had at least 50 workers (full-time weighted) in period $t-1$ and where national employers had at least a 5% employment share.

It is probable that the expansions of national employers began before the observed event—for example, the firm might have started hiring in period $t-1$, but the main wage increases are observed in period t. Therefore, I set period $t-2$ as a baseline. I further restrict the events to labor markets that had at least a 2.5% employment share in period $t-2$.

For the main specification, I define a set of treated jobs as the jobs of local employers that employ at least 5 workers (full-time weighted) in the labor market where the event occurred. To make sure that the treated job survived from baseline period to the event, I restrict the sample to the jobs that existed between period $t-2$ to t.

I define the treated incumbent workers as those who worked in treated jobs for at least six months during the baseline period. I restrict the sample of treated workers to those aged between 24 and 53 in the baseline period. Additionally, I limited the sample to one worker-year observation per individual, retaining the one representing the job in which the worker was employed for the longest duration within that year.

5.2 Matched Dataset

To find a reliable counterfactual for treated jobs and workers of local employers, I employ matching methods. I match treated establishments and incumbent workers from two years prior to the event (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:

1. are located within the estimation region,
2. belong to the same 4-digit occupation as the treated job,
3. employ at least five workers,
4. existed from period $t-2$ to t,
5. are in the same size distribution quartile in terms of full-time workers,
6. are in the same job average wage quartile.

Furthermore, I require that the controls' labor market in period $t-2$ exhibits a national employers' employment share of at least 2.5% and is in the same size distribution quartile in terms of full-time workers.

Next, to find the closest counterfactual to the treated job (a "statistical twin"), I use Mahalanobis matching. This method identifies the counterfactual closest in terms of Euclidean distance of the matching variables, where the distance of each variable is weighted by its inverse variance. The matching variables include job and labor market logarithm of employment size, the proportion of hired workers to total job workforce, national employers' employment share, national employers' relative wage measure in the large city region Ω^W, and national employers' wages in the labor market W^N.

The results of the matching procedure at the job level are presented in Table **??**. Matched and control groups are similar in terms of matched characteristics, such as employment size and national employers' employment share. They are also not statistically different in terms of non-matched average residualized wages. The only statistical difference is in the national employers' average wage in the large city, Ω^W. This is reasonable, given that the event definition anticipates that the national employer's relative wage in the large city is likely to have been lower in previous periods, allowing for a sharp increase.

In total, I matched approximately 65% of the treated jobs. The matched sample includes treated observations from about 320 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 expansion episodes occurred between 2010 and 2014, years of rapid growth in Brazil's economy. The subsequent economic downturn correlated with fewer expansions by national employers.

I restrict the potential workers' control pool to individuals of the same gender who belong to a labor market with at least a 2.5% national employment share. Moreover, I require that their job in period $t-2$:

1. is located within the estimation region,
2. belongs to the same 4-digit occupation as the treated job,
3. employs at least five workers,

4. existed from period $t-2$ to t,
5. Labor market was never treated or treated in more than last 5 years/ will be treated in more than 5 years.

Additionally, control workers must have been employed in their job for at least six months. Lastly, I exactly match the tenure bin: the length of tenure being (1) from 6 to 12 months, (2) from 1 to 2 years, and (3) more than 3 years.

I match the treated workers with the potential controls using a Caliper-match method. This method matches treated workers to controls within "calipers." That is, for each matched variable, the absolute value of the difference between match and control must fall within the caliper width. I set the caliper for the logarithm of job's employment size to be 15 log points, the logarithm of labor market employment size to be 15 log points, and the national employer's employment share to 5 percentage points.

Table **??** compares the control to the treated sample. As with the jobs-level design, the matching method closely matched targeted characteristics (such as jobs' employment size) and untargeted workers' characteristics. Again, the main difference between controlled and treated individuals lies in the national employers' average wage in the large city, Ω^W. Additionally, both matched and control workers are employed in larger jobs. The sample is also balanced by gender. Most workers have high-school diplomas, characteristic of the Brazilian labor market. In total, approximately 35% of the treated workers were matched.

5.3 Event study model

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

$$y_{j,o,m,t,\tau} = \sum_{-5 \geq \tau \leq 5, \tau \neq -2} \eta_\tau 1(\tau = t - t_j^*) + \sum_{-5 \geq \tau \leq 5, \tau \neq -2} \zeta_\tau 1(\tau = t - t_j^*) \times \text{Tr}_{j,o,m,t,\tau} \tag{19}$$
$$+ \alpha_{o,t} + \alpha_{j,o,m} + \mu X + u_{j,o,m,t,\tau}$$

Where t_j^* is the event year for job j. The variable $\text{Tr}_{j,o,m,t,\tau}$ indicates if the job was treated ($\text{Tr}_{j,o,m,t,\tau} = 1$). The specification controls for job and occupation $\times$ time fixed effects. Additionally, I control for time to event η_τ, which ensures that controls and treated jobs exhibit similar life-cycle and aggregate trends. I control for the microregion and state GDP to ensure that the observed effects are not affected by the microregion or state booms. I two-way cluster the standard errors by the job and by the labor market.

For worker-level analysis, I estimate the following model:

$$y_{i,o,m,t,\tau} = \sum_{-5 \geq \tau \leq 5, \tau \neq -2} \eta_\tau 1(\tau = t - t_i^*) + \sum_{-5 \geq \tau \leq 5, \tau \neq -2} \zeta_\tau 1(\tau = t - t_i^*) \times \text{Tr}_{i,o,m,t,\tau} \tag{20}$$
$$+ \alpha_{o,t} + \alpha_i + \mu X + u_{i,o,m,t,\tau}$$

Where t_i^* is the event year for worker i, in n occupation o, microregion m, calendar year t in time to the event period τ. The specification controls for individual and occupation $\times$ time fixed effects. Additionally, I control for time to event η_τ and age individual age polynomial, which ensures that controls and treated workers experience similar life-cycle and aggregate trends. I two-way cluster the standard errors by the worker and by the labor market.

In both specifications, the coefficients of interest are $\{\zeta\}_{\tau=-1}^{5}$, which indicates the change in the variable of interest in response to the national employers' expansion, relative to the control job or worker.

The main identifying assumption is that a matched control sample provides a valid counterfactual, conditional on the control variables. The plausibility of this assumption is based on the identification of national employers' idiosyncratic labor demand shocks, as described in the previous section, and on not matching based on the main outcome variables (wages). Although this assumption cannot be tested directly, if it holds true, the coefficients $\{\zeta\}_{\tau=-5}^{-3}$ should be close to zero. In the next subsection, I demonstrate that, for most specifications, these coefficients are indeed close to zero. Another indirect test of the assumption's validity is the evolution of employment in treated jobs: as discussed in Section **??**, common increases in wage and employment for treated jobs would suggest a local productivity shock and threaten the validity of the results. In the results section, I show that the employment and wage levels of treated jobs move in opposite directions, suggesting that $\{\zeta\}_{\tau=-1}^{5}$ indeed measure the spillover effects from the expansions of national employers.

5.4 Job Level Results: National Employers' Expansions

Figure 9 plots the event studies for the normalized measure of national employers' wages in a large city, $\hat{\Omega}^{W}_{o,m,t}$ (connected red line), and the measure of national employers' wage, $W^{N}_{o,m,t}$ (dashed red line). On average, the national employers' expansion increased $\hat{\Omega}^{W}_{o,m,t}$ by 0.05, reflecting an average increase of the national employer residualized wage by 5 log points in the large city (relative to other employers operating in this region). Between periods -1 and 1, $W^{N}_{o,m,t}$ increased by about 0.03, reflecting an average increase in the national employer residualized wage in the treated labor market by about 3 log points (compared to the control labor market).

National employers' expansions also led to significant increases in their employment, as Figure 10 shows. The total employment of national employers in the treated labor market increased by about 30%, while their employment share increased by about 3 percentage points compared to the control labor markets. In the latter period, employment and employment share slightly decreased but remained significantly higher than in the baseline period.

I interpret the event study results for national employers as a validity check for the empirical strategy used. It demonstrates that national employer expansions are likely decided at the national level and are characterized by large employment and significant wage increases for the expanding national employers' jobs. Moreover, the lack of pre-trends indicates that the expansions were rather rapid in nature.

5.5 Job Level Results: Wage and Employment Spillovers

Figure 11 compares the coefficients from an event study regression for the average wage of national employers' jobs, $W^N_{o,m,t}$, with the residualized wages of local employers' jobs. Local employers respond to expansions by national employers by increasing their wages; the average wage for local jobs increases by almost 2% compared to the control group. Nevertheless, this process is much slower than the expansions of national firms: local employers' wages stabilize three years after the event time and exhibit slow growth beforehand. Therefore, at the peak of national employers' wage growth, the increase in local employers' wages is three times weaker, eventually converging in later periods.

Figure 12 presents the coefficients from an event study regression for residualized wages and employment of local employers' jobs. Employment drops quickly in response to the expansion by national employers, decreasing in the event period by about two log points. In the worker-level section, I demonstrate that this is motivated by the transition of incumbent workers to national employers. Importantly, after the period of most intense hiring activity by national employers, employment recovers and eventually stabilizes at a level about 2% lower than in the baseline period. Thus, employment trends in the opposite direction to wages, suggesting that local employers do not experience any unobserved productivity shock. Moreover, the drop in employment is not majorly different than the wage increase, which suggests rather low labor demand elasticity.

Lastly, the left panel of Figure 13 plots the employment and wage effects restricted to the set of workers who were employed in the job in the baseline period (job-stayers). The average wage for this group increased, but the growth is stronger for the total jobs' workforce. The right panel of Figure 13 shows the event study regression coefficients for the difference between the average residualized wage of job-stayers and the average residualized wage for the total job workforce. This regression reflects the wage differential between new hires and incumbent workers, suggesting that newly hired workers received higher wage increases than incumbent workers.

5.5.1 Robustness

I explore two variations of the baseline specification, which address possible concerns regarding the validity of previous results. First, I add additional controls for the large-cities region's average five-digit industry employment and residualized wage level. This adjustment allows me to account for various industry-level shocks that might not be captured by the occupation-year controls.

The second concern is that previous results might be influenced by state-level minimum wage changes. Five of the seven states in the South-East and South regions introduced minimum wage policies. Unfortunately, the minimum wages are set differently for different occupations/industries, and the rules are not consistent across states. Following Saltiel and Urzúa (2022), I constructed a state wage floor variable by taking the minimum of each state's minimum wages. In cases where states did not have a minimum wage in a given year, I used the national minimum wage as the wage floor.

Figure 14 plots the coefficients from an event study regression for the residualized wages of local employers' jobs for the baseline specification, a specification that controls for industry effects, and one that controls for the logarithm of the state-specific wage floor. Reassuringly, all specifications indicate similar results and are not statistically different.

For the final robustness checks, I compared the event study of the previously defined event with the event of a "weaker" national employers' expansion. Specifically, I defined the expansions as events where the national employers' wage measure $\gamma_{n,o,m,t}\hat{\Omega}^{W}_{o,m,t}$ was between 0.002 and 0.005, while maintaining all other conditions the same. I constructed the matched sample using the same rules as for the main event. Figure 15 presents the coefficients from both event study regressions where the dependent variable is the local employers' residualized wage. For both events, the wages of local employers increase, although, as expected, the wage spillovers are weaker for the "weaker" event.

5.6 Worker-Level Results

The event study regressions at the job level indicate that expansions by national employers lead to average wage increases in local employers' jobs. However, these wage increases might not be a direct effect of changes in local employers' wage policies, but rather due to worker selection. It is also possible that wage policy changes only apply to new hires. Worker-level results help to confirm whether job-level increases were indeed the result of changes in local employers' wage policies.

Figure 18 shows that despite differences between the matched datasets, the worker-level analysis is consistent with the job-level analysis. The wages of national employers in large cities and local labor markets exhibit very similar patterns. Moreover, Figure 17 demonstrates that expansions by national employers do not lead to higher participation in the formal labor market. Nevertheless, workers from local employers are more likely to join national employers. Figure 16 presents the coefficients from an event study regression where the dependent variable is the probability of joining a national employer (in dashed blue) or the probability of leaving the firm (connected blue). Treated local employers' incumbent workers are about 1 percentage point more likely to join national employers and almost 2 percentage points more likely to leave their current employers, although these results are not statistically significant.

Finally, Figure 19 plots the event study for the residualized wages of incumbent workers. The estimates, connected by the solid blue line, correspond to wage effects for all workers, while the estimates connected by black lines correspond to the wage effects of incumbent workers who stayed with their employer from the baseline period. For both groups, the residualized wage increases by about 2 log-points. This increase is comparable to the results at the job level and suggests that job-stayers benefit from the expansions by national employers. This result is consistent with previous analysis by Caldwell and Harmon (2019).

5.6.1 Gender Heterogeneity

Several works (Le Barbanchon et al., 2020; Caldwell and Harmon, 2019; Carry, 2022) have highlighted gender differences in benefits from the enhancement of workers' outside options. The left panel of Figure 20 plots the event studies for the residualized wage, estimated separately for males (dashed blue line) and females (connected by a blue line). Particularly in the first period after national employers' expansions, the wage increase is indeed almost two times higher for men.

A possible explanation for such a difference is that women and men are employed in different occupations. If men tend to work in occupations with higher labor supply elasticity (for example, truck drivers) while women are in occupations with lower labor supply elasticity (for example, nurses), the different event study coefficients would capture the differences in the effects of outside options between occupations, not between genders. Therefore, the right panel of Figure 20 shows the same specification where male event study coefficients are weighted by the female fraction in the occupation. Surprisingly, under this specification, the gender differences are even larger.

Another possibility suggested by Le Barbanchon et al. (2020) is that females are less likely to move from their current employer. In terms of the model from section 2.5, their labor supply parameter is lower, which leads to a lower probability of joining the national employer. Figure 21 compares the event study coefficients for male and female sub-samples, where the dependent variable is the probability of joining the national employer. Males are almost twice as likely to join the national employer during the expansion period, which might explain the observed differences in wage changes.

5.6.2 Planned Extensions and Robustness

I plan to extend the above analysis by focusing more on the probability of workers moving to national employers. The next steps involve estimating a machine learning model of inter-firm flows and developing an event study for groups of workers with different probabilities of moving to national employers. Additionally, I would like to incorporate the measure of workers' information on the outside option developed by Caldwell and Harmon (2019).

6 Spillovers Beyond the Expansion Periods

In this short section, I discuss the average spillovers from national wage and employment changes, not restricted to expansion periods. This version includes only the job-level analysis. Nevertheless, I plan to estimate the regressions at the incumbent worker level as well.

I restrict the sample of local employers' jobs × year observations using similar restrictions as for the event study analysis. I restrict local employers' jobs to those that employed at least 5 workers (full-time-weighted) in the previous year. Moreover, jobs must belong to labor markets with at least 100 workers (full-time-weighted) and with at least 5% and less than 70% of national employers' employment share in the previous year.

I estimate the spillover effects of national employers' actions on local employers' wages and employment. For three-year changes, I estimate an equation of the form:

$$\Delta y_{j,o,m,t} = \zeta^W \gamma_{n,o,m,t-1} \Delta W^N_{o,m,t} + \zeta^E \gamma_{n,o,m,t-1} \Delta E^N_{o,m,t} + \gamma_{n,o,m,t-1} + \alpha_{o,t} + u_{j,o,m,t} \tag{21}$$

Where j index employer, o occupation, m microregion (commuting zone) and t year. $\Delta W^N_{o,m,t}$ stands for the national employers' average wage change, defined in 17, while $\Delta E^N_{o,m,t}$ is the average employers defined in 18. I control for national employers share $\gamma_{n,o,m,t-1}$ and occupation × year fixed effects. In the most demanding specification, I also add the jobs' fixed effects $\alpha_{j,o,m}$.

As seen in the event study, three-year changes do not need to capture the full spillover effects. Therefore, I also employ a level analysis. I control for the firm-level variation. Thus, I use similar time variation in the labor market exposure to national employers' wage and employment policies, although the level analysis allows me to pin down the longer-term effects. The estimating equation is defined as:

$$y_{j,o,m,t} = \zeta \gamma_{n,o,m,t-1} W^N_{o,m,t} + \gamma_{n,o,m,t-1} + \alpha_{j,o,m} + \alpha_{o,t} + u_{j,o,m,t} \tag{22}$$

The first stage for $\gamma_{n,o,m,t-1}\Delta W^N$ and $\gamma_{n,o,m,t-1}\Delta E^N$ will use the previously defined shift-share instruments for national employers' idiosyncratic wage and employment changes in the large city. Specifically, $\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^E_{o,m,t}$ and $\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^W_{o,m,t}$ are defined respectively in 12 and 13. For the national employers' wage level, I use the instrument $\gamma_{n,o,m,t-1}\hat{\Omega}^W_{o,m,t}$ defined in 11. As suggested by the results from section **??**, these instruments are powerful, and the first-stage F-statistics in all specifications exceed 20.

6.1 Job Level Results

Tables 5 and 6 present the estimation results of equations 21 and 22. The results are qualitatively consistent with the event study. Wage increases by national employers pressure local employers to raise wages and reduce employment.

The results for a three-year change in wage or employment from Table 5 can be interpreted as follows. Consider two labor markets, both with an average 10% national employers' employment share. In one market, national employers increased their wages by 1 log-point, while in the other, there was no change. Consequently, local employers in the first labor market increase their wages by $\zeta^W \times 0.1 \times 1$ log-points, resulting in a 0.03 log-point increase (in the main specification) compared to the second market.

For the levels, consider a 1 log-point increase in national employers' wages compared to the average wage level for national employers in these occupations. Using similar computations as above, the regression coefficients indicate that local employers increase their wages by 0.04 log-point in this scenario.

Overall, the estimates for both regressions indicate weaker wage and employment effects than in the event study. This may be related to the intensity of hiring activity by national employers during expansion periods: the threat of losing many employees simultaneously might pressure local employers to increase their wages sharply. Another reason is that the regression also includes negative changes in national employers' wages/employment; in such cases, local employers might react weakly due to downward wage rigidity or union activity (the latter was noted by Guanziroli (2022) in the context of mergers).

6.2 Planned extensions

I plan to extend the above results by adding two additional analyses. Firstly, I will estimate the regression equations at the worker level. This will allow me to understand the effects of national employers on both job-stayers and new employee wages.

Secondly, I will extend the labor market definition by allowing for national employers' jobs from different occupations to affect local employers' wages. In particular, I plan to use regularized, double-debiased regression to identify which occupations and jobs influence local employers' policies.

7 Conclusions

In this paper, I study the spillovers from national employers to local employers' policies in the Brazilian formal labor market. Combining a novel shift-share instrument that uses the variation in national employers' policies in large Brazilian cities with rich Brazilian employer-employee datasets, I show significant wage and employment spillovers.

First, building on Hazell et al. (2021) and Schubert et al. (2021), I demonstrate that national employers' wages strongly co-move across regions, estimating the pass-through rate from large cities to smaller labor markets to be about 0.5 for wages and 0.6 for employment.

Secondly, I estimate the event study model for spillovers from national employers' expansions, defined as large increases in their wage policies in the large cities. Using both job-level and worker-level analyses, I find significant, though gradually increasing, wage effects for local employers' workers. The event study estimates also show a sharp, 2-log-point decrease in employment, followed by a later rebound.

Next, I use the constructed shift-share instrument to estimate the average effects of national employers' actions on local employers' policies. The estimates show the same qualitative effects as the event study. However, they indicate that national employer expansions are the periods that most significantly affect local employers.

Overall, I found that workers mostly benefit from more intense labor market competition and that short-term gains do not jeopardize long-term outcomes. Local employers lose workers, but this appears to be primarily due to workers transitioning to better-paying national employers. Moreover, both local employers' job stayers and new hires benefit from better outside options.

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8 Figures

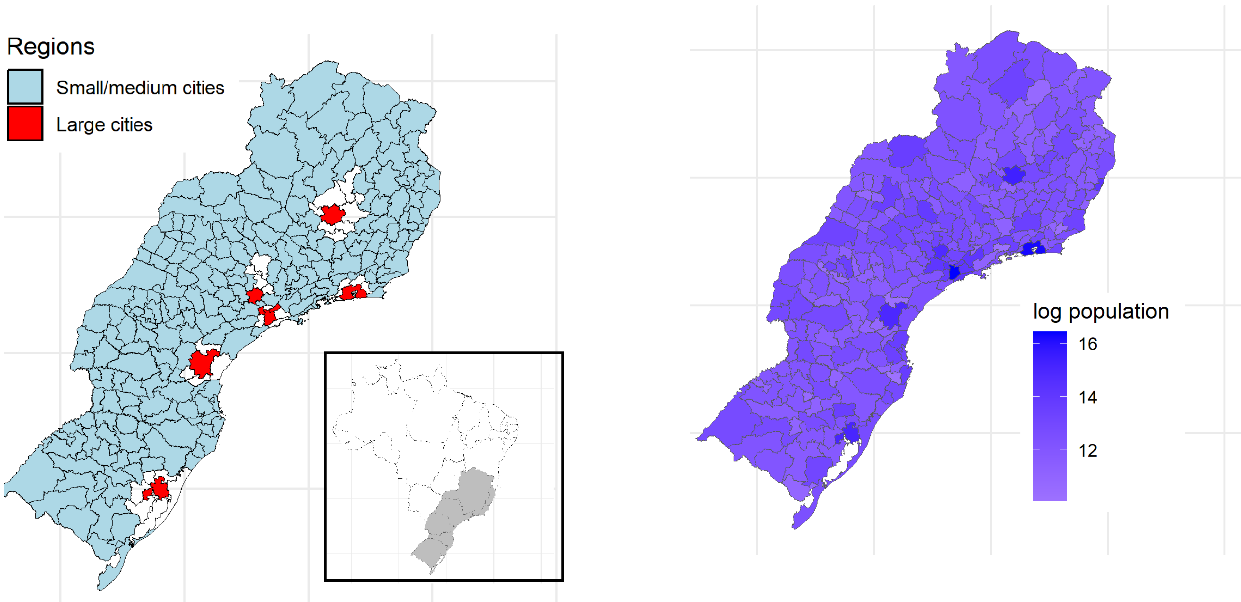


Figure 1: This figure shows the microregions (commuting zones) of Brazil's Southeast and South regions. The right panel depicts the large cities (in red) and the estimation (small/medium city) region (in light blue). The microregions that share the same mesoregion as one of the large cities are shown 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.

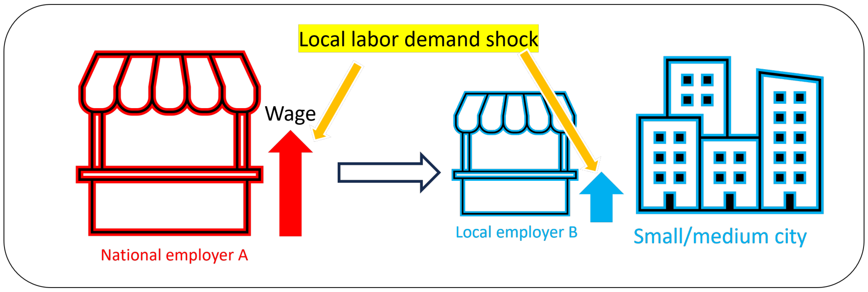


Figure 2: This figure illustrates the possible identification problem in the spillover identification. Wage increases of both local and national employers are influenced by the local labor demand shock, which confounds the spillover effect.

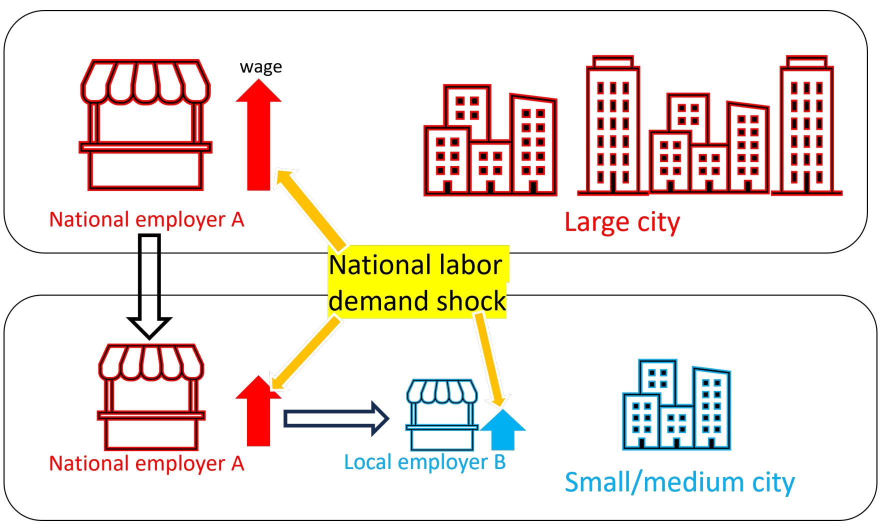


Figure 3: This figure illustrates the possible identification problem in the spillover identification after eliminating the local employment labor demand shocks. Wage increases of both local and national employers are influenced by the national labor demand shock, which confounds the spillover effect.

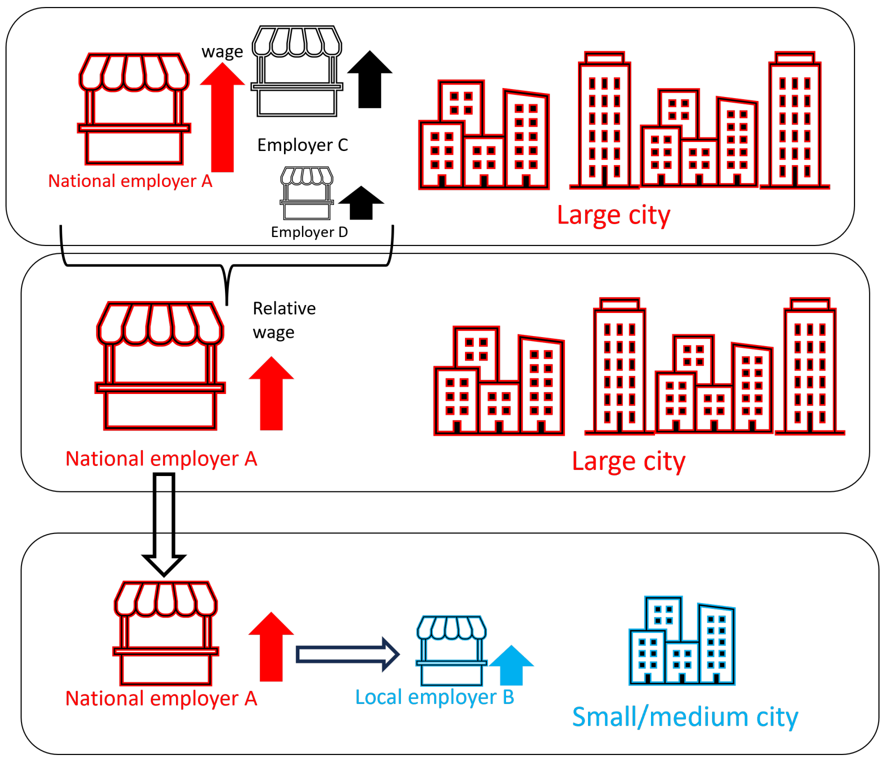


Figure 4: This figure illustrates the identification strategy. In the first step, the wage increases of Employer A are compared with those of other employers in a large city, calculating a relative wage increase that eliminates potential national labor demand shocks. Subsequently, as Employer A's relative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

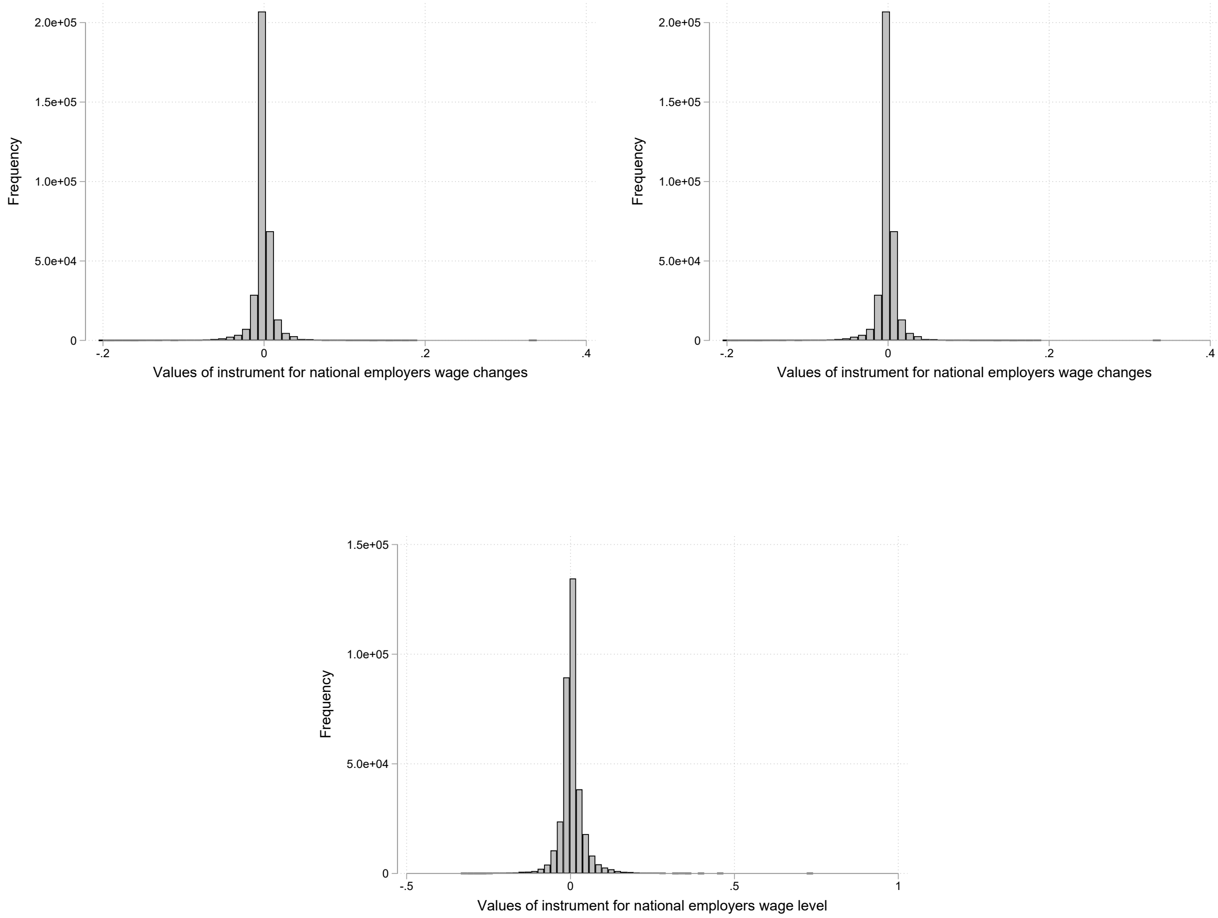


Figure 5: This figure displays the distributions of the instruments for national employers across all labor market (occupation $\times$ microregion) - year observations within the estimation region. The upper-left panel shows the histogram of national employers' wage changes instrument normalized by national employers employment share ($\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{W}_{o,m,t}$), the upper-right panel shows the histogram of national employers' employment changes instrument normalized by national employers employment share ($\gamma_{n,o,m,t-1}\Delta\hat{\Omega}^{E}_{o,m,t}$), and the bottom panel displays the histogram of national employers' employment level instrument normalized by national employers employment share ($\gamma_{n,o,m,t-1}\hat{\Omega}^{W}_{o,m,t}$).

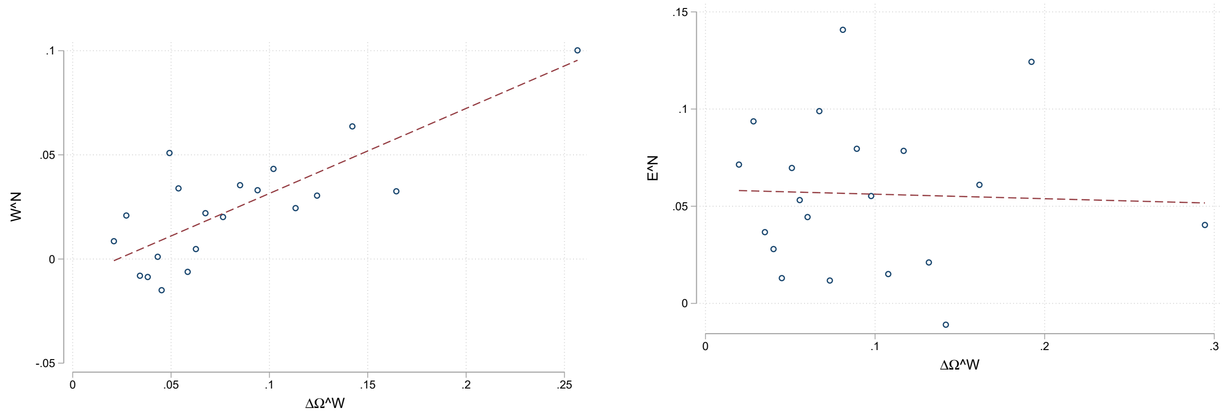


Figure 6: The bin scatterplots illustrate the relationship between the measure of national employers' wage policies in the large city region ($\Delta\hat{\Omega}^{W}_{o,m,t}$) and their policies in the labor market of the estimation region, specifically in cases of national employers' expansion ($\gamma_n \Delta\hat{\Omega}^{W}_{o,m,t} > 0.005$ and $\Delta\hat{\Omega}^{E}_{o,m,t} > 0$). The left panel displays the relationship with the measure of residualized wages ($W^{N}_{o,m,t}$) of national employers in the estimation region. The right panel depicts the relationship with the logarithm of employment ($E^{N}_{o,m,t}$) of national employers in the same region.

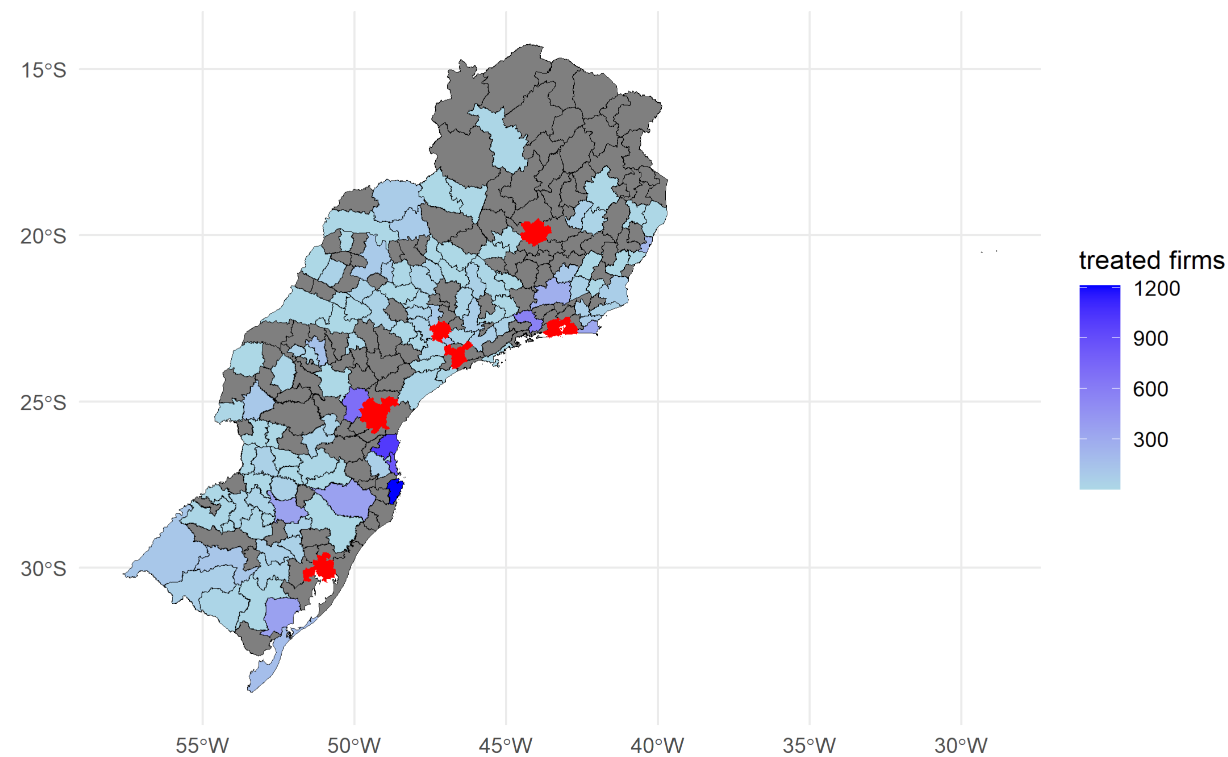
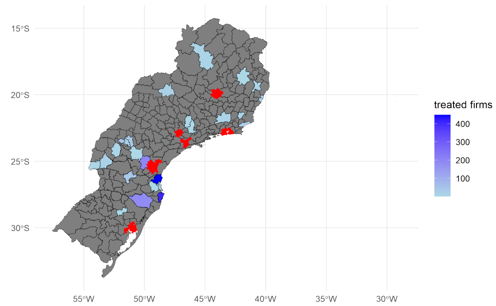
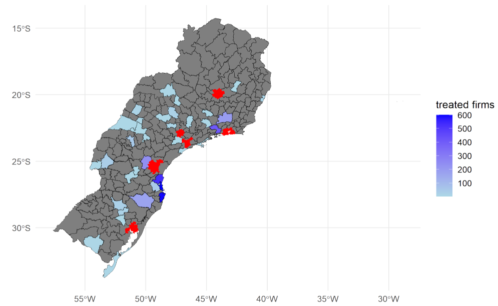


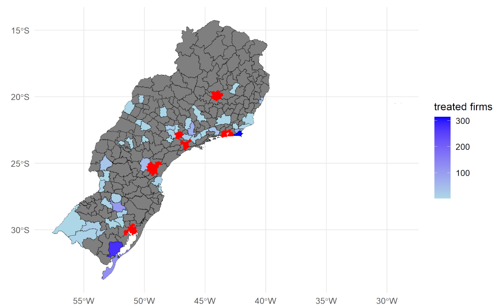
Figure 7: This figure shows the matched treated jobs by microregions (commuting zones) of Brazil's Southeast and South regions. The red color depicts the large city region. The microregions in gray have no matched treated jobs.



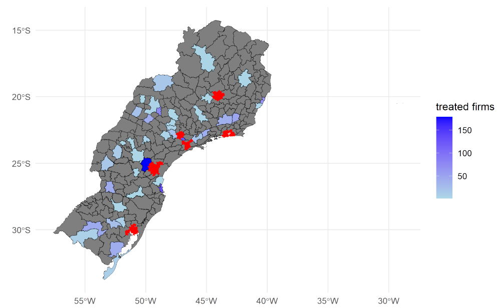
(a) 2008



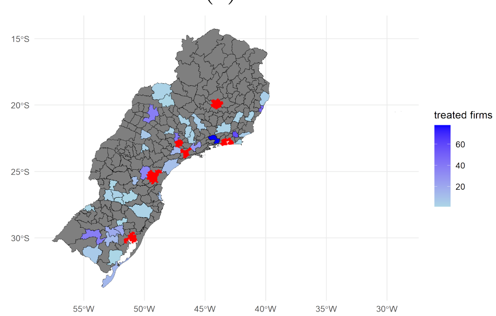
(b) 2009



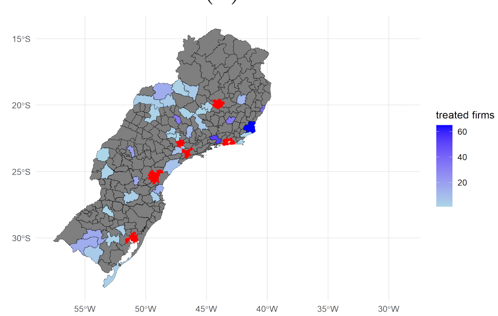
(c) 2010



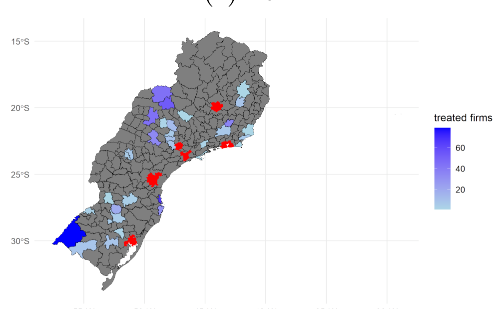
(d) 2011



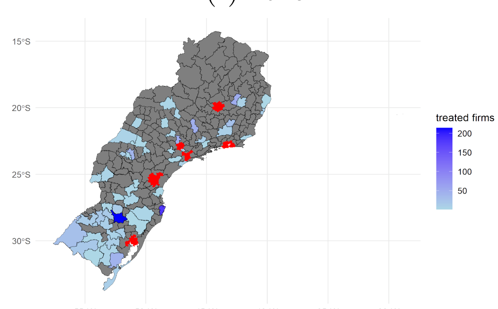
(e) 2012



(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 19. 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, $\hat{\Omega}^W_{o,m,t}$, as defined by Equation 11. The dashed red line corresponds to 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 16. The model includes fixed effects for job and year-by-occupation. Standard errors are two-way clustered: by job and by labor market.

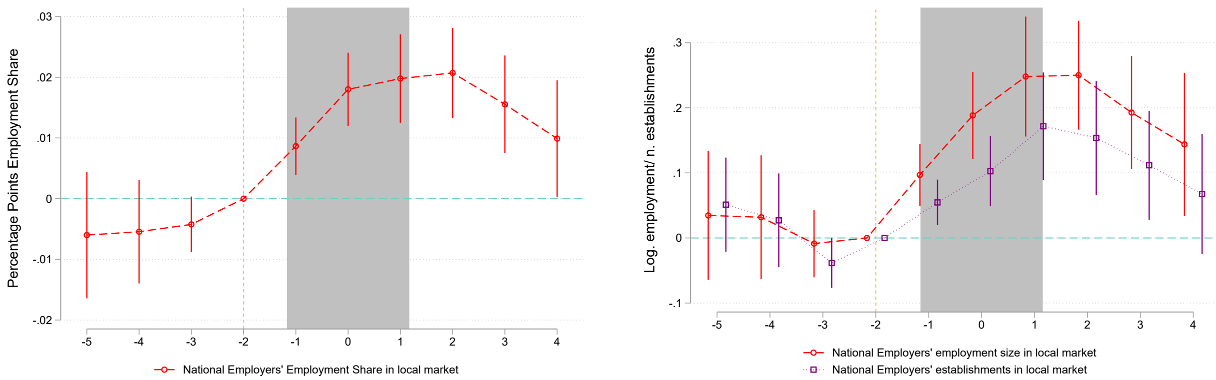


Figure 10: This figure plots the event study coefficients from Equation 19. The left panel shows the estimates when the outcome variable is the national employers' log-employment in the matched labor market. The right panel shows the estimates when the outcome variable is the national employers' employment share in the matched labor market. The model includes fixed effects for job and year-by-occupation. Standard errors are two-way clustered: by job and by labor market.

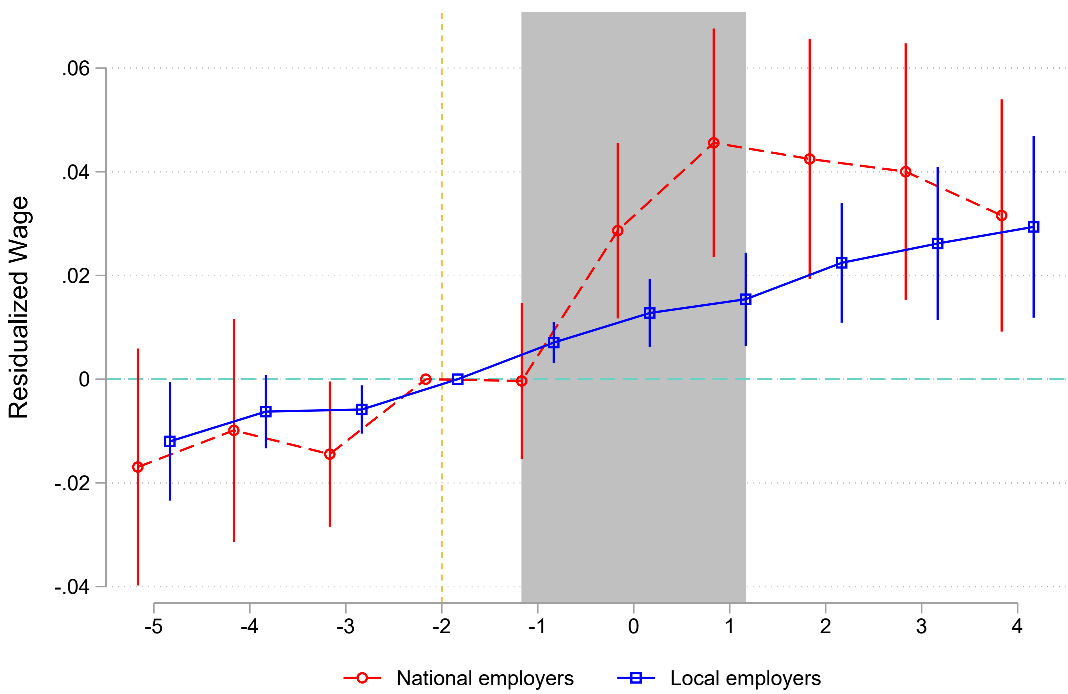


Figure 11: This figure plots the event study coefficients from Equation 19. The dashed red line represents the estimates when the outcome variable is the average wage for national employers' jobs in the matched labor market from the estimation region, $W^N_{o,m,t}$, defined by Equation 16. The connected 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 12: This figure plots the event study coefficients from Equation 19. 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.

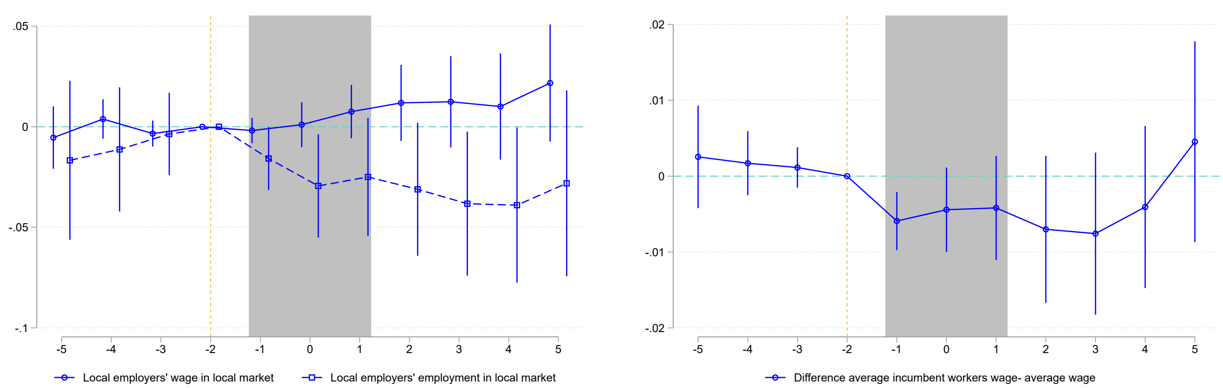


Figure 13: This figure plots the event study coefficients from Equation 19. The left panel shows the estimates when the outcome variables are the local employers' residualized wages and the log-employment of incumbent workers. The right panel shows the estimates when the outcome variable is a difference in wages between local employers' workers who were employed in the baseline period and all employers. The model includes fixed effects for job and year-by-occupation. Standard errors are two-way clustered: by job and by labor market.

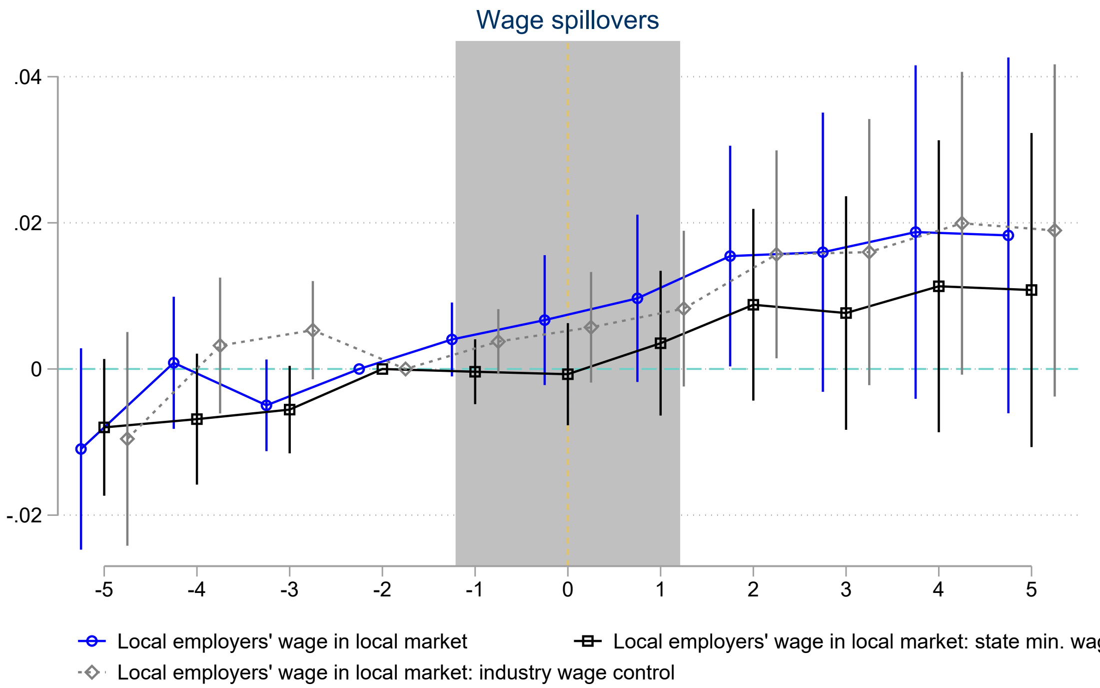


Figure 14: This figure plots the event study coefficients from Equation 19. The outcome variable is the local employer's job's average residual wage. Values are derived from three separate specifications. First (connected blue line) is the baseline specification. The second (dashed grey line) adds the industry controls. The third (connected black line) controls for the state-specific wage floor. The models includes fixed effects for job and year-by-occupation. Standard errors are two-way clustered: by job and by labor market.

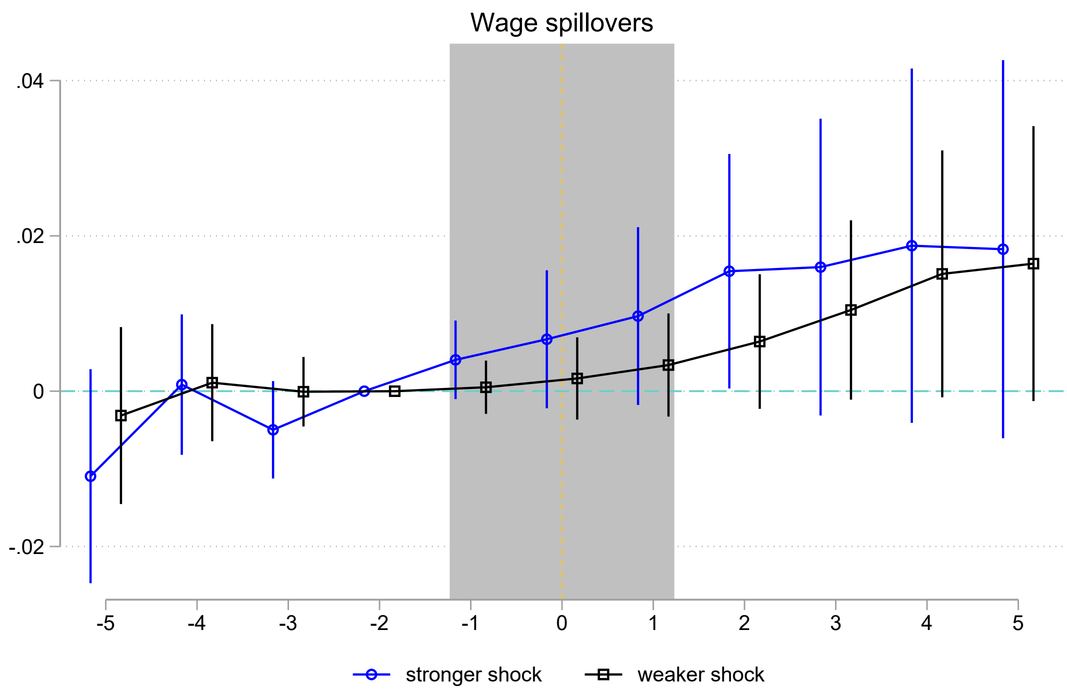


Figure 15: This figure plots the event study coefficients from Equation 19. The connected blue line represents the estimates when the outcome variable is the local employer's job's average residual wage for the "stronger" event: $\gamma_n \hat{\Omega}^W > 0.005$. The connected black line represents the estimates when the outcome variable is the local employer's job's average residual wage for the "weaker" event: $\gamma_n \hat{\Omega}^W \in [0.002, 0.005)$. The model includes fixed effects for job and year-by-occupation. Standard errors are two-way clustered: by job and by labor market.

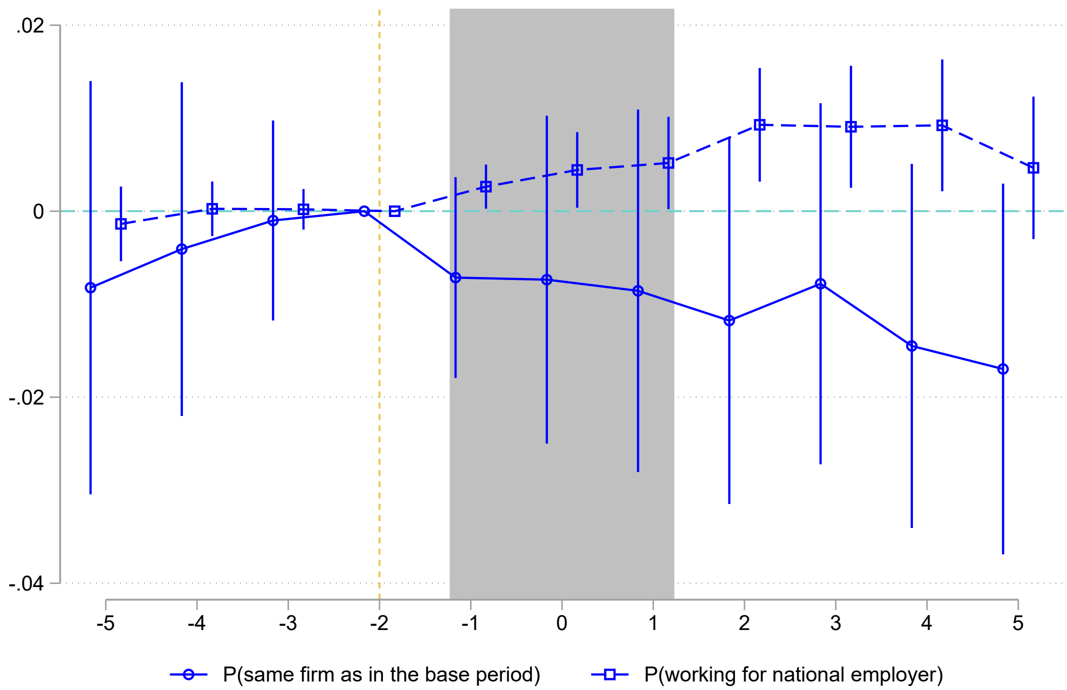


Figure 16: This figure plots the event study coefficients from Equation 20. The connected blue line represents the estimates for the outcome variable, which is the probability of leaving their employer, for workers who were employed by the local employer in the baseline period. The dashed blue line represents 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.

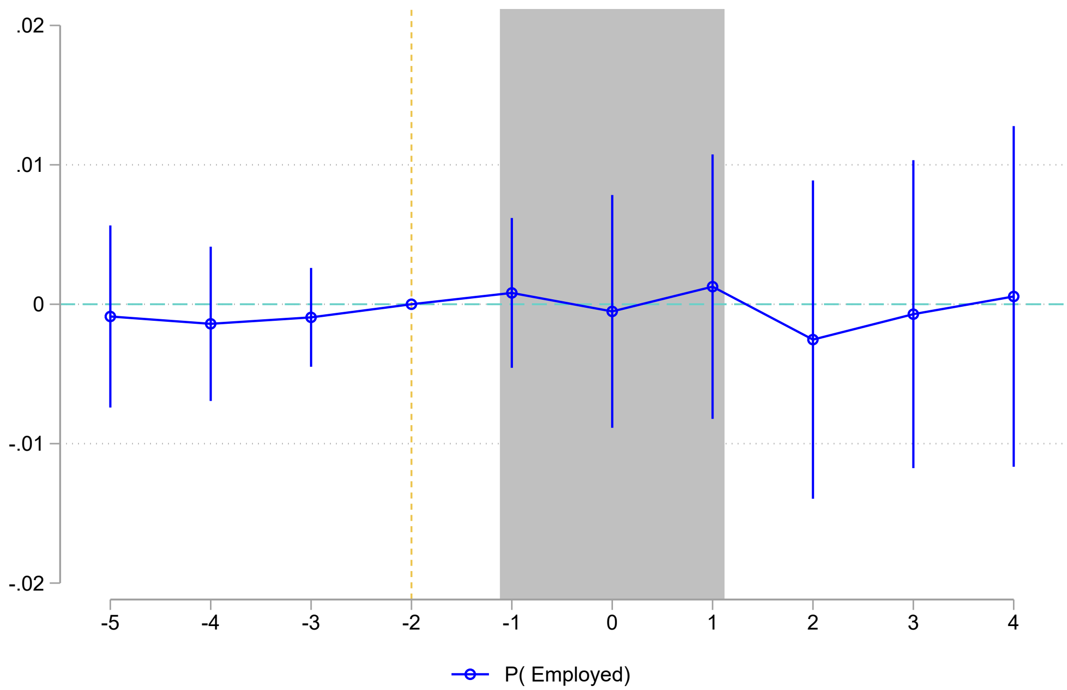


Figure 17: This figure plots the event study coefficients from Equation 20. The outcome variable is the probability of being employed for workers who were employed by the local employer in the baseline period. The model includes fixed effects for worker and year-by-occupation. Standard errors are two-way clustered: by the worker and by the labor market.

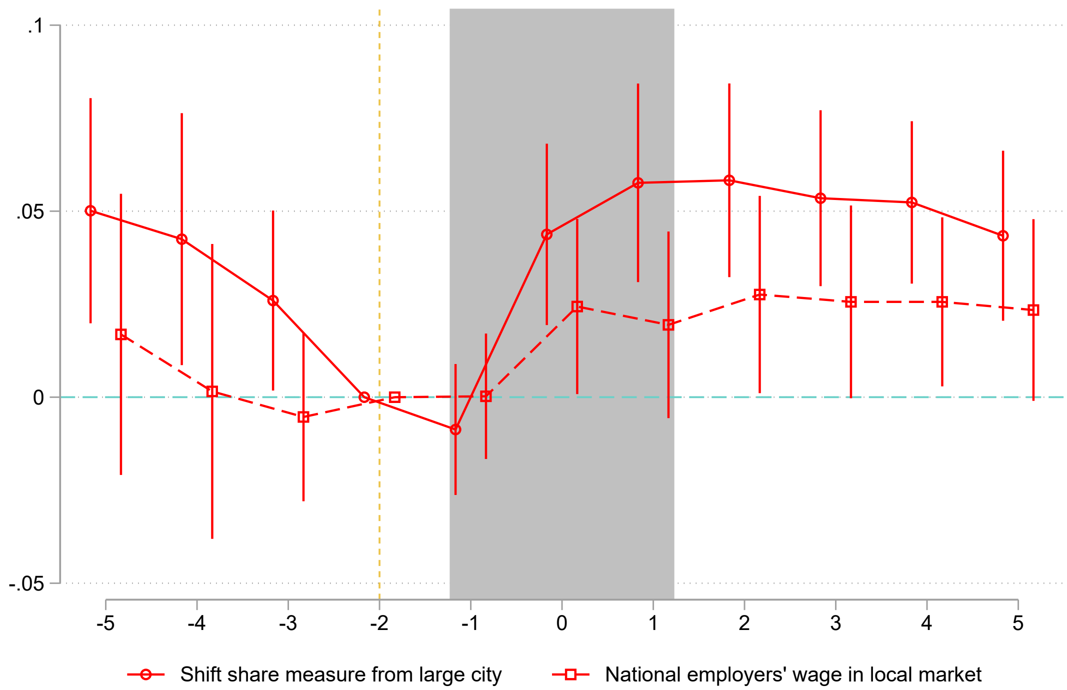


Figure 18: This figure plots the event study coefficients from Equation 20. The connected red line represents the estimates when the outcome variable is the shift-share measure of national employers' relative wage for jobs in the large city region, $\hat{\Omega}^{W}_{o,m,t}$, as defined by Equation 11. The dashed red line corresponds to 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 16. The model includes fixed effects for the worker and year-by-occupation. Standard errors are two-way clustered: by the worker and by labor market.

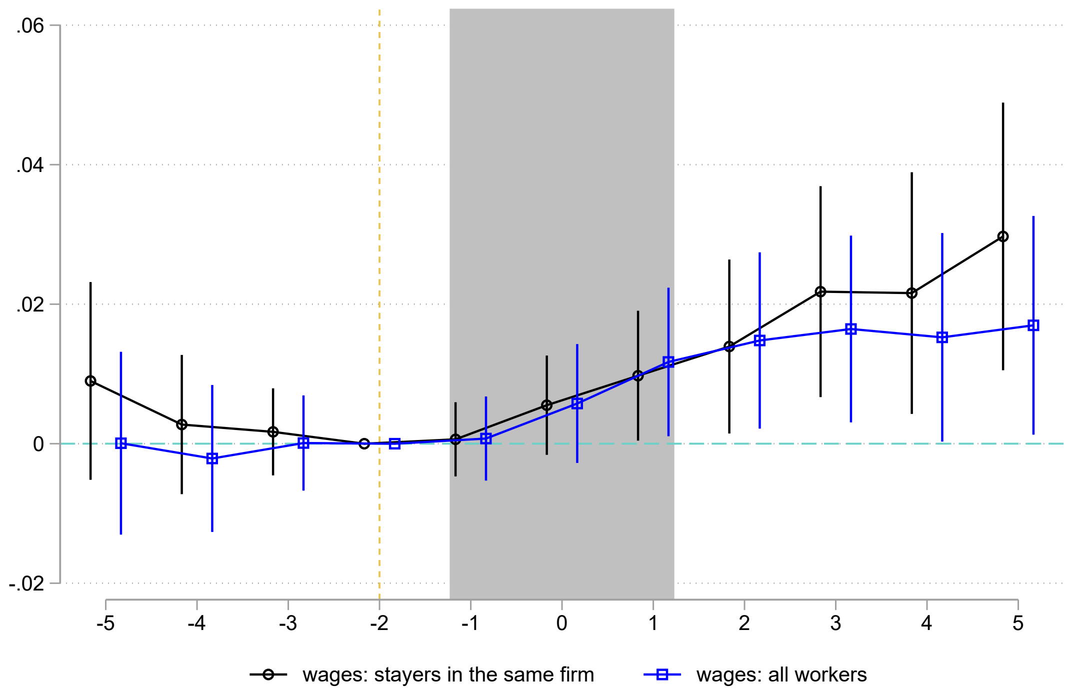


Figure 19: This figure plots the event study coefficients from Equation 20. The connected blue line represents the estimates for the outcome variable, which is the residualized wage of the workers who were employed by the local employer in the baseline period. The connected black line represents the 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.

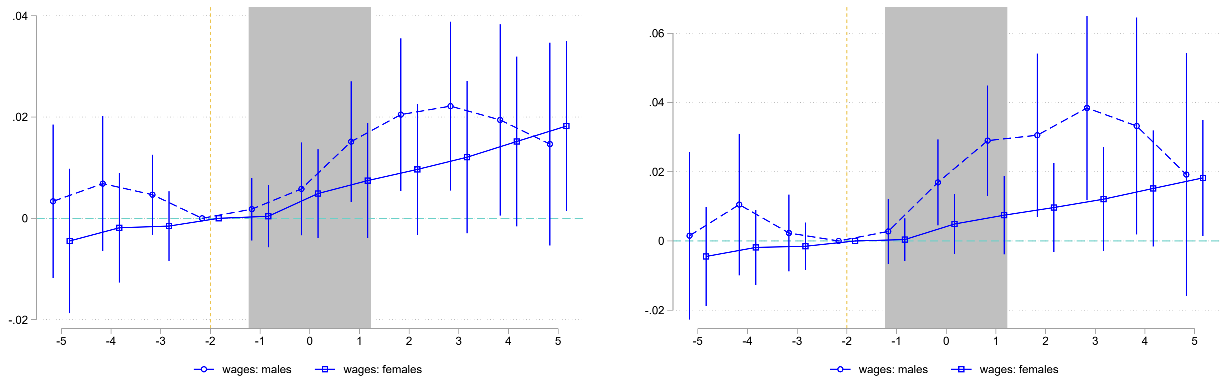


Figure 20: This figure plots the event study coefficients from Equation 20. The outcome variable is the residualized wage of the workers who were employed by the local employer in the baseline period. Values are derived from two separate regressions, each fit for a different gender. In the left panel, both estimates are unweighted. In the right panel, the regression for males is weighted by the employment occupation share of females. The model includes fixed effects for worker and year-by-occupation. Standard errors are two-way clustered: by worker and by labor market.

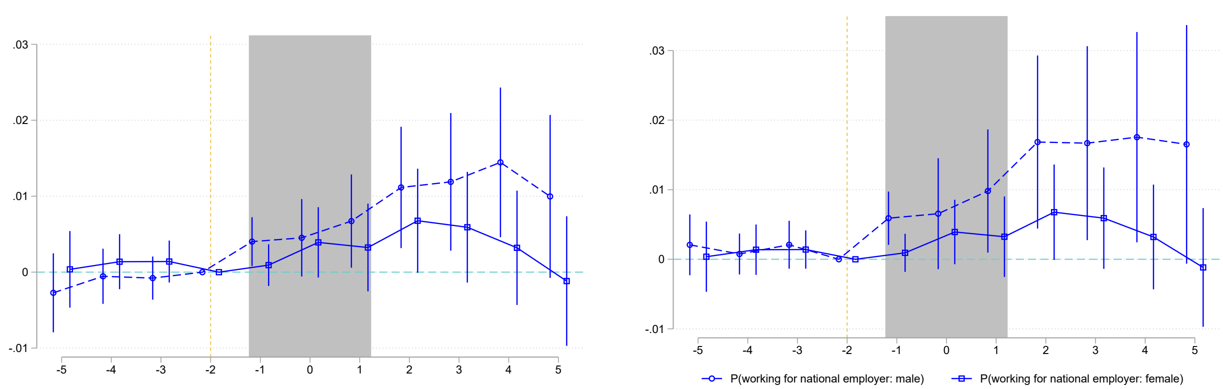


Figure 21: This figure plots the event study coefficients from Equation 20. The outcome variable is the probability of working for the national employer of the workers who were employed by the local employer in the baseline period. Values are derived from two separate regressions, each fit for a different gender. In the left panel, both estimates are unweighted. In the right panel, the regression for males is weighted by the employment occupation share of females. The model includes fixed effects for worker and year-by-occupation. Standard errors are two-way clustered: by worker and by labor market.

9 Tables

	National employers' job	Local employers'job
Estimation region locations	1.37	1.09
	(2.46)	(1.16)
Large cities locations	1.08	0.0
	(1.57)	
Employment in estimation region	49.8	15.3
	(149.36)	(41.98)
Employment in large city	68.4	0.0
	(287)	
Average hourly wage in estimation region	16.0	10.6
	(19.60)	(10.3)
Residualized hourly wage in estimation region	0.14	0.0
	(0.34)	(0.29)
Number of Employer× Occupation	113,999	657,709
Number of Employer× Occupation × year obs.	681,990	2,444,423

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 at least a 5% employment share and jobs that continuously employ at least five workers in the microregion (commuting zone).

	(1)	(2)	(3)	(4)	(5)
	$\gamma_n W^N$	$\gamma_n \Delta W^N$	$\gamma_n \Delta E^N$	$\gamma_n \Delta W^N$	$\gamma_n \Delta E^N$
$\gamma_n \Delta\hat{\Omega}^W$		0.489***	0.321*	0.333***	0.512*
		(0.0377)	(0.167)	(0.047)	(0.260)
$\gamma_n \Delta\hat{\Omega}^E$		0.00328	0.600***	0.000	0.376***
		(0.008)	(.062)		
$\gamma_n \hat{\Omega}^W$	0.674***				
	(0.0509)				
Observations	15,332	15,332	15,332	6,632	6,632
R-squared	0.643	0.541	0.684	0.499	0.443
YEAR # OCC	YES	YES	YES	YES	YES

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

Table 2: This table shows the coefficients and associated standard errors from regressions described in Equations 14 and 15. $\gamma_n W^N$ represents the national employers' wage level in the estimation region, defined in 16, multiplied by the national employers' employment share γ_n. ΔE^N represents a three-year change in the national employers' log-employment measure, as defined in Equation 18. ΔW^N represents a three-year change in the measure of national employers' average log-wage, as defined in Equation 17. $\Delta\hat{\Omega}^W$, $\Delta\hat{\Omega}^E$, and $\hat{\Omega}^W$ stand for the shift-share instruments defined in 12, 13, and 11, respectively. The analysis only includes labor markets where national employers hold at least a 5% employment share. Standard errors are clustered at the microregion level.

	Treated	**Control**	**Difference**
Labor market size	4848	5395	-546
	(4430)	(5098)	(1286)
Jobs size	14.3	13.8	0.53
	(28)	(23)	(0.84)
Average Log. wage	2.06	2.08	-0.02
	(0.41)	(0.41)	(0.04)
Average Residualized wage	0.00	0.02	-.014
	(0.27)	(0.29)	(0.025)
Univ Educ	0.11	0.11	0
Female	0.49	0.5	-0.005
Average Tenure	2.28	2.31	-0.03
	(2.2)	(2.2)	(0.12)
National employers share	0.12	0.11	.011
	(0.06)	(0.06)	(0.08)
Wage shift-share level $\hat{\Omega}^W_{o,m,t}$	-0.02	0.03	-0.05^{***}
	(0.16)	(0.13)	(0.02)
National employers' wages $W^N_{o,m,t}$	0.15	0.18	-.02
	(0.18)	(0.17)	(0.03)
Number of jobs	9,377	9,377	

Table 3: This table presents descriptive statistics of the matched job-level sample. The first column reports the characteristics of the treated workers. The second column shows the characteristics of the matched control jobs. The third column reports differences between the event and control jobs, with standard errors two-way clustered by the worker and by the labor market. $\hat{\Omega}^W_{o,m,t}$ represents a shift-share measure of national employers' relative wage for jobs in the large city region, defined by Equation 11. $W^N_{o,m,t}$ represents the average wage for national employers' jobs in the labor market from the estimation region, defined by Equation 16.

	Treated	**Control**	Difference
Labor market size	4960	5112	-152
	(4687)	(4520)	(1163)
Job size	38.9	39.3	0.44
	(84)	(83)	(8.5)
Wage (2018 Real)	9.96	10.21	-0.25
	(9.07)	(9.72)	(0.53)
Residualized wage	0.03	0.03	-0.00
	(0.41)	(0.41)	(0.03)
Female	0.5	0.5	0.0
Tenure	3.11	3.12	0.01
	(3.53)	(3.51)	(0.11)
National employers share	0.09	0.08	0.02^{**}
	(0.06)	(0.06)	(0.007)
Wage shift-share level $\hat{\Omega}^W_{o,m,t}$	-0.03	0.04	-0.07^{***}
	(0.16)	(0.16)	(0.026)
National employers wage $W^N_{o,m,t}$	0.17	0.19	-0.02
	(0.17)	(0.21)	(0.04)
Number of workers	65,183	65,183	

Table 4: This table presents descriptive statistics of the matched worker-level sample. The first column reports the characteristics of the treated workers. The second column shows the characteristics of the matched control workers. The third column reports differences between the event and control workers, with standard errors two-way clustered by the worker and by the labor market. $\hat{\Omega^W}_{o,m,t}$ represents a shift-share measure of national employers' relative wage for jobs in the large city region, defined by Equation 11. $W^N_{o,m,t}$ represents the average wage for national employers' jobs in the labor market from the estimation region, defined by Equation 16.

	Δ Resid. Wage			Δ Log. Employment		
	(1)	(2)	(3)	(4)	(5)	(6)
$\gamma_{n,o,m,t}\Delta W^N_{o,m,t}$	0.422***	0.313***	0.272**	0.094	-0.112	-0.038
	(0.052)	(0.097)	(0.107)	(0.127)	(0.289)	(0.337)
$\gamma_{n,o,m,t}\Delta E^N_{o,m,t}$	0.022**	0.085***	0.064**	0.026	-0.030	-0.015
	(0.010)	(0.029)	(0.032)	(0.042)	(0.087)	(0.138)
YEAR # OCC	YES	YES	YES	YES	YES	YES
YEAR # OCC			YES			YES
Estimator	OLS	IV	IV	OLS	IV	IV
Observatons	234,433	234,433	174,723	234,433	234,433	174,723
R^2	0.051	0.050	0.333	0.016	0.016	0.395
F-stat		35	23		35	23

Table 5: This table shows the coefficients and associated standard errors from regressions described in Equation 22. $\gamma_{n,o,m,t}\Delta W^N_{o,m,t}$ represents the three-year national employers' wage change in the estimation region, defined in 17, multiplied by the national employers' employment share $\gamma_{n,o,m,t}$. $\Delta E^N_{o,m,t}$ stands for the three-year national employers' log-employment change in the estimation region. For columns (2)-(3) and (5)-(6), $\gamma_{n,o,m,t}\Delta E^N_{o,m,t}, \gamma_{n,o,m,t}\Delta E^N_{o,m,t}$ are instrumented by shift shares $\gamma_{n,o,m,t}\Delta\hat{\Omega}^W, \gamma_{n,o,m,t}\Delta\hat{\Omega}^E$ defined in 12 and 13. The analysis includes only jobs from labor markets where national employers hold at least a 5% employment share and jobs that employ at least five workers in the period t-1. Standard errors are two-way clustered: by the worker and by labor market.

	Resid. Wage		Log. Employment	
	(1)	(2)	(3)	(4)
$\gamma_{n,o,m,t} W^N_{o,m,t}$	0.375***	0.374***	0.001	-0.242*
	(0.050)	(0.063)	(0.103)	(0.129)
YEAR # OCC	YES	YES	YES	YES
JOB	YES	YES	YES	YES
Estimator	OLS	IV	OLS	IV
Observations	410,356	410,356	410,356	410,356
R^2	0.904	0.904	0.867	0.867
F-stat		24		24

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

Table 6: This table shows the coefficients and associated standard errors from regressions described in Equation 22. $\gamma_{n,o,m,t} W^N_{o,m,t}$ represents the national employers' wage level in the estimation region, defined in 16, multiplied by the national employers' employment share γ_n. For columns (2) and (4), $\gamma_n W^N$ is instrumented by shift share $\hat{\Omega}^W$ defined in 11. The analysis includes only jobs from labor markets where national employers hold at least a 5% employment share and jobs that employ at least five workers in the period t-1. Standard errors are two-way clustered: by the worker and by labor market.