

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

Jan Rosa
Ph.D.
University of British Columbia

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Large Employers and the Rest of the Local Labor Markets

Entry/expansion effects on the local economy:

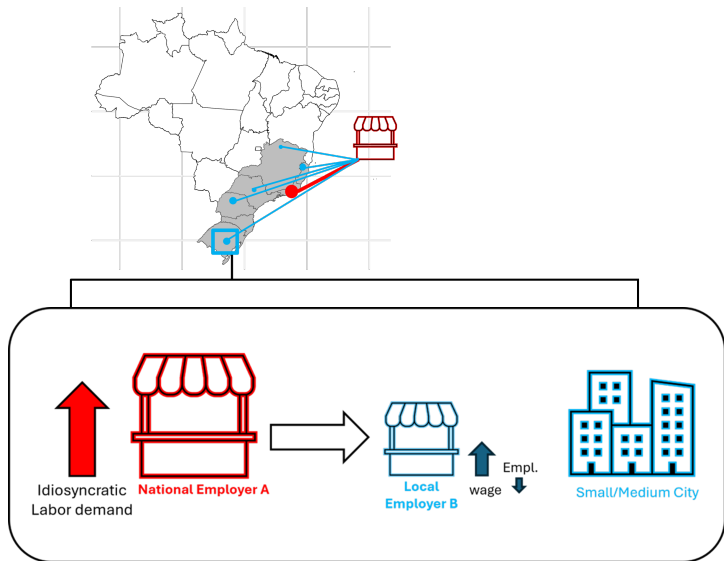
- ▶ New input-output linkages
- ▶ Intensified product market competition
- ▶ Intensified competition for workers in the **labor market**:
 - ▶ **Labor reallocation**: Workers moving from local employers to expanding national employers.
 - ▶ **Wage policy changes**: Local employers are setting higher wages in order to keep end employees.

Research question: How do large employers' expansions impact other employers' wage and employment policies in the local labor market?

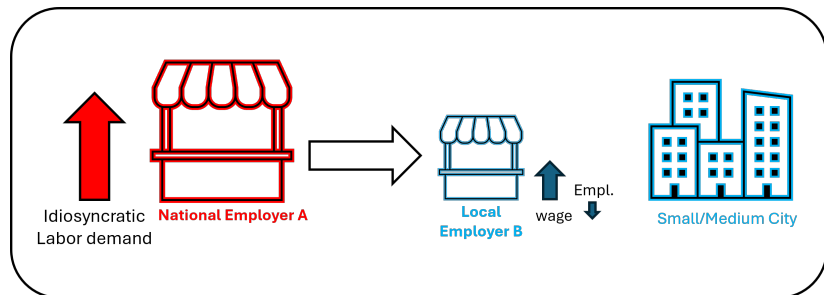
This Paper

1. Proposes a novel empirical strategy to identify idiosyncratic labor demand shocks of national (multi-location) employers.
 - ▶ Leverages national employers' wage/employment shocks in large cities (Hazell et al., 2021).
2. Estimates spillovers from national employers' expansions in small/medium-sized cities, using a staggered event-study design.
3. Develops a search-and-bargaining model to clarify the key mechanisms/ generalize counterfactuals. [Details](#)
4. Findings:
 - ▶ Significant positive wage spillovers
 - ▶ Negative (but smaller) employment spillovers
 - ▶ **Mechanism:** Labor reallocation and significant changes in local employers' wage policy

Research Design Intuition: Goal

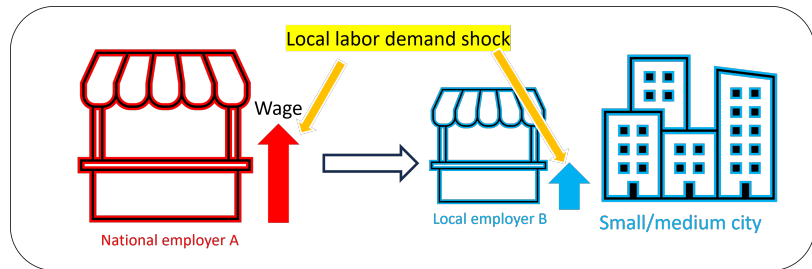


Research Design Intuition: Goal

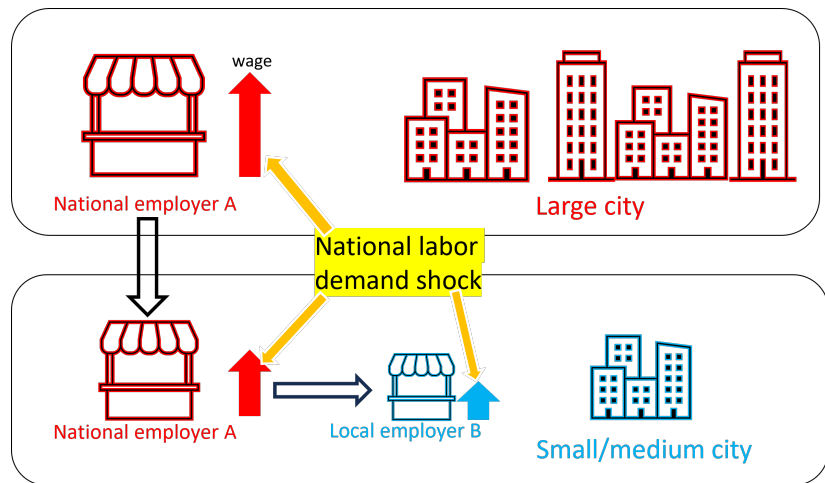


- ▶ Observables: Employers' wages and employment:
 - ▶ For a given occupation,
 - ▶ For a given commuting zone.
- ▶ Leverage national wage setting and national hiring patterns by large firms (Hazell et al., 2021; Schubert et al., 2021).

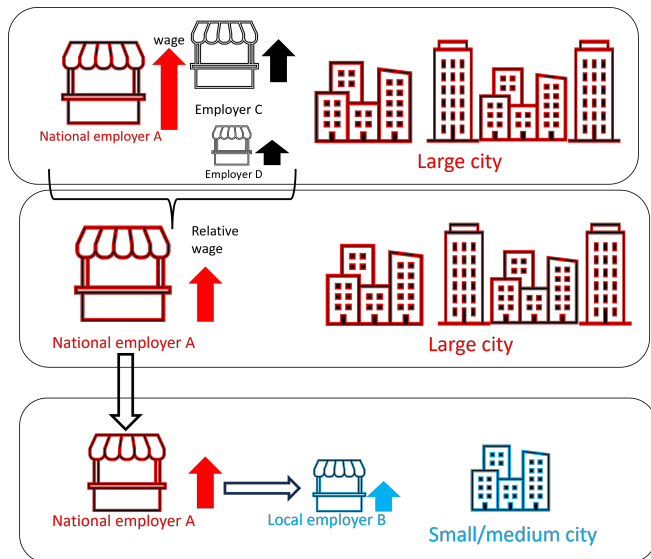
Research Design Intuition II



Research Design Intuition II



Research Design Intuition II



Individual National Employer Shocks

Defined for each national employer k , occupation o , operating in large cities $c_{bc} \in \mathcal{C}_{k,o,t}$, time t .

Constructed in two steps:

1. Wage decomposition:

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

2. **Wage shock:** Three-year change in residual wages across $c_{bc} \in \mathcal{C}_{k,o,t}$:

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

Labor Market Exposure to National Employers' Shocks

- ▶ Defined for each labor market m (occupation $o \times$ city c), time t **excluding large cities**.
- ▶ Aggregates **wage shocks** $\Delta Z_{k,o,t}^W$ for K_n national employers that hire in m :

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

- ▶ $\gamma_{k,m,t-1}^N$: National employer k employment share in $t - 1$
- ▶ Total national employers employment share:
$$\gamma_{m,t-1}^N = \sum_{k=1}^{K_n} \gamma_{k,m,t-1}^N$$
- ▶ Similar measure constructed for national employers' employment change $\gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^E$.

Data

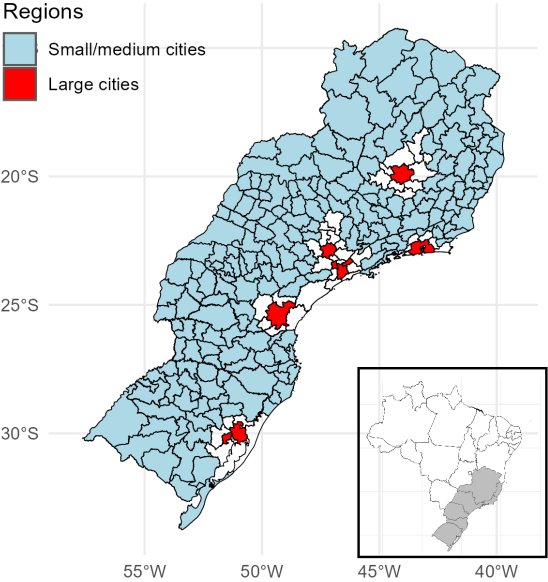
- ▶ Main dataset: Relação Anual de Informações Sociais (RAIS), 2008-2018.
 - ▶ Brazilian administrative employer-employee dataset.
 - ▶ Universal coverage of formal jobs in Brazil.
 - ▶ Allows tracking of firms' employment across locations.
- ▶ Selection: only full-time urban workers with non-fixed time employment (Gerard et al., 2021). [details](#)
 - ▶ South-East and South regions included (about 50% of the population).

Definitions

- ▶ **Labor market** = microregion \times 4-digit occupation code.
- ▶ **Job** = firm \times 4-digit occupation code \times microregion.
- ▶ Wages residualized using a flexible polynomial of age, occupation, gender, and education.
- ▶ Two regions: Large cities (shocks), medium/small cities (estimation).
- ▶ Conditions for a national employer in a large city:
 - ▶ At least ten workers in three consecutive years (in the same labor market).
 - ▶ Labor market with more than 200 workers.
- ▶ Conditions for a national employer in a medium/small city:
 - ▶ At least five workers in three consecutive years (in the same labor market).

National employers' descriptive statistics

Large Cities and Estimation Region



Event Definition

Large, positive level of exposure measure $\gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^W$.

Event Definition:

- ▶ $\gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^W > 0.005$ (about a 5-10% increase in wages for national employers in large cities):
 - ▶ No accompanying employment cut: $\Delta \hat{\Omega}_{m,t}^E > 0$.
 - ▶ No significant wage cut in the previous two years.
 - ▶ National employers having at least 5% employment share before the event and at least 2.5% two years before the event.

Map of events

Maps of events: year by year

Regression Equation: Jobs

Matched staggered event study:

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

Where:

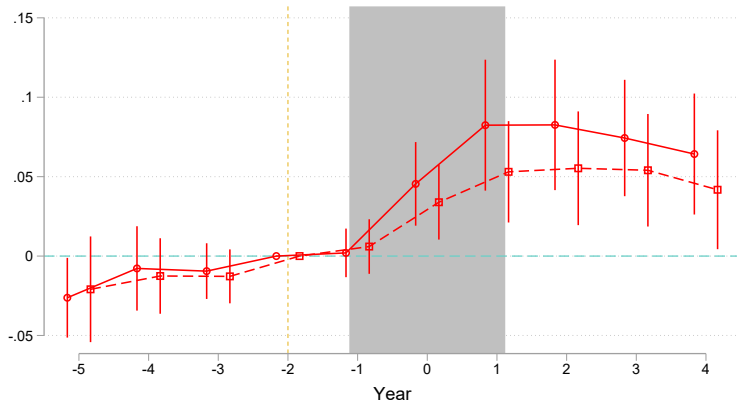
- ▶ t_j^* : event time.
- ▶ $y_{j,m,t}$: outcome variable for job j in labor market m , at time t , baseline period: -2 .
- ▶ Matched on occupation, employment size, labor market size, exposure level (65% match rate). [Details](#)
- ▶ Approximately 404 events matched.

Descriptive Statistics

	Potentially Treated	Matched Sample		
		Treated	Control	Difference
Labor market size (local employers)	4,768 (5,251)	5,179 (4,706)	5,234 (4,677)	-56 (1,242)
Job size	14.2 (35)	15.2 (44)	15.0 (44)	0.20 (0.86)
Average Hourly Log Wage (2018 Real)	2.14 (0.40)	2.09 (0.40)	2.10 (0.41)	-0.01 (0.04)
Average Residualized Hourly Wage	0.00 (0.27)	0.02 (0.30)	0.02 (0.29)	-0.00 (0.03)
Average Tenure (years)	2.56 (2.39)	2.33 (2.27)	2.36 (2.20)	-0.03 (0.14)
National Employers' Employment Share	0.08 (0.08)	0.12 (0.07)	0.11 (0.07)	0.01* (0.007)
National Employers' Residualized Wage	0.14 (0.21)	0.18 (0.18)	0.16 (0.18)	-0.02 (0.04)
University Education Female (%)	0.09 45	0.11 47	0.11 48	0.00 -0.005
Number of Observations	377,381	7,676	7,676	

Expanding National Employers Statistics

First Stage: National Employers Wage Increases

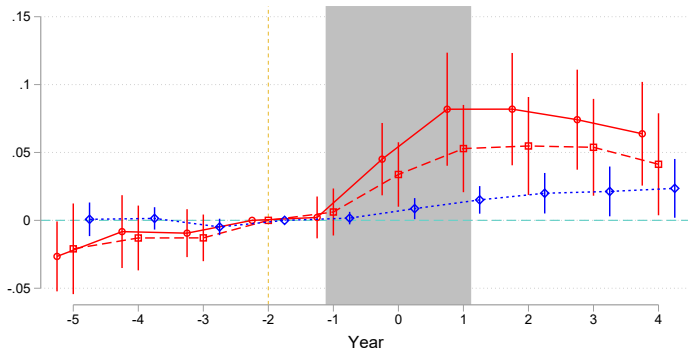


- National employers relative wage in large cities
- - -□- - - National employers' wage in the Estimation Region

First stage scaled by national employers share

National employers employment expansions

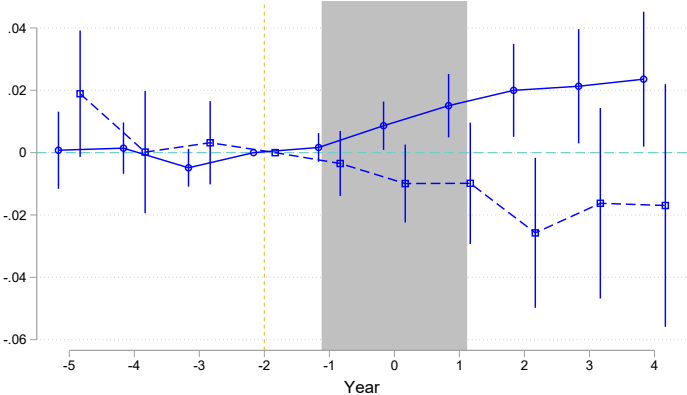
Wage Spillovers



- National employers' relative wage in large cities
- -□- - National employers' wage in the Estimation Region
- ...◇... Local employers' wage in the Estimation Region

Robustness Checks

Employment Spillovers



—○— Local employers' wage - -□- - Local employers' log employment

Robustness Checks

Regression Equation: Workers

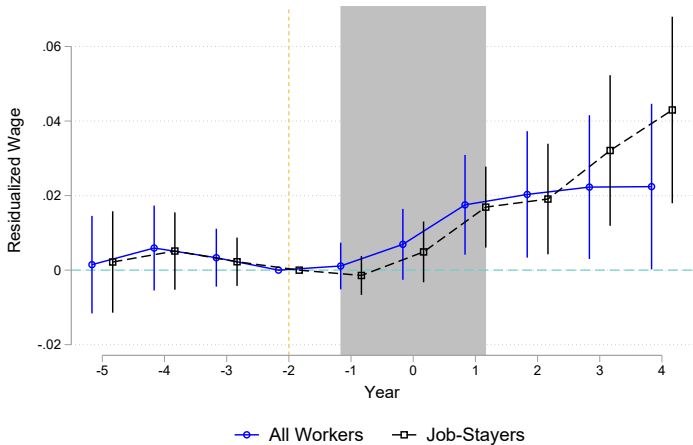
Matched staggered event study:

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

Where:

- ▶ t_i^* : event time.
- ▶ $y_{i,t}$: outcome variable for worker i in labor market m , time t , baseline period: -2 .
- ▶ Matched on occupation, gender, jobs employment size, labor market size, age (Match rate 32%). [Details](#) [Descriptive Statistics](#)

Wage Spillovers



First stage

Workers' Heterogeneity

Employment Effect

Workers' Transitions

Conclusions

- ▶ Strong co-movement of national employers' wages and employment across different locations (within the same occupation).
- ▶ National employers' expansions influence local firms' policies:
 - ▶ Local employers' wages increase by about 2 log points after a 5 log point increase in national employers' wages.
 - ▶ Employment cuts in the first years (about 2 log points), with a rebound later.
 - ▶ Job-stayers' wages are also affected.
- ▶ Policy implications: New national employers → Higher wages for all workers.
- ▶ Limitation: Applies to relatively large, non-concentrated labor markets.

Thank you!

jan.rosa1993@gmail.com

Beaudry, P., D. Green, and B. Sand (2012): “Does Industrial Composition Matter for Wages? A Test of Search and Bargaining Theory,” *Econometrica*, 80, 1063–1104.

Caldwell, S. and N. Harmon (2019): “Outside Options, Wages, and Bargaining: Evidence from Coworker Networks.” Working paper.

Gerard, F., L. Lagos, E. Severnini, and D. Card (2021): “Assortative Matching or Exclusionary Hiring? The Impact of Employment and Pay Policies on Racial Wage Differences in Brazil,” *American Economic Review*, 111, 3418–57.

Hazell, J., C. Patterson, H. Sarsons, and B. Taska (2021): “National wage setting,” Tech. rep., Working Paper.

Schubert, G., A. Stansbury, and B. Taska (2021): “Employer concentration and outside options,” Available at [SSRN 3599454](https://ssrn.com/abstract=3599454).

Data preparation details I

Data selection:

1. All the incomplete firms' individuals' ids were dropped, and the same for invalid occupation and municipality codes.
2. All firms owned by the state or NGOs were dropped. Same for central bank workers.
3. I kept only contracts on a monthly wage basis for urban workers.
4. A few microregions with changing numbers of municipalities were dropped.
5. All the observations with monthly wages below the minimum wage were dropped.

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Data preparation details II

Definitions:

- ▶ Hourly wage: average monthly wage of the contract in a given year divided by contractual hours.
- ▶ Worker year-tenure: number of months worked in a given year weighted by contractual hours.
- ▶ Firms' average wage: average of workers' wages weighted by their year-tenure.

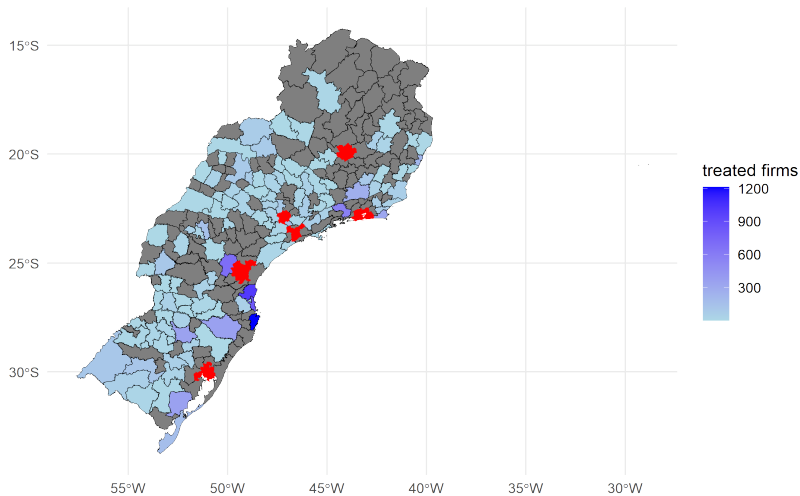
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National employers descriptive statistics

	National Employers	Local Employers
Number of locations in the Estimation Region	2.83 (5.18)	1.03 (0.28)
Large cities locations	1.94 (1.64)	0.0
Total Employment in the Estimation Region	103.2 (296.4)	14.57 (37.7)
Total Employment in large cities	281.4 (815.7)	0.0
Average hourly wage in the Estimation Region	16.4 (16.7)	9.26 (6.10)
Residualized hourly wage in the Estimation Region	0.14 (0.33)	-0.01 (0.27)
Number of Employer \times Occupation	5771	179,502
Number of Employer \times Occupation \times year obs.	25,467	607,168

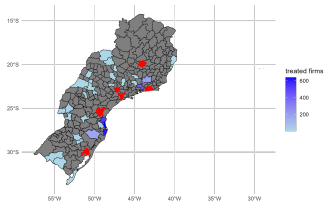
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Map of events

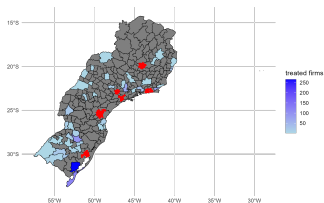


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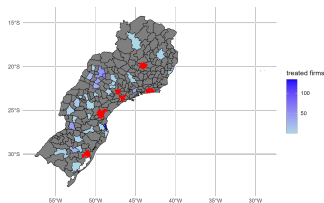
Map of events: 2011-2013



(a) 2009

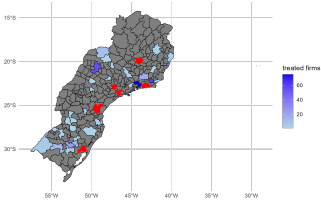


(b) 2010

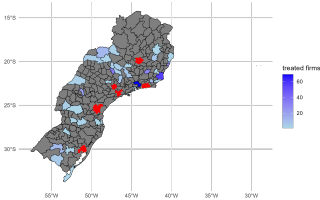


(c) 2011

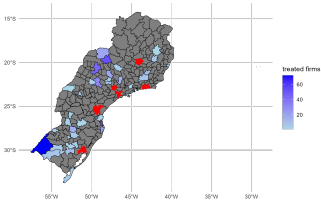
Map of events: 2014-2017



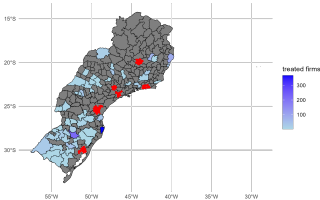
(a) 2014



(b) 2015



(c) 2014



(d) 2015

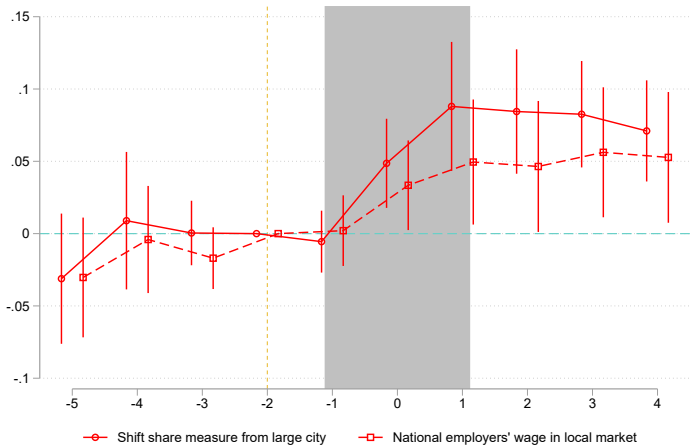
- ▶ Working for firms with at least five workers.
- ▶ Control: worker of potential control job
- ▶ Exact match on 4-digit occupation, year, gender and tenure category (less than year, 1-2 years, more than 2 years).
- ▶ Matched on period -2 to the event.
- ▶ Calip-matching:
 1. Jobs' employment size (15 log points),
 2. Labor market employment size (20 log points),
 3. National employers employment share (5 pp.),
 4. Age (5 years)
 5. Tenure (4 years)
- ▶ Match rate 32% for the main specification, about 57,000 individuals matched.
- ▶ Similar percentage importance of labor markets in the

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Matching strategy: jobs

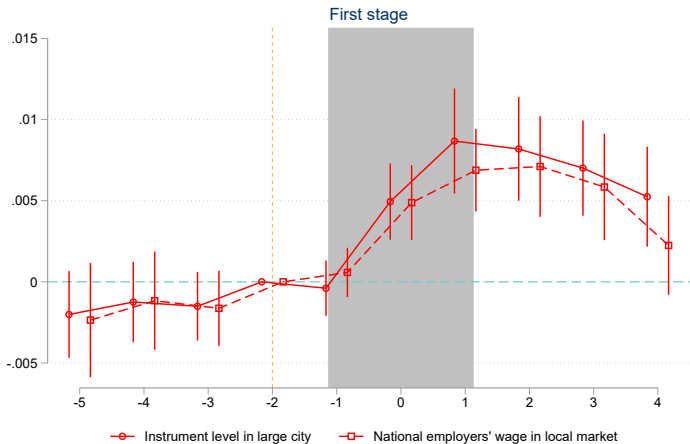
- ▶ Jobs having at least five workers,.
- ▶ Matched on period -2 to the event, only firms that survived to 2 more years matched.
- ▶ Control: $\Delta\Omega \leq 0.02$
- ▶ Exact match on 4-digit occupation, year, labor market employment quartile, jobs's employment quartile, wage distribution quartile, general industry (16 categories).
- ▶ Mahalanobis matching:
 1. Jobs employment size,
 2. Labor market employment size,
 3. National employers employment share,
 4. National employers' wages.
- ▶ Match rate 65% for the main specification, about 9040 firms matched.

First stage: worker



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Scaled first stage



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From where national employers hire?

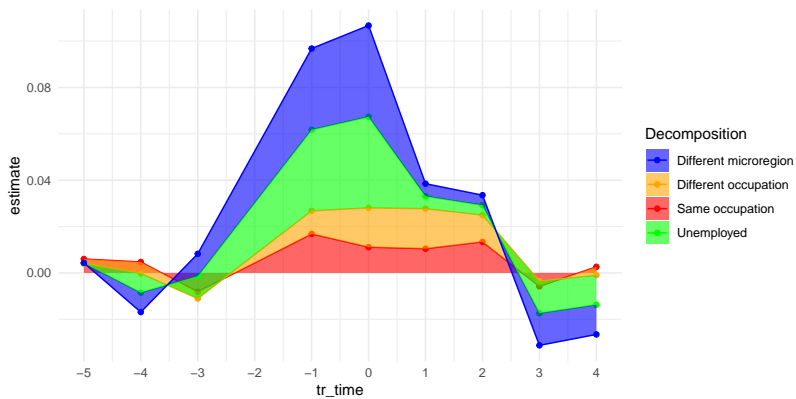
I decomposed different sources using a variant of Haltiwanger decompositions:

$$\underbrace{\Delta L_{n,t,g}}_{\text{Net inflow to national employer from } g} = \underbrace{(IN_{n,t,g} - OUT_{n,t,g})}_{\text{Inflow - outflow from } g} / \underbrace{L_{n,t^*}}_{\text{Baseline period employment level}}$$

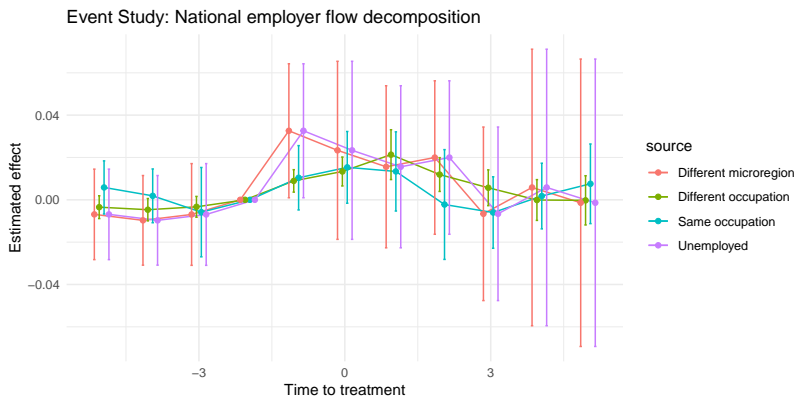
Next, I run an event study (job -level) for such defined net flow, for:

- ▶ Unemployed,
- ▶ Local employers workers from the same occupation,
- ▶ Local employers workers from the different occupation,
- ▶ Local employers workers from the different microregion.

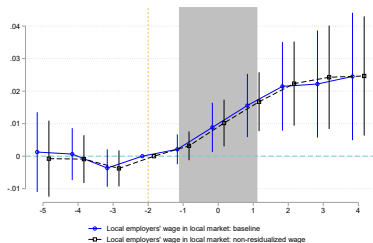
Point estimates



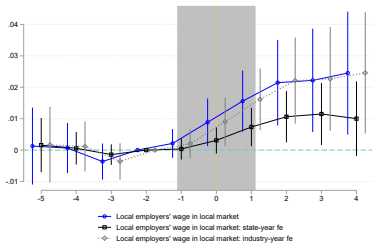
Full event study estimates (large noise)



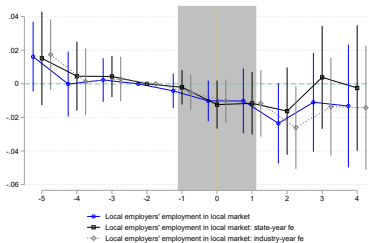
Wage Spillovers: Fixed Effects



(a) Residualized vs. Real Wages

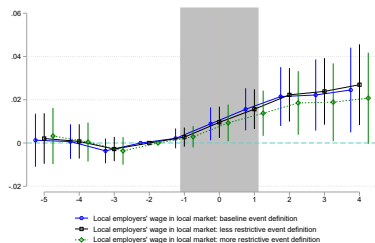


(b) Baseline vs. Additional FE

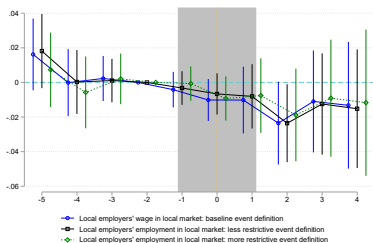


(c) Baseline vs. Additional FE

Different Event Definition



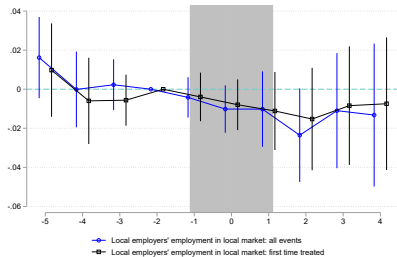
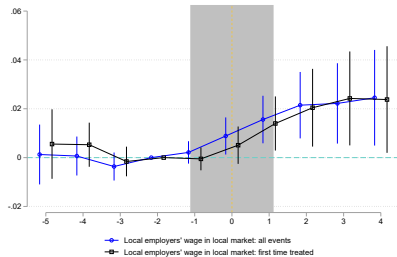
(a) Baseline vs. More or Less Restrictive



(b) Baseline vs. More or Less Restrictive

Back

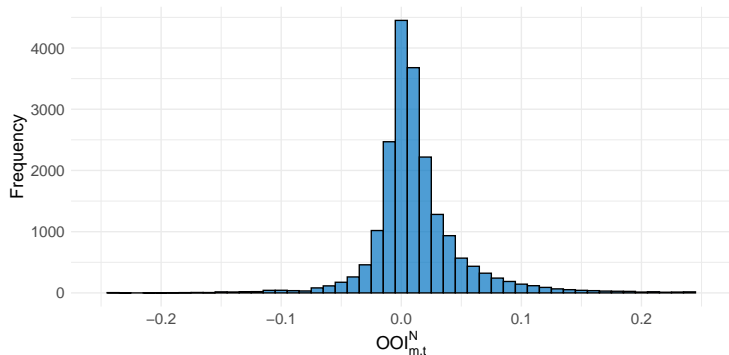
First-time treated



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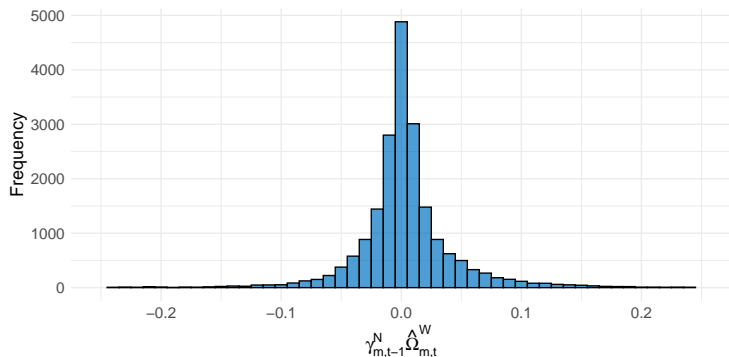
Large Variation in the Outside Option Provided by the National Employer

$$OOI_{m,t}^N = \sum_{k=1}^{K_n} \gamma_{k,m,t-1}^N w_{k,m,t}^N$$

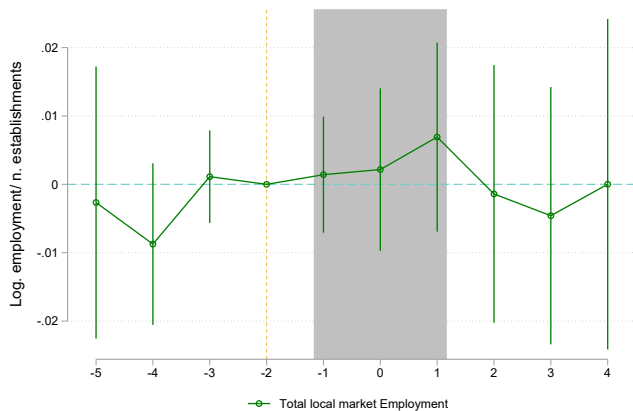


Large Variation in National Employers' Wage Policies in Large Cities

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



Total labor market size



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National employers in the year before expansion

	All National Employers	Main Contributor
Employment	1141 (1486)	194 (225)
Employment Share	0.14 (0.07)	0.04 (0.04)
Δ Wage	0.025 (0.06)	0.046 (0.1)
Δ Employment	0.06 (0.17)	0.42 (0.35)
<hr/>		
Main Industry group		
Retail: vehicles, home objects		0.66
Lodging and food		0.16
Rest		0.21
<hr/>		
5-digit Industry		
Food Super/hypermarkets		0.4
Pharmacies		0.1
Road freight transport		0.07
No-food markets		0.07
Engineering services		0.04

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Filled Vacancy Value

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

Where:

- ▶ $y_{o,t}$: occupation productivity,
- ▶ $\epsilon_{m,t}$: labor market productivity,
- ▶ $\varepsilon_{j,m,t}$: employer j productivity.

Number of new vacancies chosen based on $Y_{j,m,t}^f$, market tightness, and convex vacancy cost function.

Workers' Value Functions

Employment by j value

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

Unemployment value

$$U_{m,t} = b_{m,t} + \rho (p_{m,t} E W_{k,m,t} + (1 - p_{m,t}) U_{m,t+1}),$$

$$E W_{k,m,t} = \sum_{j=1}^K \gamma_{j,m,t} W_{j,m,t} + OOI_{m,t}^N.$$

Where:

- ▶ $\gamma_{j,m,t}$: local employer j vacancy share,
- ▶ $b_{m,t}$: unemployment income.
- ▶ $OOI_{m,t}^N$: outside option provided by national employer,
 $OOI_{m,t}^N = \gamma_{m,t}^N W_{m,t}^N.$

Wage Determination

Wage determined by Nash bargaining with parameter κ :

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

National employers' expansion effect:

- ▶ $OOI_{m,t}^N \uparrow \Rightarrow EW_{o,m,t} \uparrow$.
- ▶ $E_{m,t} \uparrow \Rightarrow p_{m,t} \uparrow$.
- ▶ Because of these two effects, $U_{o,m,t} \uparrow$.

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Robustness Checks & Additional Results

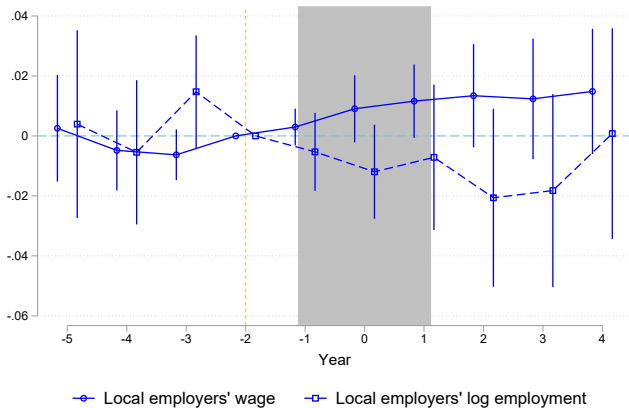
▶ Robustness:

- ▶ **Additional Controls**: additional industry/state fixed effects.
- ▶ **Cut-off sensitivity analysis**: more and less restrictive definitions of the event.
- ▶ **Real vs. Residual wages**: results for log-real wages.
- ▶ **Event study for first-time treated labor markets**
- ▶ **National employers with more than 100 workers in large cities.**

▶ Additional Results

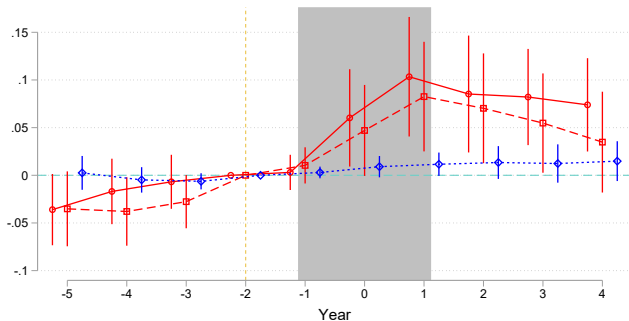
- ▶ **Who are national employers new hires?**
- ▶ **Total labor market effects.**

Robustness: Only very large national employers



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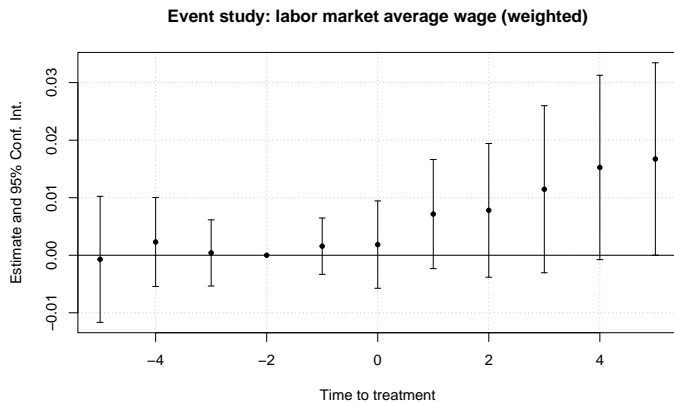
Robustness: Only very large national employers



- National employers relative wage in large cities
- - -□- - - National employers' wage in the Estimation Region
- ...◇... Local employers' wage in the Estimation Region

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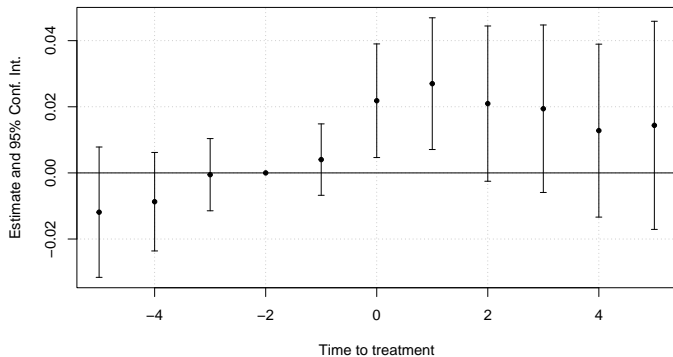
Total labor market



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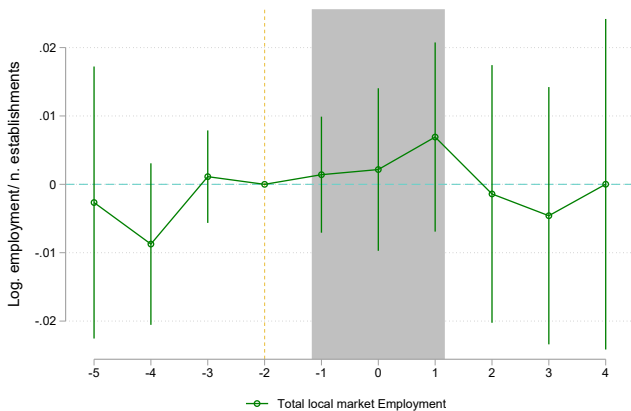
total labor market

Event study: labor market total employment (weighted)



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Total labor market: firms weighting



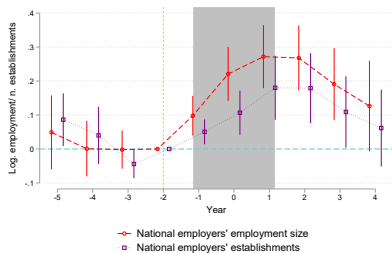
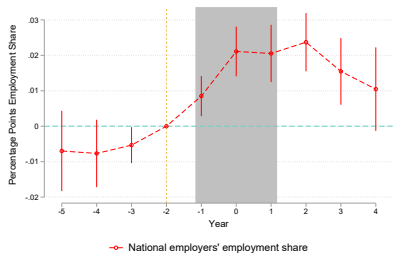
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Descriptive Statistics

	Potentially Treated	Matched Sample		
		Treated	Control	Difference
Labor market size (local employers)	4,768 (5,251)	5,179 (4,706)	5,234 (4,677)	-56 (1,242)
Job size	14.2 (35)	15.2 (44)	15.0 (44)	0.20 (0.86)
Average Hourly Log Wage (2018 Real)	2.14 (0.40)	2.09 (0.40)	2.10 (0.41)	-0.01 (0.04)
Average Residualized Hourly Wage	0.00 (0.27)	0.02 (0.30)	0.02 (0.29)	-0.00 (0.03)
Average Tenure (years)	2.56 (2.39)	2.33 (2.27)	2.36 (2.20)	-0.03 (0.14)
National Employers' Employment Share	0.08 (0.08)	0.12 (0.07)	0.11 (0.07)	0.01* (0.007)
National Employers' Residualized Wage	0.14 (0.21)	0.18 (0.18)	0.16 (0.18)	-0.02 (0.04)
University Education Female (%)	0.09 45	0.11 47	0.11 48	0.00 -0.005
Number of Observations	377,381	7,676	7,676	

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[Expanding National Employers Statistics](#)

National Employers' Employment Expansions in the Estimation Region



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Descriptive Statistics

	Potentially Treated	Matched Sample		
		Treated	Control	Difference
Labor market size (local employers)	4,409	5,668	5,607	61
	(5,155)	(4,630)	(4,559)	(1,364)
Job size	101.1	27.8	27.7	0.08
	(268)	(51)	(51)	(3.76)
Hourly Wage (2018 Real)	11.27	10.04	10.12	-0.08
	(11.07)	(9.48)	(8.79)	(0.54)
Residualized Hourly Wage	0.01	0.03	0.03	-0.00
	(0.37)	(0.42)	(0.42)	(0.045)
Average Tenure (years)	3.30	3.05	3.03	0.01
	(3.2)	(3.55)	(3.59)	(0.15)
National Employers' Employment Share	0.10	0.10	0.09	0.017**
	(0.10)	(0.04)	(0.05)	(0.007)
National Employers' Residualized Wage	0.15	0.18	0.20	-0.02
	(0.2)	(0.16)	(0.20)	(0.04)
University Education	0.09	0.08	0.09	-0.01
Female (%)	46	50	50	0
Number of Observations	3,093,583	45,403	45,403	

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Worker Heterogeneity

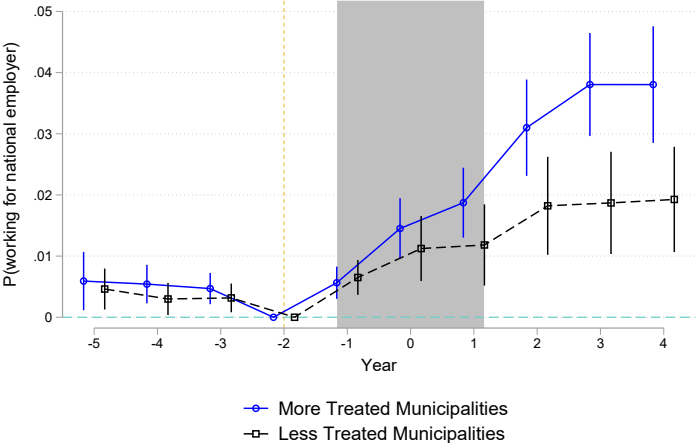
- ▶ Mechanism: Higher-than-average chance of moving to a national employer:
 - ▶ → Higher wage increase due to a higher chance of moving to a better-paying employer.
 - ▶ → Higher renegotiated wage increase due to a better outside option.

Two subgroups of treated workers:

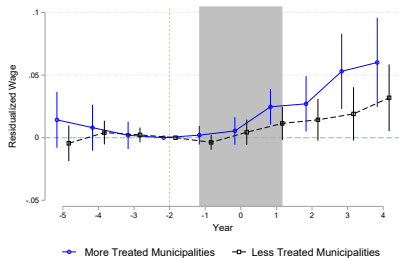
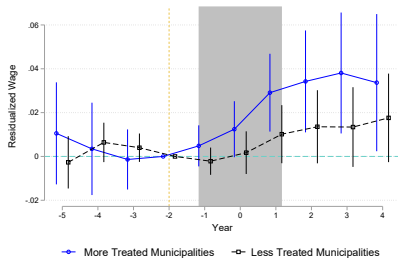
- ▶ Those working in the same municipality (subdivision of commuting zone) as expanding employers.
- ▶ Those connected to national employers through past co-workers (Caldwell and Harmon, 2019).

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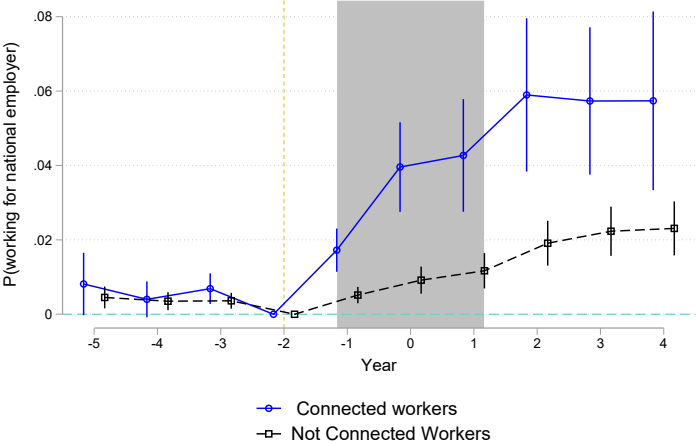
More vs Less Treated Municipalities



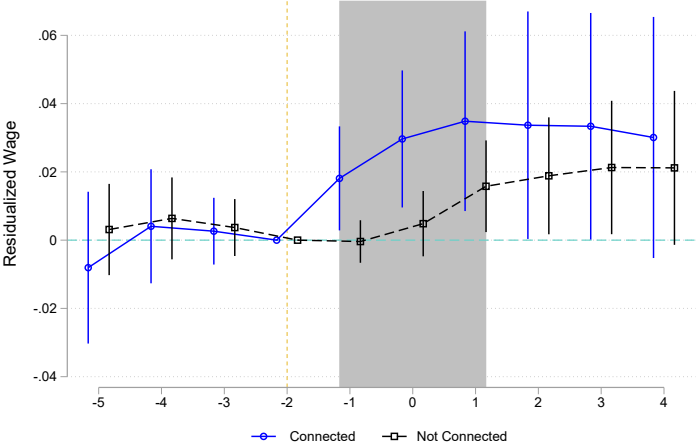
More vs Less Treated Municipalities



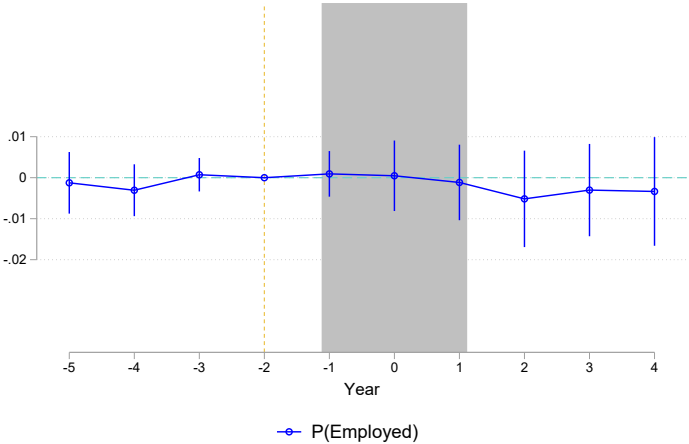
Connected vs Not Connected Workers



Connected vs Not Connected Workers

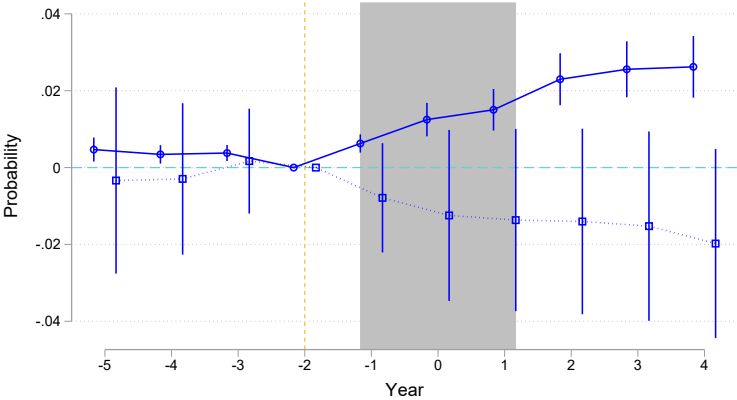


Formal Private Sector Employment Effects



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Transitions to National Employer



- P(working for the national employer)
- P(working for the baseline local employer)

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Why Structural Analysis?

Recap

- ▶ National employers' expansions pressure local employers to increase wages and cut employment.
- ▶ Job-stayers also experience wage increases.
- ▶ Incumbent workers' employment prospects are not adversely affected.

Model

- ▶ Describes the main mechanisms.
- ▶ Defines the key parameters for counterfactuals.
- ▶ Discuss identification issues.

Set-up

- ▶ Labor market m defined by commuting zone c and occupation o in time t .
- ▶ Two types of employers:
 - ▶ National employer
 - ▶ Local employers ($j = 1, \dots, K$).
 - ▶ Both types produce a tradable numeraire good.
- ▶ Unemployed workers match with employers via random search.
 - ▶ Worker (employer) probability of matching with the employer (worker) $p_{m,t}$ ($q_{m,t}$) defined by market tightness $\theta = \frac{E_{m,t}}{L_{m,t}}$.

Timing

At the beginning of each period:

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

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

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

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

Log-linearized Wage Equation in the Steady-state

Local employers' wage ($w_{j,m}$)/employment ($l_{j,m}$) depends on:

1. Outside option provided by the national employer $OOI_{m,t}^N$:

$$OOI_{m,t}^N = \underbrace{\gamma_{m,t}^N}_{\text{National employer's employment share}} \times \underbrace{w_{m,t}^N}_{\text{National employer's wage}}$$

2. Unobserved local productivity shocks ϵ_m .
3. Unobserved local employer's productivity shocks $\epsilon_{j,m}$.
4. Total employment E_m .

$$\ln w_{j,m} \approx \alpha_{O(m)} + \alpha_2 E_m + \alpha_3 OOI_{m,t}^N + \alpha_1 (\epsilon_m + \epsilon_{j,m}),$$

$$\ln l_{j,m} \approx \beta_{O(m)} + \beta_2 E_m + \beta_3 OOI_{m,t}^N + \beta_1 (\epsilon_m + \epsilon_{j,m}).$$

Log-linearized Wage Equation in the Steady-state

Local employer's wage ($w_{j,m}$)/employment ($l_{j,m}$) depends on:

1. Outside option provided by the national employer $OOI_{m,t}^N$.
2. Unobserved ϵ_m and $\varepsilon_{j,m}$.
3. Total employment E_m .

$$\ln w_{j,m} \approx \alpha_{O(m)} + \alpha_2 E_m + \alpha_3 OOI_{m,t}^N + \alpha_1 (\epsilon_m + \varepsilon_{j,m}),$$

$$\ln l_{j,m} \approx \beta_{O(m)} + \beta_2 E_m + \beta_3 OOI_{m,t}^N + \beta_1 (\epsilon_m + \varepsilon_{j,m}).$$

In differences:

$$\Delta \ln w_{j,m} \approx \Delta \alpha_{O(m)} + \alpha_2 \Delta E_m + \alpha_3 \Delta OOI_{m,t}^N + \alpha_1 (\Delta \epsilon_m + \Delta \varepsilon_{j,m}),$$

$$\Delta \ln l_{j,m} \approx \Delta \beta_{O(m)} + \beta_2 \Delta E_m + \beta_3 \Delta OOI_{m,t}^N + \beta_1 (\Delta \epsilon_m + \Delta \varepsilon_{j,m}).$$

Spillover Mechanism: National Employers' Expansions

$$\Delta \ln w_{j,m} \approx \Delta \alpha_{O(m)} + \alpha_2 \Delta E_m + \alpha_3 \Delta OOI_m^N + \alpha_1 (\Delta \epsilon_m + \Delta \varepsilon_{j,m}),$$

- ▶ Large national employer expansions affect both total employment and OOI_m^N .
- ▶ Estimated $\Delta E_m \approx 0$: suggest large value of $\alpha_3 \approx 1.8$. Total labor market employment
 - ▶ One standard deviation in OOI_m^N (4.5 log points) \Rightarrow 8.1 log points increase in local employers' wages. Empirical distribution of OOI_m^N
- ▶ Alternative/more standard estimation: shift-share regression (Beaudry et al., 2012).

Shift-Share Regression

$$\Delta y_{j,m,t} = \eta \Delta OOI_{m,t}^N + \zeta_1 \Delta B_{m,t}^E + \lambda_{O(m),t} + u_{j,m,t}$$

- ▶ All observations for local employers' jobs with more than 5 workers and national employers share greater than 5%.
- ▶ $\Delta B_{m,t}^E$: Bartik instrument to control for total employment changes.
- ▶ $\Delta OOI_{m,t}^N$ instrumented with previously defined exposure measures.

Shift-Share Regression Results

	First Stage		Local Employers' Outcomes			
	N.E. Outside option change		Δ Wage		Δ Log. Employment	
$\gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^W$	0.44*** (0.049)	0.44*** (0.047)				
$\gamma_{m,t-1}^N \Delta \hat{\Omega}_{m,t}^E \times$ N.E wage	0.15* (0.08)	0.15*** (0.066)				
$\Delta OOI_{m,t}^N$			0.60*** (0.14)	0.40*** (0.13)	-0.17 (0.47)	-0.30 (0.50)
Bartik Ind. Instrument	0.002 (0.005)	-0.003 (0.005)	0.000 (0.008)	0.003 (0.01)	0.04 (0.03)	0.04 (0.03)
Observations	126,687	126,687	126,687	126,687	126,687	126,687
R-squared	0.41	0.52				
Year \times Occupation FE	✓	✓	✓	✓	✓	✓
Year \times State FE	✓		✓		✓	
Year \times Micro-region FE		✓		✓		✓

- ▶ One standard deviation in OOI_m^N (4.5 log points) \Rightarrow 1.8 to 2.7 log points increase in local employers' wages.