

What Do (Thousands of) Unions Do? Union-Specific Pay Premia and Inequality

Ellora Derenoncourt François Gerard
Lorenzo Lagos Claire Montialoux

Motivation

- ▶ The effect of unions on wages is a classic labor topic

Commons (1905); Lester (1941); Rees (1962); Freeman and Medoff (1984); Lewis (1986)

- ▶ Union wage effects vary across countries [Jäger, Naidu, and Schoefer (2025)]

- ▶ High premia countries are associated with low coverage
- ▶ But such heterogeneity is shaped by institutional context

- ▶ Is there heterogeneity in wage effects across *individual* unions?

- ▶ Union attributes can affect what these organizations do
- ▶ Union heterogeneity can have distributional and policy-relevant implications

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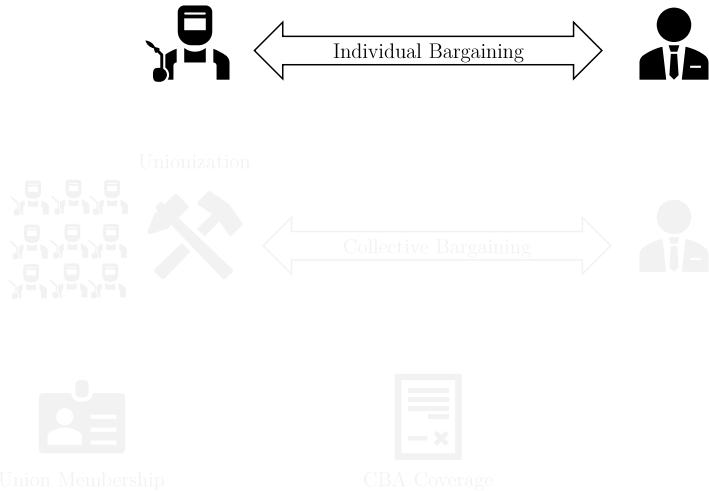
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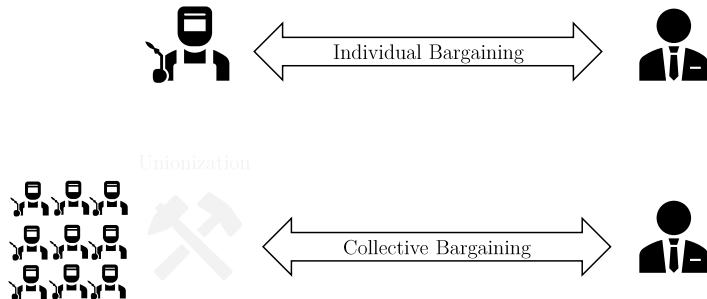
Ashenfelter (1972); Farber (1978); Budde et al. (2024); Corradini et al. (2025)

- ▶ Union heterogeneity can have distributional and policy-relevant implications

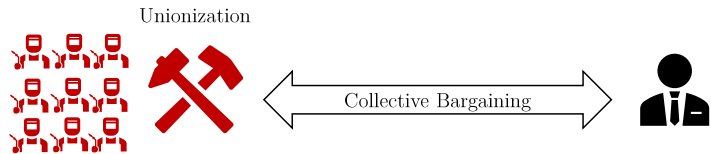
Core Concepts



Core Concepts



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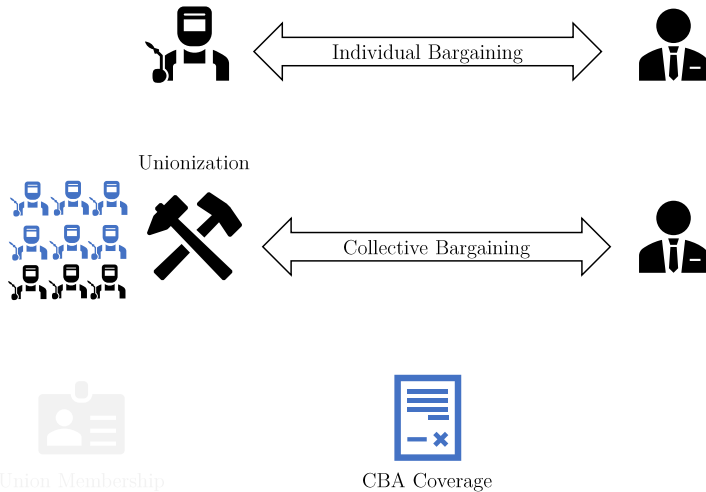


Union Membership

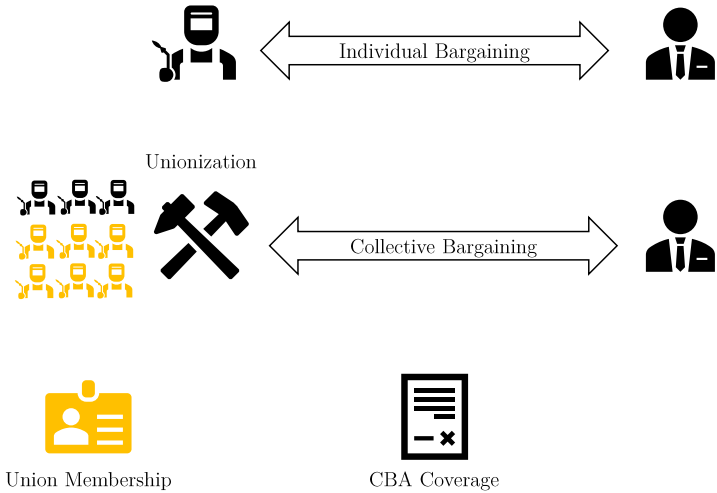


CBA Coverage

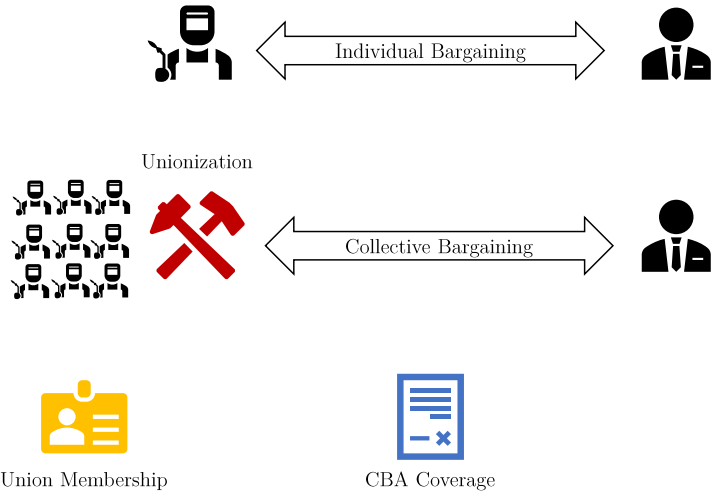
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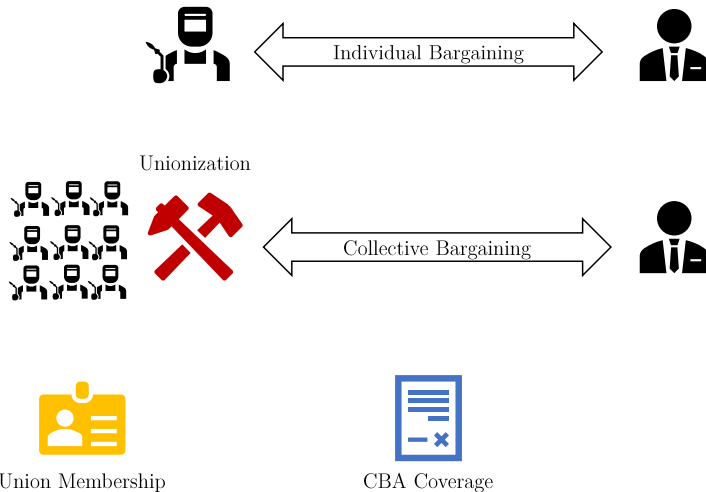
Core Concepts



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Core Concepts



This paper: estimate union-specific wage effects of **unionization** (wrt inactive unions)

Related Literature

- ▶ Establishment-specific pay premia using AKM

CHK (2013); CCK (2016); CCHK (2018); Gerard, Lagos, Severnini, & Card (2021); Azkarate-Askasua & Zerecero (2023); Dodini, Salvanes, & Willén (2024); Lagos (2024)

⇒ Augment AKM to incorporate union constraints on wage setting by employers

- ▶ Wage premia from unionization

DiNardo & Lee (2004); Lee & Mas (2012); Frandsen (2021); Wang & Young (2023); Card (1996); Lemieux (1998); Beauregard, Lemieux, Messacar, & Saggio (2025)

⇒ Estimate union-specific pay premia in a setting with widespread unionization

- ▶ Impact of right-to-work laws

Lumsden & Petersen (1975); Biasi & Sarsons (2022); Fortin, Lemieux, & Lloyd (2023)

⇒ Leverage union premium heterogeneity to better understand RTW effects

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Outline

Background and Data

Union-Firm AKM

Union-Specific Pay Premia

RTW with Union Heterogeneity

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Unions in Brazil

Rates

Premia

Cells

Example

Single union rule

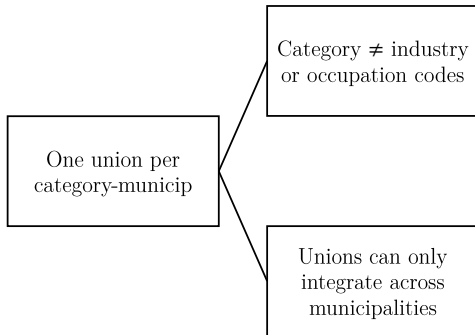
Union assignment

Union revenue

Single union rule

Union assignment

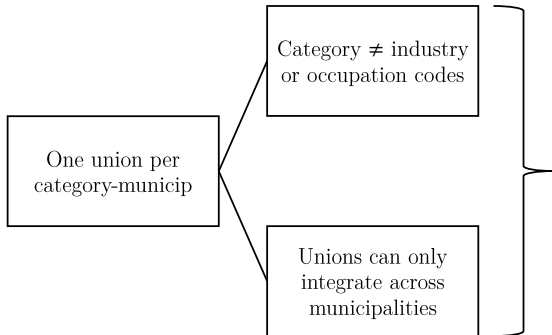
Union revenue



Single union rule

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Union revenue



Multi-firm unions

- 251 firms per union (on average)
- 1.8% of workers are in single-firm unions

Multi-union “LLM × industry” cells

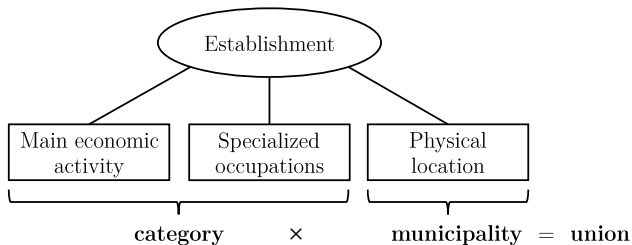
- 6 unions per cell (on average)
- 3.3% of workers are in single-union cells

New unions can only be formed at category-municip w/o local representation

Single union rule

Union assignment

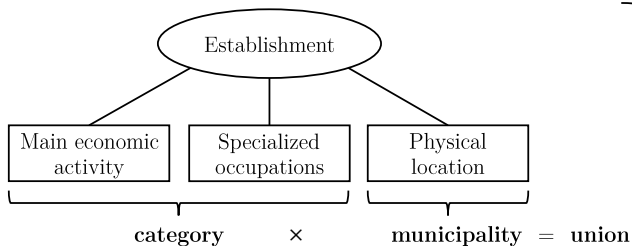
Union revenue



Single union rule

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Union revenue



Multi-union establishments

- When specialized occupations are distinct from the main economic activity
- Present in 1 out of 5 establishments

Multi-union firms

- When their establishments are
 - In municipalities with different unions for the same category
 - Assigned to different categories
- 28% of workers are in multi-union firms

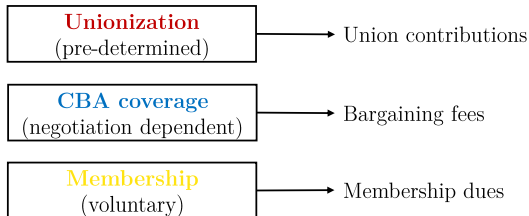
Unions in Brazil

[Rates](#)[Premia](#)[Cells](#)[Example](#)

Single union rule

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Union Revenue



Unions in Brazil

Rates

Premia

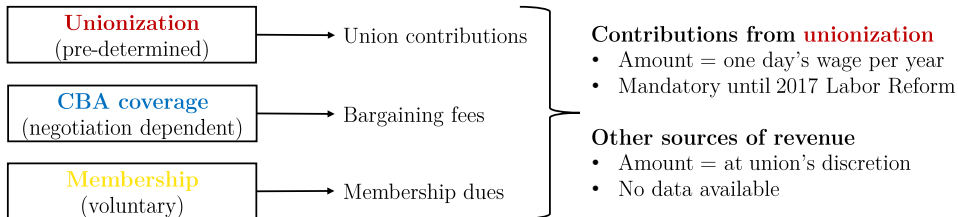
Cells

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Unions in Brazil

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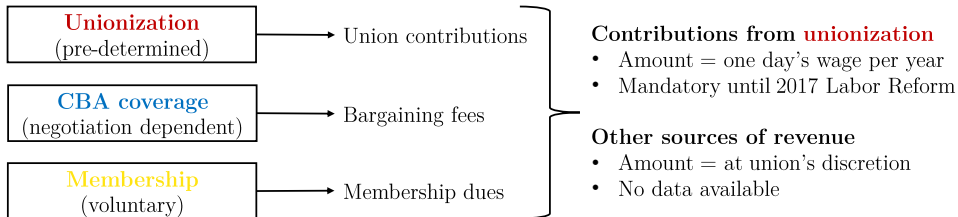
Cells

Example

Single union rule

Union assignment

Union Revenue



⇒ unions face limited external competition and have a guaranteed revenue source

Data

- ▶ Linked employer-employee data (*RAIS: 2009-2017; 2017-2024*)

- ▶ Track workers and their hourly earnings across jobs
- ▶ Separate identifiers for firms and establishments

- ▶ Union contributions data (*GRCSU: 2006-2021*)

- ▶ Links establishments making payments to unions on behalf of workers
- ▶ Used to determine the union representing workers at an establishment

- ▶ Supplementary data sources on unions

- ▶ Union registry (*CNES*): union structure, election outcomes, and leaders
- ▶ CBA registry (*SM*): sectoral and firm-level CBAs with pre-categorized clauses
- ▶ Strike registry (*SAG*): strike information mapped to establishments

⇒ establishment-level LEED where each establishment is mapped to a single firm and its workers are represented by a single union RAIS-GRSCU

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Background and Data

Union-Firm AKM

Union-Specific Pay Premia

RTW with Union Heterogeneity

Union-Firm AKM Specification

$$\text{AKM: } y_{it} = \alpha_i + \psi_{j(i,t)} + \beta X_{it} + r_{it}$$

UF-AKM(1):

UF-AKM(2):

How should we interpret these **establishment** pay premia?

- ▶ Firm-specific pay policies [standard interpretation]
- ▶ Union-specific bargaining [this paper]
- ▶ Industry-specific rents [Card et al. (2024)]
- ▶ Location-specific effects [Card et al. (2025), Carry et al. (2025)]

Union-Firm AKM Specification

$$\text{AKM: } y_{it} = \alpha_i + \psi_{j(i,t)} + \beta X_{it} + r_{it}$$

$$\text{UF-AKM(1): } y_{it} = \alpha_i + \phi_{f(i,t)} + \eta_{u(i,t)} + \beta X_{it} + \varepsilon_{it}$$

$$\text{UF-AKM(2):}$$

Propose the **establishment** effects are additive in **firm** and **union** effects

- ▶ CCHK-posting model assuming collective bargaining generates *proportional* shifts in the monopsony wage $\implies \eta_{u(i,t)}$ captures the proportion of rents extracted
- ▶ Baseline specification also includes LLM and industry fixed effects

Union-Firm AKM Specification

$$\text{AKM: } y_{it} = \alpha_i + \psi_{j(i,t)} + \beta X_{it} + r_{it}$$

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$$\text{UF-AKM(2): } \hat{\psi}_j = c + \phi_{f(j)} + \eta_{u(j)} + v_j$$

Alternatively, one could implement a two-step approach

- ▶ UF-AKM(1) assumes that characteristics replacing $\psi_{j(i,t)}$ account for the correlation between worker and establishment wage effects [Kline (2025)]
- ▶ UF-AKM(2) relies on regular AKM assumptions but is inefficient

⇒ implement both approaches since they are complementary

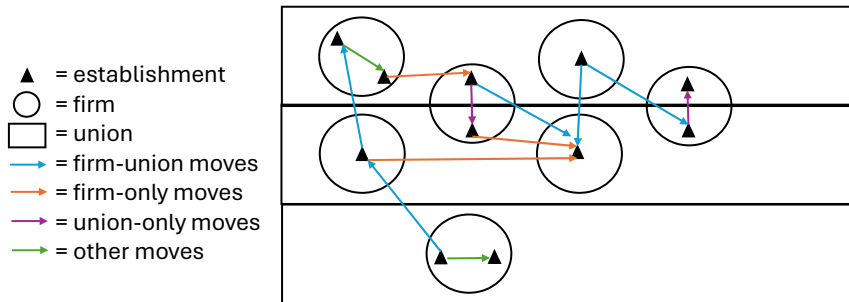
Worker Mobility and the Connected Set

Approach

Restrictions

Consider a two-period AKM without time-varying covariates

$$y_{it} = \alpha_i + \psi_{j(i,t)} + r_{it} \quad t \in \{1, 2\}$$



Connected set of establishments

$$\hat{\psi}_k - \hat{\psi}_\ell = \frac{1}{N} \sum_{i \in \mathcal{M}} (y_{i2} - y_{i1})$$

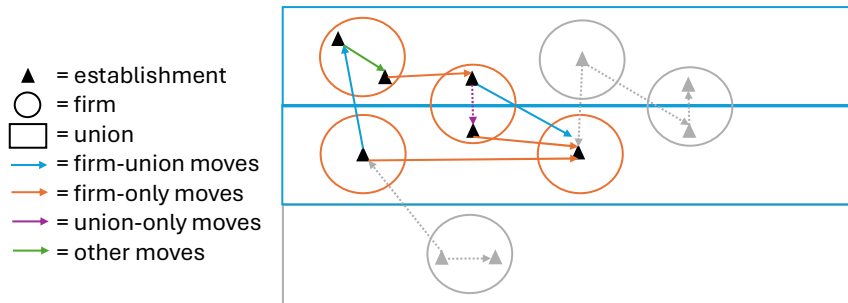
Worker Mobility and the Connected Set

Approach

Restrictions

Consider a two-period UF-AKM without time-varying covariates

$$y_{it} = \alpha_i + \phi_{f(i,t)} + \eta_{u(i,t)} + \varepsilon_{it} \quad t \in \{1, 2\}$$



Connected set of firms (firm-only moves) and corresponding unions (firm-union moves)

$$\hat{\phi}_{f(k)} - \hat{\phi}_{f(\ell)} = \frac{1}{N_f} \sum_{i \in \mathcal{F}} (y_{i2} - y_{i1}) \quad \text{and} \quad \hat{\eta}_{u(k)} - \hat{\eta}_{u(\ell)} = \frac{1}{N_b} \sum_{i \in \mathcal{B}} [(y_{i2} - y_{i1}) - (\hat{\phi}_{f(k)} - \hat{\phi}_{f(\ell)})]$$

Identifying Assumptions and Falsification Tests

[Formal](#)[ATEs](#)[UF-AKM](#)[More](#)

For mobility between establishments to separately identify the treatment effect of working for firm $f(j)$ and being represented by union $u(j)$, we assume

A1 **Additivity without establishment effects**

A2 Exclusion

A3 Parallel trends

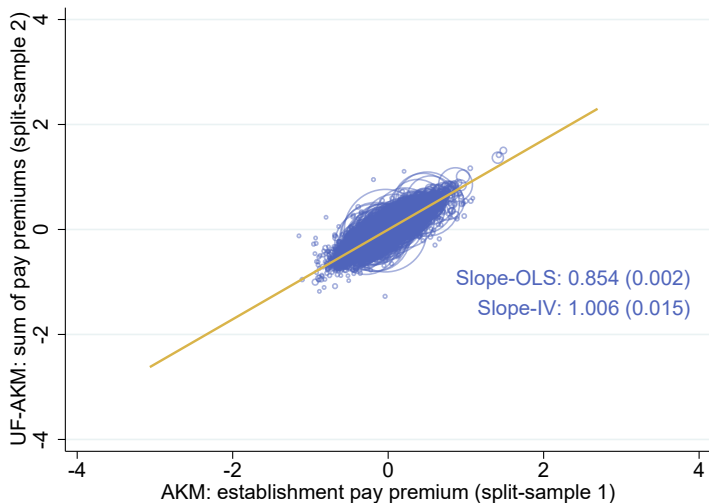
A4 Stationarity

A5 No selection on gains

Identifying Assumptions and Falsification Tests

[Formal](#)[ATEs](#)[UF-AKM](#)[More](#)

Sum of UF-AKM components $\approx$ AKM establishment fixed effect

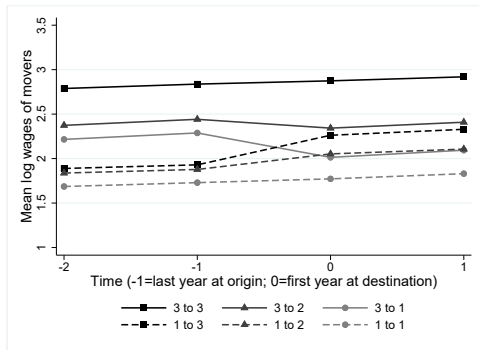


Identifying Assumptions and Falsification Tests

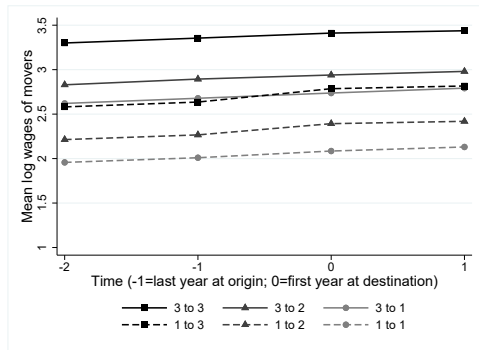
[Formal](#)[ATEs](#)[UF-AKM](#)[More](#)

The job ladder disappears for movers within a firm-union pair

Firm-only mover events



Neither-firm-nor-union mover events



Identifying Assumptions and Falsification Tests

[Formal](#)
[ATEs](#)
[UF-AKM](#)
[More](#)

Match effects, AKM, and UF-AKM models have similar fit

	AKM Connected Set	UF-AKM Connected set		
	AKM (1)	AKM (2)	KSS (3)	UF-AKM (4)
Mean log earnings	2.204	2.220	2.220	2.220
Standard deviation of log earnings	0.625	0.613	0.613	0.613
	...	...	...	...
Adjusted R ²	0.911	0.908	0.908	0.906
Adjusted R ² from match effects model	0.935	-	-	-
Number of establishment	2,710,696	1,217,788	1,217,788	1,217,788
Number of person-year observations	152,872,586	105,128,082	105,128,082	105,128,082

... R^2 of two-step UF-AKM $\approx$ signal-to-noise ratio in $\hat{\psi}_j$ as per KSS, i.e., $\frac{\sigma_{\psi, KSS}^2}{\sigma_{\psi, AKM}^2}$

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UF-AKM(1) Variance Decomposition of Log Earnings Table

Person and firm effects (+ their covariance) account for most of inequality

$$\begin{aligned} \text{Var}(y_{it}) = & \underbrace{\text{Var}(\alpha_i)}_{64.4\%} + \underbrace{\text{Var}(\phi_{f(i,t)})}_{10.1\%} + \underbrace{2\text{Cov}(\alpha_i, \phi_{f(i,t)})}_{19.4\%} \\ & + \underbrace{\text{Var}(\eta_{u(i,t)})} + \underbrace{2\text{Cov}(\alpha_i, \eta_{u(i,t)})} \\ & + \underbrace{2\text{Cov}(\phi_{f(i,t)}, \eta_{u(i,t)})} + \dots + \text{Var}(\varepsilon_{it}) \end{aligned}$$

UF-AKM(1) Variance Decomposition of Log Earnings Table

Union effects (+ its covariance with person effects) account for 3.7% of inequality

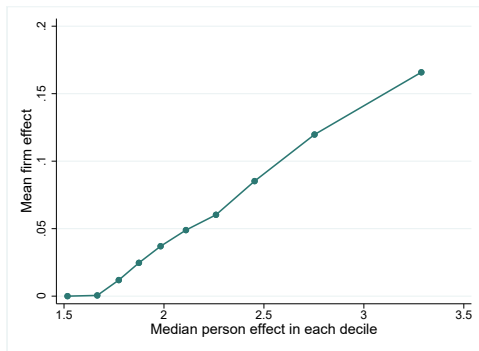
$$\begin{aligned} \text{Var}(y_{it}) = & \underbrace{\text{Var}(\alpha_i)} + \underbrace{\text{Var}(\phi_{f(i,t)})} + \underbrace{2\text{Cov}(\alpha_i, \phi_{f(i,t)})} \\ & + \underbrace{\text{Var}(\eta_{u(i,t)})}_{1.2\%} + \underbrace{2\text{Cov}(\alpha_i, \eta_{u(i,t)})}_{2.5\%} \\ & + \underbrace{2\text{Cov}(\phi_{f(i,t)}, \eta_{u(i,t)})} + \dots + \text{Var}(\varepsilon_{it}) \end{aligned}$$

$\Rightarrow$ UF-AKM(2) variance decomposition of $\hat{\psi}_j$ Figure
... firms (73.1%), unions (10.5%), LLMs (4.0%), industries (3.2%)

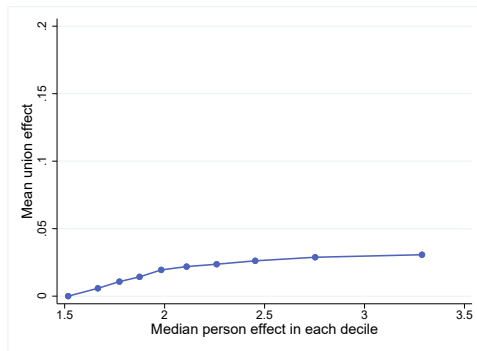
UF-AKM(1) Variance Decomposition of Log Earnings [Table](#)

PAM: sorting is *not* a source of compression under default unionization

Worker-to-Firm



Worker-to-Union



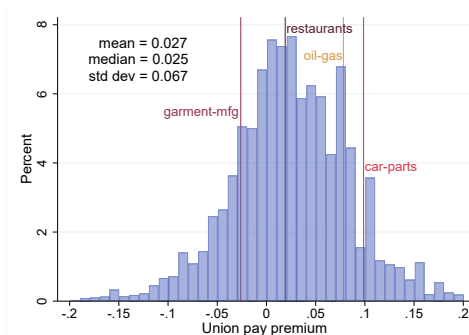
UF-AKM(1) Variance Decomposition of Log Earnings Table

Minimal union-to-firm sorting alleviates concerns about “limited mobility bias” LMB

$$\begin{aligned} \text{Var}(y_{it}) = & \underbrace{\text{Var}(\alpha_i)} + \underbrace{\text{Var}(\phi_{f(i,t)})} + \underbrace{2\text{Cov}(\alpha_i, \phi_{f(i,t)})} \\ & + \underbrace{\text{Var}(\eta_{u(i,t)})} + \underbrace{2\text{Cov}(\alpha_i, \eta_{u(i,t)})} \\ & + \underbrace{2\text{Cov}(\phi_{f(i,t)}, \eta_{u(i,t)})}_{-0.5\%} + \dots + \text{Var}(\varepsilon_{it}) \end{aligned}$$

⇒ decomposition results are robust to a split-sample adjustment Go

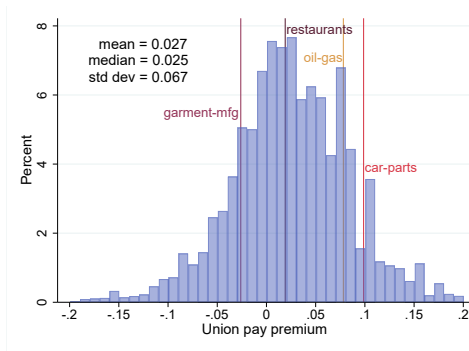
Union Premium and Compression (wrt inactive unions)



Average premium similar to estimates from Germany (2-4%) and France (2%)

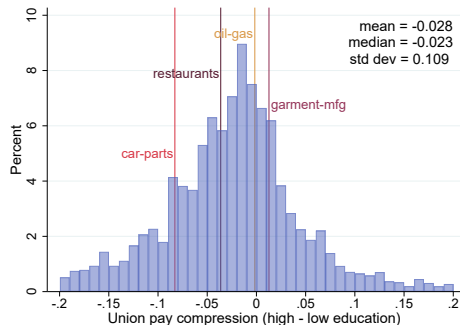
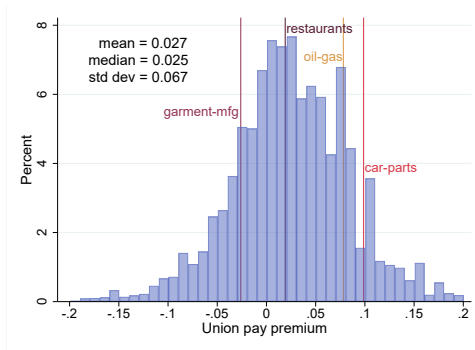
[Hirsch and Mueller (2020); Breda (2015)] ϕ Avg

Union Premium and Compression (wrt inactive unions)



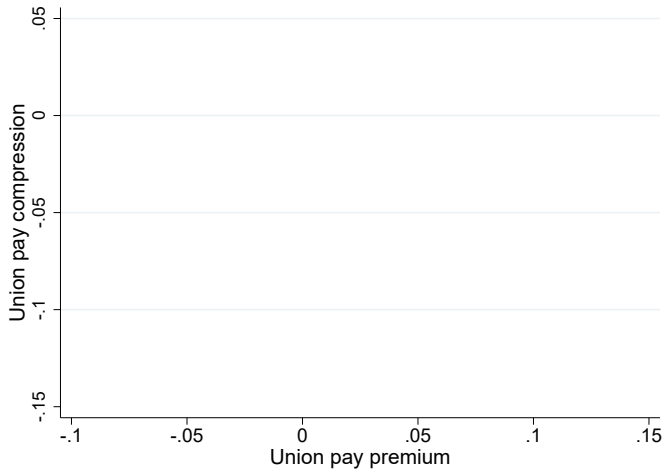
Establishments with $\uparrow \eta$ unions enjoy higher retention rates and leave-taking
 $\Rightarrow$ high pay premium unions are also effective in other dimensions [Table](#)

Union Premium and Compression (wrt inactive unions)

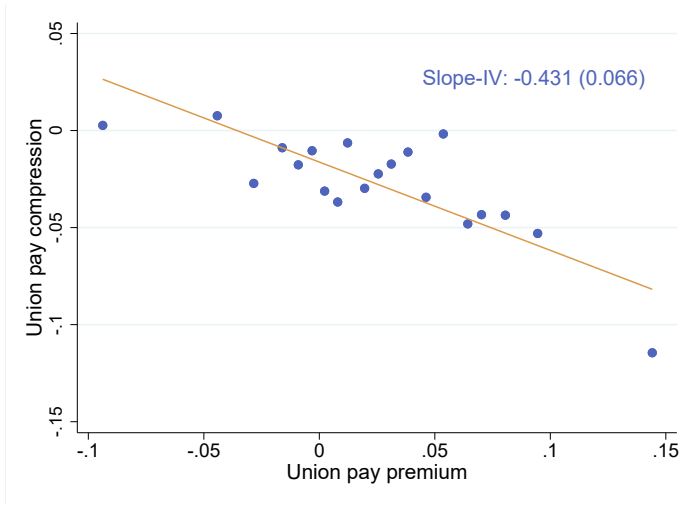


Unions compress wages on average, but there is substantial heterogeneity Oaxaca-Blinder
... split-sample adjusted std dev: premium (6.2 log pts) and compression (4.8 log pts)

Union Tradeoff: Compression vs. Premium

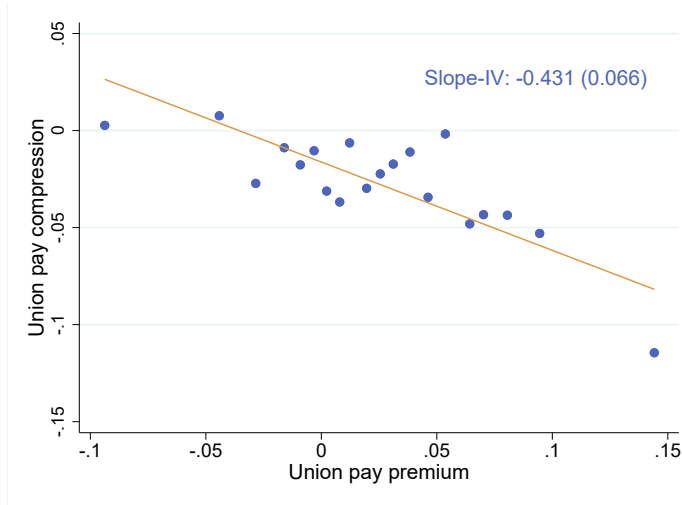


Union Tradeoff: Compression vs. Premium



⇒ unions that secure high pay premia tend to *compress* wages

Union Tradeoff: Compression vs. Premium



⇒ unions that secure high pay premia tend to *compress* wages
... 4Q unions $\propto$ strike, firm-level CBAs, competitive elections, skilled leaders

Outline

Background and Data

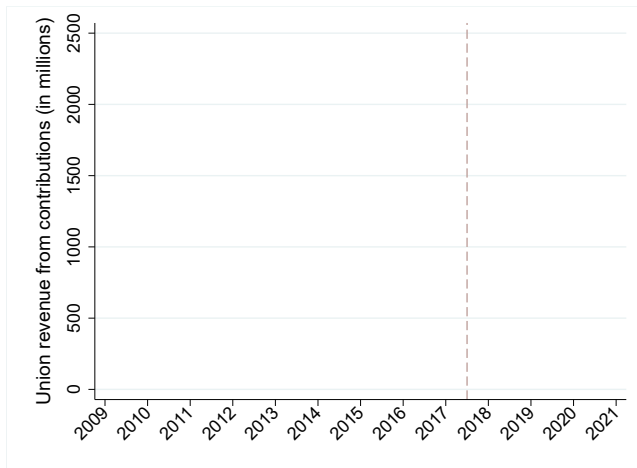
Union-Firm AKM

Union-Specific Pay Premia

RTW with Union Heterogeneity

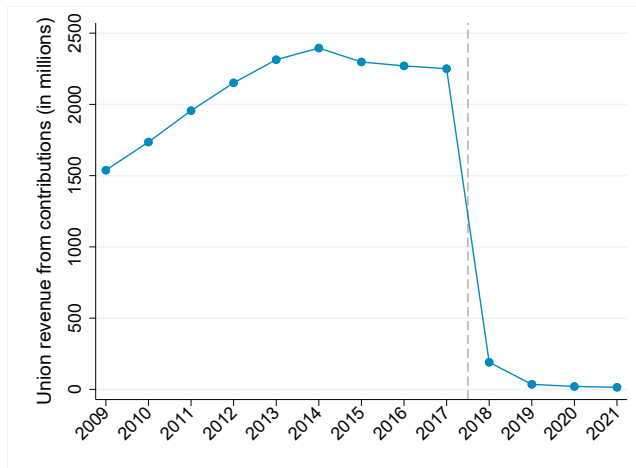
RTW and the Labor Reform of 2017

Starting Nov. 2017, mandatory contributions for unionization became voluntary



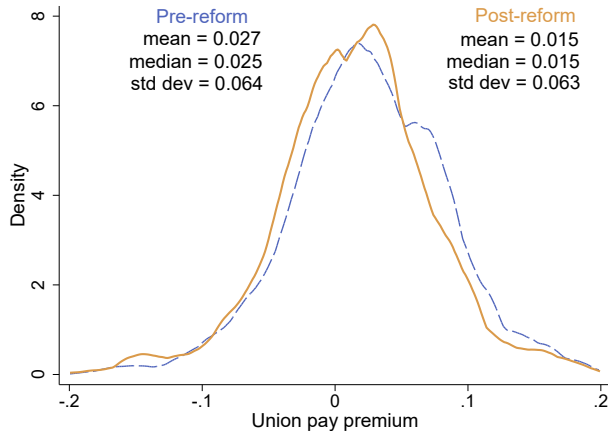
RTW and the Labor Reform of 2017

Union revenues plummet by 90% once workers need to opt into contributing



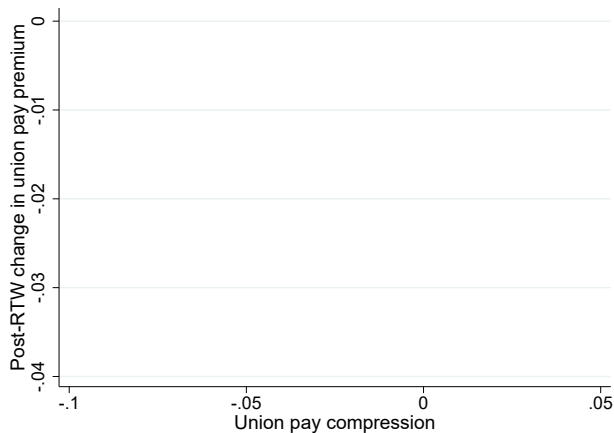
RTW and the Labor Reform of 2017

The average union premium shrinks by 44% between 2009-2017 and 2017-2024



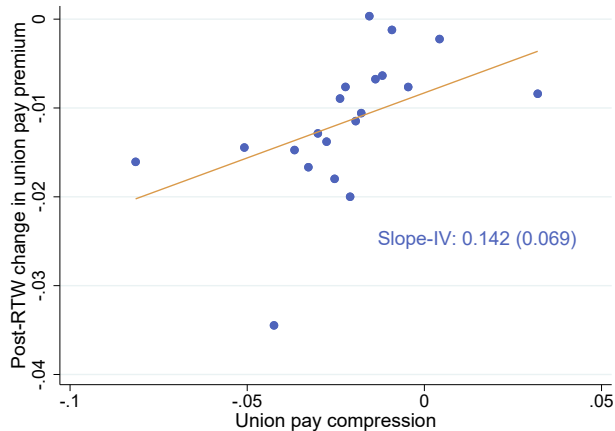
RTW and the Labor Reform of 2017

Do compressing unions tend to suffer larger premium declines?



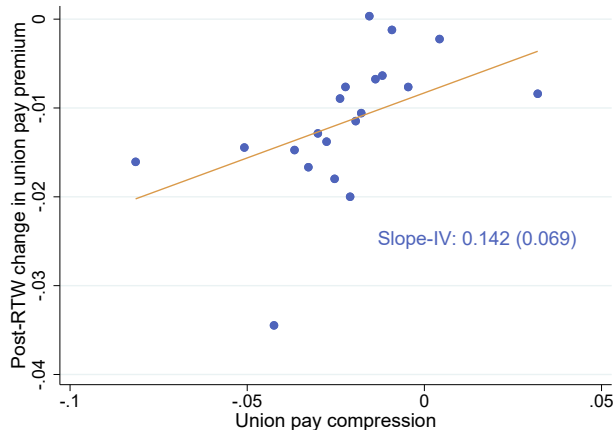
RTW and the Labor Reform of 2017

Yes: largest declines are concentrated among unions that compress wages η



RTW and the Labor Reform of 2017

Yes: largest declines are concentrated among unions that compress wages η



In fact, worker support through voluntary contributions is stronger for unions offering positive premiums but who also have *balanced cross-group effects* Figure

Conclusion

- ▶ Substantial union premium heterogeneity across 4.8K unions (SD of 6-7 log pts)
 - ▶ Variance in union effects accounts for 10% of $Var(\hat{\psi}_j)$ from an AKM
 - ▶ Under default unionization, worker-to-union sorting does not compress wages
- ▶ Compression *can* arise from within-union differential effects (avg. of 2.8 log pts)
 - ▶ High premium unions tend to compress wages: muted tradeoff between objectives
 - ▶ Associated to strikes, firm-level CBAs, internal competition, and skilled leaders
- ▶ Even with guaranteed unionization, RTW weakens unions (avg. premium ↓44%)
 - ▶ Unions that compress wages experience larger drops in premia
 - ▶ Mechanism: securing broad worker support is hindered by unequal rent-sharing

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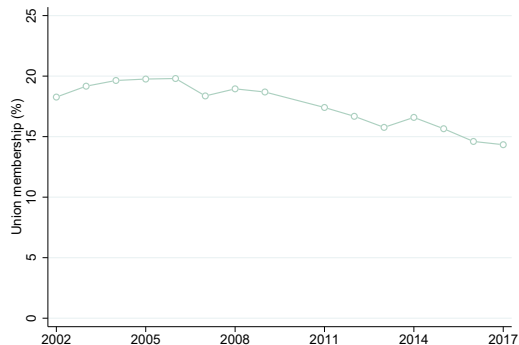
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What Do (Thousands of) Unions Do? Union-Specific Pay Premia and Inequality

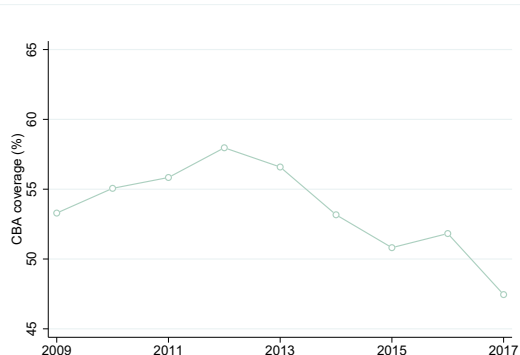
Ellora Derenoncourt François Gerard
Lorenzo Lagos Claire Montialoux

Membership and Coverage Rates [Back](#)

Membership (PNAD)



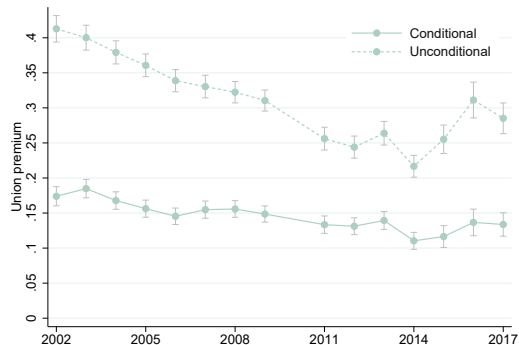
Coverage (RAIS)



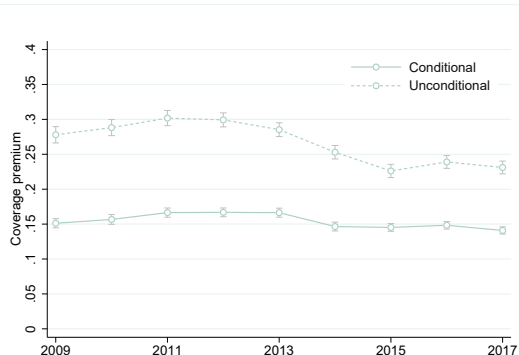
Premia from Membership and Coverage

[Back](#)

Membership (PNAD)



Coverage (RAIS)



Union Mapping to Cells [Back](#)

- ▶ Unions do not map to industry $\times$ local-labor-market cells [Example](#)
 - ▶ The median share of workers covered by a given union in an industry-LLM cell is 57%
 - ▶ The “median” union represents workers in estabs across 13 industries and 7 LLMs
- ▶ Union assignment to workplaces is largely pre-determined [Example](#)
 - ▶ An estab's main economic activity ($\neq$ industry) and geography determine its union
 - ▶ Labor courts deal with any disputes that may arise from this assignment process

Unions Do Not Map to Industry-LLM Cells [Back](#)

Industry	Local labor market	% of union's coverage	% of cell covered by union
<i>Union of Workers Driving Vehicles (Mopeds, Motorcycles, Bicycles, Tricycles) in Northern Paraná</i>			
Restaurants and other food and beverage services	Londrina	23	1
Retail trade of cultural, recreational, and sports articles	Apucarana	13	11
<i>Union of Employees in Security and Surveillance Companies in Cuiabá</i>			
Surveillance, private security, and cash transport activities	Cuiabá	82	94
Retail trade of IT and communication equipment; household items	Cuiabá	7	11
<i>Union of Workers Employed in Buying, Selling, Leasing, and Managing Real Estate and Brokerage</i>			
Combined services for building support	Blumenau	45	63
Real estate activities under contract or commission	Blumenau	24	72
<i>Union of Driving School Employees, Dispatchers, and School Transportation in the Osasco Region</i>			
Other teaching activities	Osasco	28	23
Road transport of passengers	Osasco	16	13

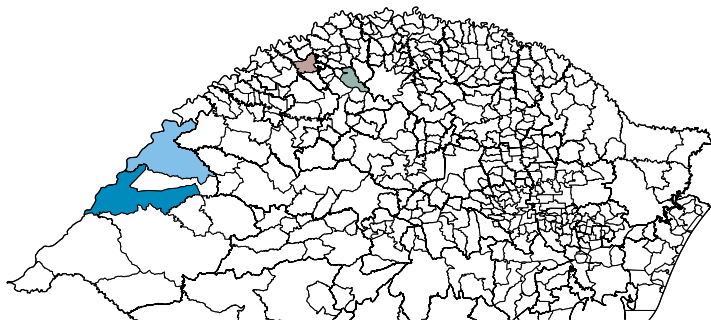
No single union represents all unionized workers in an industry-LLM cell

Union Assignment is Largely Pre-Determined [Back](#)

Industry	Local labor market	% of union's coverage	% of cell covered by union
<i>Union of Workers in Pharmacy, Cosmetics, Dentistry, and Health Products</i>			
Retail of pharmaceuticals, cosmetics, and medical/optical items	Manaus	68	58
Wholesale trade of non-food consumer products	Manaus	27	32
<i>Union of Employees in Commerce of Manaus</i>			
Non-specialized retail trade	Manaus	19	91
Retail of pharmaceuticals, cosmetics, and medical/optical items	Manaus	4	36
<i>Union of Professional Journalists of Mato Grosso do Sul</i>			
Editing for books, newspapers, magazines, and other publications	Campo Grande	73	57
Printing activities	Campo Grande	4	4
<i>Union of Workers in the Graphic Industries of Mato Grosso do Sul</i>			
Printing activities	Campo Grande	24	89
Editing for books, newspapers, magazines, and other publications	Campo Grande	11	35

Within an industry-LLM cell, the different unions representing workers likely reflect differences in economic activity, e.g., journalism vs. graphic design

Example: Multi-union Firm [Back](#)



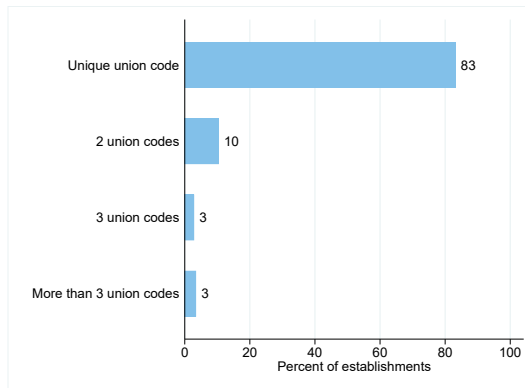
Firm: wholesale distributor in agricultural inputs
(establishments = 6, unions = 6, industries = 1, LLMs = 3)

-  *Municipal borders (LLM borders in bold)*
-  Commerce union of Ijuí
-  Commerce union of São Borja +
Food industry union of São Borja
-  Food industry union of Itaqui
-  Commerce union of Santa Rosa +
Food industry union of Santa Rosa

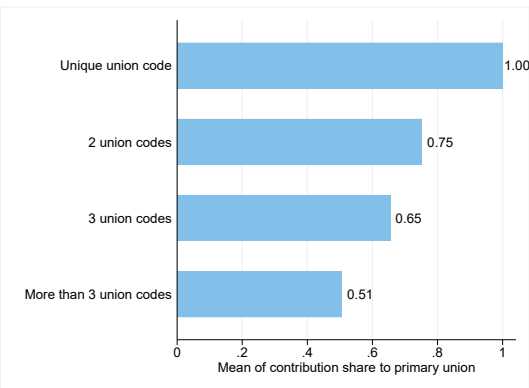


Primary Unions [Back](#)

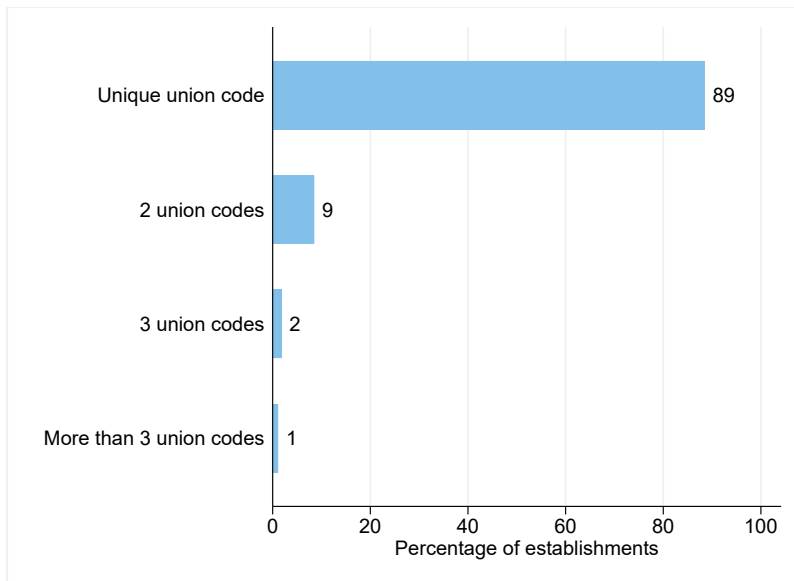
Union-to-establishment mapping



Contribution share to primary union

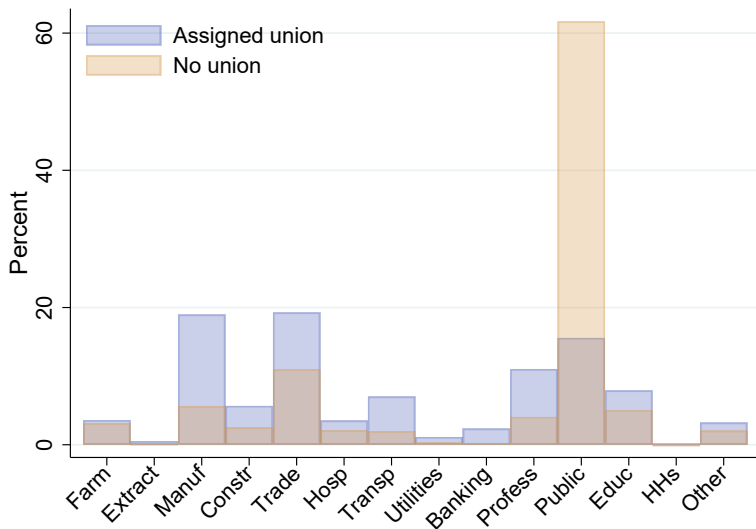


Switches in Primary Unions [Back](#)



Matching GRCSU to RAIS [Back](#)

93% of workers in RAIS (excluding public admin.) are assigned to a union in GRCSU



Our Approach [Back](#)

- ▶ Do not want to use mobility within firms: likely violation of symmetry, e.g., transfers, promotions, etc.
- ▶ Hence, focus on the connected set of firms from $\mathcal{F}$ movers and their corresponding unions connected by $\mathcal{B}$ movers, to estimate

$$\hat{\phi}_{f(k)} - \hat{\phi}_{f(\ell)} = \frac{1}{N_f} \sum_{i \in \mathcal{F}} (y_{i2} - y_{i1})$$

$$\hat{\eta}_{u(k)} - \hat{\eta}_{u(\ell)} = \frac{1}{N_b} \sum_{i \in \mathcal{B}} \left[(y_{i2} - y_{i1}) - (\hat{\phi}_{f(k)} - \hat{\phi}_{f(\ell)}) \right]$$

$$\hat{\alpha}_i = \frac{1}{T} \sum_t (y_{it} - \hat{\phi}_{f(i,t)} - \hat{\eta}_{u(i,t)})$$

UF-AKM Connected Set [Back](#)

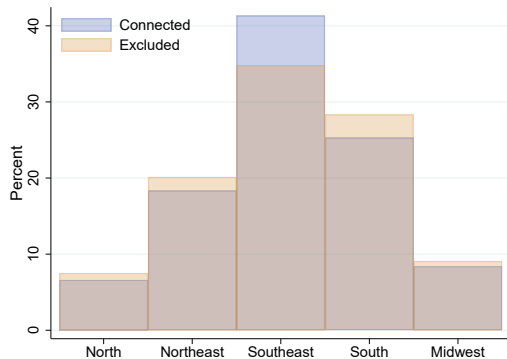
1. Common sense restrictions
 - ▶ Drop single person-year observations
 - ▶ Drop workers making within-firm moves
2. Restrictions for 1-step UF-AKM
 - ▶ Connected set of firms (firm-only moves) and respective unions (firm-union moves)
 - ▶ Remove nesting issues from adding LLM and industry effects
3. Restrictions for 2-step UF-AKM
 - ▶ Connected bi-partite graph: firm and union nodes + estab edges
 - ▶ Remove nesting issues from adding LLM and industry effects
4. KSS leave-out connected set

⇒ UF-AKM connected set retains 70% of the 6.8K unions operating in Brazil *

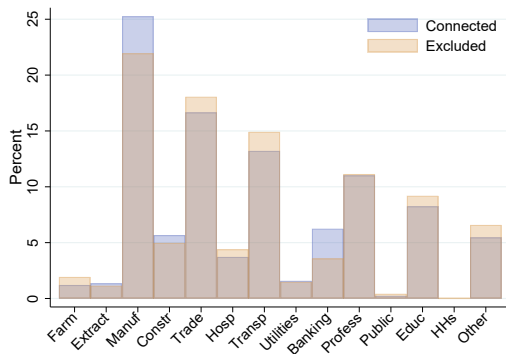
Unions in the Connected Set

[Descriptives](#)[Back](#)

Geographic regions



Broad industries



Unions in the Connected Set [Back](#)

	Full sample	Connected set	Excluded	Difference	p-value
Local union	0.941	0.915	1.000	-0.085	0.000
Industrial union	0.722	0.735	0.692	0.043	0.000
Municipal coverage	0.700	0.687	0.729	-0.042	0.001
Affiliated to any central	0.752	0.740	0.780	-0.040	0.000
Collective leadership	0.056	0.058	0.052	0.007	0.276
Elected by assembly	0.143	0.134	0.164	-0.030	0.002
Election participation	0.635	0.643	0.618	0.025	0.000
Election vote share	0.897	0.898	0.894	0.003	0.466
Avg. union revenue	305,813	365,054	169,181	195,874	0.000
Any CBA	0.769	0.785	0.732	0.053	0.000
Any strike	0.158	0.180	0.106	0.074	0.000

Unions in the Connected Set [Back](#)

	Full sample	Connected set	Excluded	Difference	p-value
Establishments covered	498	596	272	324	0.000
Avg. establishment size	24	24	26	-2	0.442
Workers covered	2,555	3,028	1,463	1,565	0.000
Union density	0.230	0.214	0.268	-0.054	0.000
Avg. female share	0.364	0.367	0.357	0.010	0.103
Avg. non-white share	0.324	0.325	0.322	0.004	0.601
Avg. no-college share	0.825	0.815	0.849	-0.034	0.000
Avg. blue-collar share	0.578	0.572	0.590	-0.018	0.016
Female parity in board	0.202	0.181	0.251	-0.070	0.000
Non-white parity in board	0.365	0.351	0.398	-0.048	0.000
No-college parity in board	0.349	0.351	0.343	0.008	0.512
Blue-collar parity in board	0.308	0.301	0.325	-0.025	0.045

- ▶ Assume $T = 2$ and ignore time-varying covariates
- ▶ Define $y_{it}(d_1, d_2)$ as the potential log earnings of worker i in year t if working in establishment d_1 at $t = 1$ and in establishment d_2 at $t = 2$
- ▶ An establishment represent a non-unique combination of firm and union identifiers
 - ▶ $f(d_1)$ denotes the firm of establishment d_1
 - ▶ $u(d_1)$ denotes the union representing workers in establishment d_1
- ▶ Need 5 assumptions so that mobility between establishments separately identifies the treatment effect of working for firm $f(j)$ and being represented by union $u(j)$

A1: Additivity without Establishment Effects [Back](#)

$$y_{it}(d_1, d_2) = y_{it}^f(f(d_1), f(d_2)) + y_{it}^u(u(d_1), u(d_2))$$

- ▶ Interpretation: pay at an establishment is determined by the sum of a firm-specific pay policy and a union-specific bargaining
- ▶ Test: symmetry in wage gains/losses for moves up/down the firm and union ladders; no ladder across establishments in the same firm-union pair
- ▶ Test: limited improvement in adjusted R^2 between AKM and UF-AKM
- ▶ Test: no pattern in mean residuals by $\hat{\phi}_f$ and $\hat{\eta}_u$ deciles
- ▶ Test: the sum of $\hat{\phi}_f$ and $\hat{\eta}_u$ approximate $\hat{\psi}_j$

$$y_{it}^f(f(d_1), f(d_2)) = y_{it}^f(f(d_t))$$

$$y_{it}^u(u(d_1), u(d_2)) = y_{it}^u(u(d_t))$$

- ▶ Interpretation: pay does not depend on the firm (union) where you were before
- ▶ Violated in sequential models of the labor market
- ▶ Need origin effects to play no role in explaining wages [Di Addario et al. (2023)]

A3: Parallel Trends [Back](#)

$$\mathbb{E}[y_{i2}^f(f(k)) - y_{i1}^f(f(k)) | j(i, 1) = k, j(i, 2) = \ell] = 0 \quad \forall \ell \neq k$$

$$\mathbb{E}[y_{i2}^u(u(k)) - y_{i1}^u(u(k)) | j(i, 1) = k, j(i, 2) = \ell] = 0 \quad \forall \ell \neq k$$

- Interpretation: among movers that left the firm (union) assigned to k in $t = 2$, their earnings that year would have been the same, on average, as their earnings in the year prior if they would have not moved
- Violated in learning models of the labor market
- Test: parallel trends before moves

A4: Stationarity [Back](#)

$$\begin{aligned}\mathbb{E}[y_{i2}^f(f(\ell)) - y_{i2}^f(f(k)) | j(i, 1) = k, j(i, 2) = \ell] \\ = \mathbb{E}[y_{i1}^f(f(\ell)) - y_{i1}^f(f(k)) | j(i, 1) = k, j(i, 2) = \ell] \quad \forall \ell \neq k\end{aligned}$$

$$\begin{aligned}\mathbb{E}[y_{i2}^u(u(\ell)) - y_{i2}^u(u(k)) | j(i, 1) = k, j(i, 2) = \ell] \\ = \mathbb{E}[y_{i1}^u(u(\ell)) - y_{i1}^u(u(k)) | j(i, 1) = k, j(i, 2) = \ell] \quad \forall \ell \neq k\end{aligned}$$

- Interpretation: the ATE among movers working for the firm (represented by the union) assigned to ℓ instead of k is the same regardless of the year
- Test: stability of $\hat{\phi}_f$ and $\hat{\eta}_u$ over 5-year periods

A5: No Selection on Gains [Back](#)

$$D_{i,1}, D_{i,2} \perp y_{it}^f(f(\ell)) - y_{it}^f(f(k)) \quad \forall \ell \neq k$$

$$D_{i,1}, D_{i,2} \perp y_{it}^u(u(\ell)) - y_{it}^u(u(k)) \quad \forall \ell \neq k$$

- ▶ Interpretations: workers do not select their employers ($D_{i,1}, D_{i,2}$) based on comparative advantage in firm-specific pay or union-specific bargaining
- ▶ Violated in models with match effects
- ▶ Test: limited improvement in adjusted R^2 when including match effects

Job Changes Identify ATEs [Back](#)

Consider wage changes among movers between establishments

$$\begin{aligned}\mathbb{E}[y_{i2} - y_{i1} | j(i, 2) = \ell, j(i, 1) = k] &= \mathbb{E}[y_{i2}(\ell, k) - y_{i1}(\ell, k) | j(i, 2) = \ell, j(i, 1) = k] \\&= \mathbb{E}[y_{i2}^f(f(\ell), f(k)) - y_{i1}^f(f(\ell), f(k)) | j(i, 2) = \ell, j(i, 1) = k] \\&\quad + \mathbb{E}[y_{i2}^u(u(\ell), u(k)) - y_{i1}^u(u(\ell), u(k)) | j(i, 2) = \ell, j(i, 1) = k] \\&= \mathbb{E}[y_{i2}^f(f(\ell)) - y_{i1}^f(f(k)) | j(i, 2) = \ell, j(i, 1) = k] \\&\quad + \mathbb{E}[y_{i2}^u(u(\ell)) - y_{i1}^u(u(k)) | j(i, 2) = \ell, j(i, 1) = k] \\&= \mathbb{E}[y_{i2}^f(f(\ell)) - y_{i2}^f(f(k)) + y_{i2}^f(f(k)) - y_{i1}^f(f(k)) | j(i, 2) = \ell, j(i, 1) = k] \\&\quad + \mathbb{E}[y_{i2}^u(u(\ell)) - y_{i2}^u(u(k)) + y_{i2}^u(u(k)) - y_{i1}^u(u(k)) | j(i, 2) = \ell, j(i, 1) = k] \\&= \mathbb{E}[y_{i2}^f(f(\ell)) - y_{i2}^f(f(k)) | j(i, 2) = \ell, j(i, 1) = k] \\&\quad + \mathbb{E}[y_{i2}^u(u(\ell)) - y_{i2}^u(u(k)) | j(i, 2) = \ell, j(i, 1) = k] \\&= \underbrace{\mathbb{E}[y_{i2}^f(f(\ell)) - y_{i2}^f(f(k))]}_{\phi_{f(\ell)} - \phi_{f(k)}} + \underbrace{\mathbb{E}[y_{i2}^u(u(\ell)) - y_{i2}^u(u(k))]}_{\eta_{u(\ell)} - \eta_{u(k)}}\end{aligned}$$

Deriving the UF-AKM Specification Back

$$\mathbb{E}[y_{i2} - y_{i1} | j(i, 2) = \ell, j(i, 1) = k] = (\phi_{f(\ell)} - \phi_{f(k)}) + (\eta_{u(\ell)} - \eta_{u(k)})$$

- ▶ Wage changes among job switchers identify the ATE of working for firm $f(\ell)$ relative to firm $f(k)$ and being represented by union $u(\ell)$ relative to union $u(k)$
- ▶ Under Assumption 1, realized wage changes can be written as

$$\Delta y_i = \Delta D'_i \underbrace{\psi}_{[\phi + \eta]} + \overbrace{(y_{i2}(j(i, 2)) - \underbrace{\psi_{j(i, 2)}}_{[\phi_{f(j(i, 2))} + \eta_{u(j(i, 2))}]}) - (y_{i1}(j(i, 1)) - \underbrace{\psi_{j(i, 1)}}_{[\phi_{f(j(i, 1))} + \eta_{u(j(i, 1))}]})}_{\text{unobserved "idiosyncratic" treatment effects heterogeneity} \equiv \Delta \varepsilon_i}$$

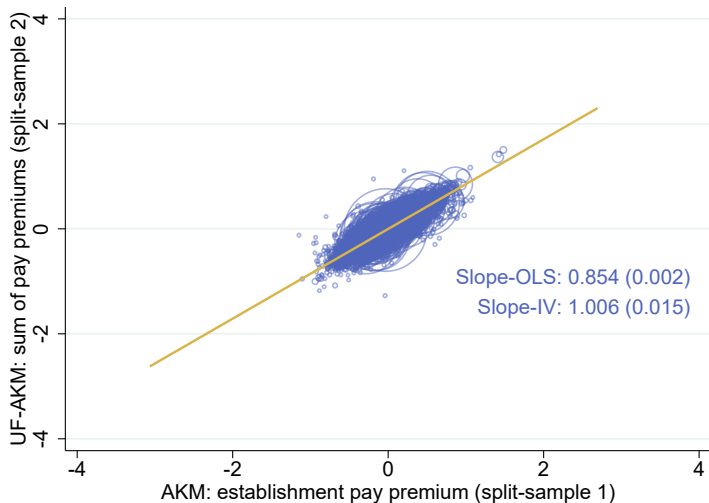
- ▶ Under Assumptions 2-5, fitting OLS to the equation above identifies the ATEs of firms $\{\phi_1, \phi_2, \dots, \phi_F\}$ and unions $\{\eta_1, \eta_2, \dots, \eta_U\}$ up to normalizing constants
- ▶ When $T = 2$, OLS in first differences equals OLS in levels with worker fixed effects

$$y_{it} = \alpha_i + \phi_{f(i, t)} + \eta_{u(i, t)} + \varepsilon_{it}$$

Falsification Tests [Back](#)

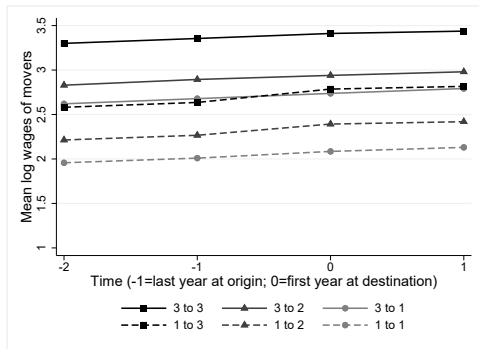
- ▶ Additivity without establishment effects
 - ▶ Sum of UF-AKM components $\approx$ AKM establishment fixed effect [Go](#)
 - ▶ Inexistent job ladder for movers within a firm-union pair [Go](#)
 - ▶ Symmetry in wage gains/losses for moves up/down the firm (union) ladder [Go](#)
 - ▶ No pattern in the mean UF-AKM residuals by $\hat{\phi}_f$ and $\hat{\eta}_u$ deciles [Go](#)
- ▶ Parallel trends and stationarity
 - ▶ Parallel trends prior to moves up/down the firm (union) job ladder [Go](#)
 - ▶ Stable firm and union fixed effect estimates across 5-year periods [Go](#)
- ▶ Reasonable statistical model
 - ▶ Adjusted R^2 is similar: AKM, match effects model, and UF-AKM [Go](#)
 - ▶ Maximal R^2 given signal-to-noise in $\hat{\psi}_j$ from KSS $\approx R^2$ of 2-step UF-AKM [Go](#)

AKM Establishment Premium $\approx$ Sum of UF-AKM Premia [Back](#)

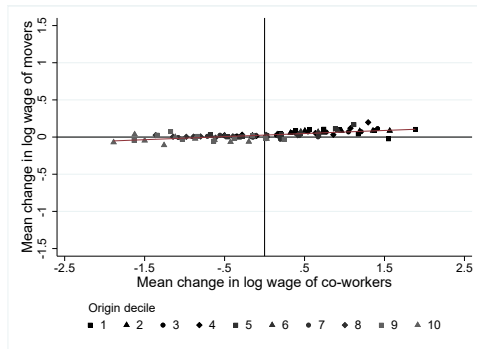


Inexistent ladder for movers within a firm-union pair

Event study

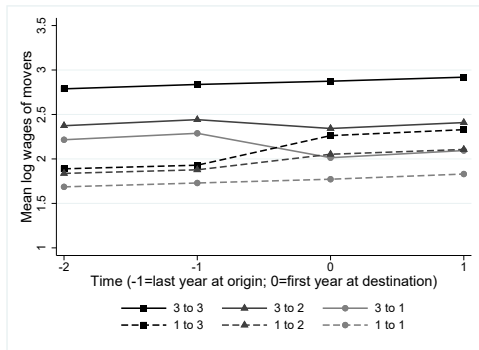


Symmetry



Parallel trends and symmetry in wage gains/losses for moves up/down the firm ladder

Event study



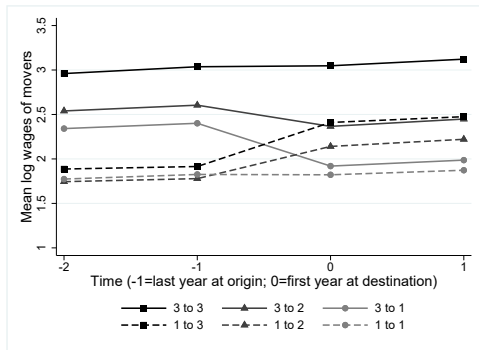
Symmetry



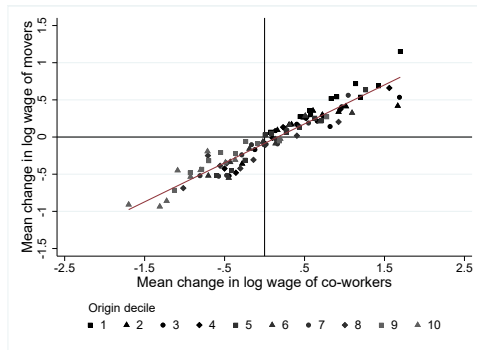
$\mathcal{B}$ Movers: Wages Adjusted by $\hat{\phi}_f$ Using $\mathcal{F}$ Movers [Back](#)

Parallel trends and symmetry in wage gains/losses for moves up/down the union ladder

Event study

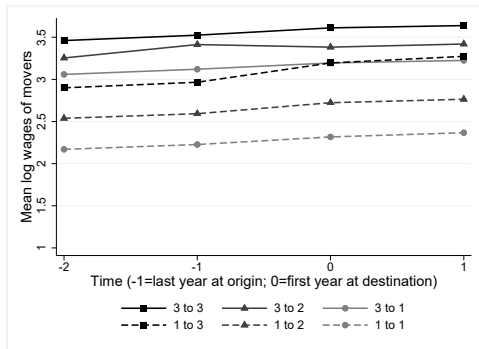


Symmetry

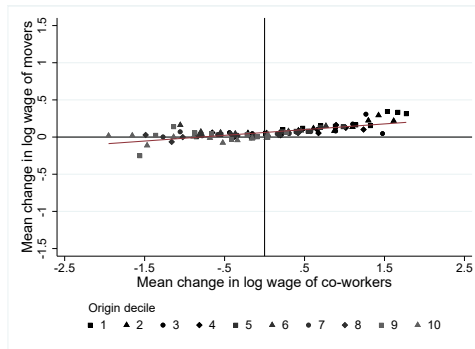


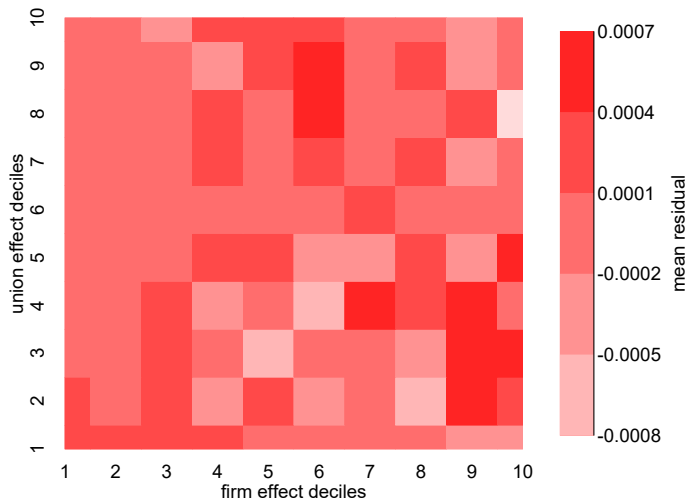
Wage rigidity in moves down the union ladder when staying in the same firm

Event study



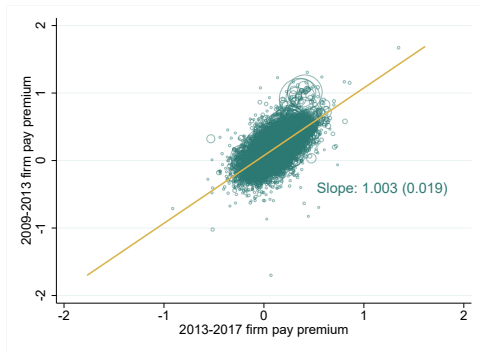
Symmetry



[Back](#)

Using a split-sample IV to correct for attenuation

Firm effects



Union effects



Comparison: AKM vs. UF-AKM [Back](#)

Goodness of fit is comparable across models

	AKM Connected Set	UF-AKM Connected set		
	AKM (1)	AKM (2)	KSS (3)	UF-AKM (4)
Mean log earnings	2.204	2.220	2.220	2.220
Standard deviation of log earnings	0.625	0.613	0.613	0.613
	...	...	...	...
Adjusted R ²	0.911	0.908	0.908	0.906
Adjusted R ² from match effects model	0.935	-	-	-
Number of establishment	2,710,696	1,217,788	1,217,788	1,217,788
Number of person-year observations	152,872,586	105,128,082	105,128,082	105,128,082

Maximal R^2 for UF-AKM(2) [Back](#)

$$R_{max}^2 = \frac{\sigma_{\psi, KSS}^2}{\sigma_{\psi, AKM}^2} \approx 0.95$$

$$R_{UF.AKM(2)}^2 = 1 - \frac{RSS_w}{TSS_w} = 1 - \frac{RSS_w}{\sigma_{\psi, AKM}^2} \approx 0.95$$

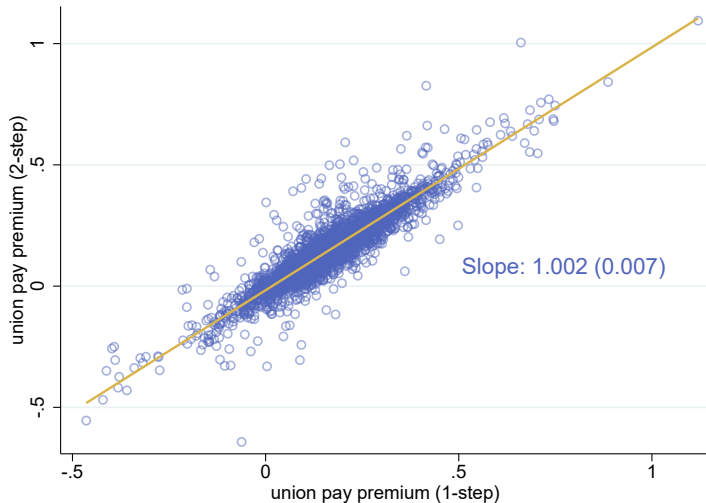
UF-AKM Variance Decomposition of Log Earnings [Back](#)

Unions explain about 3-4% of overall earnings inequality

	Brazil (1)	Southeast (2)	Early period (3)	Late period (4)
Mean log earnings	2.220	2.296	2.222	2.312
Standard deviation of log earnings	0.613	0.628	0.642	0.611
<i>Standard deviation (across person-year observations)</i>				
Person effects	0.492	0.509	0.538	0.515
Firm effects	0.194	0.195	0.189	0.184
Union effects	0.067	0.063	0.070	0.072
<i>Percentage of variance in log earnings due to</i>				
Variance in person effects	64.4	65.9	70.3	70.9
Variance in firm effects	10.1	9.6	8.7	9.1
Variance in union effects	1.2	1.0	1.2	1.4
Variance in LLM/industry effects	1.0	1.3	0.9	0.9
Covariance in person and firm effects	12.6	13.0	12.0	9.0
Covariance in person and union effects	2.5	2.6	2.0	2.8
Covariance in person and LLM/industry effects	2.9	2.9	3.1	3.1

UF-AKM: 1-step vs. 2-step [Back](#)

Share of $\text{Var}(\hat{\psi}_j)$: firms (73.1%), unions (10.5%), LLMs (4.0%), industries (3.2%)



- ▶ A small number of movers relative to the number of fixed effects introduces sampling errors that bias the variance and covariance terms

$$\hat{\phi}_f = \phi_f + \hat{e}_{\mathcal{F}} \quad \hat{\eta}_u = \eta_u + \hat{e}_{\mathcal{B}} - \hat{e}_{\mathcal{F}} \quad \hat{\alpha}_i = \alpha_i - \hat{e}_{\mathcal{B}}$$

- ▶ Since $N_b/U > N_f/F$, we expect $\hat{e}_{\mathcal{F}} > \hat{e}_{\mathcal{B}}$ so that we have
 - ▶ Overestimated variances: largest for $Var(\hat{\eta}_u) \rightarrow Var(\hat{\phi}_f) \rightarrow Var(\hat{\alpha}_i)$
i.e., $Var(\hat{\eta}_u) = Var(\eta_u) + Var(\hat{e}_{\mathcal{F}}) + Var(\hat{e}_{\mathcal{B}})$
 - ▶ Underestimated covariances: largest for $Cov(\hat{\phi}_f, \hat{\eta}_u) \rightarrow Cov(\hat{\alpha}_i, \hat{\eta}_u) \rightarrow Cov(\hat{\alpha}_i, \hat{\phi}_f)$
i.e., $Cov(\hat{\phi}_f, \hat{\eta}_u) = Cov(\phi_f, \eta_u) - Var(\hat{e}_{\mathcal{F}})$
- ▶ Since unions are assigned to workplaces independently from firm-premia in our setting, we expect $Cov(\phi_f, \eta_u) = 0$
- ▶ Hence, the magnitude of $Cov(\hat{\phi}_f, \hat{\eta}_u)$ can be interpreted as $Var(\hat{e}_{\mathcal{F}})$, thereby capturing the extent of limited mobility bias

Sampling Errors [Back](#)

$$y_{it} = \alpha_i + \phi_{f(i,t)} + \eta_{u(i,t)} + \varepsilon_{it} \quad t \in \{1, 2\}$$

In finite samples

$$\hat{\phi}_{f(k)} - \hat{\phi}_{f(\ell)} = \phi_{f(k)} - \phi_{f(\ell)} + \frac{1}{N_f} \sum_{i \in \mathcal{F}} (\varepsilon_{i,t+1} - \varepsilon_{i,t})$$

$$\implies \hat{\phi}_f = \phi_f + \hat{e}_{\mathcal{F}}$$

$$\hat{\eta}_{u(k)} - \hat{\eta}_{u(\ell)} = \eta_{u(k)} - \eta_{u(\ell)} + \frac{1}{N_b} \sum_{i \in \mathcal{B}} \left[(\varepsilon_{i,t+1} - \varepsilon_{i,t}) - \frac{1}{N_f} \sum_{i \in \mathcal{F}} (\varepsilon_{i,t+1} - \varepsilon_{i,t}) \right]$$

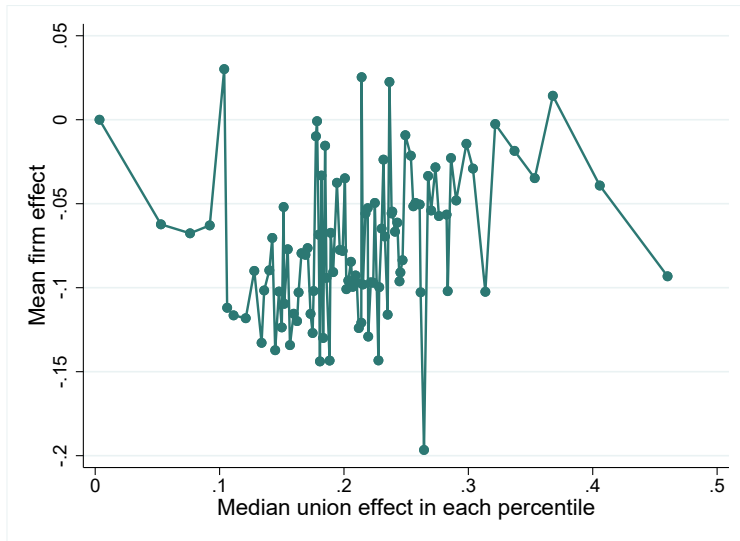
$$\implies \hat{\eta}_u = \eta_u + \hat{e}_{\mathcal{B}} - \hat{e}_{\mathcal{F}}$$

$$\hat{\alpha}_i = \alpha_i + \frac{1}{T} \left[(\phi_{f(i,t)} - \hat{\phi}_{f(i,t)}) + (\eta_{u(i,t)} - \hat{\eta}_{u(i,t)}) + \varepsilon_{i,t} \right]$$

$$\implies \hat{\alpha}_i = \alpha_i - (\hat{e}_{\mathcal{F}}) - (\hat{e}_{\mathcal{B}} - \hat{e}_{\mathcal{F}}) = \alpha_i - \hat{e}_{\mathcal{B}}$$

Union-to-Firm Selection [Back](#)

Pre-determined union assignment seems to limit assortative matching of unions to firms



Bias-Corrected Variance Decomposition [Back](#)

	Plug-in (AKM)	Bias-corrected (KSS)
Variance in person effects	0.2371	0.2273
Variance in estab. effects	0.0535	0.0506
Covariance in estab and person effects	0.0340	0.0365
<i>Percentage of variance in log earnings due to</i>		
Variance in person effects	63.2	60.5
Variance in estab. effects	14.3	13.5
Covariance in estab and person effects	18.1	19.4

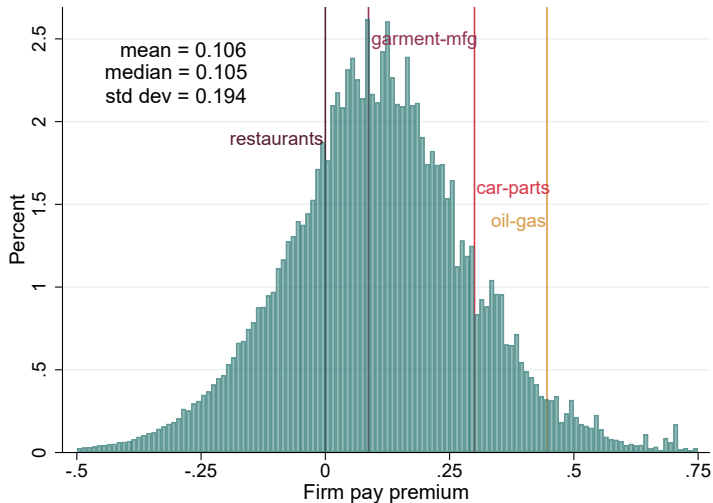
Concerning UF-AKM: union-connecting firms have **77 firm-only movers** (on average) and unions have **3.5K firm-union movers** (on average).

Split-Sample Adjusted UF-AKM Variance Decomposition [Back](#)

Adjusted percentages in brackets

$$\begin{aligned} \text{Var}(y_{it}) = & \underbrace{\text{Var}(\alpha_i)}_{66.1\%[n/a]} + \underbrace{\text{Var}(\phi_{f(i,t)})}_{10.7\%[8.1\%]} + \underbrace{2\text{Cov}(\alpha_i, \phi_{f(i,t)})}_{11.1\%[14.1\%]} \\ & + \underbrace{\text{Var}(\eta_{u(i,t)})}_{1.3\%[1.0\%]} + \underbrace{2\text{Cov}(\alpha_i, \eta_{u(i,t)})}_{2.5\%[2.5\%]} \\ & + \underbrace{2\text{Cov}(\phi_{f(i,t)}, \eta_{u(i,t)})}_{-0.6\%[-0.1\%]} + \dots + \text{Var}(\varepsilon_{it}) \end{aligned}$$

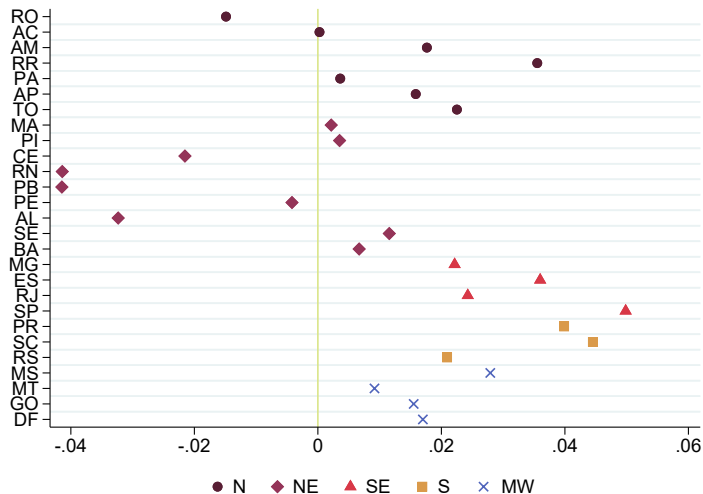
Histogram of Firm Pay Premia

[Back](#)

Where Are the High Pay Unions?

[Back](#)

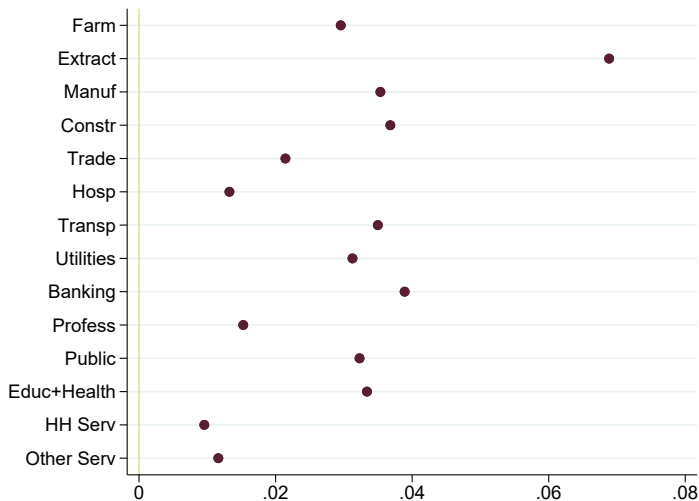
Prosperous states tend to have high premium unions



Where Are the High Pay Unions?

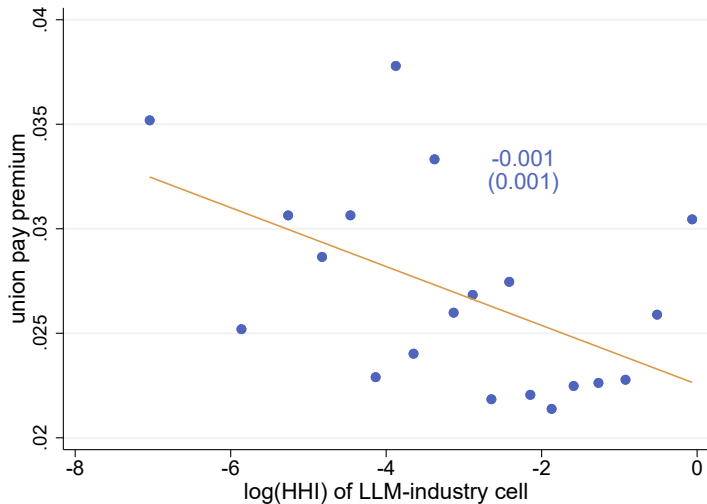
[Back](#)

Extractive industries (household services) tend to have high (low) premium unions



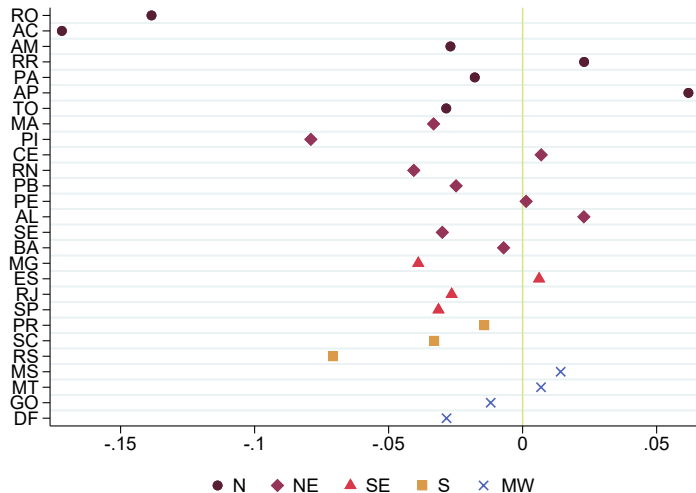
Where Are the High Pay Unions? [Back](#)

Pay premia of unions are uncorrelated with concentration at the LLM-industry level



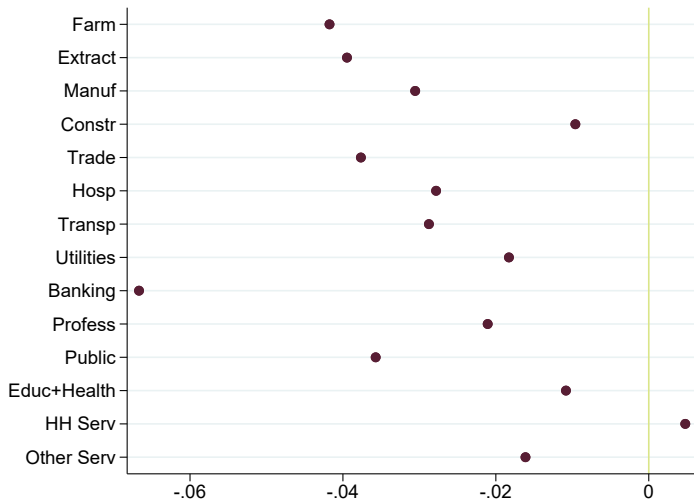
Where Are the High Compression Unions? [Back](#)

Among prosperous states, unions compress the most (least) in RS (ES)



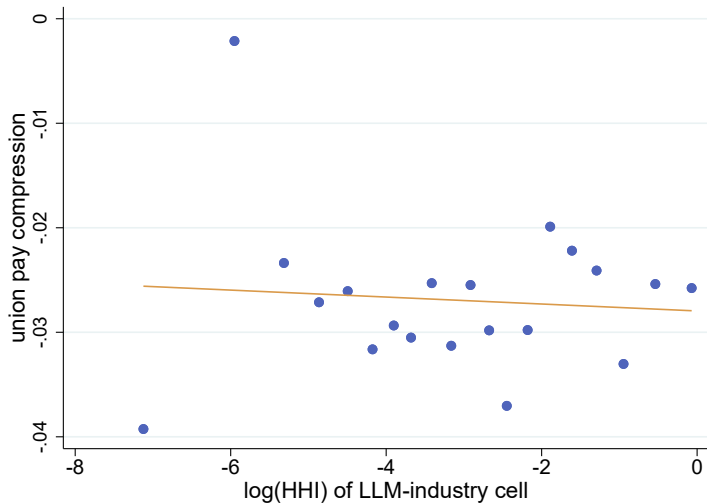
Where Are the High Compression Unions? [Back](#)

Unions compress wages in the banking (household services) sector the most (least)



Where Are the High Compression Unions? [Back](#)

Pay compression by unions is uncorrelated with concentration in LLM-industry cells



Union Pay Premia vs. Voice/Exit and Amenity Takeup [Back](#)

	Retention rate		Share taking leave	
	(1)	(2)	(3)	(4)
Union pay premium	0.139	0.100	0.069	0.052
	(0.011)	(0.022)	(0.008)	(0.010)
Firm pay premium	0.083	-	0.070	-
	(0.003)	-	(0.002)	-
LLM fixed effect	X	X	X	X
Industry fixed effect	X	X	X	X
Firm fixed effect		X		X
Mean dependent variable	0.576	0.576	0.050	0.050
Adjusted R-squared	0.284	0.589	0.155	0.761
Observations (estabs)	1,199,102	317,385	1,217,843	327,780

⇒ high pay premium unions are also effective in other dimensions

Dual connected set with DFL weights by industry-LLM

Overall wage gap (1)	Gap in firm effects (2)	Decomposition		Gap in union effects (5)	Decomposition	
		Relative pay setting (3)	Cross-firm sorting (4)		Differential bargaining (6)	Cross-union sorting (7)
0.734	0.132	0.087	0.045	-0.017	-0.023	0.006
	<i>18.0%</i>	<i>11.9%</i>	<i>6.1%</i>	<i>-2.3%</i>	<i>-3.1%</i>	<i>0.8%</i>

⇒ unions reduce the wage gap through differential bargaining only

⇒ bargaining shrinks firms' relative pay setting effects by 26%

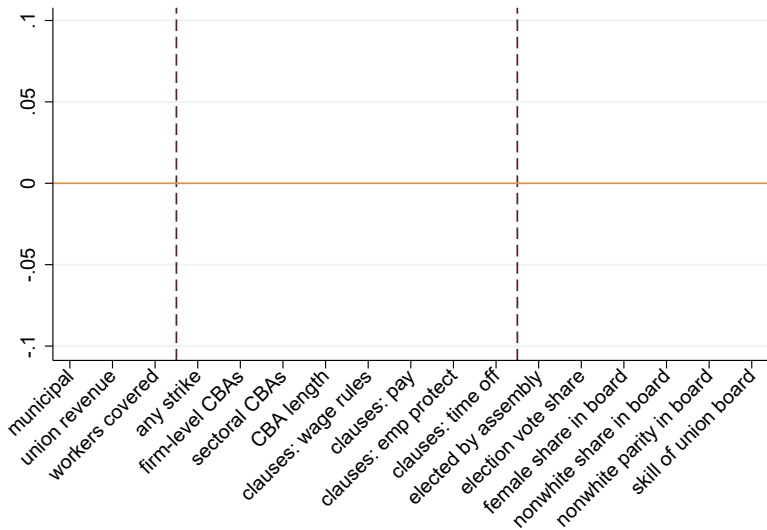
Wage Gap Decomposition [Back](#)

Use dual connected set of $g \in \{H, L\}$

$$\begin{aligned}\mathbb{E} \left(y_{it}^H \right) - \mathbb{E} \left(y_{it}^L \right) &= \left(\bar{\alpha}^H - \bar{\alpha}^L \right) && \text{“transferable” skills} \\ &+ \sum_j \phi_{f(j)}^H \left(\pi_j^H - \pi_j^L \right) && \text{cross-firm sorting} \\ &+ \sum_j \left(\phi_{f(j)}^H - \phi_{f(j)}^L \right) \pi_j^L && \text{within-firm relative pay setting} \\ &+ \sum_j \eta_{u(j)}^H \left(\pi_j^H - \pi_j^L \right) && \text{cross-union sorting} \\ &+ \sum_j \left(\eta_{u(j)}^H - \eta_{u(j)}^L \right) \pi_j^L && \text{within-union differential bargaining}\end{aligned}$$

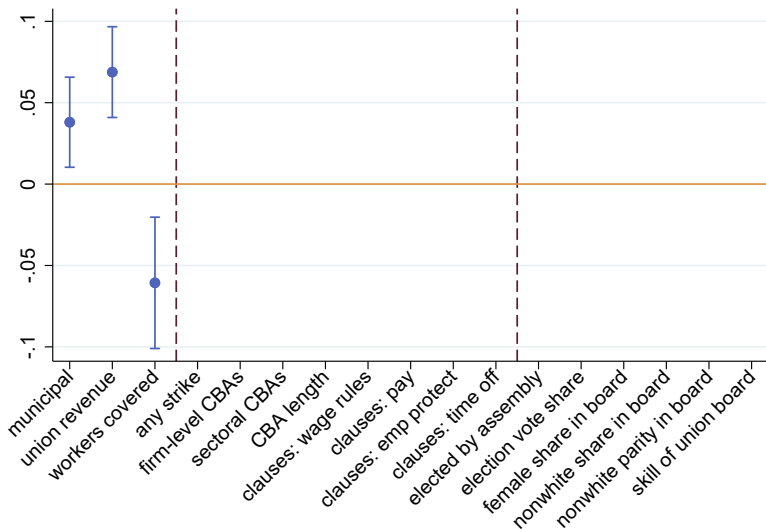
Attributes Associated with High-Pay, High-Compression [*](#) [Desc](#) [Rob](#) [FE](#) [Back](#)

Union attributes with a significant association to $\uparrow \eta$ and $\downarrow (\eta^H - \eta^L)$ using PDS lasso



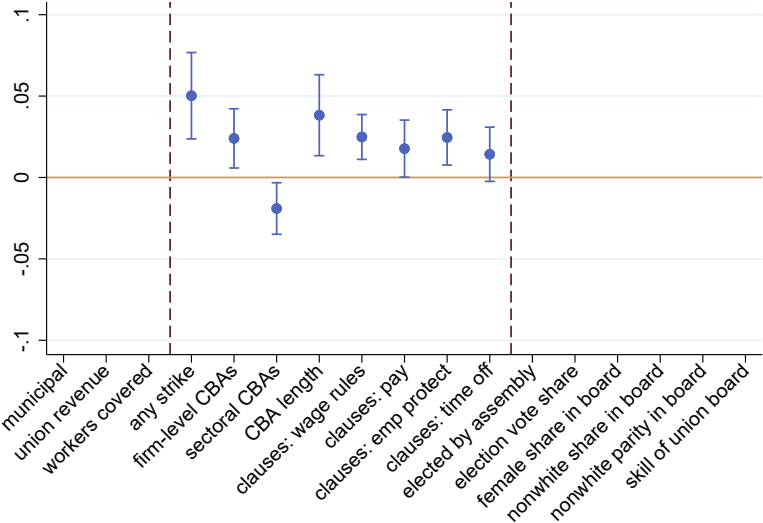
Attributes Associated with High-Pay, High-Compression * Desc Rob FE Back

Positively related to local/municipal unions with large revenues and few workers



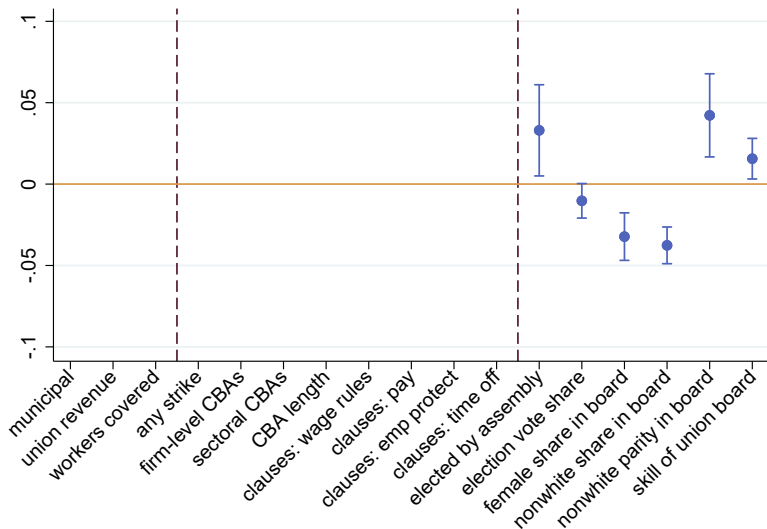
Attributes Associated with High-Pay, High-Compression * Desc Rob FE Back

Positive association to unions engaging in strikes and firm-level collective bargaining



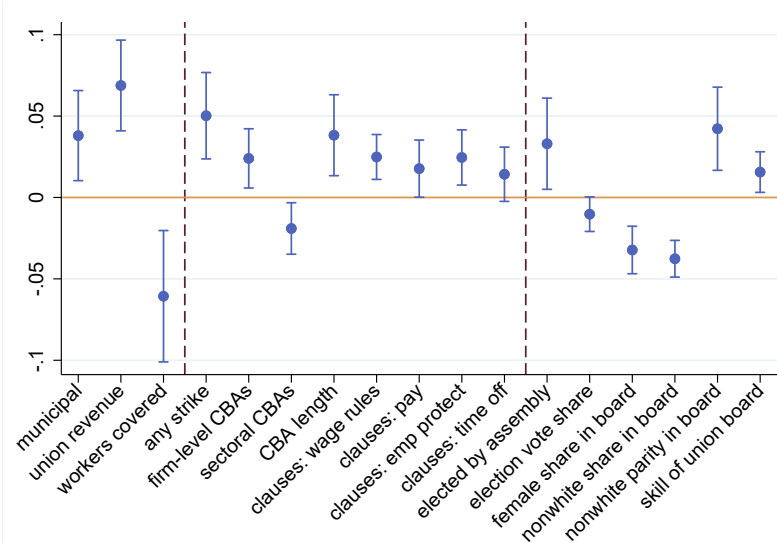
Attributes Associated with High-Pay, High-Compression [*](#) [Desc](#) [Rob](#) [FE](#) [Back](#)

Positively related to electoral competition and representative/skilled leadership



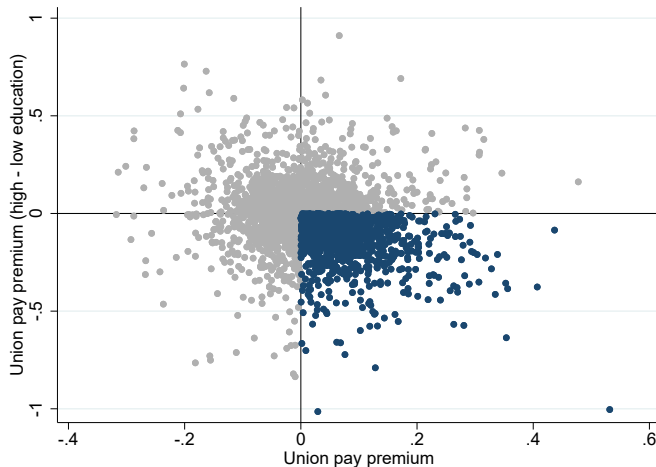
Attributes Associated with High-Pay, High-Compression * Desc Rob FE Back

These correlations corroborate existing studies and suggest paths for future work



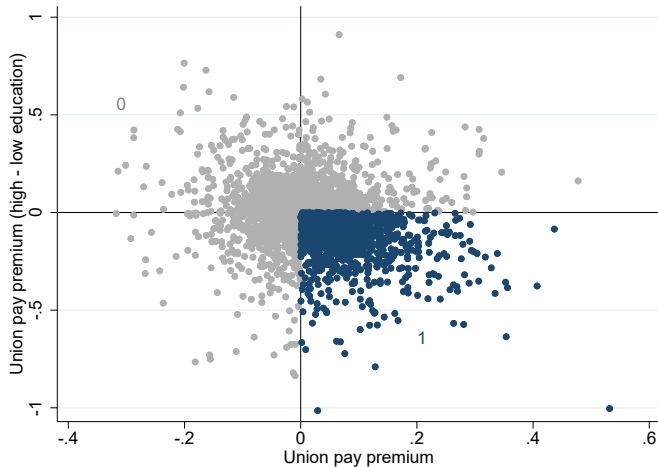
Building a Continuous Fourth-Quadrant Proxy [Back](#)

Target: unions that raise pay and compress it (positive η and negative $\eta^H - \eta^L$)



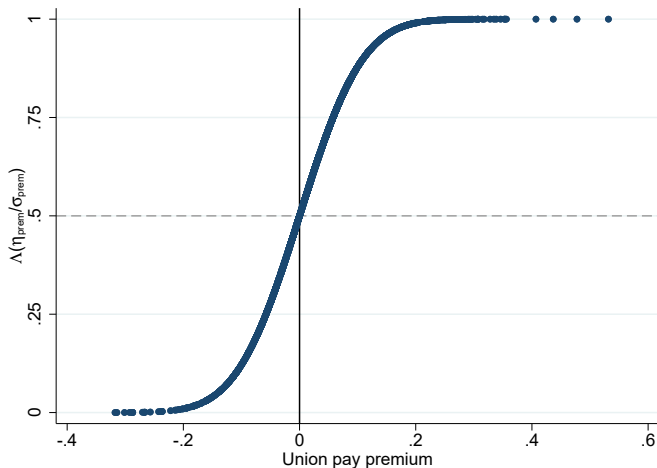
Building a Continuous Fourth-Quadrant Proxy [Back](#)

A dummy variable records membership but not depth



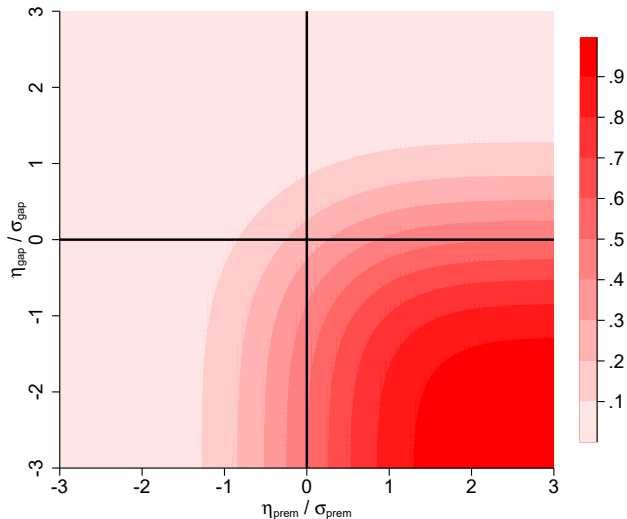
Building a Continuous Fourth-Quadrant Proxy [Back](#)

Rescale each factor by their std. dev. and pass through a sigmoid $\Lambda(\cdot)$



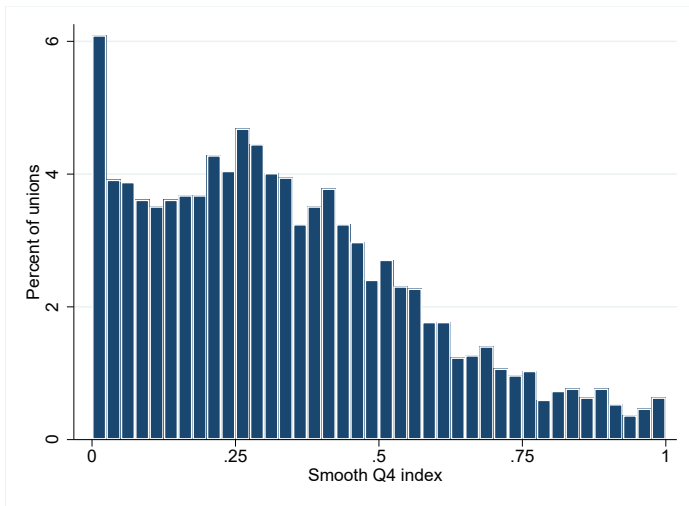
Building a Continuous Fourth-Quadrant Proxy [Back](#)

Multiply the two factors: the probability that *both* conditions hold



Building a Continuous Fourth-Quadrant Proxy [Back](#)

The continuous proxy ranks unions by how far into the fourth-quadrant they lie



	Mean	Std dev	Q1	Q2	Q3
<i>Union type</i>					
Local union	0.97	0.18	1.00	1.00	1.00
Industrial union	0.85	0.35	1.00	1.00	1.00
Municipal coverage	0.72	0.45	0.00	1.00	1.00
Força Sindical central	0.22	0.41	0.00	0.00	0.00
CUT central	0.20	0.40	0.00	0.00	0.00
UGT central	0.17	0.37	0.00	0.00	0.00
NCST central	0.14	0.34	0.00	0.00	0.00
CSB central	0.06	0.23	0.00	0.00	0.00
CTB central	0.06	0.24	0.00	0.00	0.00
Log union revenue	14.46	1.35	13.63	14.44	15.32
Log workers covered	7.04	1.69	6.19	7.24	8.14
Union density	0.14	0.25	0.01	0.04	0.12

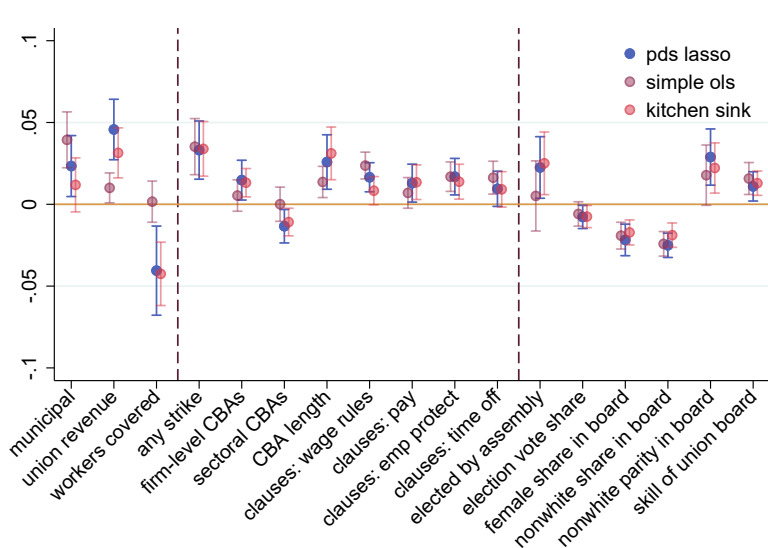
	Mean	Std dev	Q1	Q2	Q3
<i>Union actions</i>					
Any strike	0.24	0.42	0.00	0.00	0.00
Any CBA	0.96	0.19	1.00	1.00	1.00
Log firm-level CBAs	3.7	2.0	2.5	4.1	5.1
Log sectoral CBAs	2.8	1.4	2.3	2.9	3.8
CBA length	2,769	1,718	1,666	2,504	3,533
CBA clauses	28.9	15.4	18.2	28.0	38.9
Amenity value	0.05	0.08	0.00	0.03	0.09
Clauses: wage adjustments	1.97	1.38	1.08	1.84	2.63
Clauses: wage payment	1.01	0.93	0.31	0.80	1.46
Clauses: other wages	0.10	0.23	0.00	0.00	0.10
Clauses: wage rules	0.88	1.09	0.20	0.57	1.18
Clauses: bonuses	0.52	0.64	0.06	0.33	0.75
Clauses: pays	1.49	1.16	0.58	1.30	2.16
Clauses: assistances	2.48	1.91	0.93	2.20	3.64
Clauses: incentives	0.91	0.87	0.25	0.73	1.33
Clauses: separations	1.33	1.20	0.43	1.00	1.92
Clauses: contract types	0.09	0.19	0.00	0.00	0.09
Clauses: hiring	0.79	0.90	0.15	0.53	1.09
Clauses: contracting	0.67	0.91	0.08	0.35	0.91

Governance and Leadership [Back](#)

	Mean	Std dev	Q1	Q2	Q3
<i>Governance and leadership</i>					
Collective leadership	0.06	0.23	0.00	0.00	0.00
Elected by assembly	0.13	0.33	0.00	0.00	0.00
Election participation	0.63	0.23	0.50	0.66	0.79
Election vote share	0.90	0.16	0.88	0.96	0.99
Female share in board	0.22	0.22	0.05	0.16	0.35
Nonwhite share in board	0.29	0.25	0.08	0.23	0.46
No-college share in board	0.73	0.28	0.62	0.83	0.93
Blue-collar share in board	0.48	0.31	0.19	0.53	0.74
Female parity in board	0.17	0.38	0.00	0.00	0.00
Nonwhite parity in board	0.36	0.48	0.00	0.00	1.00
No-college parity in board	0.41	0.49	0.00	0.00	1.00
Blue-collar parity in board	0.34	0.47	0.00	0.00	1.00
Skill of union board	0.08	1.01	-0.53	0.05	0.63

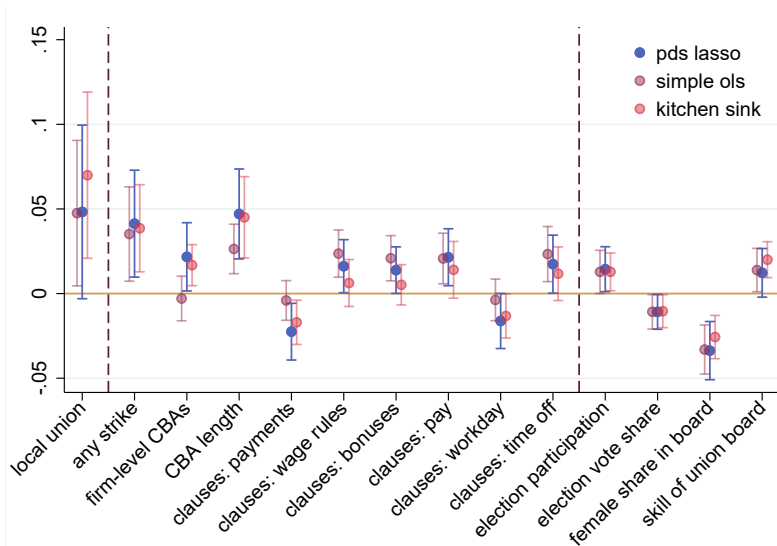
Attributes Associated with High-Pay, High-Compression [Back](#)

Continuous proxy using logistic CDF rather than the standard normal CDF

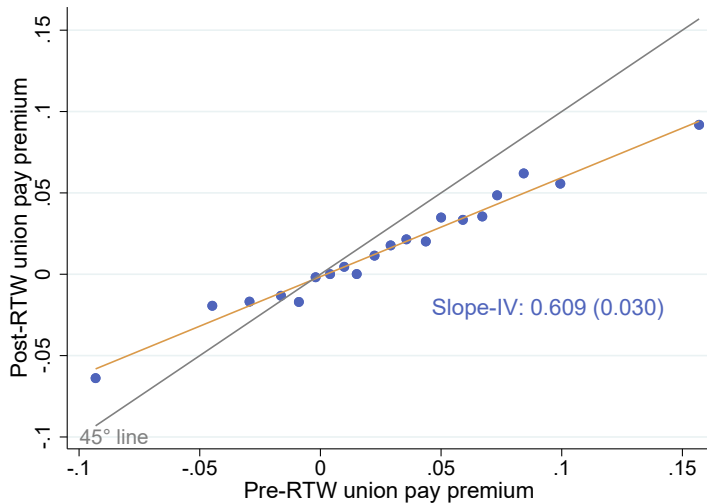


Attributes Associated with High-Pay, High-Compression [Back](#)

Associations that remain after adding industry and state fixed effects



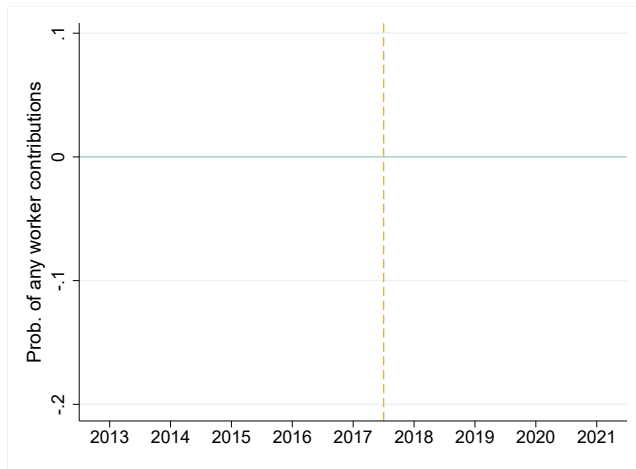
Post-RTW Changes in Union Premia [Back](#)



⇒ larger premium decreases for high pay unions after RTW

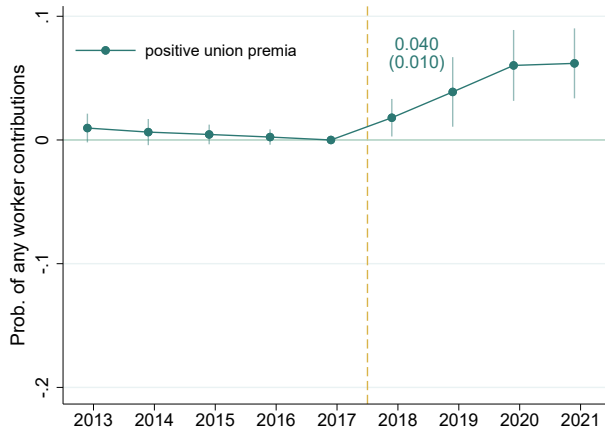
Post-RTW Worker Support [Back](#)

$y_{ut} = \sum_{j \neq 0} \beta_j (D_u \times \delta_j) + \mu_u + \delta_t + \gamma X_{ut} + \varepsilon_{ut}$ for some union type indicator D_u



Post-RTW Worker Support [Back](#)

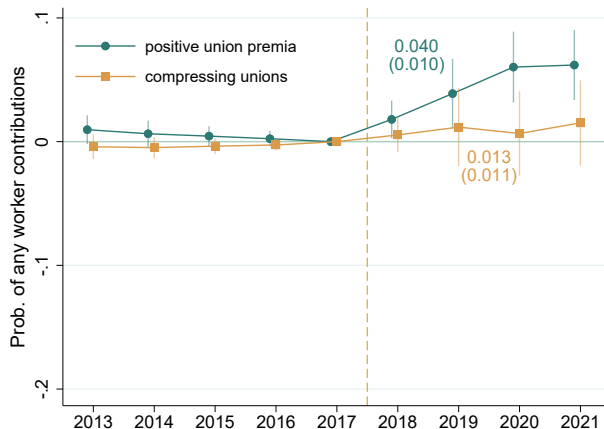
$$y_{ut} = \sum_{j \neq 0} \beta_j (D_u \times \delta_j) + \mu_u + \delta_t + \gamma X_{ut} + \varepsilon_{ut} \text{ for some union type indicator } D_u$$



⇒ unions offering pay premia maintain worker support from voluntary contributions

Post-RTW Worker Support [Back](#)

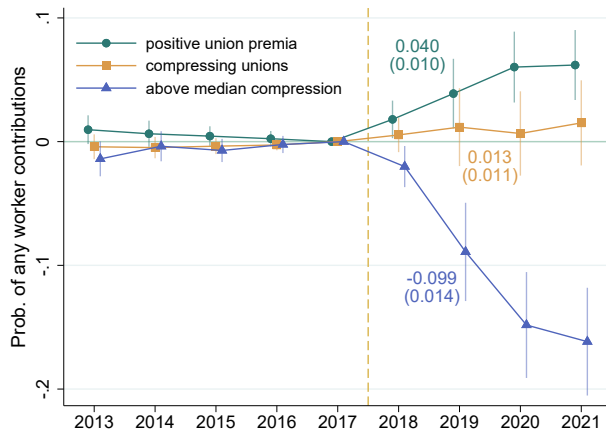
$$y_{ut} = \sum_{j \neq 0} \beta_j (D_u \times \delta_j) + \mu_u + \delta_t + \gamma X_{ut} + \varepsilon_{ut} \text{ for some union type indicator } D_u$$



⇒ compressing unions do not necessarily enjoy more worker support

Post-RTW Worker Support [Back](#)

$y_{ut} = \sum_{j \neq 0} \beta_j (D_u \times \delta_j) + \mu_u + \delta_t + \gamma X_{ut} + \varepsilon_{ut}$ for some union type indicator D_u



⇒ very high compression can be detrimental to securing voluntary contributions

Thank you