Buying Out the Means of Production:

Wages, Employment and Productivity in Labor-managed Firms

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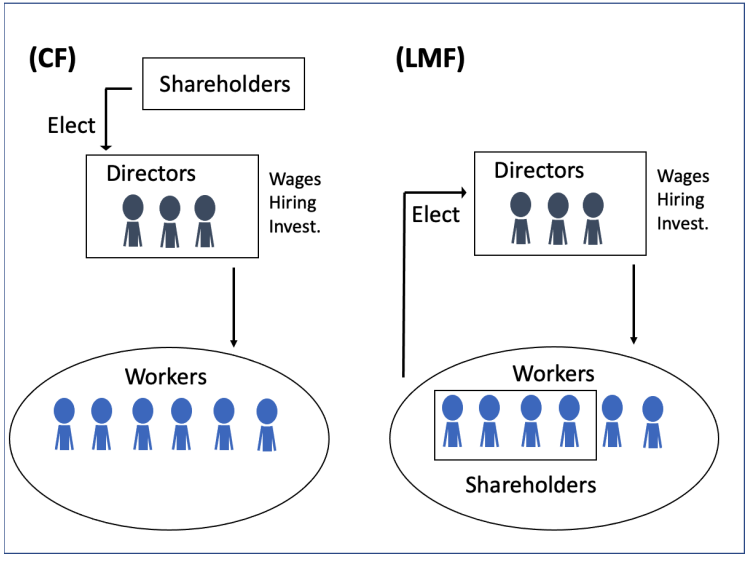
Introduction

- Usually, we think of firms as organizations where investors have **ownership** and **control rights**
  $\longrightarrow$ **max profits**
- In **labor-managed firms** (LMFs), workers own and control the firm
  $\longrightarrow$ **max workers' preferences**


(CF)
Shareholders
Elect
Directors
Wages
Hiring
Invest.
Workers
(LMF)
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  $\longrightarrow$ **max workers' preferences**

- What does **labor management** imply for the **wage distribution, employment and productivity**?

- Is there an **efficiency-equality** tradeoff?

Motivation

- **LMFs** and other types of cooperatives exist in most countries Employment in LMFs
  - **LMFs employ 2-4% of workers** in Italy, Sweden, Argentina and Malaysia.
  - Cooperatives employ **1/10 workers** globally (CICOPA, 2017)
- **Weaker forms of worker representation are widespread**:
  - **Unions**; **Co-determination** in Germany, Denmark, France; **Employee stock ownership plans** (ESOP), e.g. the US, UK, South Korea
- **Policy relevance**:
  - Given high wage inequality (50-60% within firm) (Song et al., 2019), decreasing labor share and worker bargaining power (Stansbury and Summers, 2020)
  - Can LMFs reduce inequality without harming efficiency?

This paper

- **Exploit transitions to labor-management**: worker buyouts (WBOs) of distressed firms
- Compare WBO firms to distressed firms that restructure but stay conventionally owned: **matched difference-in-differences**
- Use rich data. Observe the **full wage distribution** for all firms + **income statements & balance sheets**
  - Assess parallel trends assumptions
  - Study wage inequality in detail
  - Employment, productivity and worker sorting
- Rationalize findings through a model
  - Both firm types are inefficient
  - Under what conditions are LMFs comparatively less efficient?

Preview of findings

- There is no **efficiency-equality** tradeoff
- WBO firms are **as efficient** as the counterfactual
  - Average wage effects ~ 0
  - Employment effects: negative in the SR, ~ 0 in the LR
  - Value added per worker not affected
- **Lower within-firm inequality** & flatter hierarchy:
  - The P90/P50 ratio decreases by 8.1%: **driven by change in wage policies**
  - Probability of having no managers increases by 33.8%
- Consistent with parametrization of the model using data
  - Comparative statics: if relative productivity of managers vs. blue-collar workers $\uparrow$, LMFs are less productive

Contribution & Related literature

- Reduced-form evidence of labor-management on **both** wages and firm performance
  - Theoretical literature on LMFs (Ward, 1958; Sen, 1966; Holmstrom, 1982; Kremer, 1997; Brzustowski and Caselli, 2021)
  - Empirical literature on LMFs (Pencavel et al., 2006; Abramitzky, 2008; Burdín, 2016; Montero, 2022)
- Analyze an **extreme** and understudied form of **worker representation**
  - Co-determination, worker voice, unions (Blandhol et al., 2020; Jäger et al., 2021; Harju et al., 2021; Dodini et al., 2023)
- Study **firm control rights** as a determinant of **wage inequality**
  - Firms, firm structure and wage inequality (Lemieux et al., 2009; Song et al., 2019; Casarico and Lattanzio, 2024)
- Evaluate two potential solutions to **firm distress**
  - Job displacement and firm distress (Lachowska et al., 2020; Bertheau et al., 2023; Schmieder et al., 2023)

Roadmap

1. Background and data
2. Empirical approach
3. Results
4. Framework
5. Conclusion

Background: worker buy-outs

Background: worker buy-outs

- Employees buy their firm and turn it into a **worker cooperative** (WC)
- **Regulated by law** from 1984
- **Funding:** unemployment benefits and severance pay + loan from government, coop associations and private sector Details Funding for control
- **Rare event**: 91 since 2005.
- Mostly manufacturing (70%), but also retail trade (11%) and construction (7%)
- **Representativeness**: 25% of Italian firms make negative profits Figure

Data

- (INPS) **Matched employee-employer** data 2005-2021
  Variables: earnings, weeks worked $\longrightarrow$ weekly wage, worker charact.
  Sampling: universe private sector employees

- (Cerved) **Firm-level balance sheet** data 2005-2018
  Variables: value added, profits, assets
  Sampling: all incorporated firms

- (CFI) **Universe of government-supervised WBOs** 2005-2021 (91)

Empirical Approach

Empirical approach

- **WBOs:** new WC founded in year c_j, let $k = t - c_j$
- **Comparison firms**: new *conventional* firm founded in year c_j, $> 60\%$ of its workers were **employed together** in $c_j - 1, c_j - 3$ in a different **firm which ceased to exist**. Link the two IDs, and define $k = t - c_j$
- A **cohort** c_j comprises both treated and control firms.
- Focus on firms **with 5+ employees** in the pre-transition period
- **WBOs:** 51 cases. **Comparison firms:** 13,271 cases.

Empirical approach

- **Coarsened exact matching**, 1:m with matching variables:
  - quintile of employment at $k = -3$
  - quintile of hiring rate at $k = -3$
  - quintile of EBITDA at $k = -3, -2$
  - manufacturing dummy

- Find 93 matches for 26 WBO firms $t \in [2005 - 2021]$ and $C_i \in [2009, 2021]$ Balance table

- Can use years before the transition to evaluate common trends assumption

- Robustness checks
  - Change matching variables
  - Synthetic controls

Empirical approach

- **Main specification.** Compare WBOs to controls in the same matched group:

$$Y_{jt} = \alpha_{gt} + \eta_j + \sum_{k=-5, k\neq -3}^{k=5} \beta_k \big(\mathbb{1}\{k = t - c_j\} \times WBO_j \big) + \big(\beta_{>5} \mathbb{1}\{k > 5\} + \beta_{<5} \mathbb{1}\{k < 5\} \big) \times WBO_j + \varepsilon_{jt} \quad (1)$$

  - Y_{jt} is the outcome
  - α_{gt} are year X matched-group FE, η_j are firm FE
  - k is elapsed-time period, c_j is cohort
  - WBO_j is a dummy equal to 1 if the firm underwent a WBO
  - ε_{jt} is the error term clustered at the firm level

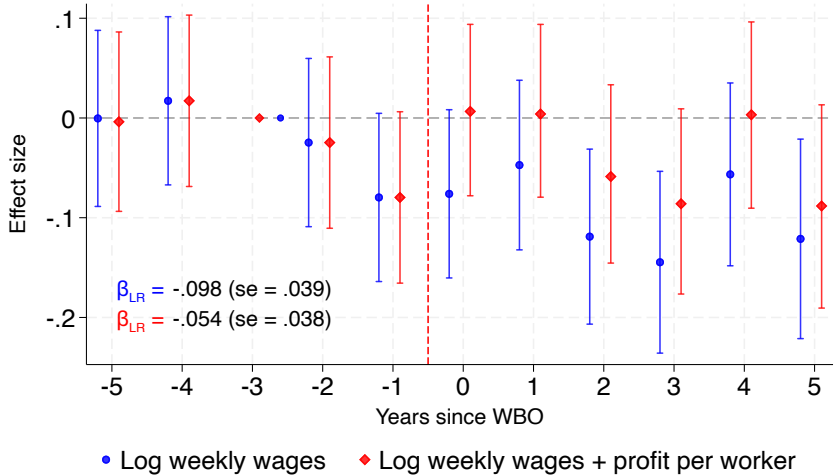
- Also aggregate coefficients into **short run** β_{SR} $0 \leq k \leq 2$, and **long run** β_{LR} $3 \leq k \leq 5$

Identifying assumption

- The **identifying assumption is parallel trends**: will show event studies for main outcomes
- Other potential **sources of selection**:
  - Firms' financial situation Event study
  - Workers' trust and social capital Table
  - Worker homogeneity Table
  - Firm-specific human capital Table
  - Information access and political connections Slide

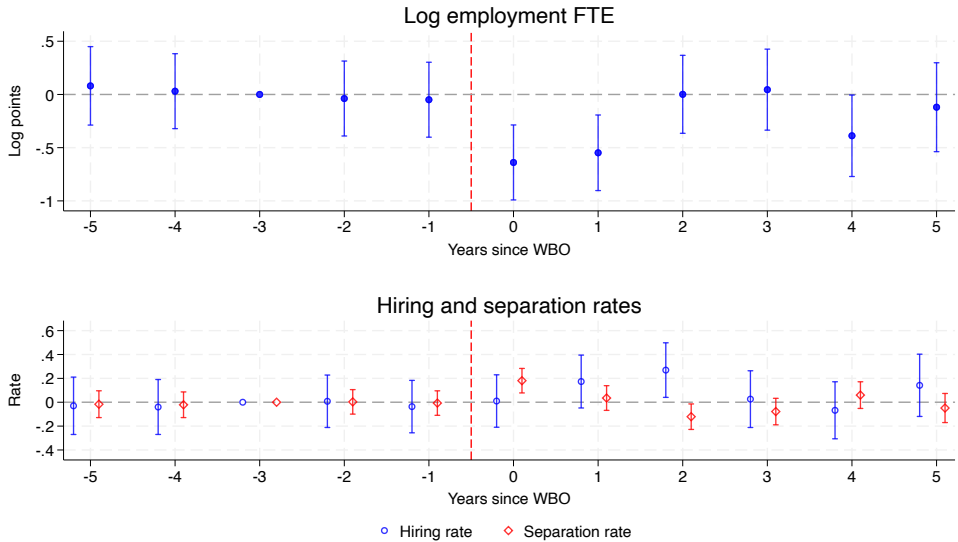
Empirical Results

Weekly wages decrease, but not when adjusted for profits

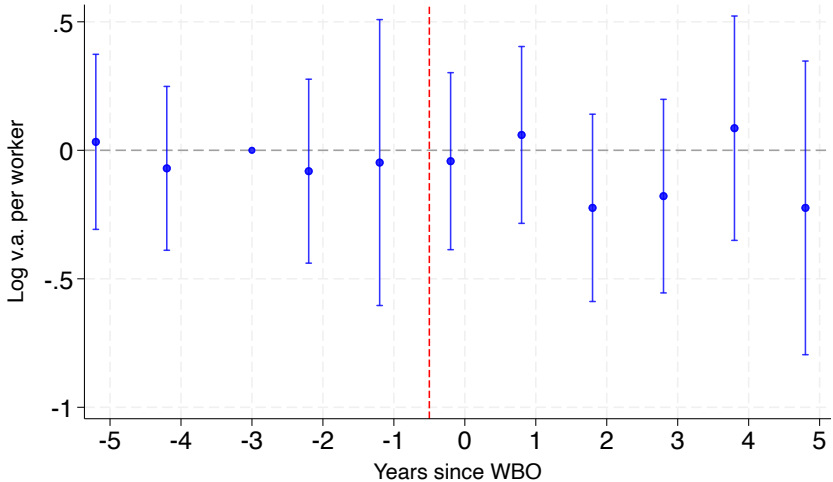


Table

Employment ↓ in the short run, but recovers after 2 years



No effect on value added per worker



WBO firms are as efficient as comparison

- Average worker compensation is on par with counterfactual
  - More flexible in LMFs: higher survival rates Show rates
- Employment is affected only in the short run
  - Later: explore worker sorting
- Productivity is similar to comparison
  - Revenues per worker are lower Event study
  - Investment is similar Event study
  - EBITDA per worker, net profit per worker, indebtedness and Return on Assets (ROA) are also unaffected Event study
- What happens to **within-firm inequality**? What is the main **mechanism**?

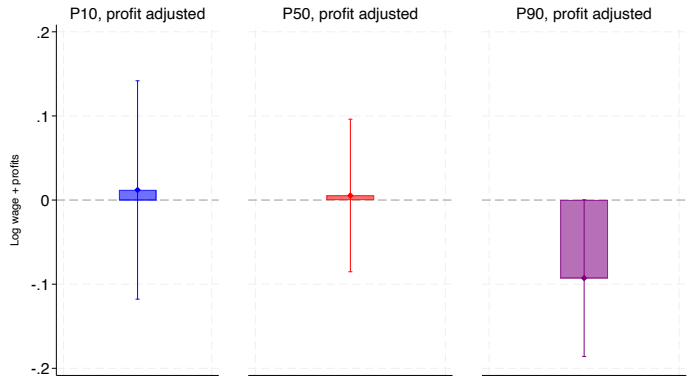
Within-firm inequality decreases

Event study

- Mechanism:
  - **Wage policies**: high-wage workers earn less, low-wage workers more
  - **Worker composition**: high-wage workers leave.

Role of redistributive wage policies

- Estimate event study using **stayers only**: employees from $k = -3$ to $k = 2$.



Sorting of workers

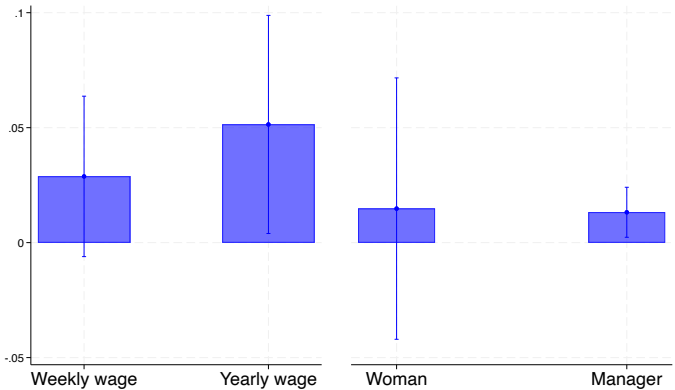
- What are the **characteristics of workers** that exit the WBO (**leavers**) and new hires (**newcomers**)
- Compare **differences** in leavers vs. stayers in WBO to **differences** leavers vs. stayers in comparison firms
- Using worker-level outcomes two years prior $k = -2$:

$$y_{it} = \eta_{j(i)} + \delta L_i + \beta(L_i \times WBO_{j(i)}) + u_{it} \quad (2)$$

  - y_{it} are outcomes two years before the transition ($k = -2$)
  - L_i is a equal to 1 if the worker leaves the firm in $k = \{-2, -1\}$
  - $\eta_{j(i)}$ is a firm FE
  - u_{it} are error terms clustered at the firm level

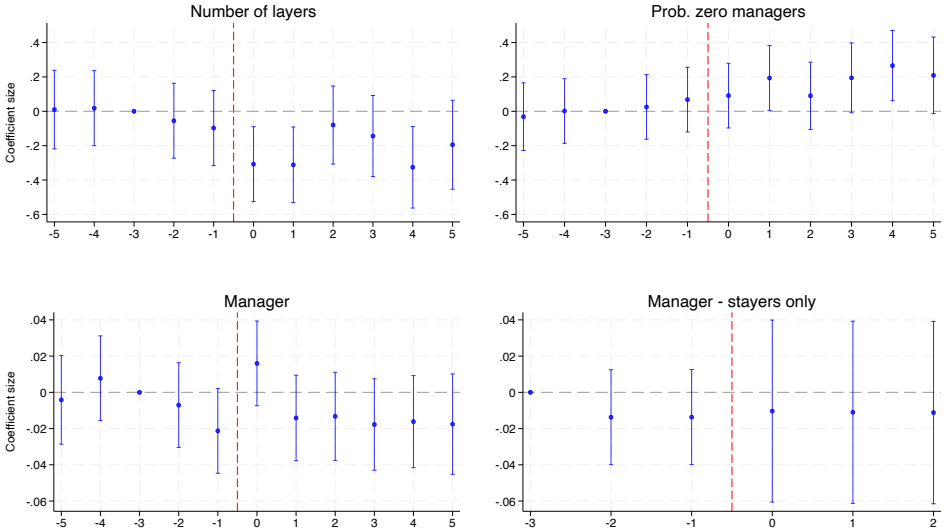
Sorting of workers

$$y_{it} = \alpha_{j(i)} + \delta L_i + \beta(L_i \times WBO_{j(i)}) + u_{it}$$



Stayers vs. leavers in control firms

The firm becomes less hierarchical



Lower inequality and flatter hierarchy

- Role of **wage policies**:
  - Redistribution from high- to low-paid workers
  - Lower wage inequality overall
  - Higher probability of employment Effects
- Role of **workforce composition**:
  - High-wage workers (managers) are more likely to leave
  - Leavers come from high deciles of wage distribution Picture
  - No differential selection of new hires Picture
- The firm is less hierarchical: fewer managers.

Robustness checks

- Matching specifications:
  - Omit EBITDA in $k = -2$ Wages Employment Productivity
  - Employment $\pm 10\%$ Wages Employment Productivity
- Synthetic difference-in-differences:
  - Restructured firms donor pool Wages Employment Productivity
  - Universe donor pool Wages Employment Productivity
- Profit-adjustment scenarios: Wages
- Other measures of inequality:
  - Above vs. below median Within firm Within stayers
  - Three terciles Within firm Within stayers

Back to Empirical Approach

Framework

Framework

- **Three types** θ of workers: B(lue)<W(hite)<M(anager), $n_B > n_W > n_M$
- **Worker output**: $y_i = \theta_i + e$
- **Average output**: $\bar{Y}(e) = n^{-1}(n_B y_B + n_W y_W + n_M y_M)$
- In **CFs**, workers choose effort to max utility:

$$u_i = \underbrace{\mu * (\theta_i + e)}_{i\text{'s wage in a CF}} - \frac{1}{2}e^2 \longrightarrow e^* = \underbrace{\mu}_{\text{Euros per MRPL} \in (0,1)}$$

- In **LMFs**, the firm redistributes part of avg. output:

$$u_i = \underbrace{\gamma(\theta_i + e) + (1-\gamma)[\bar{Y}(e)]}_{w_i} - \frac{1}{2}e^2 \longrightarrow e^* = \gamma$$

- The **median worker sets** $\gamma \in (0,1)$ to maximize her utility
- Internalize: (a) choice of effort, (b) participation constraints: PC_M, PC_W.

Comparative statics

- **Calibration.** Using parameters from data and literature
  - $n_B = 33$, $n_W = 16$, $n_M = 1$
  - $B = 1$, $W = 2$, $M = 3$
  - $\mu = 0.65$ (Yeh et al., 2022)
- LMFs are as productive as conventional firms, but more egalitarian
  - Optimal redistribution equals the markdown, so effort is the same
  - All types stay in the LMFs
- **Counterfactual:** increase relative productivity of W vs. B (e.g. skill-biased technological change)
  - Optimal redistribution in LMFs is higher $\longrightarrow$ lower effort
  - LMFs are less productive
  - A 10% increase in the productivity of W workers causes a 3.7% decrease in the relative productivity of LMFs vs. CFs

Conclusion

- I studied the **effect of labor-management on firm outcomes**
- **Labor-management works quite well**: the LR effects on avg. wages, employment and productivity are zero
- **Inequality decreases** and the **firm becomes less hierarchical**
- Consistent with the firm **maximizing median worker utility**
- **Future questions:**
  - Is LMF creation inefficiently low because of information frictions or other market failures?
  - If so, should policy makers encourage LMF creation?
  - What are the macro implications of high density of LMFs, e.g. Basque Country in Spain, Emilia-Romagna in Italy

Thank you

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Find the paper here:

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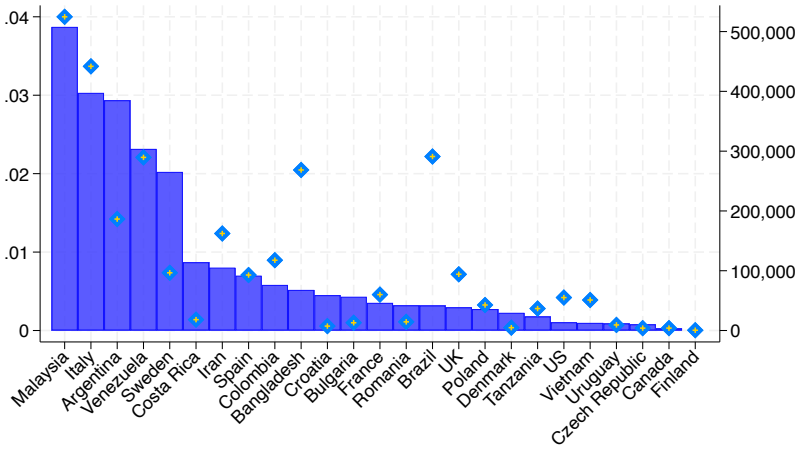
Employment in LMFs



Note: bars indicate percentage points (left axis). Diamonds indicate absolute numbers (right axis)

Return

J.S. Mills, Principles of Political Economy: Book IV, Chapter VII

- The form of association [...] which [...] must be expected in the end to predominate is [...] the association of the labourers themselves on terms of equality, collectively owning the capital with which they carry on their operations, and working under managers elected and removable by themselves.
- Their rules of discipline, instead of being more lax, are stricter than those of ordinary workshops; but being rules self- imposed [...] they are far more scrupulously obeyed.
- A private capitalist, exempt from the control of a body, if he is a person of capacity, is considerably more likely than almost any association to run judicious risks, and originate costly improvements.

Return

WBO funding

- Contribution by worker-partners:
  - Can use unemployment benefits (UB), severance pay (SP) and private savings
  - For a worker earning 1500 euros per month, UB + SP amount to about 25,000 euros
  - At least 4000 euros
- Subsidies from CFI:
  - Equity: at most 2 * worker-partners' contribution, max duration 10 years, dividend 3%-6%
  - Loan for investments: covers 100% of investment, max interest rate 5%
  - Loan for capitalization: at most 2 * worker-partners' contribution, max duration 5 years, interest rate BCE rate + 1.5%

Return

Subsidies for comparison firms

- *Fondo di Garanzia* (Guarantee Fund):
  - Guarantees loans up to 80%
  - In 2018: 19 billion euros benefitting 83,000 firms (9,4 billion in manufacturing for 35,000 firms)
  - 20% of small firms in manufacturing (10-49 employees)
- *Beni Strumentali* (Credit for Capital Goods):
  - Interest rate subsidy for investment in capital goods or capitalization
  - Subsidy equals between 7% and 10% of loan.
  - In 2018: 1 billion in loans.
- Place-based industrial development scheme (*Aree di Crisi Industriale*)
  - Complex: a) distress of one or more medium-large firms (250+ employees) or b) crisis of a locally relevant industrial sector (e.g. tiles in Sassuolo) List of areas
- Others: subsidy for digital innovation (10,000 euros)

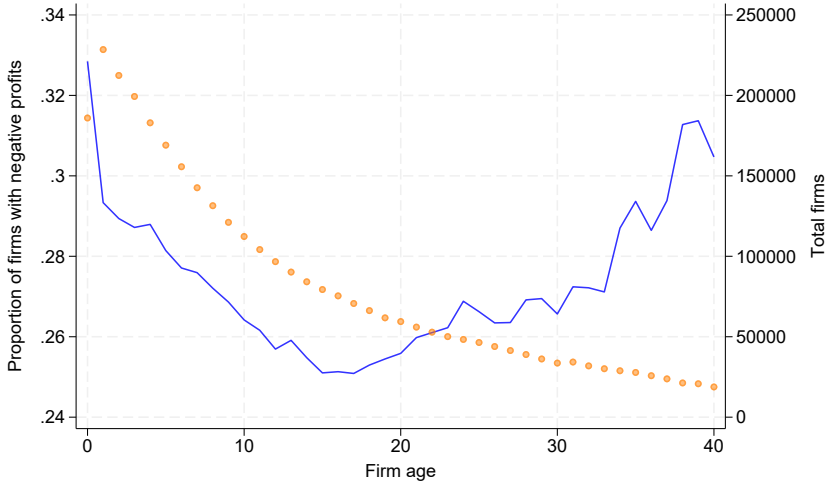
Return

Aree di Crisi Industriale

- 2011: Rieti (Lazio)
- 2012: Taranto (Puglia)
- 2013: Trieste (Friuli Venezia Giulia), Piombino (Toscana)
- 2014: Termini Imerese (Sicilia)
- 2015: Venafro, Bojano e Campochiaro (Molise), Gela (Sicilia), Livorno (Toscana)
- 2016: Val Vibrata - Valle del Tronto - Piceno (Marche), Frosinone (Lazio), Savona (Liguria), Porto Torres (Sardegna), Portovesme (Sardegna), Terni-Narni (Umbria)
- 2017: Acerra-Marcianise-Airola, Torre Annunziata-Castellammare e Battipaglia-Solofra (Campania), Venezia (Veneto)
- 2018: Fermo-Macerata (Marche)
- 2019: Torino (Piemonte)
- 2023: Melfi - Potenza - Rionero in Vulture (Basilicata)

Return

Many firms make negative profits

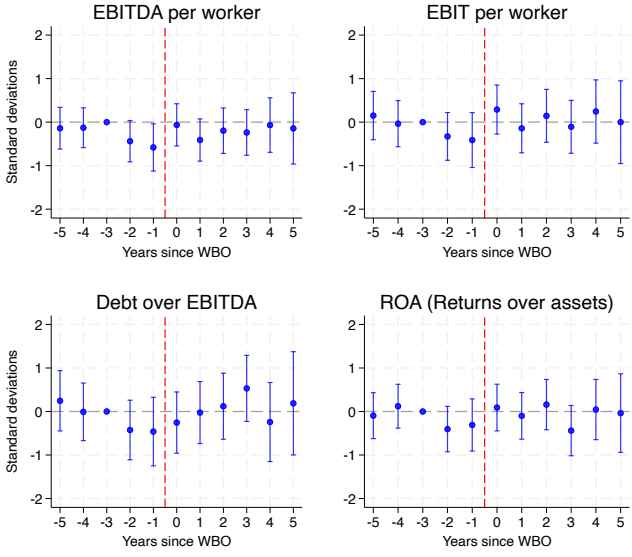


Return

Balance table: 3 years prior to transition

	WBO pred.		Conventional pred.		p-value
	Mean	Median	Mean	Median	Diff. in mean
Log wages, avg.	6.230	6.217	6.349	6.341	0.016**
Employment, F.T.E.	45.89	29.5	93.86	67	0.001***
Avg. Age	42.37	42.34	41.67	41.83	0.395
Woman	0.290	.264	0.267	.197	0.619
Avg. Tenure	4.108	3.555	4.296	4.037	0.757
Manufacturing	0.846	1	0.828	1	0.824
Log v.a. per worker	3.588	3.777	3.953	4.071	0.061*
EBITDA p.w. (1,000 EU)	8.643	6.345	17.90	14.41	0.206
Profits p.w. (1,000 EU)	-16.78	0.357	-0.239	-6.760	0.210
N, firms	26		93		

Return


EBITDA per worker
EBIT per worker
Profit per worker
Debt over EBITDA
ROA (Returns over assets)
Standard deviations
Years since WBO
-5 -4 -3 -2 -1 0 1 2 3 4 5
-2 -1 0 1 2

Return

	WBO pred.		Conventional pred.		p-value
	Mean	Median	Mean	Median	Diff. in mean
	Panel A: Worker trust and social capital				
HHI municipality	0.243	.202	0.186	.147	0.049**
Foreign, mean	0.093	0.049	0.099	0.069	0.832
	Panel B: Worker homogeneity				
HHI CBA	0.980	1	0.959	1	0.104
Age, s.d.	8.966	8.801	8.907	8.686	0.869
Gender, s.d.	0.393	0.443	0.378	0.383	0.581
	Panel C: Firm-specific human capital				
Tenure	4.108	3.555	4.296	4.037	0.757
N, firms	26		93		

Return

Information access and political connections

- Differential access to information may or may not be problematic for identification
- If information arrives randomly, this is exogenous and not problematic. For example, one firm (*Cartiera Pirinoli*) learned about WBOs through the bankruptcy curator.
- If information arrives through political connections, it can be an issue. Political connection may be simultaneously affecting the probability of getting a WBO and outcomes.
- **Political connections are unlikely to play a role.** Only 3.5% firms with <100 employees have a political connection (Akcigit et al., 2023). Median size is 30 for WBO firms.

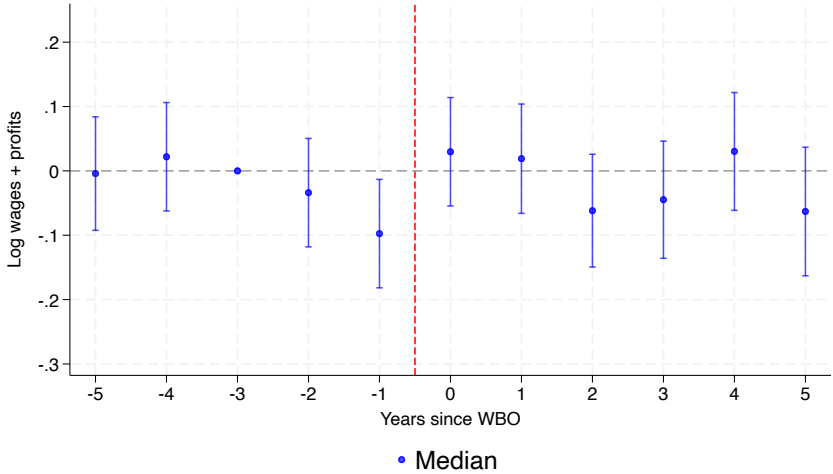
Return

Effects on wages

	Mean	*p50*	*p10*	*p90*
		Weekly wages		
β_{LR}	-.098**	-.074**	-.103	-.159***
	(.038)	(.037)	(.063)	(.050)
		Weekly wages + profits		
β_{LR}	-.054	-.022	-.051	-.107**
	(.038)	(.037)	(.064)	(.050)

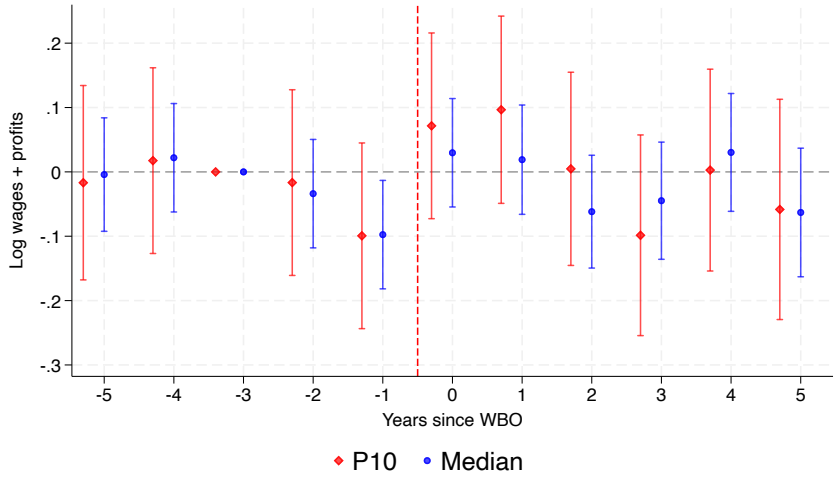
Return

Within-firm inequality decreases



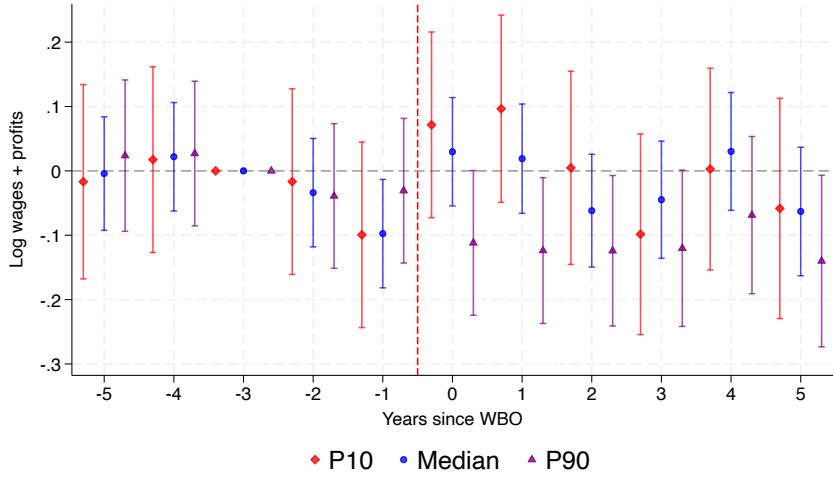
Return

Within-firm inequality decreases



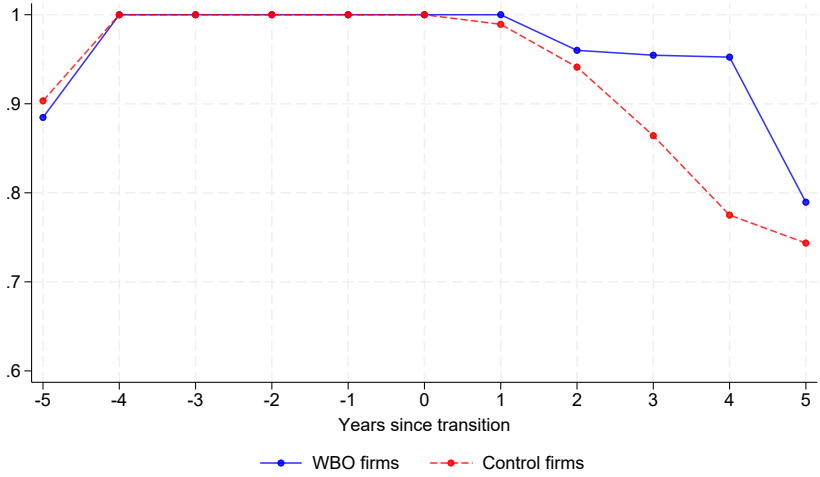
Return

Within-firm inequality decreases



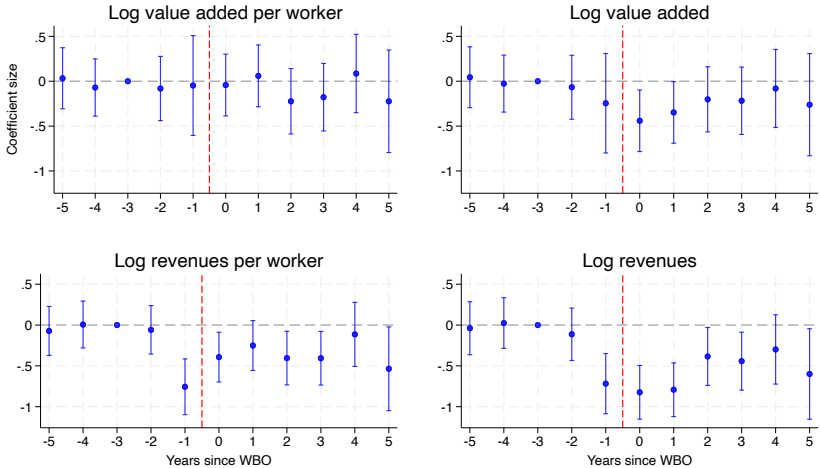
Return

WBO firms have higher survival rates



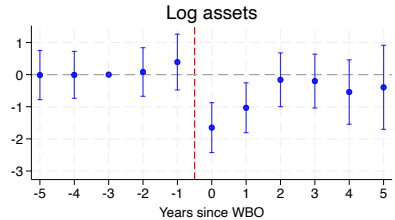
Return

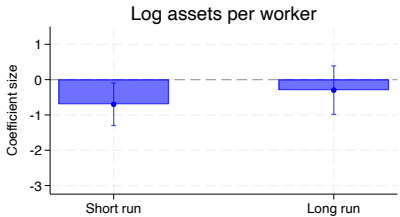
Productivity and Revenues

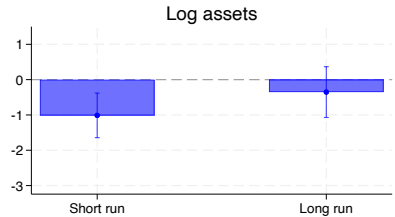


Return

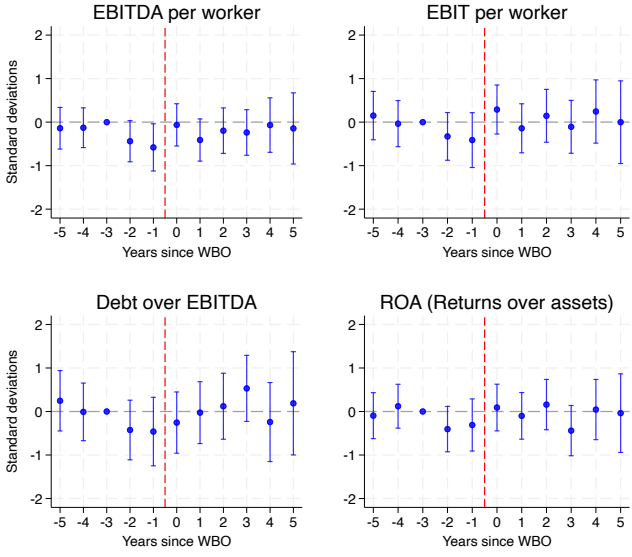
Investment





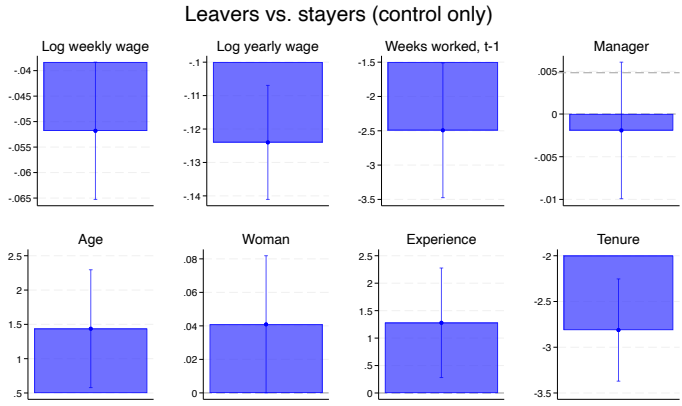


Return


EBITDA per worker
EBIT per worker
Profit per worker
Debt over EBITDA
ROA (Returns over assets)
Standard deviations
Years since WBO
-5 -4 -3 -2 -1 0 1 2 3 4 5
-2 -1 0 1 2

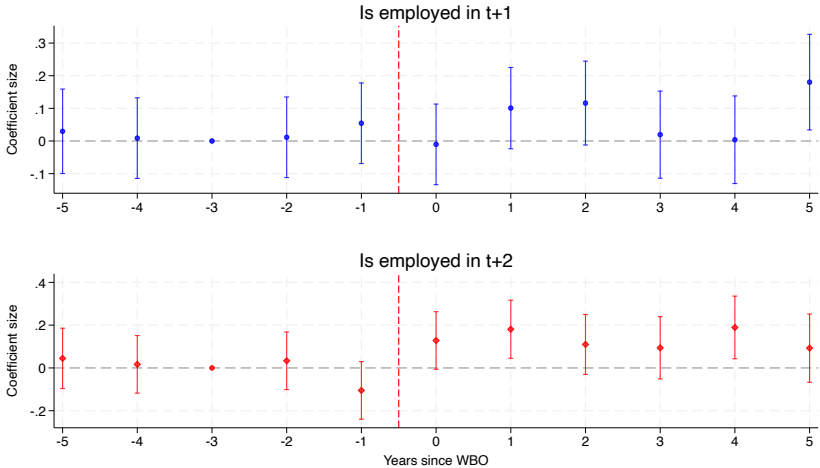
Return

Sorting in control firms



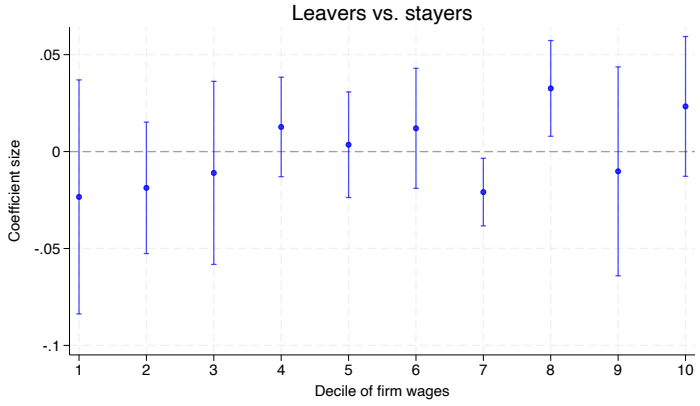
Return

Job stability



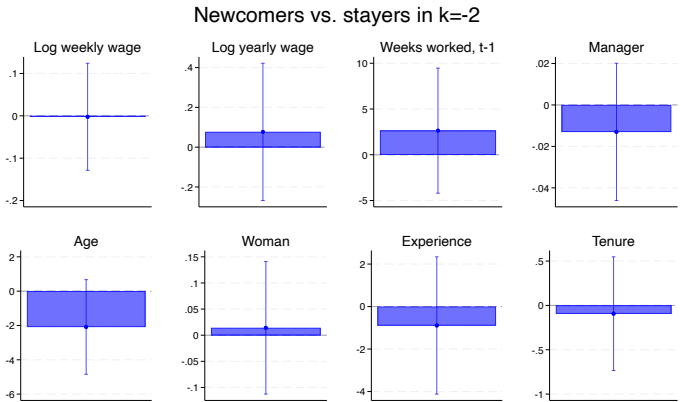
Return

Sorting by deciles of the wage distribution



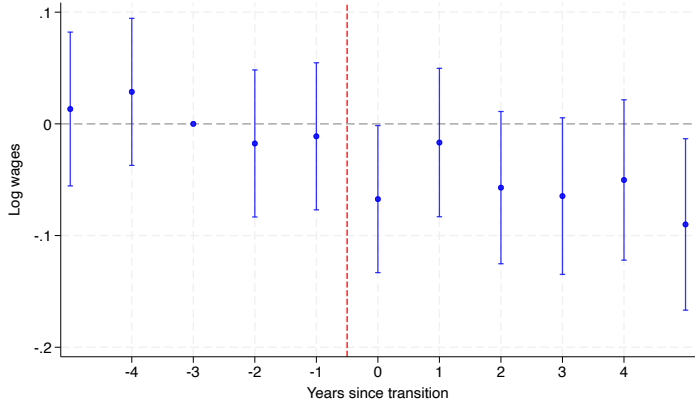
Return

Selection of new hires



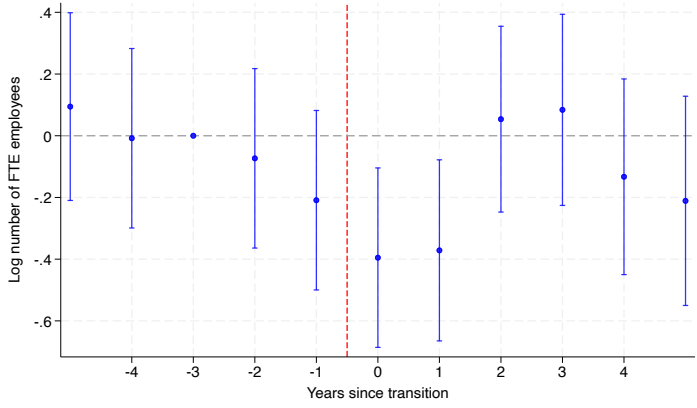
Return

Matching Specification 2: Average wages



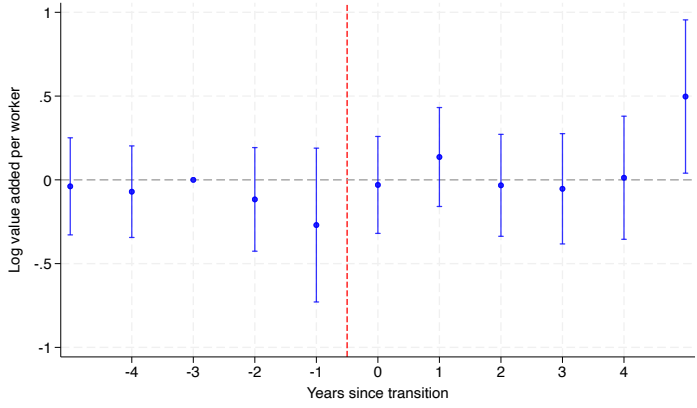
Return

Matching Specification 2: Employment



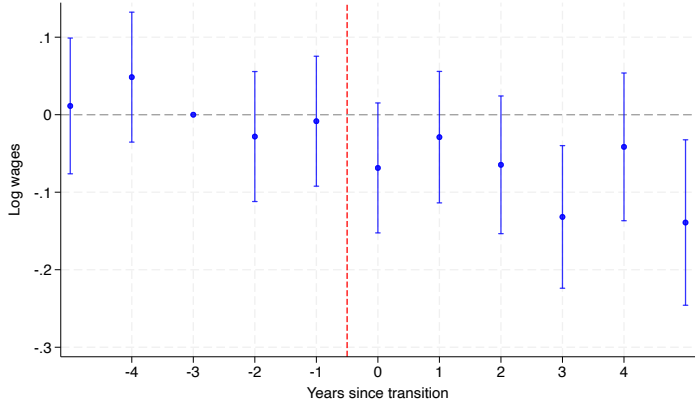
Return

Matching Specification 2: Productivity



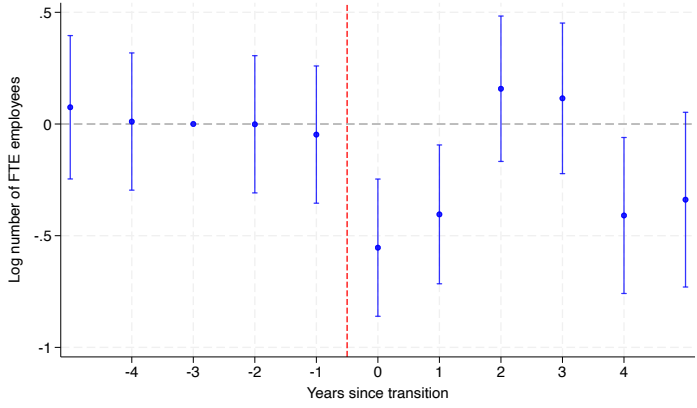
Return

Matching Specification 3: Average wages



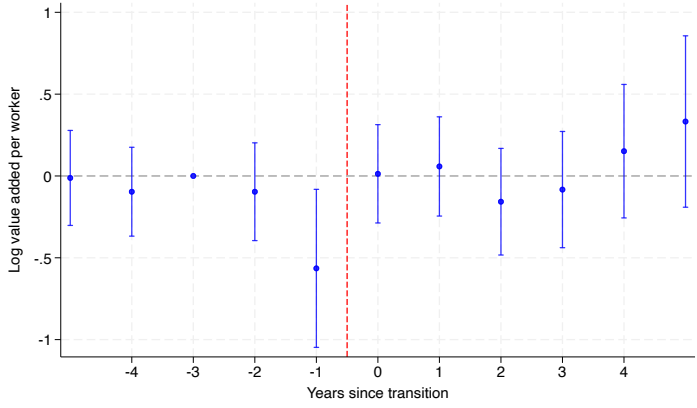
Return

Matching Specification 3: Employment



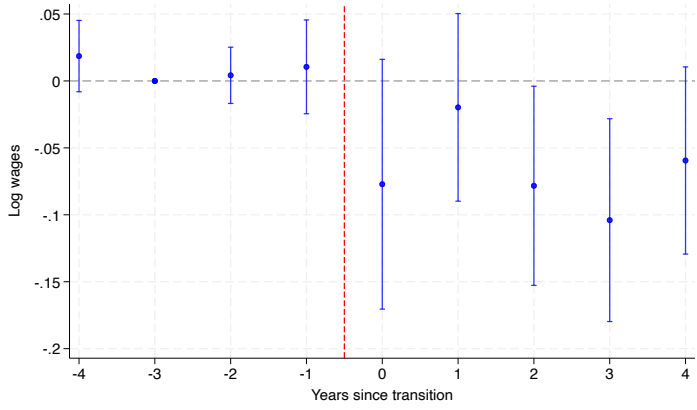
Return

Matching Specification 3: Productivity



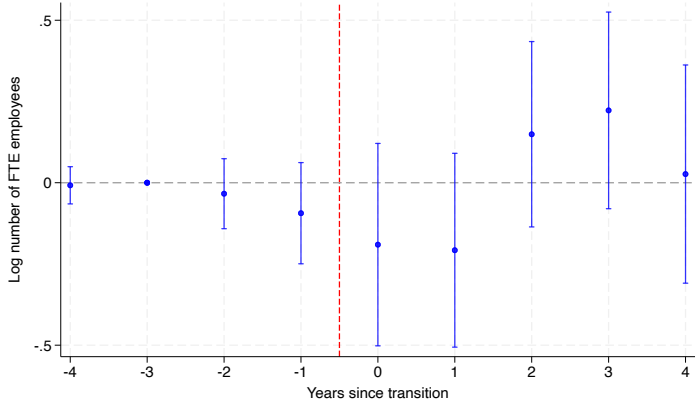
Return

SDID: Average wages



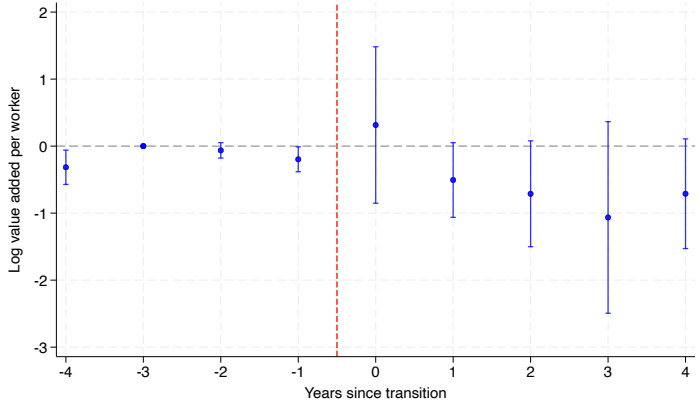
Return

SDID: Employment



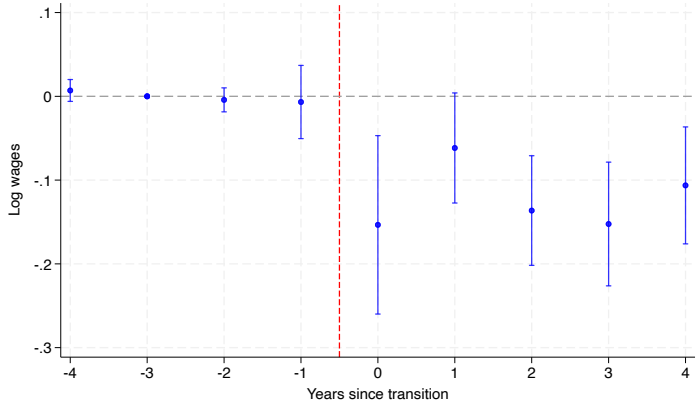
Return

SDID: Productivity



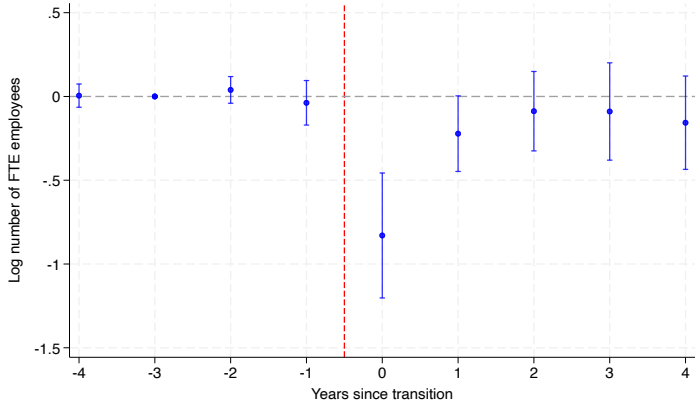
Return

SDID: Average wages (Universe donor pool)



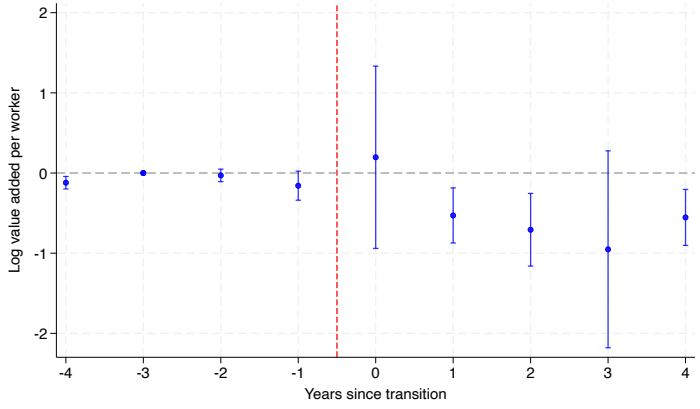
Return

SDID: Employment (Universe donor pool)



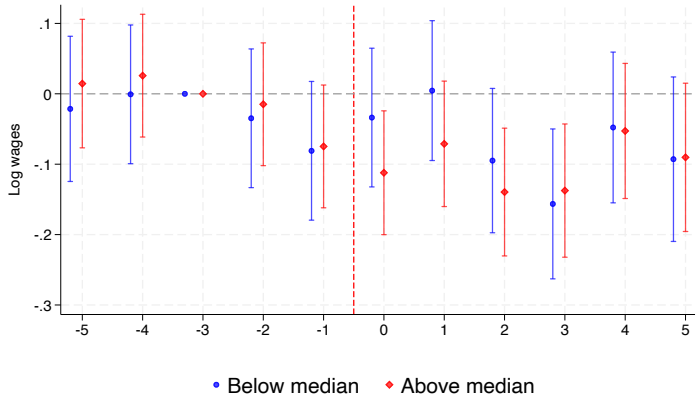
Return

SDID: Productivity (Universe donor pool)



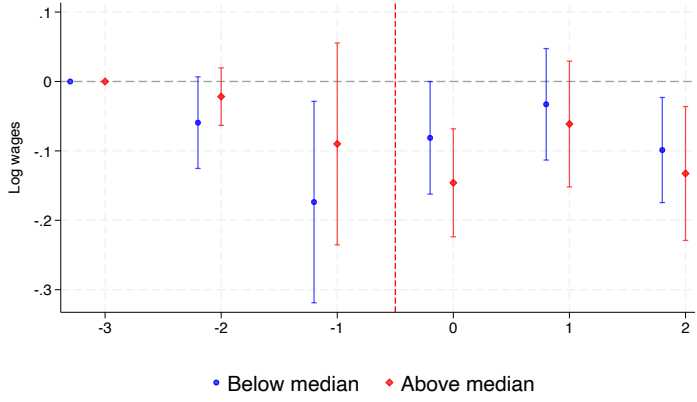
Return

Above vs. below median: within firm



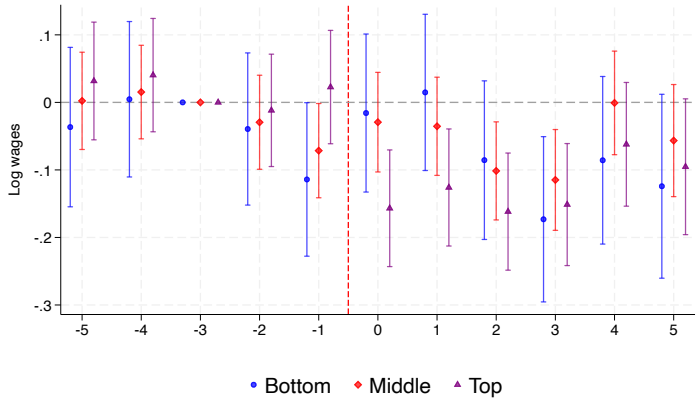
Return

Above vs. below median: within stayers



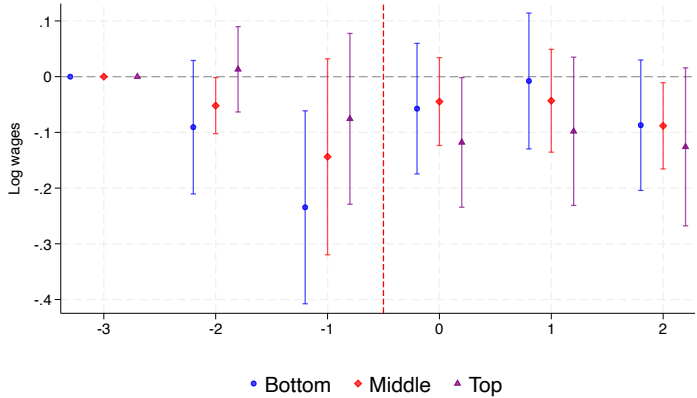
Return

Terciles: within firm

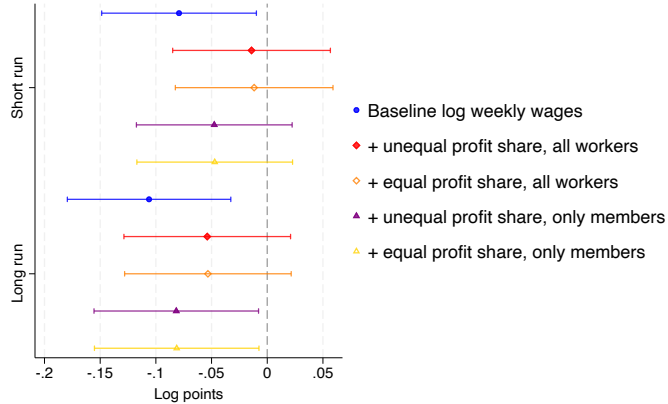


Return

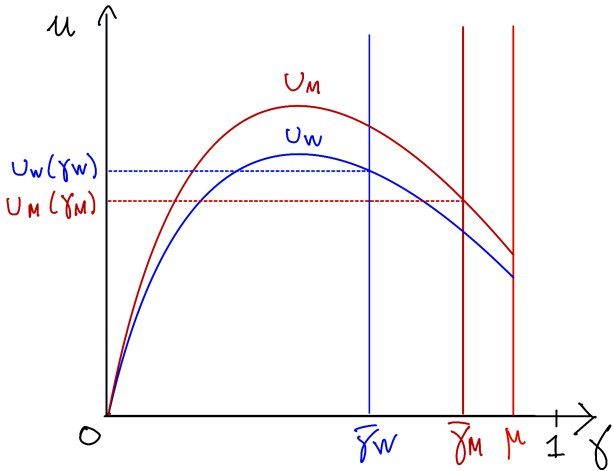
Terciles: within stayers



Return


Short run
Long run
-.2
-.15
-.1
-.05
0
.05
Log points
Baseline log weekly wages
+ unequal profit share, all workers
+ equal profit share, all workers
+ unequal profit share, only members
+ equal profit share, only members

Return



Return