Heterogeneous Labour Market Concentration and Minimum Wage Policy

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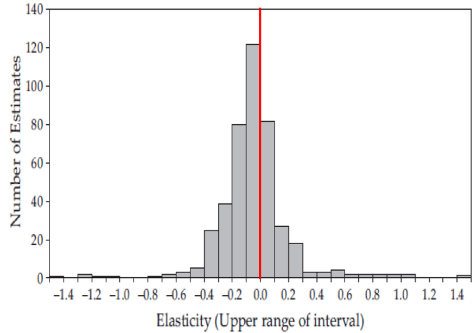
Motivation

- Vast literature on minimum wages has failed to reach a consensus regarding their employment effects.
  eg. non-negative: Card and Krueger (1994); Dube et al. (2007, 2010); negative: Neumark and Wascher (1992, 2007)
- Possible explanation: labour market power.
- Theory predicts negative employment effects in perfect competition, but positive effects in monopsony.



Source: Card and Krueger (1995) 20th anniversary edition (2015)

- Growing literature on monopsony power in labour markets,* but difficult to test monopsony model of minimum wages with existing data for US. Azar et al. (2023)
  *eg. Bhaskar et al. (2002); Manning (2011); Manning and Petrongolo (2022); Martins (2021); Martins and Melo (2023); Azar et al. (2019, 2022a)

What This Paper Does

Research Question

Do minimum wages have differential employment effects depending on the degree of competition of each local labour market?

- I take advantage of the rich granular employment data of Portugal, a setting with high minimum wage coverage.
- I split Portugal into several local labour markets.
- For each local labour market:
  - I measure the degree of market concentration.
  - I measure how impactful the minimum wage is in the market's wage structure.

Preview of Results

- Minimum wages have **significant disemployment effects in perfectly competitive markets**.
- **The less competitive** (more concentrated) the market, **the less severe is this disemployment effect**.
- In **monopsonistic labour markets**, minimum wage employment effects may be **positive**.

Outline

1. Model
2. Data and Design
3. Empirics
4. Conclusion

Outline

Dominant Firm Cournot Model

- Continuum of self-contained local labour markets j, with N firms indexed by i.
- DRS production function:

$$Y_{ji} = z_{ji} L_{ji}^{\alpha}$$

- In each market, $N-1$ quasi-competitive symmetric firms, and one dominant firm indexed by D.

$$z_{ji} = 1 \quad \forall j \text{ and } \forall i \neq D$$

$$z_{jD} \geq 1; \quad z_{jD} \sim \mathcal{U}(1, \bar{z})$$

- Labour supply in each market:

$$L_j = W_j^{\varepsilon}$$

- Government sets market-specific legally binding minimum wage equal to W_j^{min}.

Static Optimisation

- Firm solves:

$$\underset{L_{ji},W_{ji}}{max} \quad \Pi_{ji} = z_{ji}L_{ji}^{\alpha} - \max\left\{W_{ji}; W_j^{min}\right\} \times L_{ji}$$

$$s.t. \quad L_{ji} + \sum_{-i \in j} L_{j,-i} = W_{ji}^{\varepsilon}$$

- Equilibrium wage:

$$W_j = \max\left\{\left(\sum_{i \in j} L_{ji}\right)^{\frac{1}{\varepsilon}}; W_j^{min}\right\}$$

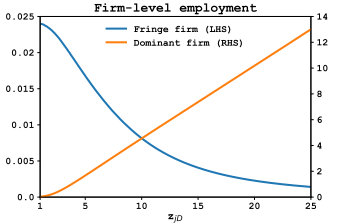
- Equilibrium employment:

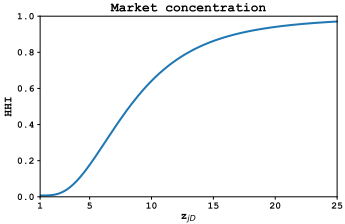
$$L_j = \sum_{i \in j} L_{ji}$$

Free Market Equilibrium

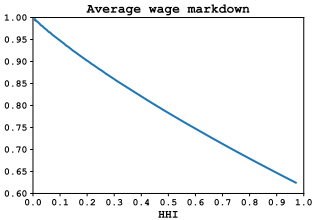
If W_j^{min} is not binding, then:

- Market concentration

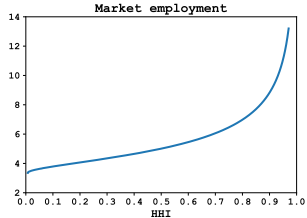


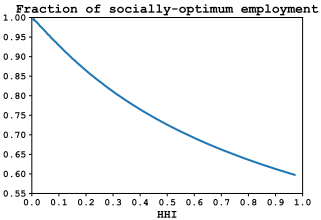


- Wages



- Employment

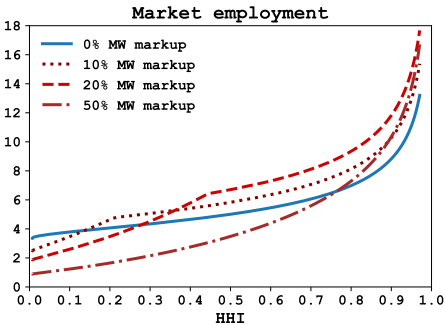


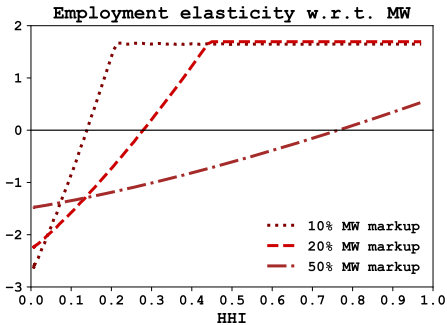


▸ Model parameters

Minimum Wage Effects

When W_j^{min} is binding, then:





- Positive employment effects in highly concentrated markets, because...
  - Higher HHI $\leftrightarrow$ higher market power.
  - Can have larger MW markup without "overshooting".
  - Employment response of dominant firm has bigger impact.

▸ Firm-level response

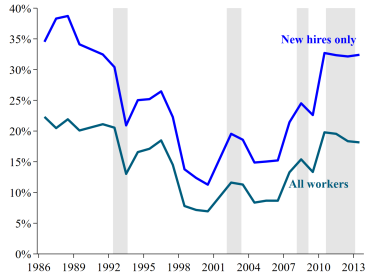
Outline

Data

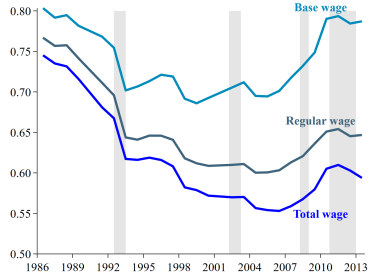
- Quadros de Pessoal
  - Administrative yearly worker-level data covering the universe of private sector workers in Portugal.
  - Matched employer-employee panel dataset.
  - Data on worker's wages, hours, contract, occupation, age, education, tenure...
  - Data on firms' sector, location, establishments, sales...
  - Period 1986-2013, with gaps in 1990 and 2001.
- INE + National legislation
  - Price levels
  - Municipality population
  - Minimum wages

Setting

- Minimum wage variation across
  - Time ▸ NMW evolution
  - Sector/occupation (until 1991)
  - Region (mainland vs. Azores and Madeira)
  - Age group (until 1998)
- Exceptionally binding minimum wage: Kaitz index in 2013 was 0.66 in Portugal versus 0.29 in US (OECD)



(a) Minimum wage earners



(b) Kaitz Index

Local Labour Markets

- Cluster municipalities into 63 commuting zones. ▸ Map
  - 52 commuting zones defined for mainland Portugal by Afonso and Venâncio (2016).
  - 11 islands each considered a separate commuting zone.
- 88 sectors of activity (CAE-Rev.3 2-digit level).
- Define local labour markets as unique combinations of commuting zone $\times$ sector.
- Drop:
  - Pure public sectors (*Public administration and social security* and *International organisations*).
  - Pure monopsonies (mostly single-hire markets).
  - Markets which are not hiring (can't measure competition).
  - Bottom 5% of remaining observations in terms of hires.
- 2,818 local labour markets; 38,107 observations; 94.8% of workers.

▸ Market mobility ▸ Summary statistics

Outline

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Minimum Wage Exposure

- Measure the counterfactual increase in the wage bill necessary to comply with the new minimum wage while keeping the workforce constant.

$$\Delta\tilde{w}_{mt|t-1} \equiv \tilde{w}_{mt|t-1} - w_{m,t-1}$$

- $w_{m,t-1}$ is the observed (log real) wage bill in labour market m in year $t-1$.
- $\tilde{w}_{mt|t-1}$ is the counterfactual wage bill in labour market m in year t if worker and hours composition was kept the same as in year $t-1$ and wages were only increased to comply with minimum wage.

Minimum wage exposure

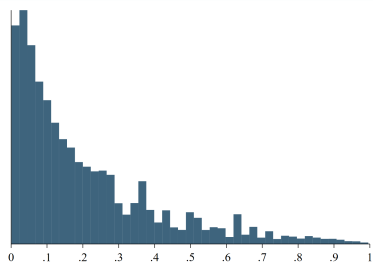
"If all firms decided to keep the same workers working the same hours as the previous year, by what percentage would the wage bill need to increase just in order to comply with the minimum wage?"

- **Threat to identification:** Firms anticipate change in NMW and adjust employment *before* change is enacted.

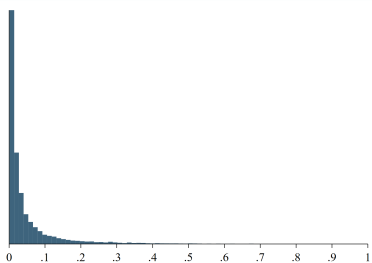
Labour Market Concentration

- Measure the Herfindahl-Hirshman Index (HHI) firm shares of yearly hires.
- If $\mathcal{M}$ is the set of all firms i participating in local labour market m in year t, then

$$H_{mt} \equiv \sum_{i \in \mathcal{M}} \left(\frac{\text{New Hires}_{i,mt}}{\sum_{i \in \mathcal{M}} \text{New Hires}_{i,mt}} \right)^2$$



(a) Distribution of labour markets



(b) Distribution of workers

Trends and dispersion

Econometric Model

- Panel two-way fixed effect model:

$$\Delta \ell_{mt} = \beta_1 \cdot \Delta \tilde{w}_{mt|t-1} + \beta_2 \cdot H_{mt} + \beta_3 \cdot \Delta \tilde{w}_{mt|t-1} \times H_{mt}$$
$$+ \sum_{j=1}^{2} \gamma_j \cdot \Delta \tilde{w}_{m,t-j|t-j-1} + \mathbf{X}'_{mt} \cdot \mu + \alpha_m + \phi_t + \varepsilon_{mt}$$

- $\Delta \ell_{mt}$: change in labour market log employment.
- $\mathbf{X}'_{mt}$:
  - Demographic controls: average age and years of schooling, fraction of female workers, number of firms, median firm age, average tenure.
  - Labour supply controls: growth rate of commuting zone population.
  - Labour demand controls: growth rate of real sales per worker, average sector real wage and average commuting zone real wage.
  - Equilibrium controls: growth rate of average real wage.
- α_m: labour market fixed effect.
- ϕ_t: year fixed effect.

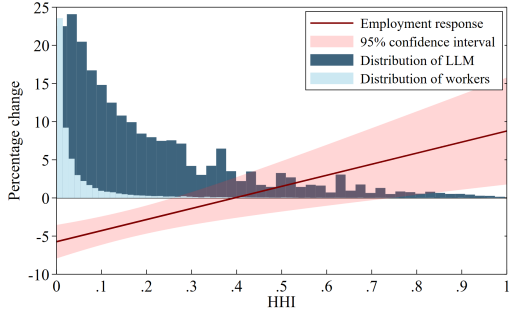
OLS Estimates

Δ Log(Employment)	(1)	(2)	(3)
MW Exposure	-1.437	-3.870***	-10.224***
	(0.909)	(1.014)	(1.978)
MW Exposure × HHI	4.507	8.758**	25.871***
	(3.627)	(3.900)	(7.217)
Additional Controls	✓	✓	✓
Fixed Effects		✓	✓
Lags MW Exposure			✓
Observations	31,611	31,465	20,560
Adjusted R^2	0.103	0.176	0.183

Standard errors are clustered at the sector (1 letter) × NUTS-II level

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure: Response to 1 std. dev. increase



- A 1 std. dev. increase in minimum wage exposure **decreases** employment by 5% in perfectly competitive labour markets.
- A 1 std. dev. increase in the impact of the minimum wage has a **positive** effect on employment of 9% in monopsonistic labour markets.

▸ Robustness checks

IV Estimates

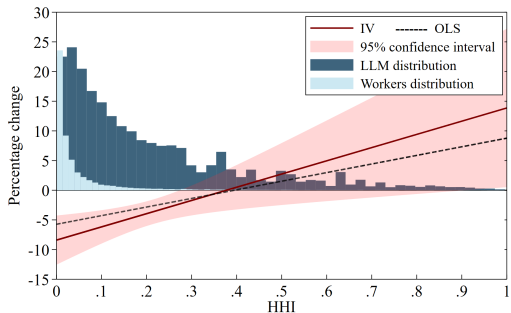
- Possible sources of HHI endogeneity: measurement error, mechanical reverse causality, economic reverse causality...
- Instrument for HHI using the average of $log\left(\frac{1}{N}\right)$ in all other commuting zones for the same sector and year, where N corresponds to the number of firms.
- Less likely to be endogenous as does not depend on market shares.

Δ Log(Employment)	OLS	IV
MW Exposure	-10.224***	-14.989***
	(1.978)	(3.730)
MW Exposure × HHI	25.871***	39.711***
	(7.217)	(15.104)
Additional Controls	✓	✓
Fixed Effects	✓	✓
Lags MW Exposure	✓	✓
Observations	20,560	20,560
Adjusted R^2	0.183	0.077

Standard errors at the sector (1 letter) × NUTS-II level

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure: Response to 1 std. dev. increase

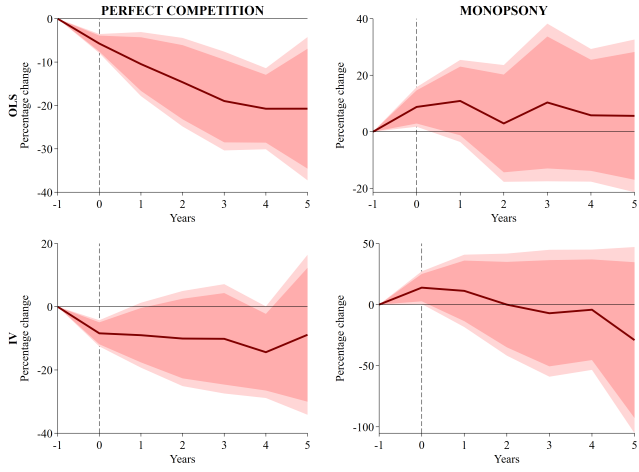


▸ First stage ▸ Robustness checks

Dynamic Responses

- Using a Local Projection specification: Pre-Trends Robustness checks

Figure: Cumulative response to a 1 std. dev. increase



Outline

Conclusion

- Minimum wages have differential employment effects depending on the concentration of the labour market. May even be **positive**.
- Labour markets are hetereogeneous in their concentration level.
- Local studies of minimum wage employment effects will depend on the concentration level of the specific labour market.
- Aggregate minimum wage employment effects will partially cancel out conditional on the distribution of workers.
- Policy implications:
  - Policy tool to combat labour market inefficiencies.
  - Differential minimum wages according to productivity, cost of living, **but also according to concentration of local labour markets.**

Appendix

Model Parameters

Parameter	Interpretation	Value	Source
α	Returns to scale / labour elasticity of output	0.7	Approximate value of labour share
ε	Wage elasticity of labour supply	1.6	Azar et al. (2022b)
$\bar{z}$	Upper-bound of dominant firm productivity distribution	25	Value such that HHI ≈ 1
N	Number of firms in each labour market	140	Average size of Portuguese local labour markets

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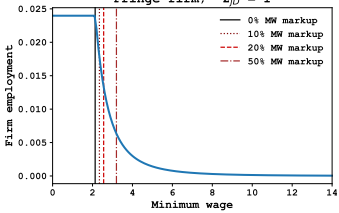
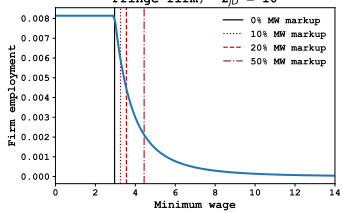
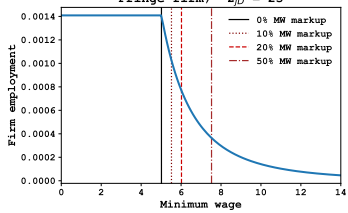
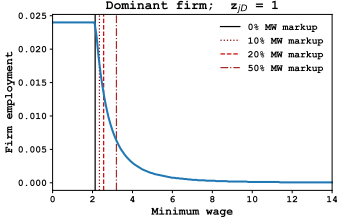
Firm Choice of Employment

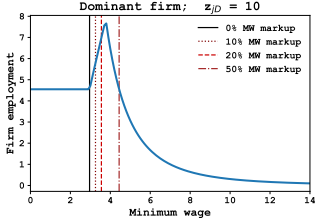
- $z_{jD} = 1$
- $z_{jD} = 10$
- $z_{jD} = 25$

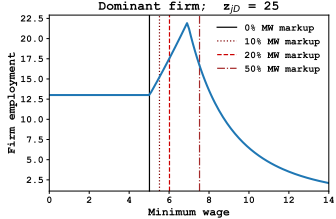












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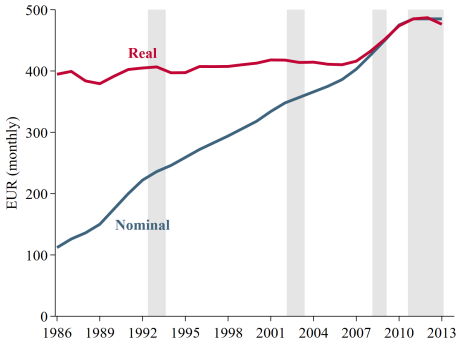
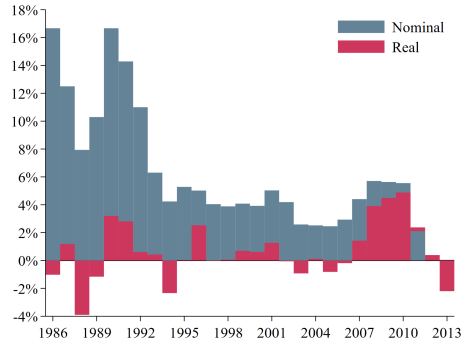
Evolution of National Minimum Wage



(a) Monthly value (€)



(b) Change y.o.y.

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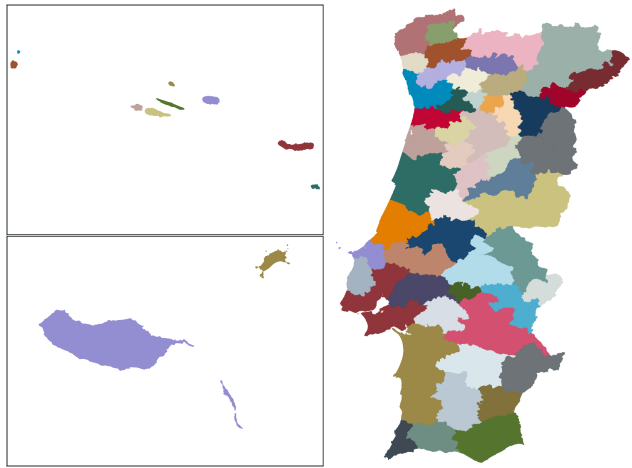
Commuting Zones Map



Source: Author's own map, based on Afonso and Venâncio (2016).
Note: Islands are not to scale.

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Labour Market Mobility

Table: Geographic Mobility

Geographic mobility of workers	**Location variable**	
Workers in year t compared to $t-1$	Commuting zones	Districts
Same location	**73.4%**	**73.5%**
Same firm	67.8%	67.8%
Different firm	5.6%	5.7%
Different location	**2.2%**	**2.1%**
Same firm	0.8%	0.8%
Different firm	1.4%	1.3%
Entering employment	**24.4%**	**24.4%**
Clusters considered	63	29

Labour Market Mobility

Table: Activity Mobility

Activity mobility of workers	**Activity variable**	
Workers in year t compared to $t-1$	Sector	Occupation
Same activity	**64.2%**	**62.3%**
Same firm	61.0%	58.6%
Different firm	3.2%	3.7%
Different activity	**11.4%**	**13.3%**
Same firm	7.6%	10.0%
Different firm	3.8%	3.3%
Entering employment	**24.4%**	**24.4%**
Clusters considered	88	98

Note: Sectors are from CAE-Rev.3 at the 2 digit level. Occupations are from CPP-2010 at the 2 digit level.

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Summary Statistics

Panel A: average across workers		
	All labour markets	**Selected sample**
Age (years)	36.1	36.0
Female workers	42.5%	42.9%
Years of schooling	7.6	7.6
Tenure (months)	88.8	88.1
Regular real wage	€850.19	€847.07
Monthly normal hours	163.5	163.6
Minimum wage earners	14.5%	14.5%
Panel B: average across labour markets		
	All labour markets	**Selected sample**
Number of firms	89	140
Employment (nr. workers)	789	1,240
Total hires (yearly)	162	257
Employment representativeness	100%	94.8%
Observations	63,210	38,107

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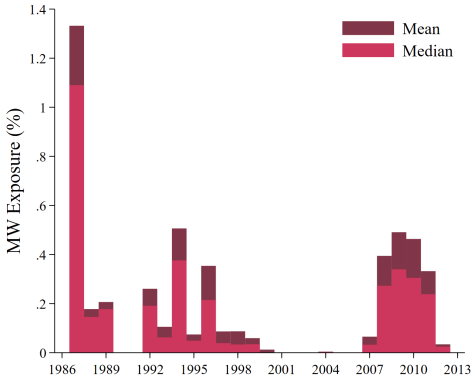
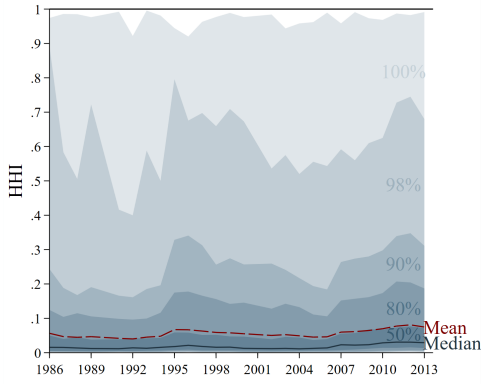
MW Exposure and HHI Trends

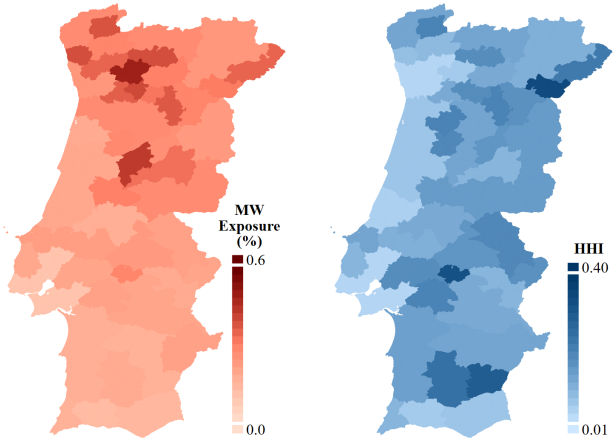


(a) MW Exposure



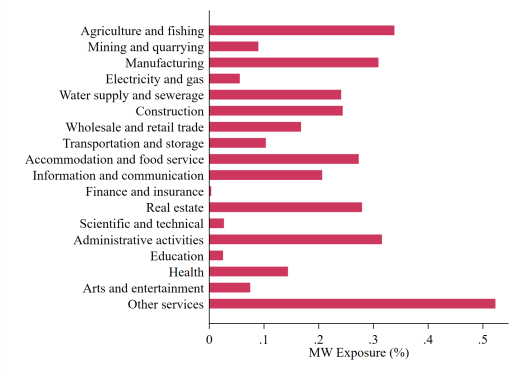
(b) HHI

MW Exposure and HHI Regional Dispersion

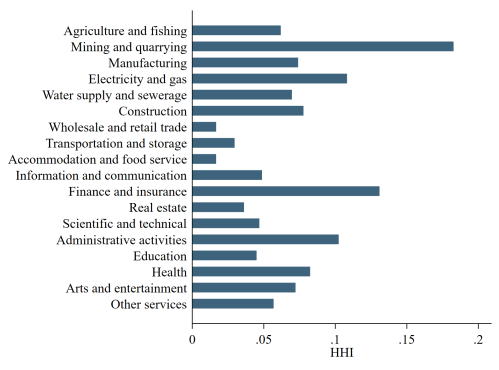


(a) MW Exposure (b) HHI

MW Exposure and HHI Industry Dispersion



(a) MW Exposure



(b) HHI

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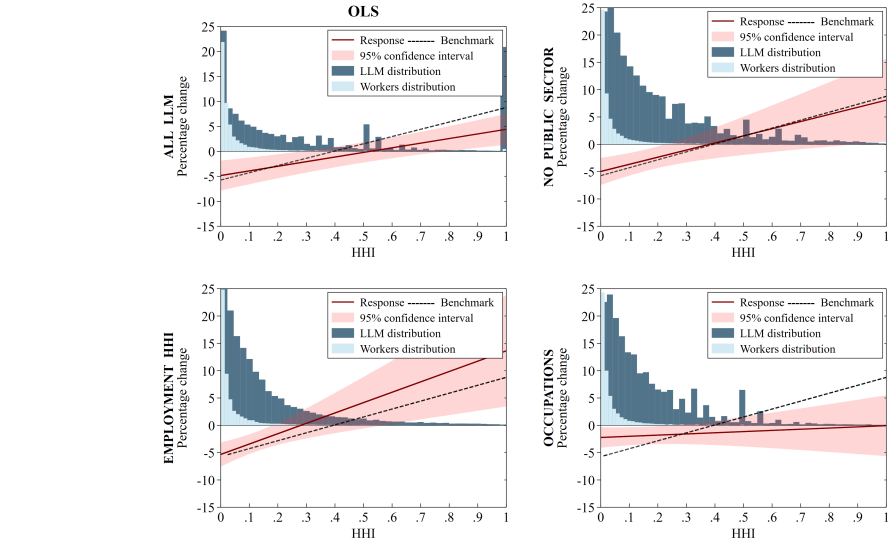
OLS Robustness Checks - Contemporaneous Response



OLS Robustness Checks

Δ Log(Employment)	Benchmark	All LLM	No Pub. Sect.	Empl. HHI	Occupations
MW Exposure	-10.224***	-8.624***	-8.855***	-9.532***	-5.041**
	(1.978)	(2.693)	(2.239)	(1.995)	(2.160)
MW Exposure $\times$ HHI	25.871***	16.504***	23.254***	33.844***	4.882
	(7.217)	(4.102)	(7.961)	(10.216)	(7.230)
Additional Controls	✓	✓	✓	✓	✓
Fixed Effects	✓	✓	✓	✓	✓
Lags MW Exposure	✓	✓	✓	✓	✓
Observations	20,560	28,514	16,496	20,560	24,941
Adjusted R^2	0.183	0.204	0.193	0.183	0.079

Standard errors in parentheses are clustered at the sector/occupation (1 letter/digit) $\times$ NUTS-II level

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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IV First Stage

	HHI	MW Exposure × HHI
Average Log(1/N)	0.138***	0.000***
	(0.006)	(0.000)
MW Exposure × Average Log(1/N)	-0.761***	0.096***
	(0.220)	(0.008)
Observations	20,560	20,560
Adjusted R^2	0.655	0.723
H0 = Under-identified		
Sanderson-Windmeijer χ^2	631.63	115.33
P-value	0.000	0.000
H0 = Weakly identified		
Sanderson-Windmeijer F statistic	625.48	114.20

Standard errors are clustered at the sector (1 letter) × NUTS-II level

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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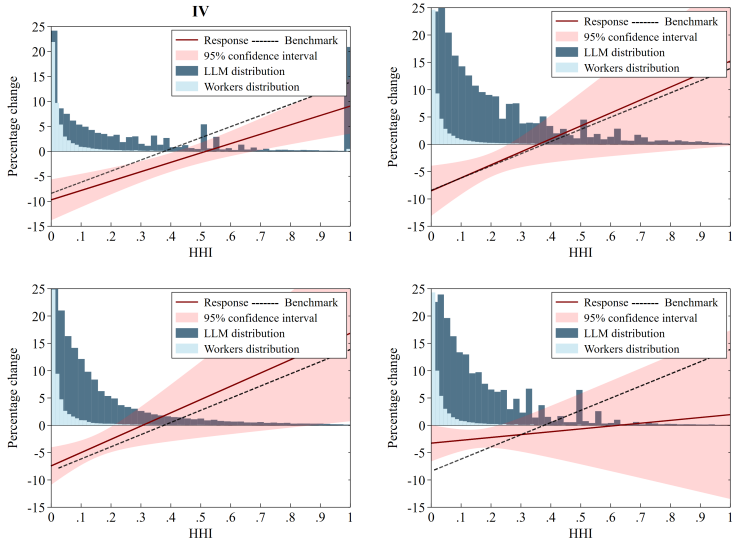
IV Robustness Checks - Contemporaneous Response



IV Robustness Checks

Δ Log(Employment)	Benchmark	All LLM	No Pub. Sect.	Empl. HHI	Occupations
MW Exposure	-14.989***	-17.304***	-15.181***	-13.283***	-7.388*
	(3.730)	(3.688)	(4.123)	(3.089)	(3.835)
MW Exposure × HHI	39.711***	33.473***	42.335**	43.326**	11.804
	(15.104)	(7.945)	(17.428)	(16.826)	(20.984)
Additional Controls	✓	✓	✓	✓	✓
Fixed Effects	✓	✓	✓	✓	✓
Lags MW Exposure	✓	✓	✓	✓	✓
Observations	20,560	28,514	16,496	20,560	24,941
Adjusted R^2	0.077	0.093	0.079	0.073	-0.117

Standard errors in parentheses are clustered at the sector/occupation (1 letter/digit) × NUTS-II level

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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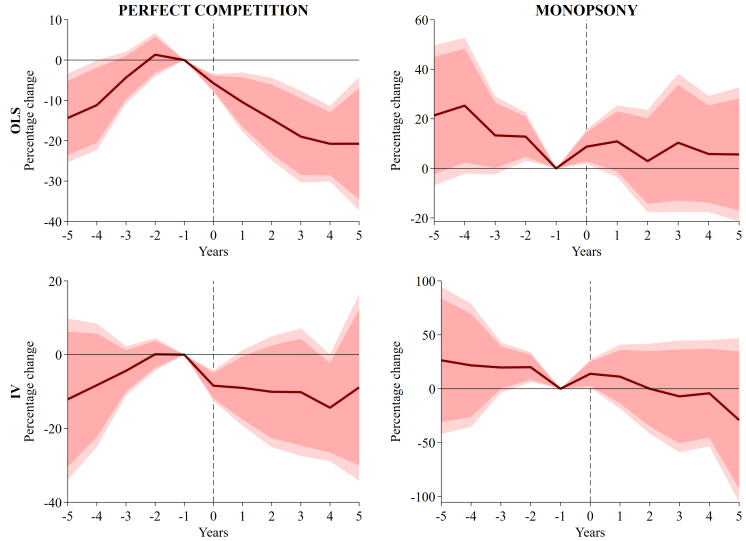
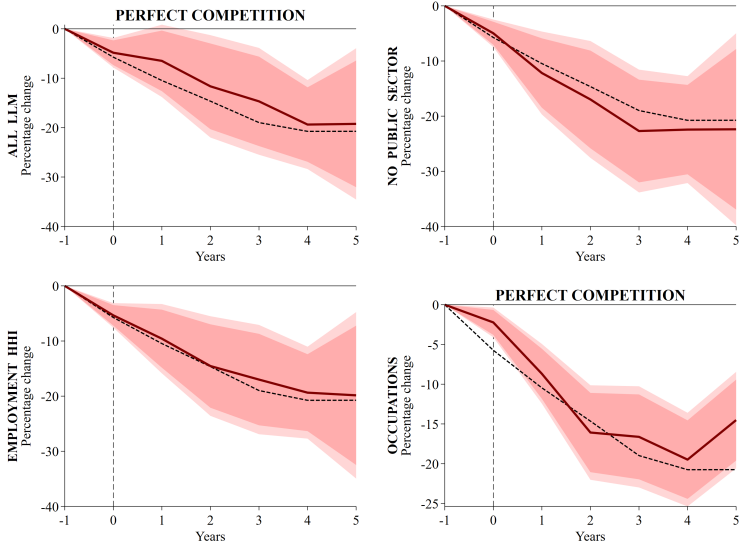
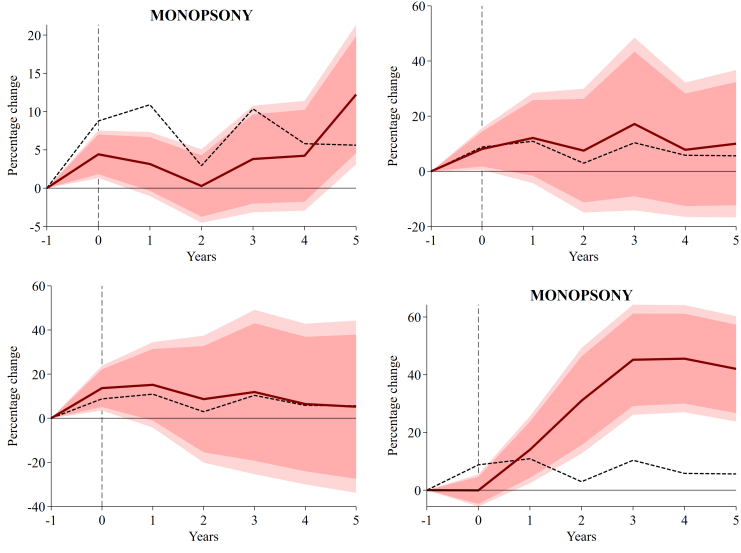
PRE-TRENDS


PERFECT COMPETITION
MONOPSONY
OLS
IV
Percentage change
Years

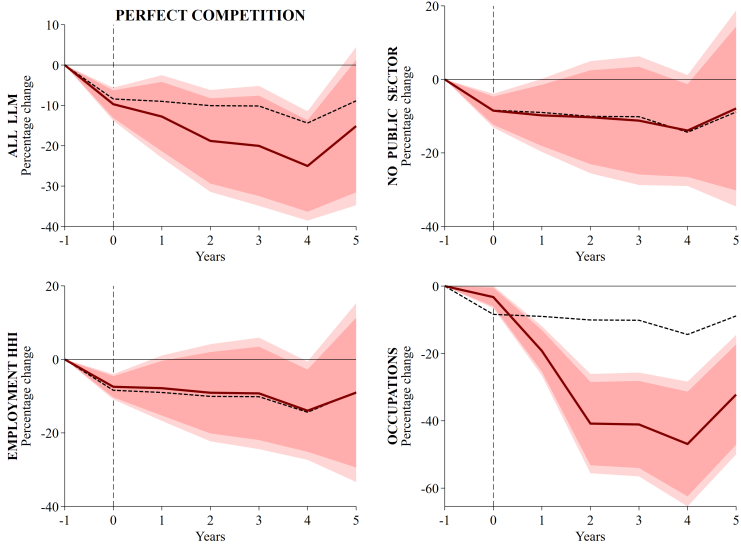
OLS Robustness Checks - Dynamic Response (Perfect Competition)



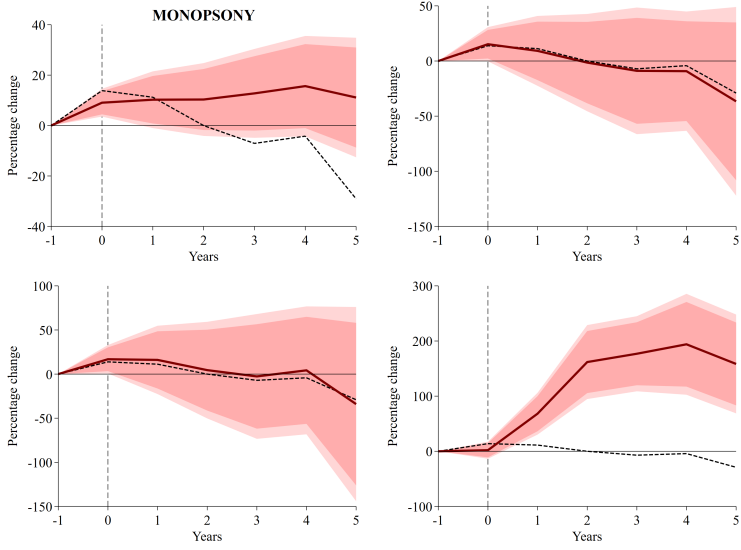
OLS Robustness Checks - Dynamic Response (Monopsony)



IV Robustness Checks - Dynamic Response (Perfect Competition)



IV Robustness Checks - Dynamic Response (Monopsony) Back



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