

Multinational Enterprises and Between-Firm Wage Inequality Across European Regions

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Between-Firm Wage Inequality

- ▶ Two-thirds of overall wage inequality explained by within-sector firm heterogeneity (Helpman et al., 2017 RES; Akerman et al. 2013 AER).
- ▶ Potential channels:
 - > Search and matching frictions resulting in heterogeneous bargaining power (Davidson et al., 2008).
 - > Efficiency or fair wages vary with the **revenue of the firm** (Amiti & Davies, 2012).
 - > **Trade-related wage inequality:** exporters are larger and pay higher wages due to self-selection and market access effects (Helpman et al., 2017 RES).

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 - > Efficiency or fair wages vary with the **revenue of the firm** (Amiti & Davies, 2012).
 - > **Trade-related wage inequality:** exporters are larger and pay higher wages due to self-selection and market access effects (Helpman et al., 2017 RES).
- ▶ **Multinationals-related wage inequality:** larger and more productive than non-multinational exporters and non-exporters (Amiti et al., 2024).
- ▶ Inward FDI and wage inequality: limited evidence at the industry and firm-level at the national level (Taylor & Driffield, 2005; Chen et al., 2011).

Examines wage dispersion between firms across European regions and the role played by multinational enterprises (MNEs).

Among MNEs, we distinguish those holding dominant market shares (i.e. the international superstar firms).

Data

- ▶ Between-firm wage dispersion at the NUTS2 level and MNEs presence → ORBIS Europe and CompNet, 2012-2021

Novelties

- 1 Scope: first (to the best of our knowledge) to examine the role of MNEs and international superstar firms on between-firm wage inequality across regions.
- 2 Methodology: shift-share instrumental variables (IV) strategy interacting aggregate FDI inflows with the pre-sample regional employment structure by industry (*shift-share FDI shocks*).

- ▶ We document:
 - > Increased between-firm wage dispersion driven by average wages in the top 90th and 95th percentiles.
 - > Increased regional presence of MNEs, which is stronger for the top-performing foreign affiliates, both in terms of labour and turnover shares.
- ▶ Increases in the regional presence of MNEs significantly rise between-firm wage inequality.
 - > On average, over and above other factors and using three-year differences, a one percentage point increase in the foreign affiliates' (MNEs parents) employment share leads to a 0.3% (0.5%) increase in the Gini coefficient of between-firm wage inequality.
- ▶ Effects increase in magnitude when comparing the overall presence of foreign-owned companies to the presence of top-performing foreign-owned companies measured as those in the top quartile and percentile of revenue by region and year.

▶ **Between-firm inequality and its determinants**

rising dispersion of earnings between firms as the main driver of rising overall earnings inequality

Song et al., 2019 QJE; Autor et al. 2020 QJE; De Loecker et al., 2020 QJE; De Loecker et al. 2022 IFS; Akerman et al. 2013 AER; Helpman et al., 2017 RES

▶ **Inward FDI and wage inequality in host economies**

Positive effect indentified using lagged regressors as IVs (Arellano & Bond, 1991)

Chen et al., 2011; Taylor & Driffield, 2005; Feenstra & Hanson, 1995 AER

▶ **Effects of inward FDI on regional outcomes**

Stojčić & Orlić, 2020; Carbonell & Werner, 2018; Yuandi Wang & Prevezer, 2016; Oscar Bajo-Rubio & Díaz-Roldán, 2010)

▶ **Shift-share instruments in regional differential exposure settings**

Jaeger et al., 2018; Dell et al., 2019; Autor et al., 2013; Bartik, 1991

Data sources

- ▶ ORBIS Europe database, 2012-2021: firm ownership, employment, wage bill, turnover, total assets
- ▶ Wages adjusted by firms' observable characteristics and aggregated at regional level wage adjustment
- ▶ 195 NUTS2 regions in 21 EU countries and the UK coverage
- ▶ Controls sourced from Eurostat

Between-firm Wage Inequality across Regions

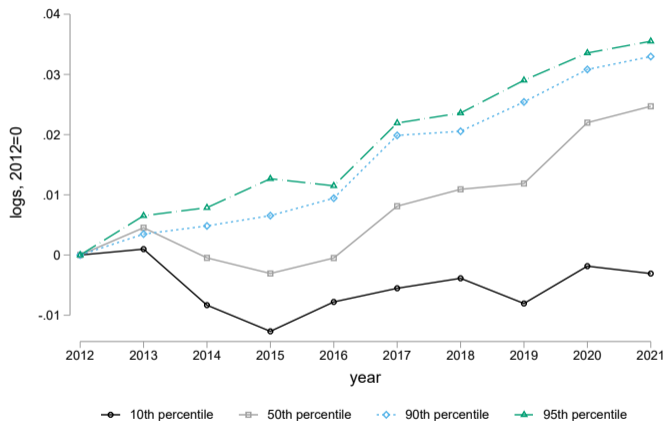
- ▶ Gini coefficient
- ▶ Ratio of the 90/10 and 90/50 wage percentiles

Measures of regional presence of MNEs

- ▶ Share of foreign affiliates or parent companies (at least 10% of foreign direct ultimate ownership and with ten+ employees) in region's employment
- ▶ Change in ownership structure: Orbis M&A dataset to update the status to domestic/foreign before the M&A transaction occurs whenever the firm identifier can be traced
- ▶ Superstar foreign-owned: firms with revenues in the top quartile and decile by region and year

0 Descriptive Evidence

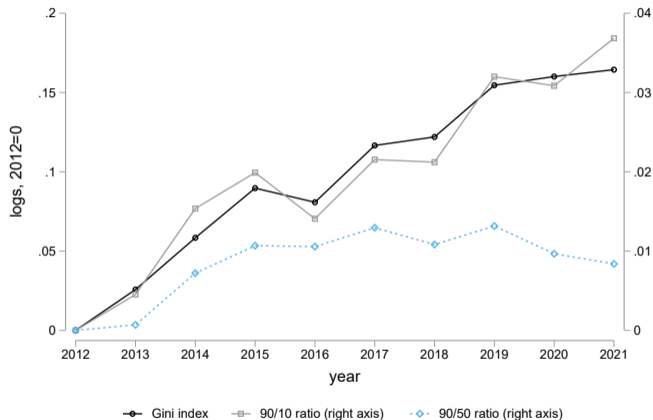
Wage Percentiles across Regions, 2012-2021



Notes: Weighted average of firm wages across NUTS2 regions in the EEA countries, the UK and Switzerland.
Source: Authors' calculations using data from the Orbis Europe and Eurostat.

0 Descriptive Evidence

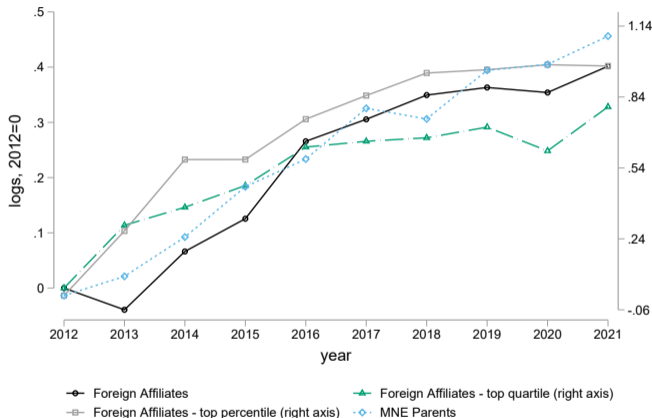
Between-firm Wage Inequality across Regions



Notes: Weighted average of firm wages across NUTS2 regions in the EEA countries, the UK and Switzerland.
Source: Authors' calculations using data from the Orbis Europe and Eurostat.

o Descriptive Evidence

MNE Regional Labour Shares across Regions



Notes: Weighted average firm wages across NUTS2 regions in 21 EU countries and the UK. Series are winsorized at the 5th and 99th percentiles by year. Foreign affiliates and parent MNEs defined with a > 10% threshold for direct ownership.

Top performers foreign affiliates are defined given revenue shares by region and year.

Source: Authors' calculations using data from the Orbis Europe and Eurostat.

$$\Delta \log (Inq_{jt}) = \beta_0 + \beta_1 \Delta MNE_{jt} + \Gamma \mathbf{X}_{jt^0} + \alpha_t + \epsilon_{jt},$$

- ▶ ΔInq_{jt} : three-year difference change in wage inequality across firms in region j and year t
- ▶ ΔFDI_{jt} : three-year difference change measure of foreign affiliates or parent MNEs presence
- ▶ \mathbf{X}_{jt^0} : vector of base years regional controls:
 - > third-level education attainment (share of the population aged 25-64 with third level education)
 - > employment share in knowledge-intensive sectors
 - > innovation (employees in Human Resources in Science & Technology per inhabitant)
- ▶ α_t : year fixed-effects

All regressions weighted by regional employment from Eurostat and standard errors clustered at the NUTS2 level.

o Identification (2/2)

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Identification assumption: $Cov(\epsilon_{jt}, FDI_{jt} | \mathbf{X}_{jt}) = 0$

- ▶ MNE presence might increase more in regions with growing between-wage inequality due to time-varying shocks that we cannot control for, such as the presence of production amenities.

Instrumental variable

Shift-share instrument for FDI that interacts the changes in FDI across industries at the EU level with the regional industry labour shares:

$$\widetilde{\Delta MNE}_{jt} = \sum_k \eta_{kjt^0} \cdot \Delta \overline{MNE}_{kt},$$

- ▶ η_{kjt^0} : employment share of industry k in region j at a reference year t^0
- ▶ $\Delta \overline{MNE}_{kt}$: mean change of MNE presence in industry k across all the regions in our sample

O Estimation Results

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Baseline estimates

Outcome variable:	Panel A. OLS Estimates					
	Gini index		90/10 ratio		90/50 ratio	
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Foreign aff. employment share	0.333** (0.1342)		0.051*** (0.0195)		0.021 (0.0151)	
Δ Parent MNE employment share		0.486*** (0.1338)		0.067*** (0.0162)		0.044*** (0.0093)
N	1,031	1,031	1,032	1,032	1,032	1,032
R2	0.111	0.161	0.070	0.096	0.047	0.084
Outcome variable:	Panel B. 2SLS Estimates					
	Gini index		90/10 ratio		90/50 ratio	
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Foreign aff. employment share	0.315** (0.1350)		0.050** (0.0201)		0.101 (0.0883)	
Δ Parent MNE employment share		0.472*** (0.1362)		0.066*** (0.0169)		0.051 (0.0749)
N	1,031	1,031	1,032	1,032	1,032	1,032
R2	0.111	0.161	0.070	0.096	0.059	0.056
Kleibergen-Paap F stat	49.135	36.694	49.097	36.588	49.097	36.588
First stage coefficient	0.415*** (0.0592)	0.483*** (0.0797)	0.415*** (0.0592)	0.483*** (0.0798)	0.415*** (0.0592)	0.483*** (0.0798)

Notes: All models are weighted by regional employment and include year fixed effects. Outcome variables are three-year log changes of the wage inequality indices constructed with mean residual wages. Differences in MNE regional labour shares are instrumented in Panel B.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors are shown in parentheses, clustered at the region level.

O Estimation Results

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Top Performers - IV Estimates

Outcome variable:	Gini index		90/10 ratio		90/50 ratio	
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Foreign aff. - Q1 employment share	0.386** (0.1637)		0.062*** (0.0236)		0.124 (0.1071)	
Δ Foreign aff. - P1 employment share		0.463** (0.1924)		0.074*** (0.0271)		0.149 (0.1264)
N	1,031	1,031	1,032	1,032	1,032	1,032
R2	0.084	0.071	0.066	0.050	0.054	0.050
Kleibergen-Paap F stat	40.850	41.123	41.090	41.110	41.090	41.110
First stage coefficient	0.338*** (0.0528)	0.282*** (0.0440)	0.338*** (0.0527)	0.282*** (0.0440)	0.338*** (0.0527)	0.282*** (0.0440)

Notes: All models are weighted by regional employment and include year fixed effects. Outcome variables are three-year log changes of the wage inequality indices constructed with mean residual wages. Differences in MNE regional labour shares are instrumented in Panel B.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors are shown in parentheses, clustered at the region level.

O Estimation Results

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Regional Heterogeneity

	Below median GDP per capita				Above median GDP per capita			
	<i>Panel A. Outcome variable: Gini index</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ Foreign aff. employment share	0.204 (0.2237)				0.364** (0.1585)			
Δ Parent MNE employment share		0.611** (0.2670)				0.427*** (0.1532)		
Δ Foreign aff. - Q1 employment share			0.251 (0.2676)				0.442** (0.1924)	
Δ Foreign aff. - P1 employment share				0.321 (0.3283)				0.522** (0.2257)
N	517	517	517	517	514	514	514	514
R2	0.176	0.267	0.192	0.176	0.098	0.125	0.034	0.028
Kleibergen-Paap F stat	33.957	5.271	25.937	60.446	24.130	19.757	18.147	26.310

Notes: All models are weighted by regional employment and include year fixed effects. Outcome variables are three-year log changes of the wage inequality indices constructed with mean residual wages. Differences in MNE regional labour shares are instrumented in Panel B.* p<0.1, ** p<0.05, *** p<0.01.

Robust standard errors are shown in parentheses, clustered at the region level.

- ▶ Alternative wage inequality indicators datasource (CompNet database) CompNet
- ▶ 50% foreign ownership instead of 10% as a threshold to define inward FDI 50
- ▶ Turnover regional shares instead of labour shares for FDI presence turnover
- ▶ ORBIS Europe high coverage countries → 8 economies identified by Kalemli-Ozcan et al. (2015) and Fons-Rosen et al. (2021). high-coverage

Main Findings

- ▶ Rising between-firms wage inequality across regions
- ▶ Positive effect of inward FDI on between-firm wage dispersion
- ▶ Effects are stronger when looking at the regional presence of top performing foreign affiliates

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Policy Implications

- ▶ Policy measures aimed at enhancing spillovers from highly innovative and productive international firms to local firms.
- ▶ Measures include strengthening the absorptive capacity of domestic firms and enabling supply chain linkages between superstar firms and domestic firms.

o Wage Residuals

back

We borrow from the literature on individual wage inequality (Shapiro, 2006; Albouy, 2009) and adjust the average wage per employee to account for the observable characteristics of the firms.

$$W_{ijt} = F_{ijt}\gamma + e_{ijt}$$

- ▶ F_{ijt} : vector of individual characteristics of firm i located in region j and year t , including size, age, and age squared.

o Wage Residuals

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$$W_{ijt} = F_{ijt}\gamma + e_{ijt}$$

Outcome variable: Log wage per employee	
	(1)
Size (total fixed assets)	0.209*** (0.0004)
Age	-0.046*** (0.0014)
Age squared	0.090*** (0.0023)
Constant	1.476*** (0.0029)
Obs.	1,436,926
R-squared	0.299

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors clustered at the region level are shown in parentheses.

o Summary Statistics

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	Domestic	Foreign Affiliates	Foreign Affiliates top performers	Parent MNEs
Employees	28.15 (320.48)	56.24 (541.79)	86.26 (761.32)	497.91 (2,724.84)
Fixed assets (euro mn)	6.59 (213.74)	12.16 (227.34)	20.49 (326.97)	199.47 (1,483.55)
Log average wages	4.22 (0.96)	4.37 (0.74)	4.53 (0.67)	5.29 (0.61)
Turnover (euro mn)	5.20 (77.03)	11.12 (225.57)	19.57 (307.06)	149.42 (1,408.40)
Regional labour share (%)	0.09 (0.82)	0.15 (1.25)	0.17 (1.14)	1.06 (4.47)
Observations	1,752,467	92,835	41,422	32,403

Notes: Standard deviations in parentheses. Monetary values are in constant 2018 prices calculated using the Eurostat harmonised CPIs. Wages are residualized..

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o Coverage

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Country	Orbis	CompNet	Eurostat
Austria	✓		✓
Belgium	✓	✓	✓
Bulgaria	✓		✓
Germany	✓	✓	✓
Denmark	✓	✓	✓
Estonia	✓		✓
Finland	✓	✓	✓
France	✓	✓	✓
Croatia	✓	✓	✓
Hungary	✓	✓	✓
Ireland	✓		✓
Italy	✓	✓	✓
Netherlands	✓		✓
Norway	✓		✓
Poland	✓	✓	✓
Portugal	✓	✓	✓
Romania	✓	✓	✓
Slovakia	✓	✓	✓
Sweden	✓	✓	✓
Spain	✓	✓	✓
United Kingdom	✓		✓

Notes: CompNet data for Netherlands is not available at the NUTS2 level.

O Robustness Check

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IV Estimates Using CompNet Data [back](#)

Outcome variable:	90/10 ratio				90/50 ratio			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ Foreign aff. employment share	0.108** (0.0465)				0.083*** (0.0306)			
Δ Parent MNE employment share		0.070 (0.0430)				0.010 (0.0295)		
Δ Foreign aff. - Q1 employment share			0.130** (0.0545)				0.100*** (0.0370)	
Δ Foreign aff. - P1 employment share				0.160** (0.0667)				0.123*** (0.0477)
N	651	651	651	651	651	651	651	651
R2	0.207	0.201	0.204	0.196	0.069	0.048	0.068	0.050
Kleibergen-Paap F stat	39.128	33.939	29.715	21.471	39.128	33.939	29.715	21.471
First stage coefficient	0.427*** (0.0682)	0.512*** (0.0879)	0.352*** (0.0646)	0.286*** (0.0618)	0.427*** (0.0682)	0.512*** (0.0879)	0.352*** (0.0646)	0.286*** (0.0618)

Notes: All models are weighted by regional employment and include the full set of controls and year fixed effects. Outcome variables are three-year log changes of the wage inequality indices from the CompNet database. Differences in MNE regional labour shares are using predicted changes following Eq. ??.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors are shown in parentheses, clustered at the region level.

O Robustness Check

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50% Foreign Ownership Threshold - IV Estimates [back](#)

Outcome variable:	Gini index				90/10 ratio			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ Foreign aff.	0.315** (0.1350)				0.050** (0.0201)			
Δ Parent MNE		0.472*** (0.1362)				0.066*** (0.0169)		
Δ Foreign aff. - Q1			0.386** (0.1637)				0.062*** (0.0236)	
Δ Foreign aff. - P1				0.461** (0.1921)				0.074*** (0.0271)
N	1,031	1,031	1,031	1,031	1,032	1,032	1,032	1,032
R2	0.111	0.161	0.084	0.072	0.070	0.096	0.066	0.051
Kleibergen-Paap F stat	49.171	36.694	40.884	41.500	49.133	36.588	41.125	41.488
First stage coefficient	0.415*** (0.0591)	0.483*** (0.0797)	0.338*** (0.0528)	0.283*** (0.0439)	0.415*** (0.0591)	0.483*** (0.0798)	0.338*** (0.0527)	0.283*** (0.0439)

Notes: All models are weighted by regional employment and include the full set of controls and year fixed effects. Outcome variables are three-year log changes of the wage inequality indices constructed with mean residual wages using Orbis Europe data. Differences in MNE regional turnover shares are instrumented using predicted changes. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors are shown in parentheses, clustered at the region level.

O Robustness Check

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Regional Turnover Shares - IV Estimates [back](#)

Outcome variable:	Gini index				90/10 ratio			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ Foreign aff. turnover share	0.362** (0.1520)				0.058*** (0.0222)			
Δ Parent MNE turnover share		0.472*** (0.1362)				0.066*** (0.0169)		
Δ Foreign aff. - Q1 turnover share			0.411** (0.1779)				0.066*** (0.0252)	
Δ Foreign aff. - P1 turnover share				0.470** (0.1986)				0.075*** (0.0279)
High tech employment share	-0.072*** (0.0273)	-0.070*** (0.0260)	-0.080*** (0.0287)	-0.086*** (0.0287)	-0.006 (0.0048)	-0.006 (0.0047)	-0.008 (0.0050)	-0.009* (0.0051)
N	1,031	1,031	1,031	1,031	1,032	1,032	1,032	1,032
R2	0.076	0.161	0.042	0.034	0.044	0.096	0.033	0.020
Kleibergen-Paap F stat	37.023	36.694	30.572	27.890	36.965	36.588	30.716	27.880
First stage coefficient	0.361*** (0.0593)	0.483*** (0.0797)	0.318*** (0.0575)	0.278*** (0.0526)	0.361*** (0.0593)	0.483*** (0.0798)	0.318*** (0.0574)	0.278*** (0.0526)

Notes: All models are weighted by regional employment and include the full set of controls and year fixed effects. Outcome variables are three-year log changes of the wage inequality indices constructed with mean residual wages using Orbis Europe data. Differences in MNE regional turnover shares are instrumented using predicted changes.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors are shown in parentheses, clustered at the region level.

o Robustness Check

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High Coverage Countries [back](#)

Outcome variable:	Gini index				90/10 ratio			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ Foreign aff. employment share	0.315** (0.1350)				0.050** (0.0201)			
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First stage coefficient	0.415*** (0.0592)	0.483*** (0.0797)	0.338*** (0.0528)	0.282*** (0.0440)	0.415*** (0.0592)	0.483*** (0.0798)	0.338*** (0.0527)	0.282*** (0.0440)

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