

International Trade and Collective Bargaining Outcomes: Evidence from German Employer-Employee Data

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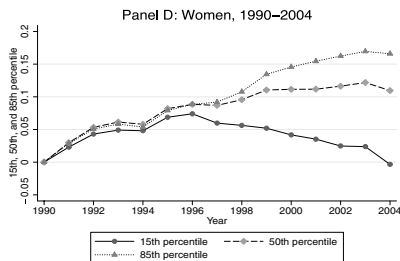
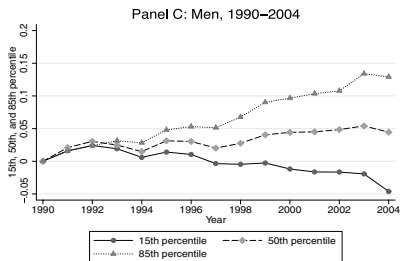
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The German wage gap

- ▶ Recent decades characterized by rising (residual) wage inequality, also in Germany
- ▶ Largely driven by wage growth at the top of the distribution



Source: Dustmann, Ludstek, Schönberg (2009, QJE)

The German wage gap

Potential explanations:

- ▶ *Labor demand shifts*
 - ▶ Skill biased technological change
 - ▶ Outsourcing of less skill intensive production stages
- ▶ *The exporter wage premium*
 - ▶ Egger and Kreickemeier (2009, 2010): more productive exporters pay higher wages
 - ▶ Rent sharing in combination with the surge in globalization can explain the evolution of wages
 - ▶ Empirical evidence: Schank, Schnabel, and Wagner (2009), Klein, Moser, and Urban (2010)
- ▶ *Changing wage setting structure*
 - ▶ Weakened bargaining power of the unions

Theoretical background

- ▶ Egger and Etzel:
 - ▶ Rent-sharing and sector-specific markups
 - ▶ Globalization reduces sector-specific markups
 - ▶ Argument holds for industry and firm level collective agreements

- ▶ Skaksen/Egger and Eckel:
 - ▶ Outsourcing is a potential threat for unions
 - ▶ Firms can discipline unions through outsourcing parts of the production

Our contribution

Our research question:

Is there another channel through which globalization has magnified wage inequality by reducing the bargaining position of the union?

- ▶ Rent-sharing subdued in international firms?
- ▶ The result hinges on the type of bargaining within the plant
- ▶ As theory predicts: the result only appears in the presence of collective bargaining!

The German linked employer-employee (LIAB) data

- ▶ **Person data: Employment statistics**
 - ▶ covers entire population under social security regulation (not self-employed, not some civil servants, ...); about 80-85% of all workers
 - ▶ Employee's occupation, gross earnings, tenure
 - ▶ Employee's individual characteristics: gender, age, nationality, education
- ▶ **Plant data: IAB Establishment panel**
 - ▶ Survey of about 1% of all establishments
 - ▶ Information about plant characteristics: export share, investment, structure of employment, collective agreement coverage
- ▶ Focus on German manufacturing, between 1996-2007

The German linked employer-employee (LIAB) data

▶ Advantages

- ▶ Germany: the world's first or second exporter nation in the period 1993-2007; a rich industrialized country
- ▶ High quality data (social security data)
- ▶ Fairly comprehensive data on workers and establishments
- ▶ Widely used: Dustman et al. (QJE, 2009); Schank et al. (JIE, 2007); Moser et al. (JIE, 2010); ...

▶ Short-comings

- ▶ About 12% of all wages are censored: imputation needed (Gartner & Rässler, 2005)
- ▶ Over-sampling of large plants (but weights exist)
- ▶ No information on export destinations
- ▶ Plant-level (not firm-level) information, no data on within-firm trade

Empirical strategy

Dependent variable: log imputed wage

$$\ln w_{ijt} = \beta_1 \ln \varphi_{jt} + \beta_2 EXP_{jt} + \beta_3 \ln \varphi_{jt} \times EXP_{jt} \\ + \alpha'_1 \mathbf{Z}_{it} + \alpha'_2 \mathbf{Z}_{jt} + \nu_t + \nu_i \times \nu_j + v_{ijt}$$

where:

- ▶ φ_{jt} is plant productivity/profitability
- ▶ EXP_{jt} is plant export share
- ▶ \mathbf{Z}_{it} collects worker characteristics (age, tenure, skill level)
- ▶ \mathbf{Z}_{jt} collects plant characteristics (size, capital intensity, shares of high skilled, females and part timers)
- ▶ Fixed effects $\nu_t, \nu_i \times \nu_j$ (spell effects; take out all time-invariant match-specific characteristics)

Measuring TFP

- ▶ Capital stock (Müller, 2008,2010)
 - ▶ Investment per type (buildings, machinery, IT, transport equipment) for each plant/year
 - ▶ Type-specific sectoral depreciation rates
 - ▶ Perpetual inventory method (Müller, 2010)
- ▶ Accounting for unobserved productivity shocks
 - ▶ semi-parametric method of Levinson and Petrin (2003)
 - ▶ intermediate inputs used as proxies
- ▶ Regressions
 - ▶ Pooled data
 - ▶ Separately for exporters and non-exporters
 - ▶ Separately by industry
- ▶ How purge TFP measure from skill-composition effects?

Measuring TFP

Iranzo et al. (2008)

- ▶ Production function

$$Y_{jt} = \varphi_{jt} \cdot K_{jt}^{\alpha} \cdot \tilde{L}_{jt}^{\beta}$$

where:

- ▶ φ denotes total factor productivity
- ▶ K denotes the plant's capital stock
- ▶ Labor is measured in efficiency units as

$$\begin{aligned}\tilde{L}_{jt} &= L_{jt} \cdot E(h_1, \dots, h_{L_{jt}}) \\ E &= \left(1/L_{jt} \cdot \sum_{i=1}^{L_{jt}} h_{it}^{\rho} \right)^{1/\rho}\end{aligned}$$

- ▶ Observed and unobserved components of worker ability measured by h_{it}

Measuring TFP

Iranzo et al. (2008)

2nd order Taylor series expansion around mean ability

$$\ln Y_{jt} \simeq \ln \varphi_{jt} + \alpha \ln K_{jt} + \beta \ln (L_{jt} \bar{h}_{jt}) + \delta \left(\frac{\sigma_{jt}}{\bar{h}_{jt}} \right)^2$$

- ▶ where $\delta = \beta \frac{1}{2} (\rho - 1)$
- ▶ \bar{h}_{jt} and σ_{jt} are the first and second moments of ability distribution within each plant
- ▶ and approximations $\ln(x + y) \simeq \ln x + \ln(1 + y/x) \simeq \ln x + y/x$ have been employed

Estimation of human capital index

Abowd et al. (1999)

$$w_{it} = \bar{w} + \eta (x_{it} - \bar{x}) + \gamma (y_{j(it)} - \bar{y}) + \theta_i + \phi_{j(it)} + \varepsilon_{it}$$

- ▶ “Person first, employer second” identification
- ▶ $w_{i,t}$... log of imputed wage
- ▶ x_{it} ... employer characteristics
- ▶ $y_{j(it)}$... firm characteristics
- ▶ “Grand” means: $\bar{w}, \bar{x}, \bar{y}$
- ▶ Worker fixed effects θ_i ; employer fixed effects $\phi_{j(it)}$ (identified by “movers”)
- ▶ Human capital index

$$\hat{h}_{it} = \hat{\eta}x_{it} + \hat{\theta}_i$$

Production function estimates

<i>Dependent variable: Value added (ln)</i>					
	(1)	(2)	(3)	Non-exporter (4)	Exporter (5)
	OLS	FE	LP	LP	LP
Employment $\times \bar{h}_{jt}$ (ln)	0.854*** (0.010)	0.622*** (0.030)	0.692*** (0.015)	0.693*** (0.021)	0.692*** (0.024)
Capital (ln)	0.157*** (0.008)	0.135*** (0.025)	0.167*** (0.036)	0.132** (0.053)	0.196*** (0.075)
VC(h_{jt}) ²	0.252** (0.126)	0.152 (0.132)	0.221** (0.109)	0.461*** (0.140)	-0.291 (0.188)
Observations	21,771	21,771	21,771	9,566	12,011

Standard errors in parenthesis, * significant at 10%, ** significant at 5%, *** significant at 1%. All estimations include industry and time fixed effects. Estimation methods: OLS is ordinary least squares, FE is fixed effects and LP is Levinsohn and Petrin (2003). Standard errors are clustered at the plant level in columns (1)-(2) and bootstrapped in columns (3)-(5).

Main Regression Results

First results

- - -

Dependent variable: Logarithm of individual daily wage

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	FE-Spell	OLS	FE-Spell	OLS	FE-Spell
Exports (share)	0.043*** (0.014)	-0.016 (0.018)			0.049*** (0.014)	0.001 (0.016)
TFP (ln)			0.025** (0.010)	0.011*** (0.003)	0.026*** (0.009)	0.011*** (0.004)
R ²	0.618	0.177	0.620	0.180	0.621	0.180
Plants	5040	5040	5040	5040	5040	5040
Observations	4658595	4658595	4658595	4658595	4658595	4658595

Inclusion of the interaction

<i>Dependent variable: Logarithm of individual daily wage</i>				
	(1)	(2)	(3)	(4)
	OLS	FE-Spell	OLS	FE-Spell
TFP (ln)	0.071*** (0.007)	0.029*** (0.006)	0.108*** (0.011)	0.053** (0.021)
Exports (share)	0.785*** (0.111)	0.243*** (0.074)		
Exports × TFP	-0.089*** (0.013)	-0.029*** (0.009)		
Openness			0.056*** (0.018)	0.033 (0.021)
Openness × TFP			-0.005*** (0.001)	-0.002** (0.001)
R ²	0.623	0.181	0.622	0.188
Plants	5040	5040	5003	5003
Observations	4658595	4658595	4654547	4654547

Individual vs. collective bargaining

Dependent variable: Logarithm of individual daily wage

	No collective agreement			Collective agreement		
	OLS	FE-Spell	RE-Spell	OLS	FE-Spell	RE-Spell
TFP (ln)	0.083*** (0.010)	0.031*** (0.010)	0.045*** (0.010)	0.066*** (0.008)	0.028*** (0.008)	0.041*** (0.007)
Exports (share)	0.287 (0.207)	-0.100 (0.183)	0.018 (0.164)	0.726*** (0.124)	0.244*** (0.088)	0.423*** (0.079)
Exports × TFP	-0.037 (0.026)	0.008 (0.023)	-0.004 (0.020)	-0.081*** (0.015)	-0.029*** (0.011)	-0.049*** (0.009)
R ²	0.590	0.126		0.597	0.192	
Plants	2626	2626	2626	3302	3302	3302
Observations	491828	491828	491828	4166767	4166767	4166767

Key findings

1. Robust and consistent evidence for rent sharing, but magnitude is relatively small
2. Exporter wage premium appears to be small, not always positive
3. Wage schedules flatter for exporters
4. Accounting for TFP, one finds a robust positive exporter premium
5. Rent sharing is lower in firms more exposed to trade
6. Results are driven by plants that bargain wages collectively