Trends in Worker Bargaining Power

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The Productivity-Pay Gap

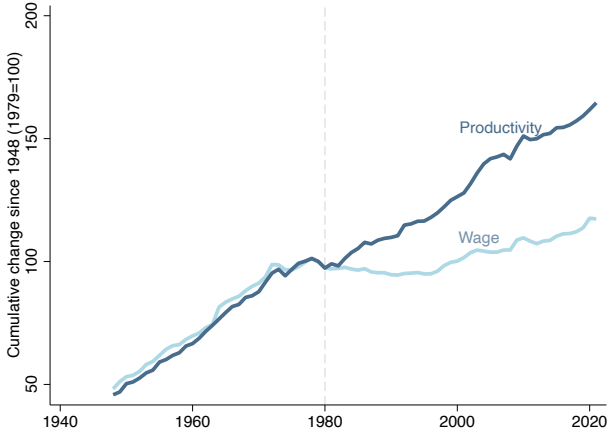

Figure: The Productivity–Pay Gap

Economic Policy Institute

Introduction

How did worker bargaining power evolve over time?

1. Measure worker bargaining power
   - structural method combining macroeconomics and industrial organization
2. Study the implications for the economy
3. Propose policy interventions
4. Shed lights on potential drivers

Literature

1. Declining worker bargaining power
   Stansbury&Summers, 2020; Drautzburg et al, 2020; Lombardi et al, 2022; Ratner&Sim, 2022
   - microfounded evidence
2. Frictional labor markets with wage bargaining
   Jaimovich et al., 2021, Dix-Carneiro et al., 2021, Cacciatore and Ghironi, 2021, ...
   - theory-consistent value
3. Rent sharing
   Card et al., 2018; Friedrich et al., 2021; Barth et al., 2016; Fakhfakh and FitzRoy, 2004,...
   - model-consistent and time-varying
4. Monopsony
   Manning, 2020; Berger et al., 2021; Jarosch et al., 2021; Yeh et al., 2022; Traina, 2021,...
   - new evidence on how the surplus is split

Model

Environment

Heterogeneous firms model with random search in the labor market (DMP)

Risk neutral workers and firms

- continuum of workers
- free entry determines # firms

Workers

- employed → working
- unemployed → searching

Firms

- heterogeneous in productivity
- post vacancies

Labor market

- random search frictions
- Nash bargaining

Wage Equation

Nash bargaining:

$$\text{wage}(w) = \arg\max_{w} \ (\text{Firm Surplus})^{1-\tau} (\text{Worker Surplus})^{\tau}$$

with τ being worker bargaining power

Solving the Nash product:

$$w = \tau \begin{pmatrix} \text{marginal} \\ \text{productivity} \end{pmatrix} + \ (1-\tau) \begin{pmatrix} \text{outside} \\ \text{option} \end{pmatrix} + \ \tau \begin{pmatrix} \text{labor market} \\ \text{conditions} \end{pmatrix}$$

Empirical Framework

Estimation With Firm Heterogeneity

$$\text{Target equation: } w_{ist} = \tau \text{MPN}_{ist} + (1-\tau) b_{st} + \tau \theta_{st} \kappa_{st} + \varepsilon_{ist}$$

Three main challenges:

1. MPN is unobservable
2. endogeneity bias
3. $\left\{ \begin{matrix} \text{outside} \\ \text{option} \end{matrix} , \begin{matrix} \text{labor market} \\ \text{conditions} \end{matrix} \right\}$

more

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more

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Later: incorporate worker dimension

more

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Later: incorporate worker dimension $\rightarrow$ no effect on aggregate trend

more

Data

US: Compustat
financial information on universe of publicly listed firms

- balance sheet and income statement
- sales, # employees, wages (lc/n), intermediate inputs, fixed assets, COGS
- period: 1960 - 2019

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$\Rightarrow$ focus on Manufacturing: $\sim$37% of workforce

Summary Statistics

Data

France: Administrative data

1. FARE/FICUS: financial information on universe of firms, 1994-2019 (2020)
   - universe of private firms
   - balance sheet and income statement

Summary Statistics

Data

France: Administrative data

1. FARE/FICUS: financial information on universe of firms, 1994-2019 (2020)
2. DADS-Postes: job-level information, 1994-2019 (2020)
   - universe of employees
   - wages, hours, age, office location, residence, occupation, contract, (collective agreement)
   - anonymized data with firm identifier
   - 2-year tracking

Summary Statistics

Data

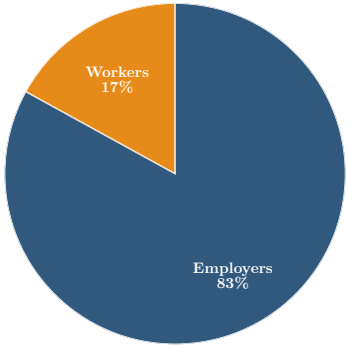
France: Administrative data

1. FARE/FICUS: financial information on universe of firms, 1994-2019 (2020)
2. DADS-Postes: job-level information, 1994-2019 (2020)
3. Robustness and extensions:
   a) DADS-Panel: worker panel 1976-2019 (20), up to 8% of workforce → education
   b) EAP: survey on production, 2008-19 (20) → prices
   c) TIC Entreprises: survey on ICT, 2008-19 (20) → ERP, ICT, robots
   d) EAE Industrie: annual business survey, 1994-2007 → export, outsourcing

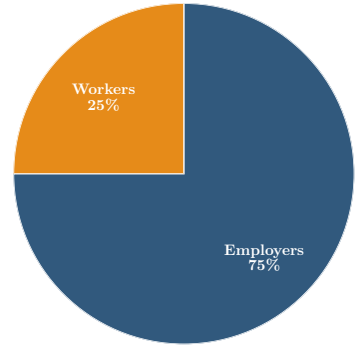
Summary Statistics

Results

Constant Bargaining Power

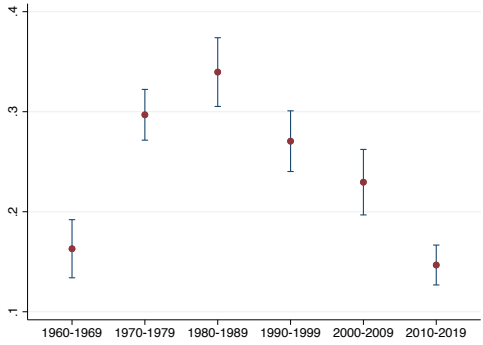


(a) United States



(b) France

Trends in Bargaining Power



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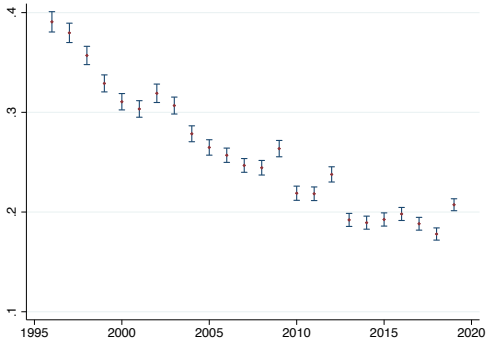

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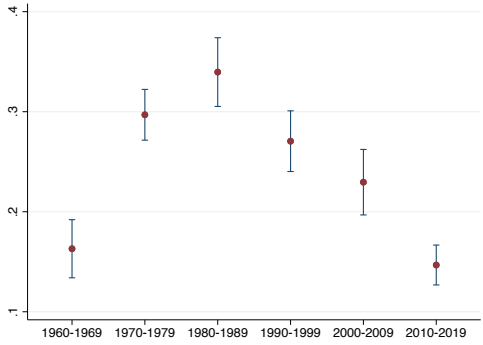
Trends in Bargaining Power



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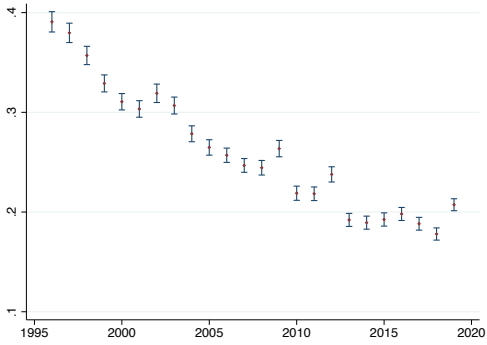

(b) France

FR Economy | Size | Work Stoppage | Regions | Industries | Manufacturing | Markdowns

Trends in Bargaining Power - Robustness

1. Firm Heterogeneity

Trends in Bargaining Power - Robustness

1. Firm Heterogeneity
   - Technical change

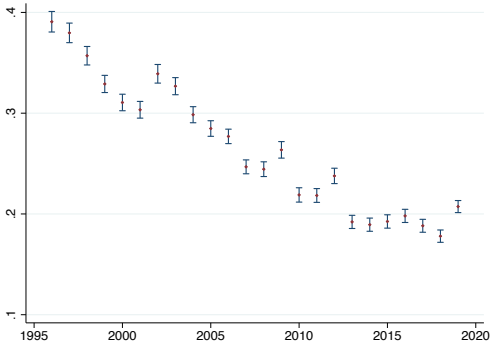

Figure: FR Manufacturing

More

Trends in Bargaining Power - Robustness

1. Firm Heterogeneity
   - Technical change
   - Technological differences

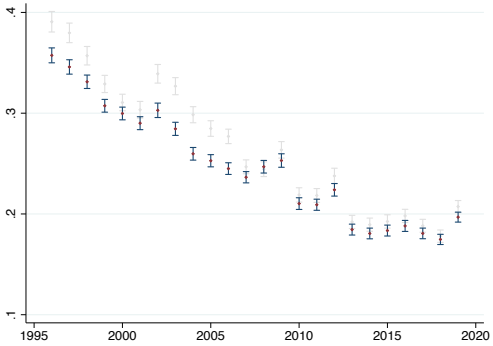

Figure: FR Manufacturing

More

Trends in Bargaining Power - Robustness

1. Firm Heterogeneity
   - Technical change
   - Technological differences
   - Product market power

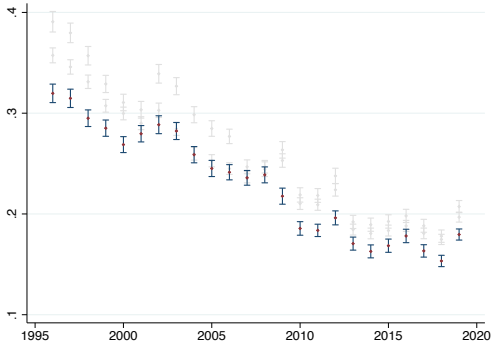

Figure: FR Manufacturing

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Trends in Bargaining Power - Robustness

1. Firm Heterogeneity
   - Technical change
   - Technological differences
   - Product market power
   - Intra-firm bargaining

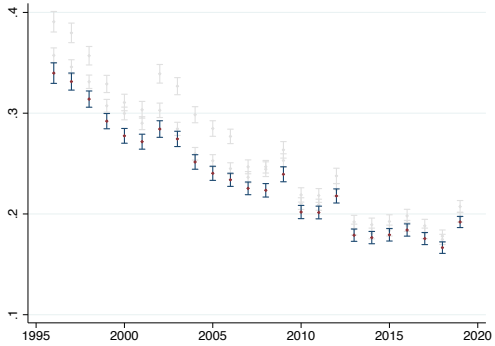


Figure: FR Manufacturing

More

Trends in Bargaining Power - Robustness

1. Firm Heterogeneity
   - Technical change
   - Technological differences
   - Product market power
   - Intra-firm bargaining
2. Worker Heterogeneity
   - Sorting

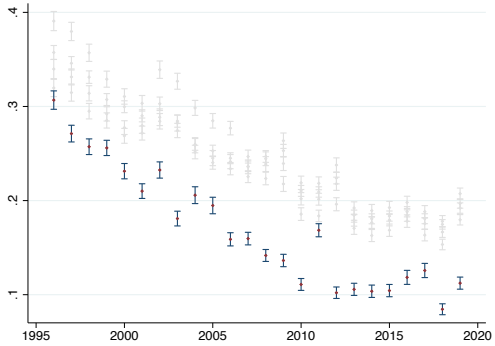


Figure: FR Manufacturing

More

Trends in Bargaining Power - Robustness

1. Firm Heterogeneity
   - Technical change
   - Technological differences
   - Product market power
   - Intra-firm bargaining
2. Worker Heterogeneity
   - Sorting
   - Occupation composition

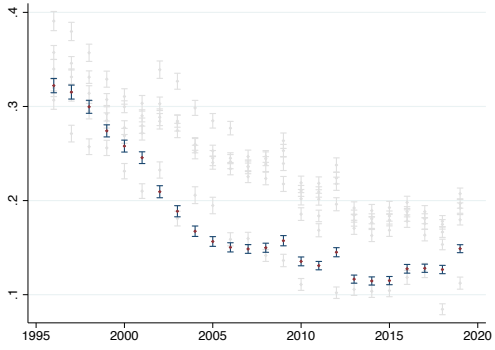


Figure: FR Manufacturing

More

Trends in Bargaining Power - Robustness

1. Firm Heterogeneity
   - Technical change
   - Technological differences
   - Product market power
   - Intra-firm bargaining
2. Worker Heterogeneity
   - Sorting
   - Occupation composition
   - Worker information

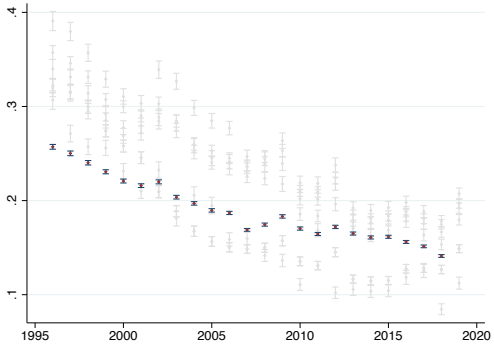


Figure: FR Manufacturing

More

Why Is This Important?

Compare steady states with highest and lowest WBP

Table: United States

Variable	Model		Data	
	80s	10s	80s	10s
Unemp	7.3	**6.1**	7.3	**6.3**
W/P	1	**0.91**	1	**0.72**
Barg. Power	0.34	0.15	0.34	0.15

→ policy interventions!

France Calibration

What Happened to Bargaining Power?

What Happened to Bargaining Power?

Find the sources of the decline

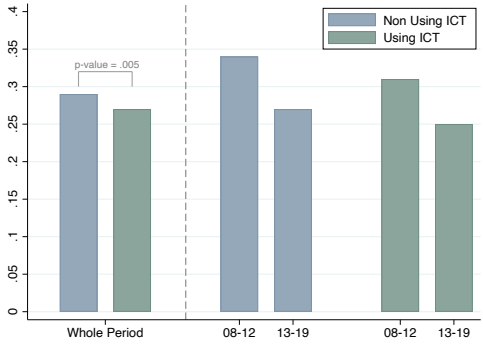
- distinguish firms and workers according to specific characteristics
- estimate differential BP

$$w_{it}^A = \tau^A \text{MPN}_{it} + \Omega_{it}^A + \varepsilon_{it}^A \quad \text{vs} \quad w_{it}^B = \tau^B \text{MPN}_{it} + \Omega_{it}^B + \varepsilon_{it}^B$$
$$w_{jit}^A = \tau^A \text{MPN}_{jit} + \Omega_{jit}^A + \varepsilon_{jit}^A \quad \text{vs} \quad w_{jit}^B = \tau^B \text{MPN}_{jit} + \Omega_{jit}^B + \varepsilon_{jit}^B$$

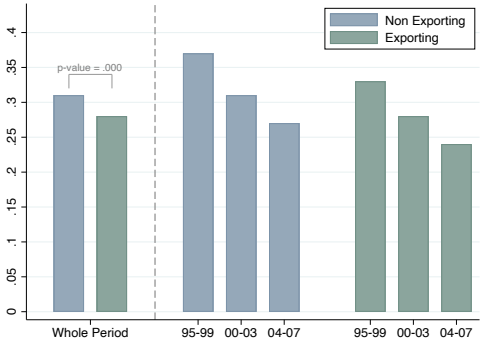
Two purposes

1. show differences across groups
2. study differential trends

Sources of Decline in Worker Bargaining Power

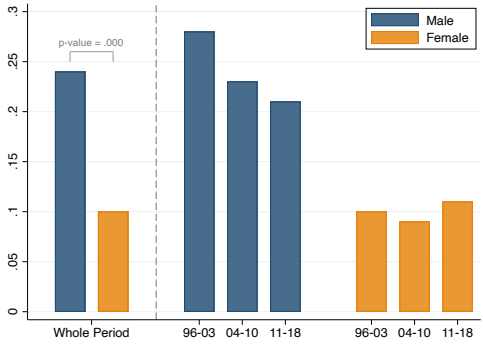


(a) Technology

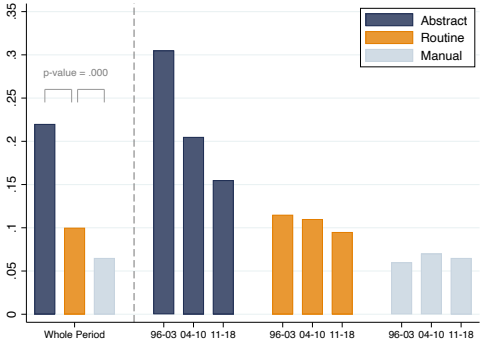


(b) Trade

Sources of Decline in Worker Bargaining Power



(a) Gender



(b) Occupation

Conclusions

Propose a novel method for estimating worker bargaining power

Measure time-varying bargaining power uncovering an aggregate decline

Help reconcile unemployment and labor share trends and design policy interventions

Such a decline is concentrated in non routine occupations and male workers

- technology, competition, trade, and outsourcing seem to play a smaller role

Ongoing projects: link to labor force participation, the effect of COVID

Thank you!

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Appendix

Non Profit Condition

$$\underbrace{\kappa}_{\text{Vacancy cost}} = \underbrace{\beta \mathbb{E}[q(\theta_t) J_{it+1}]}_{\text{Expected profits}}$$

back

Worker Problem

Workers

$$E_t = w_t + \beta \mathbb{E}[(1-s)E_{t+1} + sU_{t+1}]$$
$$U_t = b_t + \beta \mathbb{E}[p(\theta_t)E_{t+1} + (1-p(\theta_t))U_{t+1}]$$

Surplus from becoming employed:

$$E_t - U_t = w_t - b_t + \beta \mathbb{E}[(1-s-p(\theta_t))(E_{t+1} - U_{t+1})]$$

back

Firm Problem

Firm problem

$$\begin{aligned}\Pi_t = &\max_{v_t, k_t} \ \pi_t + \beta \mathbb{E}[\Pi_{t+1}] \\ \text{s.t. } &N_{t+1} = (1-s)N_t + V_t q(\theta_t) \\ &A_{t+1} = g(A_t) + \nu_{t+1}\end{aligned}$$

with $\pi_t = F(A_t, N_t) - w_t N_t - \kappa_t V_t$

back

Labor Market

Random search frictions: workers and firms meet at random

Matching function

- CRS, increasing in v and u
- $M(v,u) = Av^{\alpha}u^{1-\alpha}$

Tightness ratio: $\theta = \frac{v}{u}$

Exogenous separation: s

Job filling rate: $q(\theta) = \frac{M}{v}$

Job finding rate: $p(\theta) = \frac{M}{u} = \theta q(\theta)$

back

Summary Statistics for France

Table: Summary statistics

(a) Firms

	p1	p25	p50	p75	p99	Mean	N
Sales	113	510	1,041	2,406	41,756	3,231	8,987,284
Value Added	35	186	353	754	9,818	877	8,856,811
Materials	1	107	334	998	24,605	1,566	8,987,284
Capital	5	106	270	733	19,528	1,223	8,987,284

(b) Workers

	p1	p25	p50	p75	p99	Mean	N
Wages	5.5	10.0	12.1	15.9	43.3	14.2	227,043,310

Notes: this table shows summary statistics for firms and employees in the sample of analysis. All variables are real. Values for firms are in thousands of Euros, values for employees are in Euros.

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Summary Statistics for the US

Table: Summary Statistics

	All	Reporting	Non-Reporting	Δ
Revenues	1,185	3,849	924	2,925***
Capital	345	1,259	256	1,003***
Employees	6	21	5	16***
Wages	35	35	.	.
Observations	128,757	13,794	114,963	

Revenues and Capital are expressed in USD millions;

Number of Employees and Wages in thousands of workers and USD, respectively

back

Calibration

Parameter	US		France	
	Value	*Source*	*Value*	*Source*
Productivity (z)	1	normalization	1	normalization
Discount factor (β)	0.99	4% annual interest	0.99	4% annual interest
Bargaining power (τ)	0.34	own estimation	0.28	own estimation
Outside option (b)	0.4	Shimer (2005)	0.6	Cahuc et al. (2010)
Separation rate (s)	0.1	2001q1 - 2019q4	0.02	Hairault et al. (2015)
Matching elasticity (α)	0.22	Lange et al. (2020)	0.5	Cahuc et al. (2010)
Matching scale (A)	1	normalization	0.1	normalization

Calibration κ to match unemployment rate

back

Why Is This Important?

Compare steady states with highest and lowest WBP

Table: France

Variable	Model		Data	
	95	18	95	18
Unemp	11.8	**9.2**	11.8	**9.0**
W/P	1	**0.94**	1	**0.99**
Barg. Power	0.28	0.16	0.28	0.16

→ policy interventions!

back

Bargaining Power in the United States

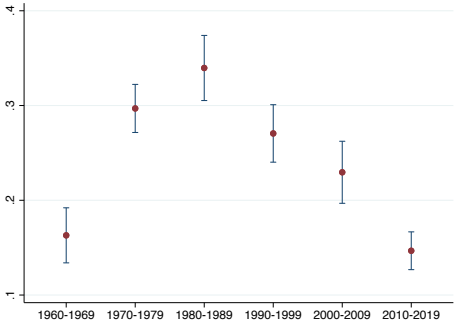

Figure: US Manufacturing

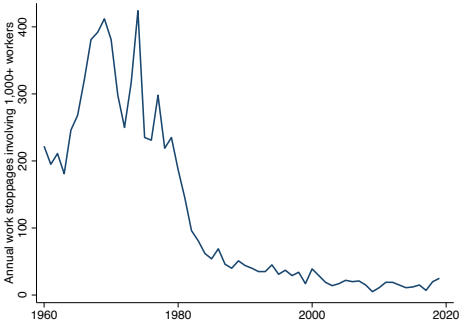

Figure: Work Stoppages

back

Bargaining Power in France

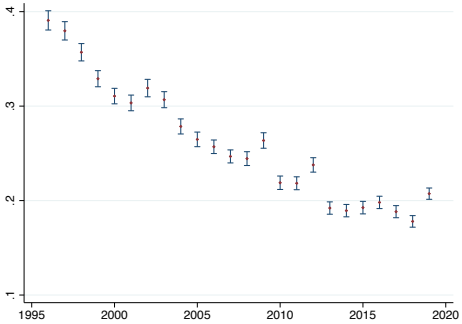

Figure: FR Manufacturing

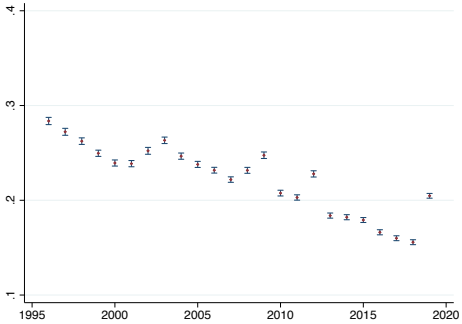

Figure: FR Total Economy

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Bargaining Power by Size

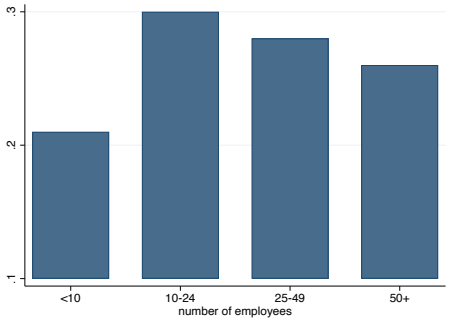


Figure: Constant

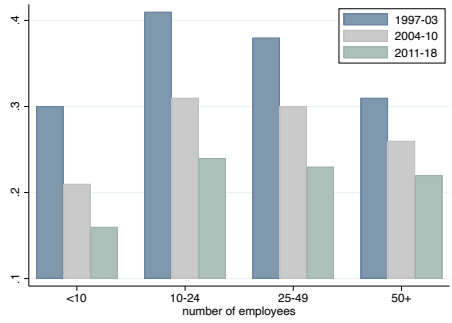


Figure: Time-varying

back

Trends in Bargaining Power: Regional Differences*

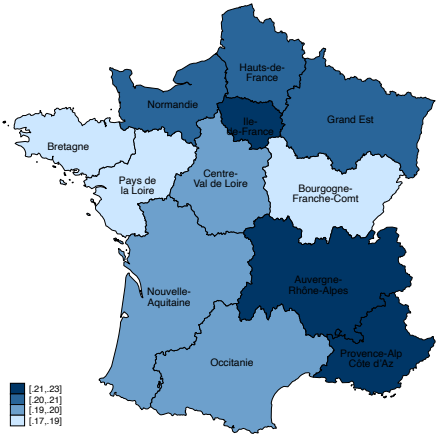


Figure: Bargaining Power

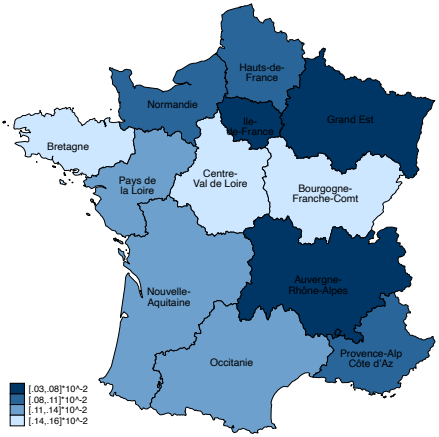
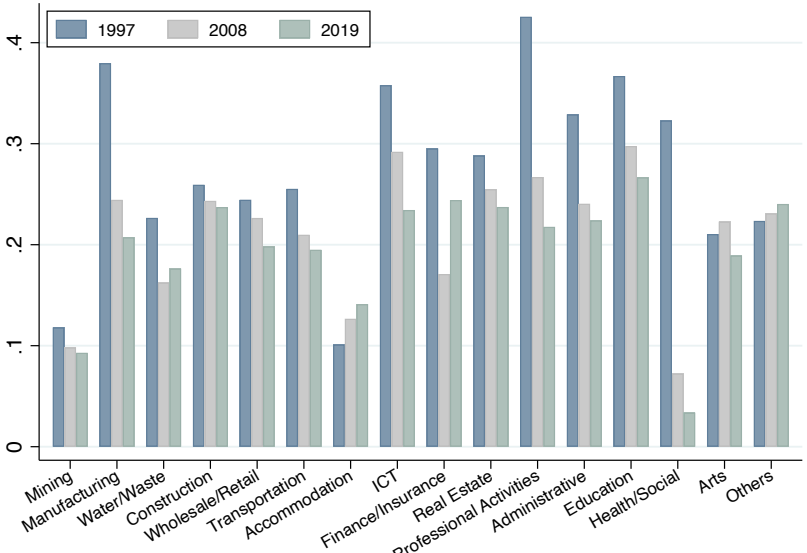


Figure: HHI (employment)

*only manufacturing firms operating in a single region

back

Trends in Bargaining Power: Industry Breakdown



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Trends in Bargaining Power: Breakdown in Manufacturing

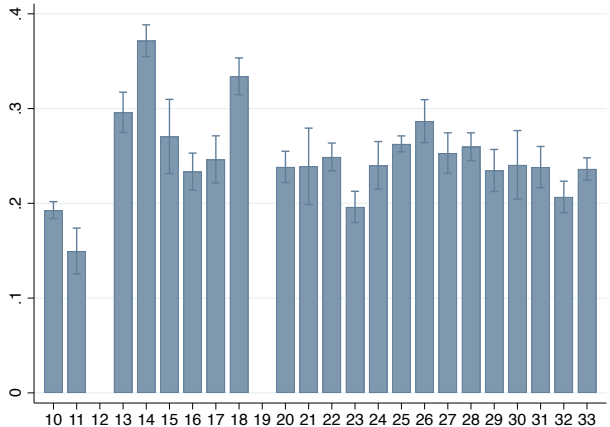

Figure: Bargaining Power

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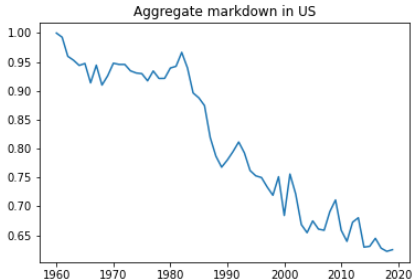
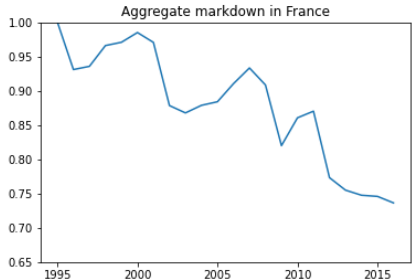
Bargaining vs Markdowns





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Measuring Workers' Productivity

$$\text{MPN} = \frac{\partial F(\cdot)}{\partial N} = \epsilon_{Y,N} \frac{Y}{N}$$

$\varepsilon_{Y,L}$ is unobservable and recovering it presents many challenges (Ackerberg et al. 2015)

- technology, competition

Olley & Pakes' intuition (control function approach):

1. firm productivity is unobservable to the econometrician but observable to the firm
   $\rightarrow$ use another observable variable to infer unobserved productivity
2. exploit the stochastic (first-order Markov) process of productivity

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Control Function Approach

Aim: recover Hicks-neutral productivity as a residual: $Y = AF(\cdot) \rightarrow A = Y/F(\cdot)$

Two main challenges:

1. what is in the residual?
2. what is $F(\cdot)$?

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1. $Y_{it} = A_{it} K_{it}^{\epsilon_K} N_{it}^{\epsilon_L}$

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1. $y_{it} = m_t^{-1}(m_{it}, \Omega_{it}) + \epsilon_K k_{it} + \epsilon_L n_{it} + \varepsilon_{it}$

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1. $y_{it} = \phi(m_{it}, k_{it}, n_{it}, \Omega_{it}) + \varepsilon_{it}$

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1. $y_{it} = \phi(m_{it}, k_{it}, n_{it}, \Omega_{it}) + \varepsilon_{it} \rightarrow \hat{y}_{it}$
2. $a_{it} = g(a_{it-1}) + \nu_{it}$

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2. $\underbrace{a_{it}}_{\hat{y}_{it} - \epsilon \times \{k,n\}_{it}} = g(\underbrace{a_{it-1}}_{\hat{y}_{it-1} - \epsilon \times \{k,n\}_{it-1}}) + \nu_{it}$

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Value added vs Gross Output, Cobb-Douglas vs Translog, Single labor vs multiple labor types, Revenues vs Quantities back

Instruments and Fixed Effects

IV: lagged productivity $\rightarrow$ structural identification

- relevance: Markov Process
- exclusion restriction: period-by-period renegotiation

FEs: industry $\times$ year $\rightarrow$ time variation but restrictive on the cross-section

- gradually relax introducing worker dimension

Final equation:

$$w_{ist} = \tau \underbrace{\text{MPN}_{ist}}_{\uparrow \text{MPN}_{ist-1}} + \Omega_{ist} + \varepsilon_{ist}$$

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Technical Change

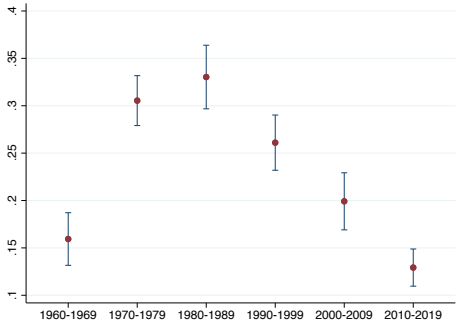

Figure: US

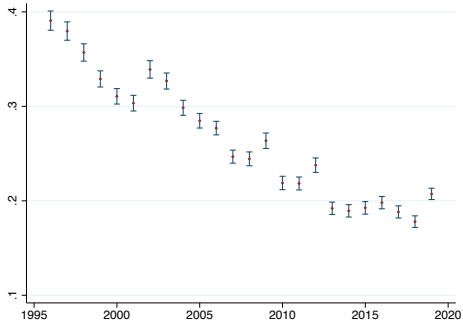

Figure: FR Manufacturing

Allowing the production function to vary every year

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Alternative Production Function: Translog

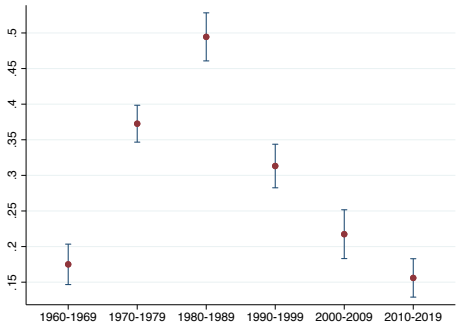

Figure: US

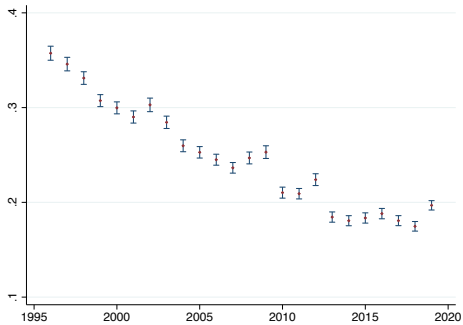

Figure: France

flexible and firm-specific production function:

$$y_{it} = a_{it} + \beta_K 1 k_{it} + \beta_K 2 k_{it}^2 + \beta_L 1 n_{it} + \beta_L 2 n_{it}^2 + \beta_K L k_{it} n_{it} + \varepsilon_{it}$$

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Bargaining Power with Heterogeneous Markups

Wage equation with market power in the output market

$$w = \tau \text{MRPN} + (1 - \tau)b + \tau\theta\kappa$$

Hence, in need of MRPN!

It takes the form: MRPN$=\frac{\beta_L}{\mu}\frac{PY}{N}$ $\rightarrow$ De Loecker & Warzynski's approach

Bargaining Power with Heterogeneous Markups

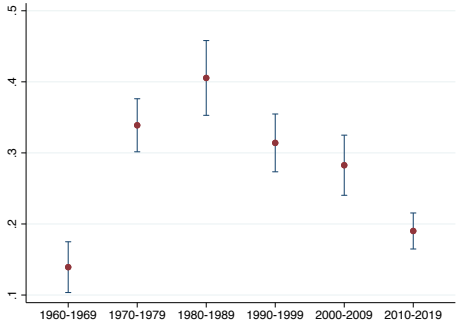

Figure: US

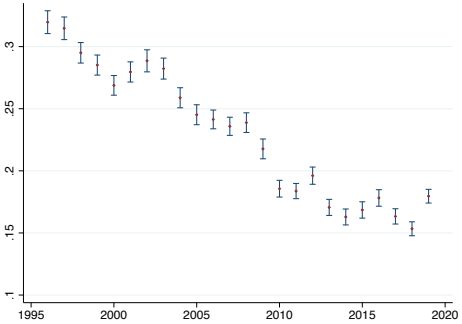

Figure: FR Manufacturing

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Wages with Multi-Worker Negotiation

Firms internalize effect of new hire on existing workforce:

$$w = \tau \left(\text{MPN} - N \frac{\partial w}{\partial N} \right) + (1 - \tau) b + \tau \theta \kappa$$

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$$w N^{\frac{1}{\tau}} = \int \frac{\text{MPN}}{N^{1 - \frac{1}{\tau}}} dN + \left[(1 - \tau) b + \tau \theta \kappa \right] N^{\frac{1}{\tau}} + C_2$$

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Additional assumptions:

1. Cobb-Douglas: $Y = AN^{\beta_L}K^{\beta_K} \quad \Rightarrow \quad \text{MPN} = \beta_L \frac{Y}{N}$

$$w = \frac{1}{(\beta_L + \frac{1}{\tau} - 1)}\text{MPN} + (1-\tau)b + \tau\theta\kappa + C_3 N^{-\frac{1}{\tau}}$$

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2. $\lim_{N\to 0} \underbrace{Nw}_{\text{Labor Cost}} = 0 \quad \Rightarrow \quad C_3 = 0$

$$w = \frac{1}{(\beta_L + \frac{1}{\tau} - 1)}\text{MPN} + (1-\tau)b + \tau\theta\kappa$$

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The Role Of Sorting

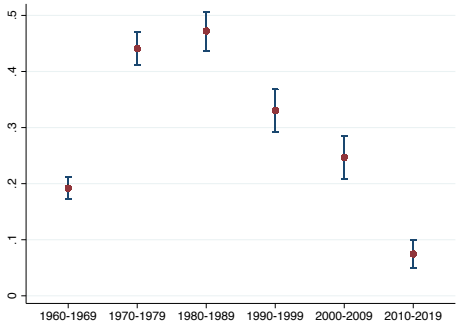

Figure: US

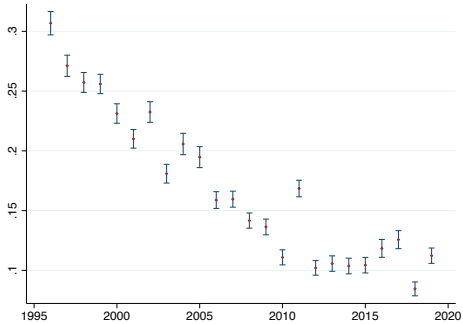

Figure: France

Estimation in first differences

→ Preliminary: don't find evidence for increasing sorting

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Controlling For Occupation Composition

Intuition: include occupation-specific components (FEs) (Wong, 2021; Chen et al., 2020)

Step 1: estimate occupation FEs (on random subsample, 20%)

$$\ln w^o_{jit} = \underbrace{\alpha^o_t}_{\text{occupation FEs}} + \underbrace{\psi_{i(j,t),t}}_{\text{firm}\times\text{t FEs}} + \underbrace{X_{jt}\Gamma_t}_{\text{worker controls}} + \varepsilon_{jit}$$

Step 2: construct firm-level "labor bundle" in efficiency units

$$\tilde{H}_{it} = \sum_j \exp(\alpha^o_t) h^o_{jit}$$

... estimate PFE, $Y_{it} = F_t(A_{it}, \tilde{H}_{it}, K_{it})$, and BP

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Comparing Occupation and Worker Ability

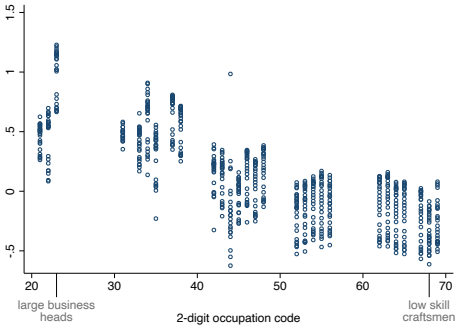

Figure: Occupation Ability

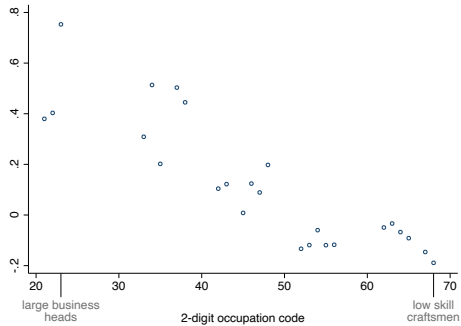

Figure: Worker Ability from 8% of workforce

Correlation $>$ .96

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Bargaining Power Controlling For Occupation Composition

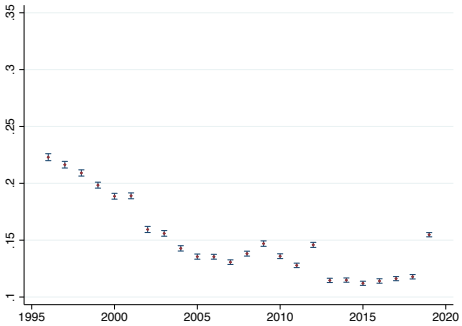

Figure: FR Total Economy

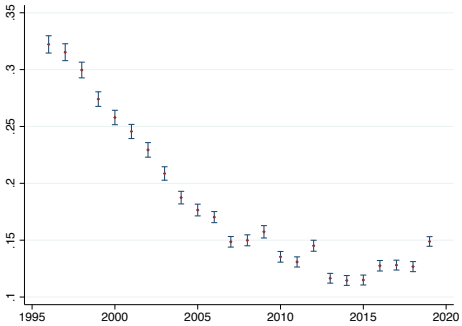

Figure: FR Manufacturing

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Including Worker Information

$$w_{jit} = \tau_t MPL_{it} + X_{jt}\Gamma_t + \delta_{st} + \varepsilon_{jit}$$

with X_{jt} including:

- polynomial in age
- gender, region, contract dummies

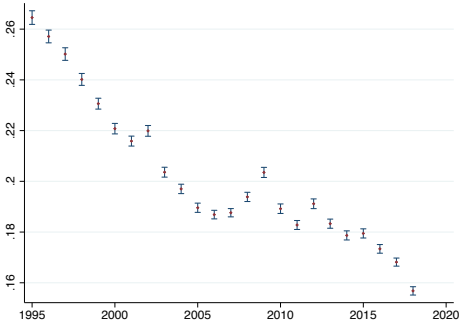

Figure: FR Manufacturing

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