The Fall of the Labor Share and the Rise of Superstar Firms

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This Paper

motivation

- ▶ Global fall in labor share well documented, but less well understood
- ▶ Investigating labor share using establishment micro data enables closer look into underlying economics

'superstar firm' hypothesis

- ▶ Many markets characterized by "winner-takes-most"
- ▶ Large firms with higher profits and lower labor share
- ▶ If globalization/technology increasingly favor industry leaders:
  ⇒ market concentration ↑
  ⇒ aggregate labor share ↓

Potential Explanations for Concentration

- ▶ Check Technology, Trade, business dynamism, computer investment, routine labor exposure
- ▶ Finding: mainly driven by technology

This Presentation & Relation to Our Series

▶ Paper on reading list due to emphasis on technology as driver in AER p&p version

▶ Focus in the end: empirical exploration of aggregate macroeconomic trends

▶ This focus ties into a growing literature

▶ Question in our context: *What are potential channels for technology to impact economy?*

▶ This presentation: overview of current macroeconomic trends

  – Autor et al. in detail
  – De Loecker and Eeckhout in brief
  – Common themes and relation to technology
  – Outlook

Autor et al. modeling framework: Sketch – Environment

- ▶ Value-added production function: $Y_i = A_i V_i^{1-\alpha} K_i^{\alpha}$

- ▶ TFPQ term A_i heterogeneous across firms

- ▶ Crucial: higher $A_i \rightarrow$ higher input levels, higher sales

- ▶ fixed cost in terms of labor F, i.e. total labor $L = V + F$

- ▶ factor markets perfectly competitive

- ▶ product markets imperfectly competitive

- ▶ fixed entry cost κ for drawing productivity parameter

Modeling framework: Sketch (2) – Labor Share

- ▶ from static FOC for labor, labor share in value added derived as

$$S_i \equiv \frac{wL_i}{P_iY_i} = \frac{1-\alpha}{\mu_i} + \frac{wF}{P_iY_i}$$

- ▶ Lower labor share if
  - higher markup $\rightarrow$ generally constant or increasing in A_i, depending on model of competition
  - higher output $\rightarrow$ generally increasing in A_i

- ▶ Generally: shocks favoring high A_i firms will skew distribution further and lower aggregate labor share, e.g.
  - increase in consumer sensitivity to price/quality
  - increase in fixed cost of production
  - increase in fixed cost of entry

Modeling framework: Sketch (3) – testable implications

- ► Version of the model: monopolistic competition

- ► Exercise: increase in product market competition – product substitutability $\rho \uparrow$

- ► Model predictions:

  1. within-industry sales concentration $\uparrow$

  2. fall in labor share mainly driven through between-firm reallocation rather than within-firm changes

  3. in industries with highest Δ in concentration, labor share will drop most

  4. effects should not be confined to the US

Data

- detailed US and (less) detailed international data
- here: focus on US
- quinquennial economic census, 1982-2012
  - 6 sectors:
    manufacturing/retail/wholesale/services/finance/utilities
  - 80% of total private sector employment
  - assign plants to time consistent industry concordance based on
    1987 sic codes
  - 676 industries, of which 388 manufacturing
  - variables (all industries): annual payroll, employement, output
    plus firm identifier
  - add. vars (manufacturing): value added
- additional data:
  - KLEMS data for European countries plus for US intermediate
    inputs (services)
  - comtrade data on imports to adjust for size of domestic market
  - ECB CompNet data, firm level, covering European markets
  - Orbis data on european countries

Empirical Methodology

Correlation analysis

► Regress labor shares on sales concentration changes

$$\Delta S_{jt} = \alpha \Delta CONC_{jt} + \tau_t + u_{jt}$$

– τ_t full set of time dummies

– standard error clustered at industry level

Decomposition of changes

► Establish importance of within- and between-firm changes in labor shares

► Define aggregate labor share in levels as

$$S = \sum \omega_i S_i = \bar{S} + \sum (\omega_i - \bar{\omega})(S_i - \bar{S})$$

– ω_i: firm's share in industry value-added, $\sum \omega_i = 1$

– $\bar{S}$ unweighted mean industry labor share

► In changes:

$$\Delta S = S_2 - S_1 = \underbrace{\Delta \bar{S}}_{\text{within}} + \underbrace{\Delta \sum (\omega_i - \bar{\omega})(S_i - \bar{S})}_{\text{between}}$$

Evidence 1: Labor Share Concentration – Manuf/Finance

Figure 3: Average Payroll-to-Sales Ratio

Panel A: Manufacturing

Panel B: Finance
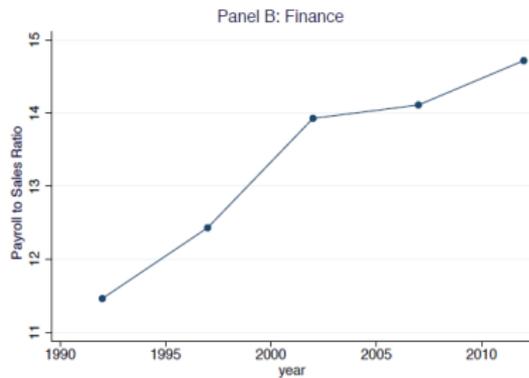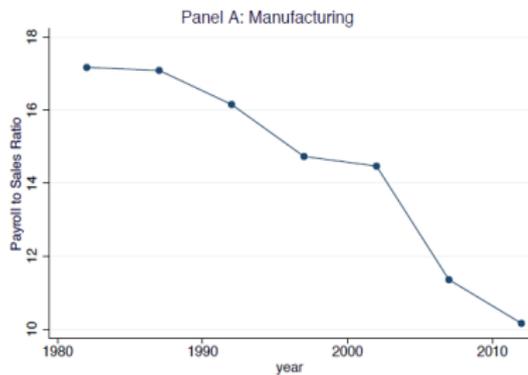
Evidence 1: Labor Share Concentration – other sectors
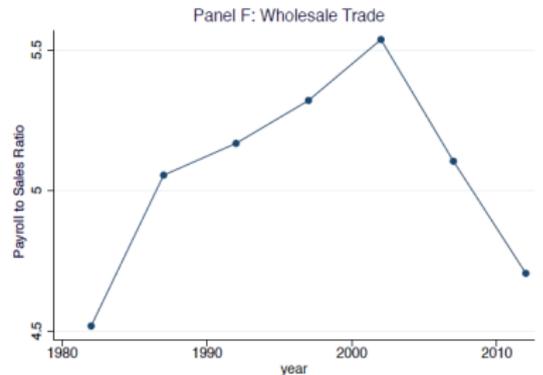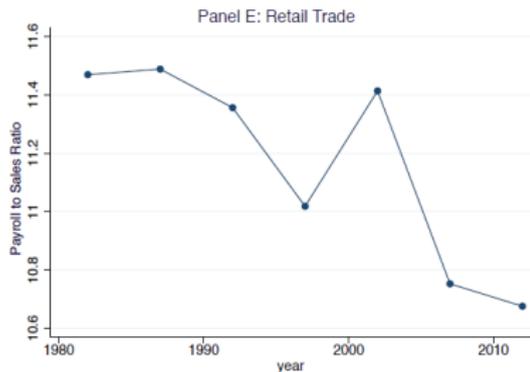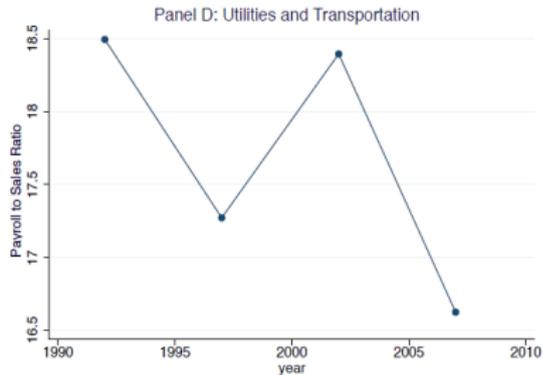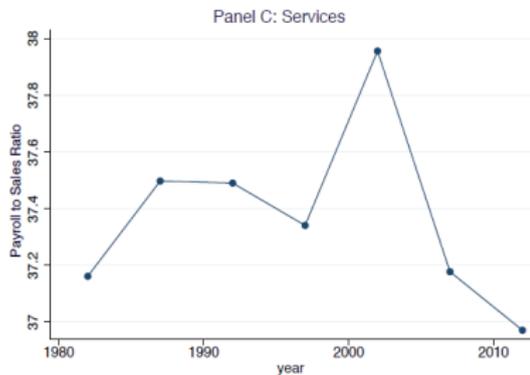
Evidence 2: Sales Concentration

Figure 4: Average Concentration Across Four Digit Industries by Major Sector
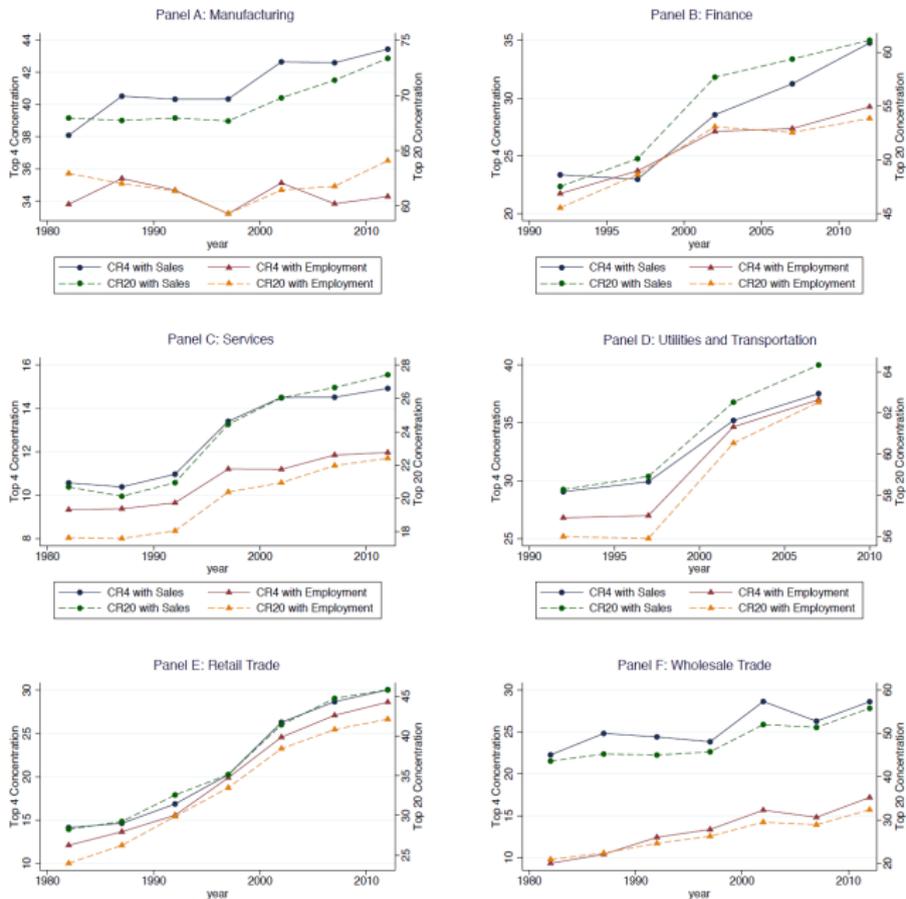
Evidence 3: Labor Share and Firm Size

Figure 5: The Relationship Between Firm Size and Labor Share
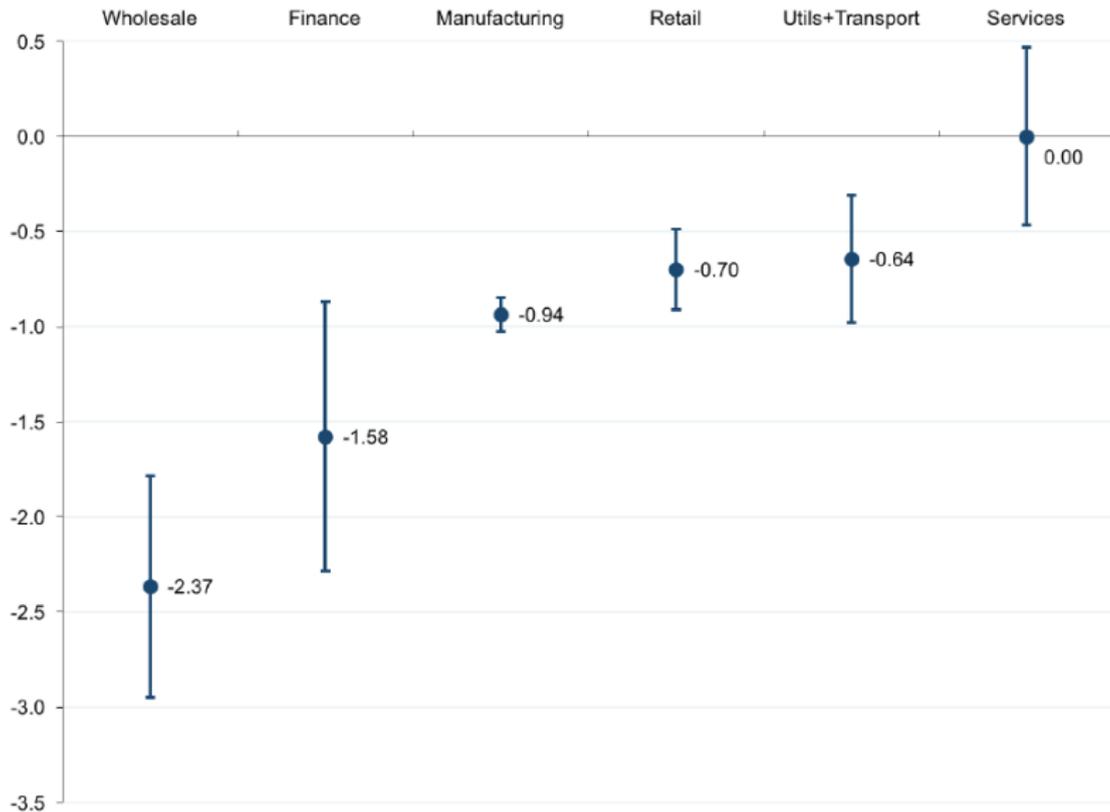
Evidence 4: Δ Labor Share and Δ Concentration

Figure 6: The Relationship Between the Change in Labor Share and the Change in Concentration Across Six Sectors
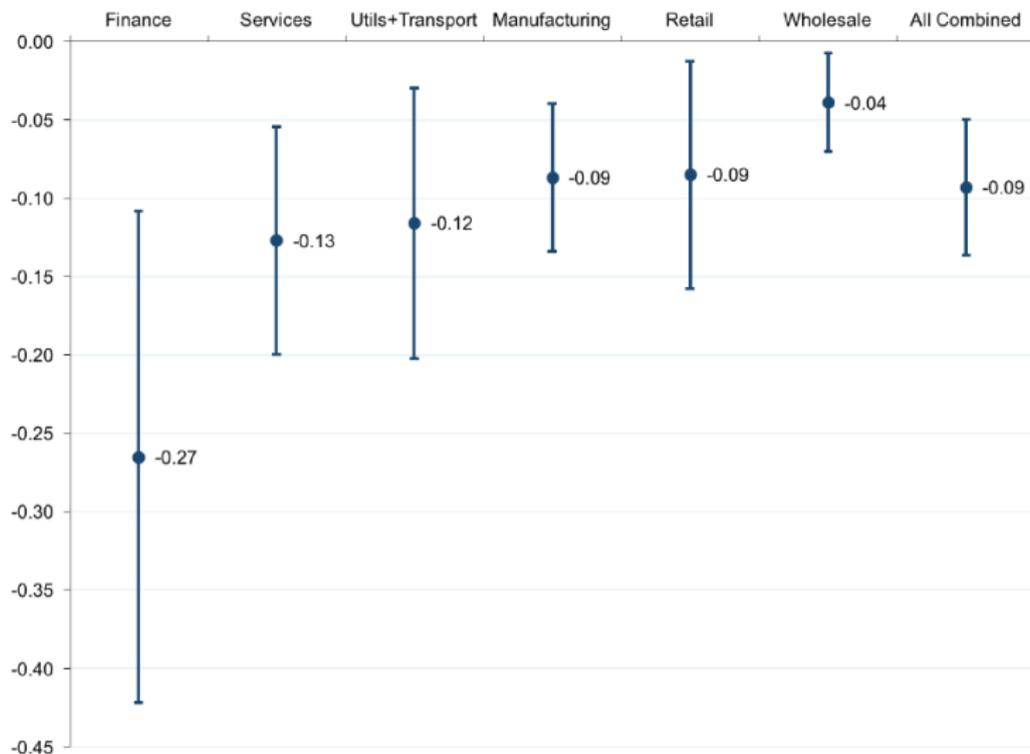
Evidence 5: Decomposition of Δ Labor Share

Figure 9: Melitz-Polanec Decomposition of the Change in Labor Share in Manufacturing

Period A: 1982 - 1997   Period B: 1997 - 2012

2.3%   -2.7%   -7.9%   -2.2%   -0.7%   2.3%   -4.9%   -2.8%

□ Entry   ■ Exit   ■ Between   □ Within
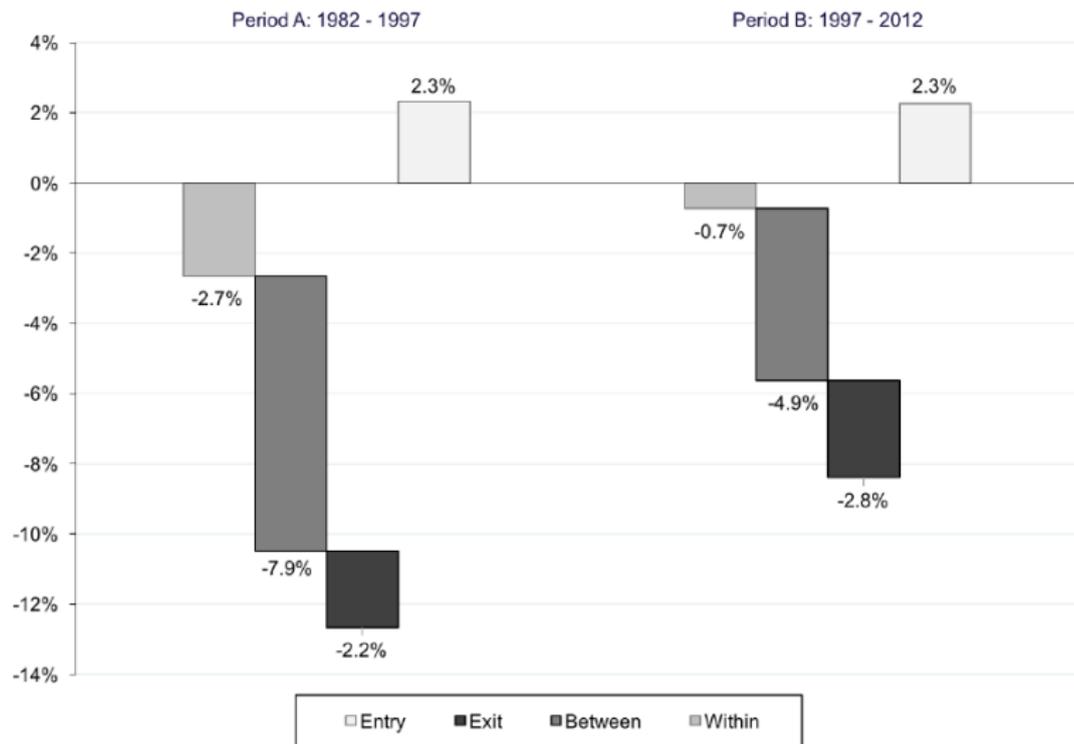
Evidence 6: Relating Δ LS, Δ Conc. to between-within

Figure 11: Regressions of the Components of the Change in Labor Share on the Change in Concentration
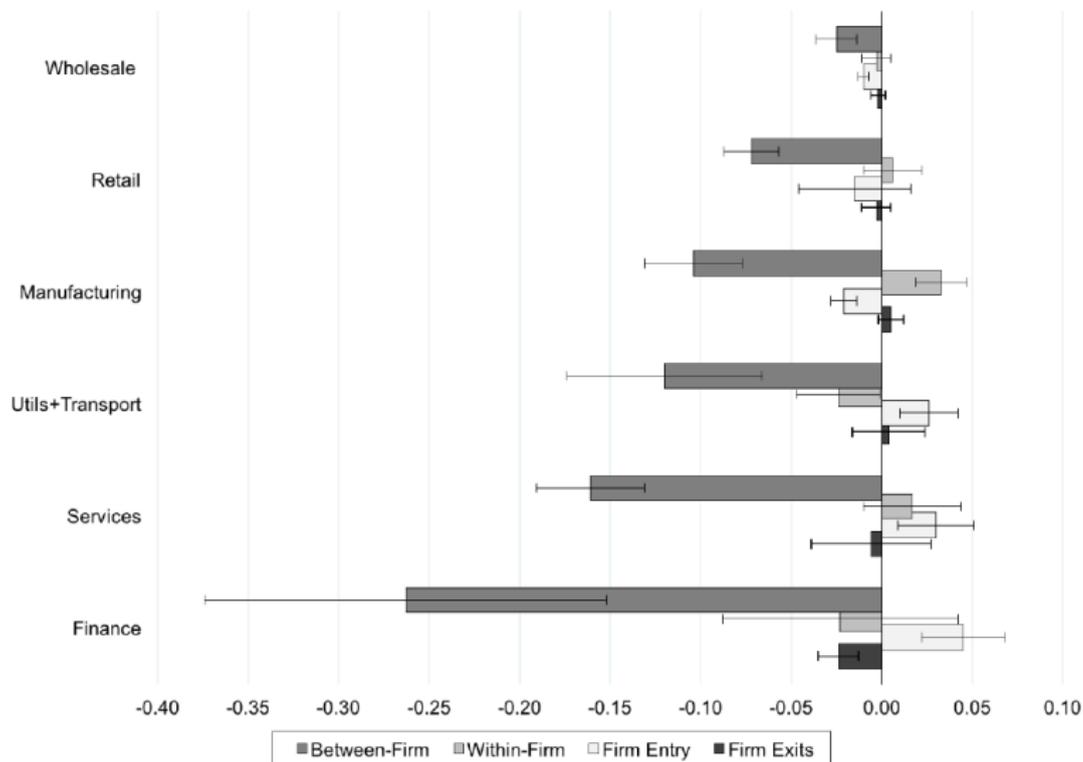
Evidence 7: Explaining Corr(Δ LS, Δ Concentration)

Figure 14: Change in Concentration in U.S. Manufacturing and Change in Industry Characteristics
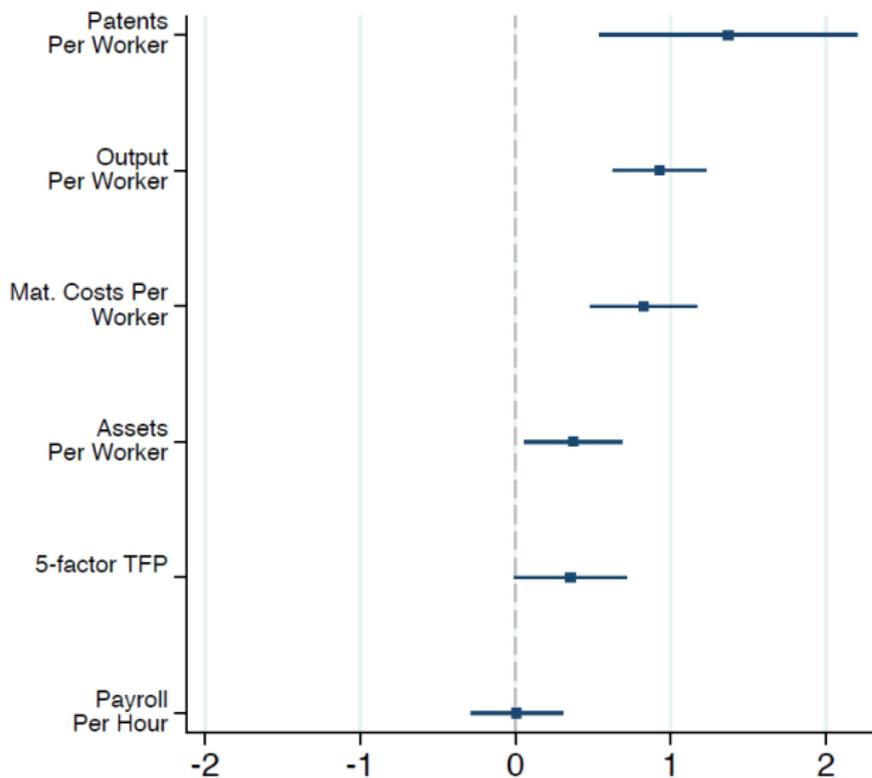
Evidence 8: Explaining Corr(Δ LS, Δ Concentration)

Table A.6: The Labor Share and the Rise in Chinese Imports

|	Sales (1)		Wages (2)		Value Added (3)		CR4 (4)	CR20 (5)	HHI (6)		Labor Share (7)		Payroll-to-Sales (8)	
OLS Estimates														
Sample 1: 1992-2012														
5 year Changes	-1.967	**	-0.485	~	-0.805	*	0.563	0.234	1.630		7.070	*	2.034	
	(0.76)		(0.28)		(0.36)		(4.66)	(5.11)	(2.12)		(3.16)		(1.85)	
10 year Changes	-1.717	*	-0.487		-1.026		-12.514	-2.577	-4.780		13.634	**	5.506	
	(0.75)		(0.67)		(0.89)		(10.48)	(11.80)	(4.20)		(3.16)		(3.54)	
IV Estimates														
Sample 1: 1992-2012														
5 year Changes	-3.693	**	-0.855	*	-1.156	**	6.027	4.765	6.814	*	6.695	*	2.457	
	(1.42)		(0.36)		(0.42)		(5.07)	(4.94)	(3.38)		(3.24)		(1.83)	
10 year Changes	-4.553	**	-1.043		-1.788	~	-1.973	11.178	4.962		16.375	**	8.067	*
	(1.75)		(0.80)		(0.98)		(13.60)	(13.76)	(7.49)		(3.24)		(3.72)	
Sample 2: 1992-2007														
5 year Changes	-2.667	**	-1.125	**	-1.237	**	16.295 ~	10.442 *	12.681	*	0.321		-1.29	
	(1.00)		(0.41)		(0.42)		(9.00)	(4.56)	(5.90)		(3.24)		(1.48)	
10 year Changes	-3.024	**	-1.961	**	-2.314	**	20.47	11.974 ~	18.405	*	6.443		0.21	
	(1.01)		(0.73)		(0.81)		(15.22)	(6.99)	(9.22)		(6.05)		(1.70)	

Trade and IV Strategy

- ▶ Previous evidence links labor shares and import intensity (Elsby, Hobijn and Sahin, 2013, Brookings)

- ▶ Redo this exercise here, focus on manufacturing data

- ▶ Same IV strategy as in Autor, Dorn and Hanson (2013, AER)
    - Instrument US import shares from China with Chinese import shares of 8 European countries
    - Underlying concern: import shares correlated with industry demand shock
    - since demand shock likely to have direct employment impact, OLS estimates potentially biased
    - Aim with IV: focus on variation in Chinese import demand driven by Chinese supply shocks, orthogonal to US demand

- ▶ positive result opposite of EHS13

- ▶ explanation: main driver manufacturing as opposed to trade

Conclusion & Comments

Conclusion

- ▶ Investigate fall in labor share using firm level data

- ▶ Sketch a model of 'superstar firms' as explanation

- ▶ Show that micro data patterns support predictions from the theory

- ▶ potential explanation: technology driven

Comments

- ▶ primarily descriptive paper

- ▶ underlying economic mechanisms only touched upon

- ▶ complementary literature also pointing to firms as drivers

Complementary literature: De Loecker and Eeckhout (2017)

- ▶ estimate markups for public US firms since 1960s
- ▶ Findings:
  - – markups have gone up from 20% up to 1980 to $> 60\%$ in 200s
  - – economy wide, driven by small firms
  - – within industries, driven by large firms
  - – indicates that firm size distribution differs across industries
  - – markup increase driven by top end of markup distribution, i.e. high markup firms increase markups even further.
- ▶ Explanations: Market power vs technology
  - – variable vs fixed costs of production
  - – but: profit measures tightly related to markups
- ▶ Like Autor et al.: Market concentration story

Why has concentration/market power gone up?

- ▶ Open question

- ▶ loose list of speculative answers

    - Increased rate of innovation: first-mover advantage

    - Increased importance of network goods

    - Deregulation

    - ...

- ▶ How might AI/technological progress come into play?

    - (potentially large) fixed cost of adoption

    - access to training data

    - scalability

How to move on from here? Bigger Picture

How to define AI/technological progress?

- ▶ Literature so far: AI does things only humans could do

    - task based framework, focus on labor markets

    - race between HK/machines, looming immiseration

    - more: e.g. Sachs and coauthors (2012, 2015)

- ▶ Potential alternative: AI makes capital *more flexible*

    - already happening: 3D-printing, platform based cars, etc.

    - implications for product differentiation/customization $\rightarrow$ consumer surplus?

    - implications for boundary of the firm/IO/market structure?

    - possible framework?

How to move on from here? Next presentations

- forthcoming NBER volume from recent conference on AI and Economics http://papers.nber.org/books/agra-1

Literature

[1] [[1]]David Autor, David Dorn, Lawrence F Katz, Christina Patterson, John Van Reenen, et al. The fall of the labor share and the rise of superstar firms. Technical report, Centre for Economic Performance, LSE, 2017.

[2] [[2]]H David, David Dorn, and Gordon H Hanson. The china syndrome: Local labor market effects of import competition in the united states. *The American Economic Review*, 103(6):2121–2168, 2013.

[3] [[3]]Jan De Loecker and Jan Eeckhout. The rise of market power. 2017.

[4] [[4]]Michael WL Elsby, Bart Hobijn, and Ayşegül Şahin. The decline of the us labor share. *Brookings Papers on Economic Activity*, 2013(2):1–63, 2013.

[5] [[5]]Jeffrey D Sachs, Seth G Benzell, and Guillermo LaGarda. Robots: Curse or blessing? a basic framework. Technical report, National Bureau of Economic Research, 2015.

[6] [[6]]Jeffrey D. Sachs and Laurence J. Kotlikoff. Smart machines and long-term misery. Working Paper 18629, National Bureau of Economic Research, December 2012.