



Programme on
Innovation and Diffusion

The Rise of Superstar Firms: Causes and Consequences

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DG-COMP
October 19th 2022



Draws on (ongoing) work with many coauthors, especially

- de Loecker, Obermeier and Van Reenen (2022) “Firms and Inequality” *Deaton Inequality Review*
- Amiti, Duprez, Konings and Van Reenen (2022) “Superstar Spillovers”
- Autor, Dorn, Katz, Patterson and Van Reenen “The Fall of the Labor Share and the Rise of Superstar Firms” (2020, QJE) & ongoing work
- Bloom, Sadun, Schuh and Van Reenen (2021) “Management as Capital”
- **My annual NBER/POID/SRF “Mega Firms” conference with Chad Syverson**
<https://www.nber.org/conferences/megafirms-and-post-covid-economy-spring-2022>

Forbes

*Apple Becomes 1st
Company Worth \$3 Trillion—
Greater Than The GDP Of
The UK*



Forbes, Jan 3rd 2022

Market Valuation at start of 2022 (GAFAMs)

- **Apple** \$3 Trillion



- **Microsoft** \$2.53 Trillion



- **Google/Alphabet** \$1.92 Trillion



- **Amazon** \$1.69 Trillion



- **Facebook/Meta** \$0.93 Trillion



- Growth has been supercharged by COVID's push to online, but has been going on long before the Pandemic

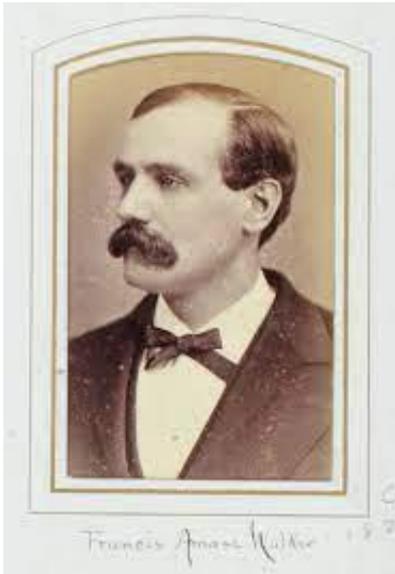
Introduction

- Growth of Superstar Firms goes beyond digital sector
- Concern that product market power has generally increased
- Potential welfare costs – living standards (prices & real wages); productivity & innovation; falling labor share & inequality
- Broader concerns around democracy (e.g. lobbying to shift “rules of the game”); privacy, etc.

Introduction

- Explosion of micro data on firms that shows huge cross-sectional differences in terms of size, productivity, exports, management practices....

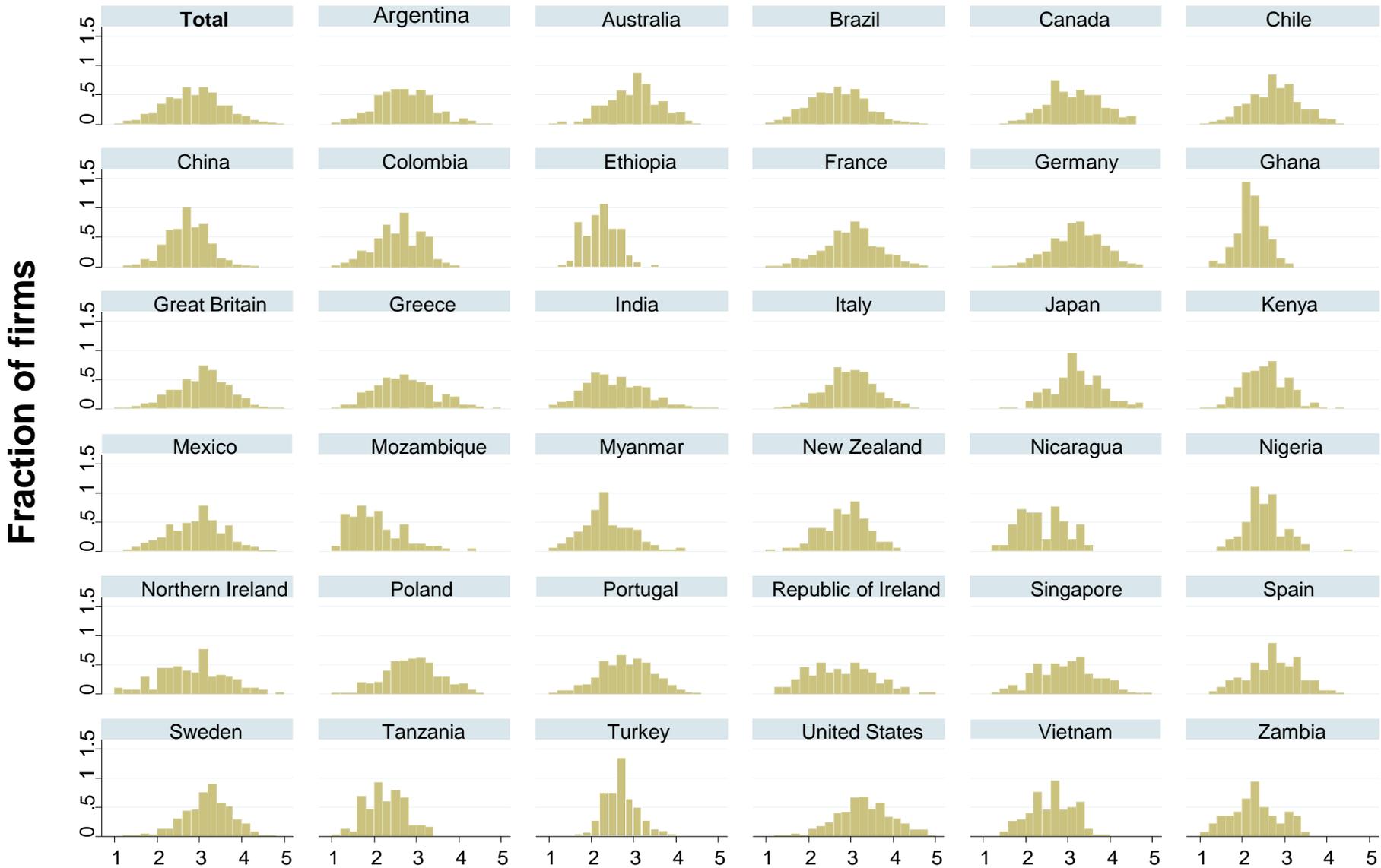
Francis Walker



Robert Gibrat



Example: Firm Management quality varies enormously



Notes: Firm level average management scores, 1 (worst practice) to 5 (best practice). [World Management Survey](#) data from Scur et al (2021)

Introduction

- This heterogeneity matters for macro growth & productivity comparisons between countries
- Importance of firm heterogeneity always been critical to IO, but has now been accepted through most economic fields – e.g. trade, labor, macro, development, etc.
- So cross sectional firm dispersion well established, but
 - Less well-known is that these differences have **increased** over time in US & many/most OECD countries

Summary

- Industrial concentration has increased generally since 1980s
 - not the same as well-defined anti-trust market conc.
- Aggregate gross markups **seem** to have increased
- Reasons not well understood, but likely more due to technology than institutions
- Does not mean that superstar firms have an inherent advantage in innovation due to their size/market power
- Implications for policies in product & labor markets

Agenda

Increasing differences across firms

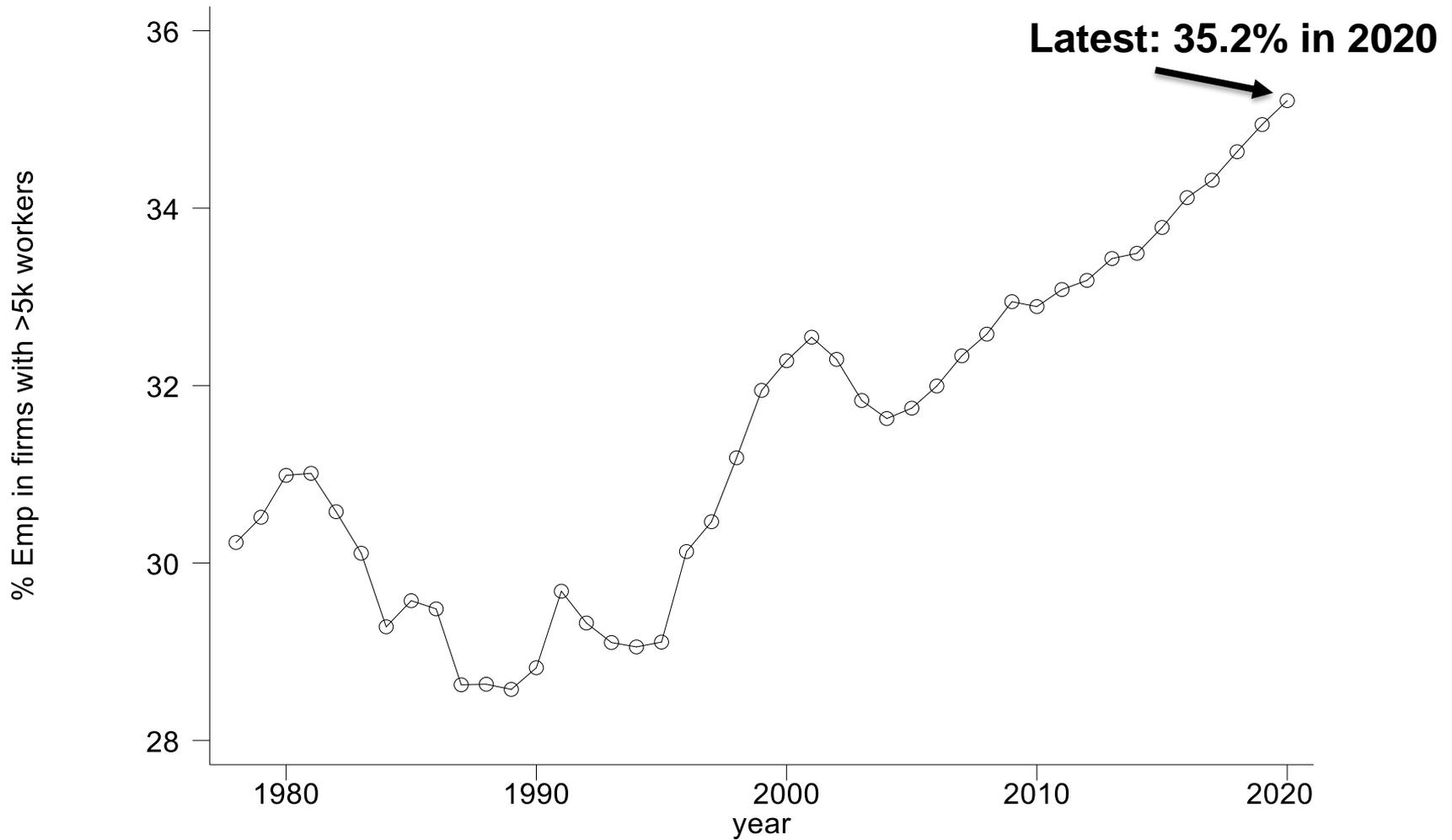
Markups

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Since mid '80s, Big Firms get bigger: % domestic jobs in US firms with 5,000+ workers rose ~28% in '87 to ~35% in 2020

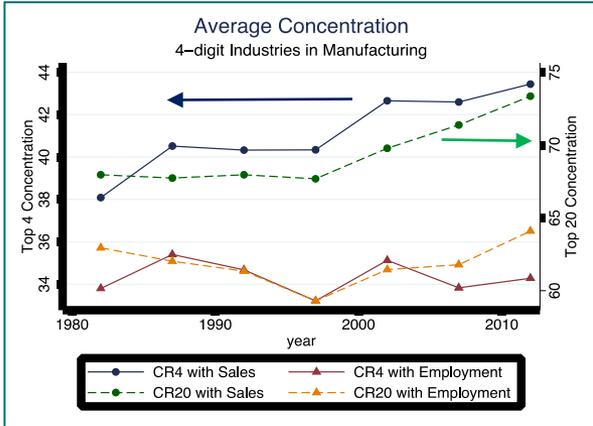


Source: US Business Dynamics Statistics (2022),

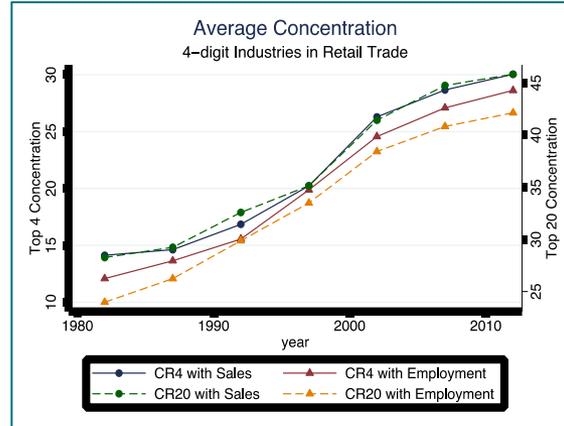
<https://www.census.gov/data/datasets/time-series/econ/bds/bds-datasets.html>

Rising Sales Concentration in US SIC4 since 1982

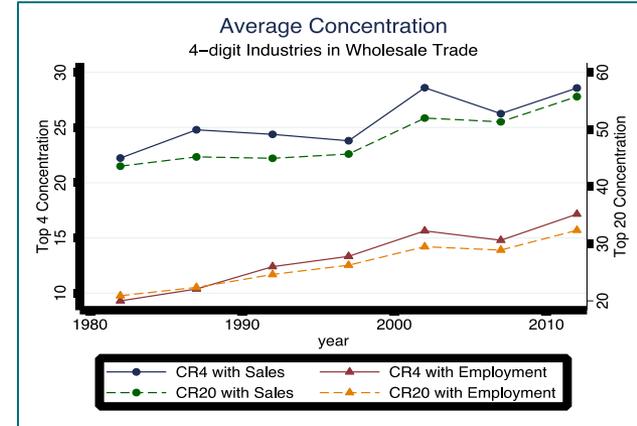
Manufacturing



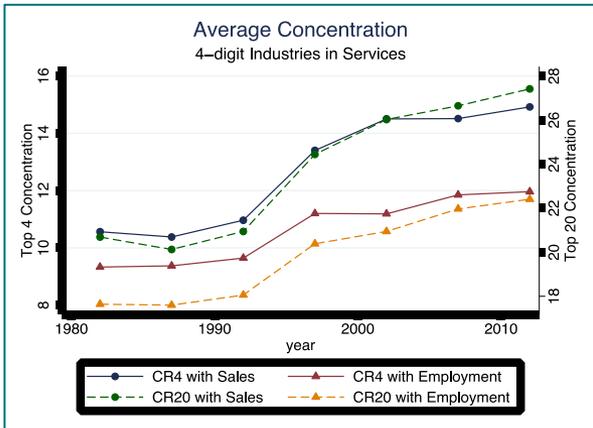
Retail Trade



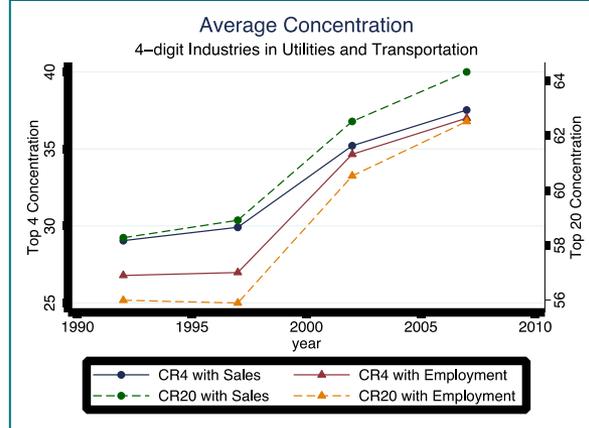
Wholesale Trade



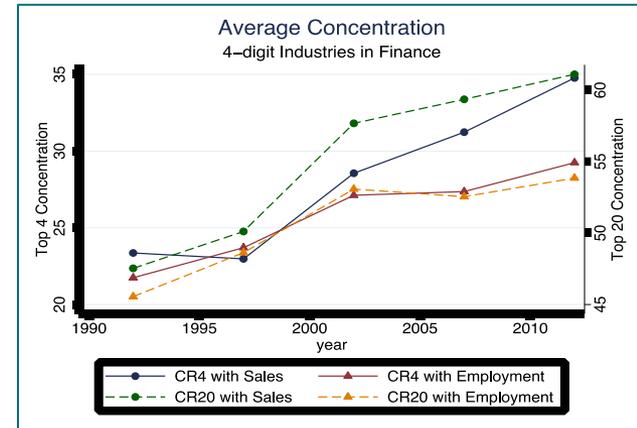
Services



Utilities + Transportation

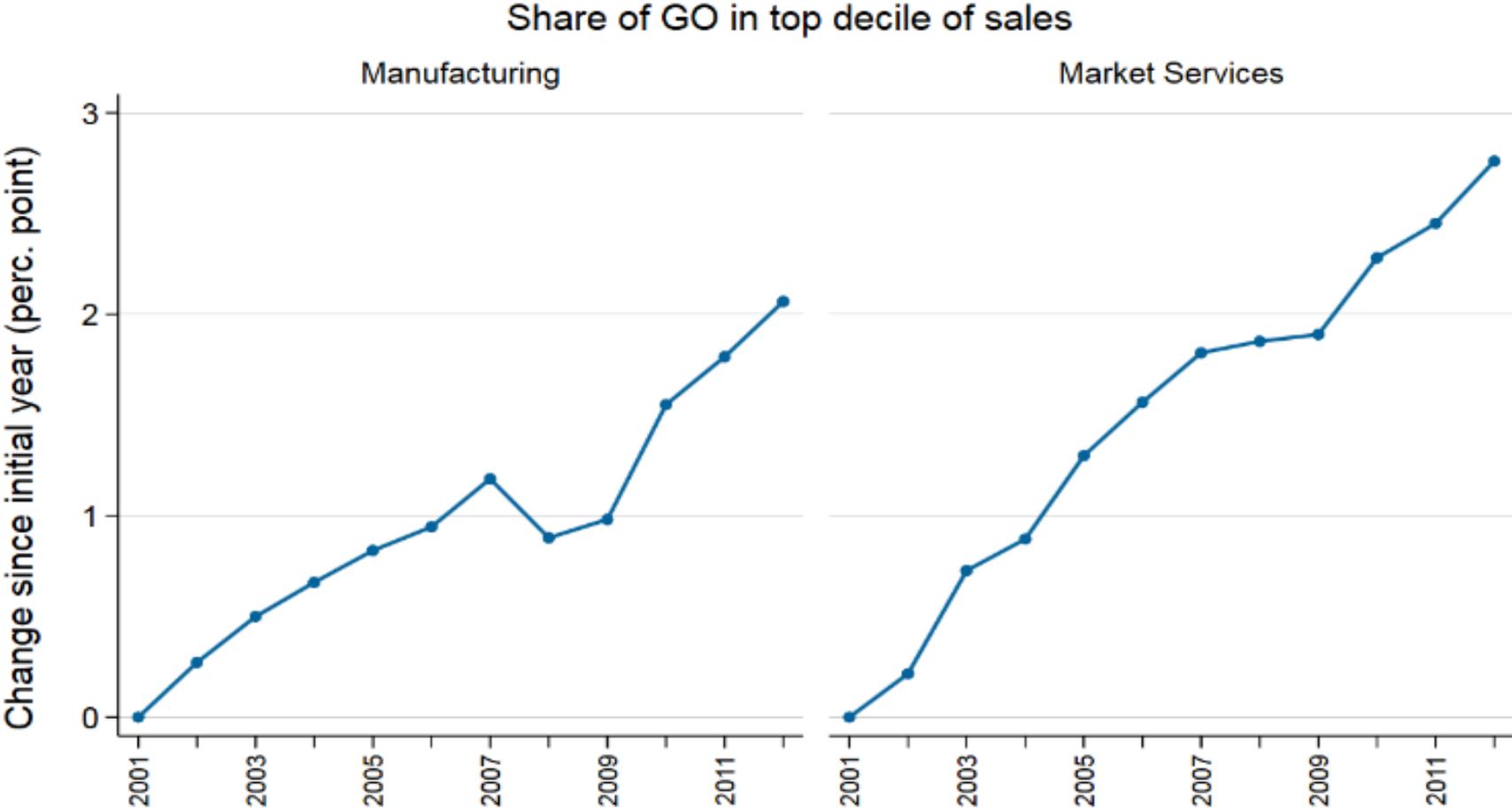


Finance



Notes: Autor, Dorn, Katz, Patterson & Van Reenen (2020) from Economic Census; Weighted av. of concentration across the SIC-4's within each sector. 676 SIC4 industries underlying this.

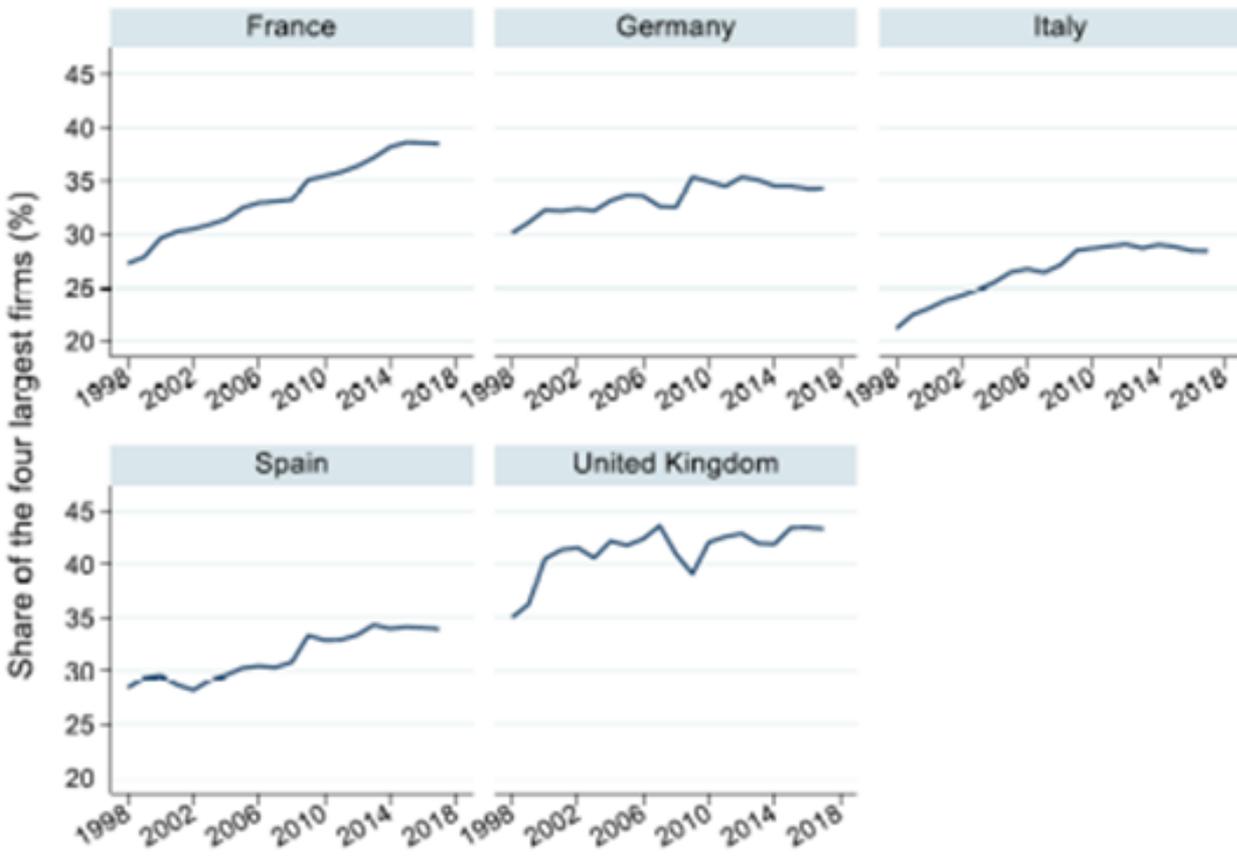
Like US, Sales Concentration has also increased in Europe (country by industry Census micro data)



Source: OECD Multiprod, <https://www.oecd.org/sti/ind/multiprod.htm>; Criscuolo (2018)

Notes: Year effects from regressions with country-industry dummies and year dummies (BEL, DEU, DNK, FIN, FRA, HUN, NOR, PRT, SWE)

Like US, Sales Concentration seems to have increased in Europe (company accounts data)



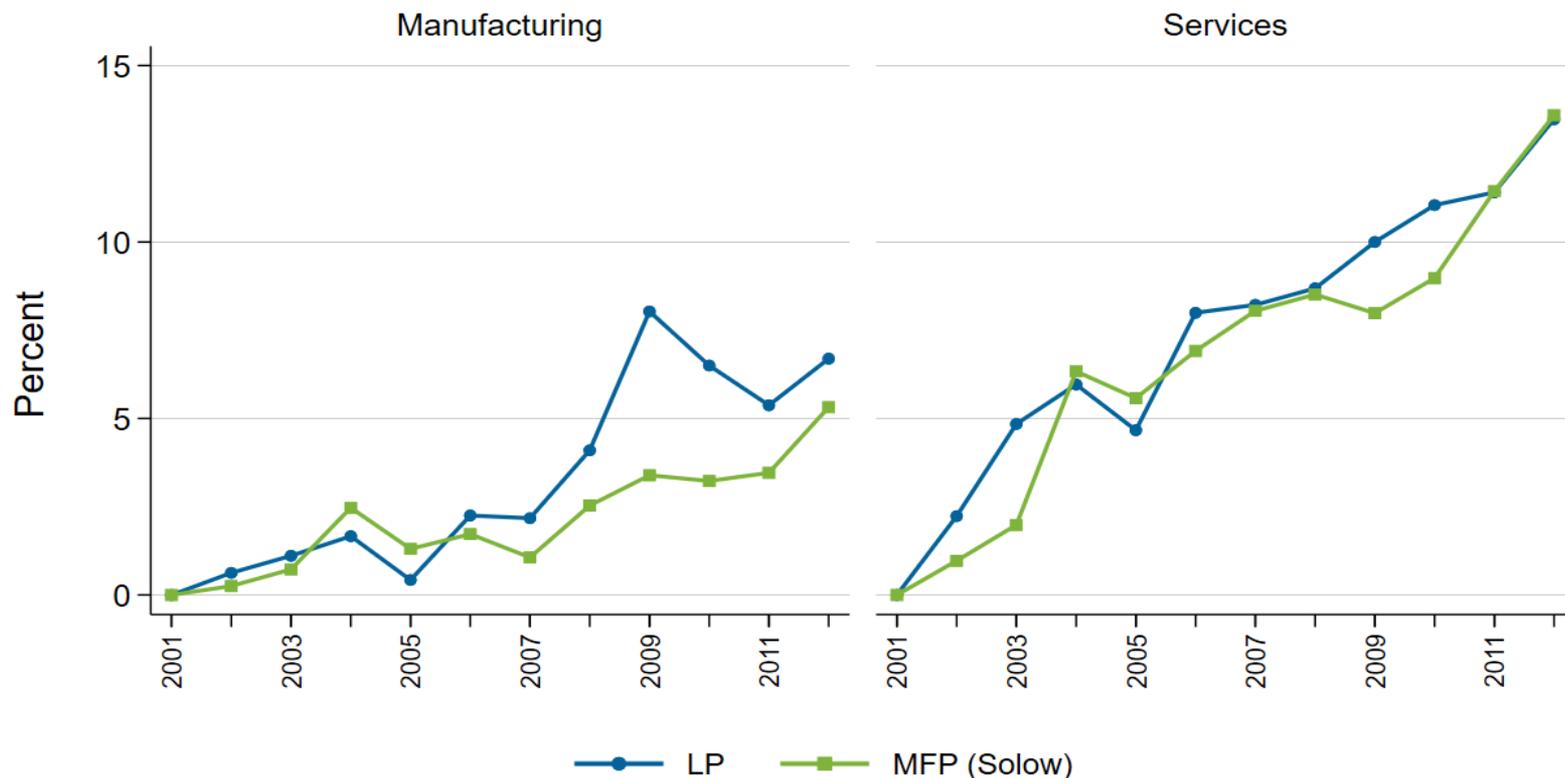
Source: Authors' calculations based on Euromonitor International's Passport Industrial database.

Source: Koltay, Lorincz and Valletti (2020) DG-COMP Chief Economist Team using ORBIS, Euromonitor Industrial Passport and STAN

Issues

- Industrial Concentration is not the same as market power
 - Use better defined (narrower) anti trust markets (e.g. Benkard, Yurukoglu & Zhang, 2021)
 - Taking imports into account (e.g. Amiti & Heise, '21)
 - Examine price-cost markups
- **Quick digression:** Other dimensions of firm inequality (than size) also increased

Rising firm-level productivity dispersion outside US (pooled across 16 non-US OECD countries), 2001-2012



Source: OECD Multiprod, <https://www.oecd.org/sti/ind/multiprod.htm>

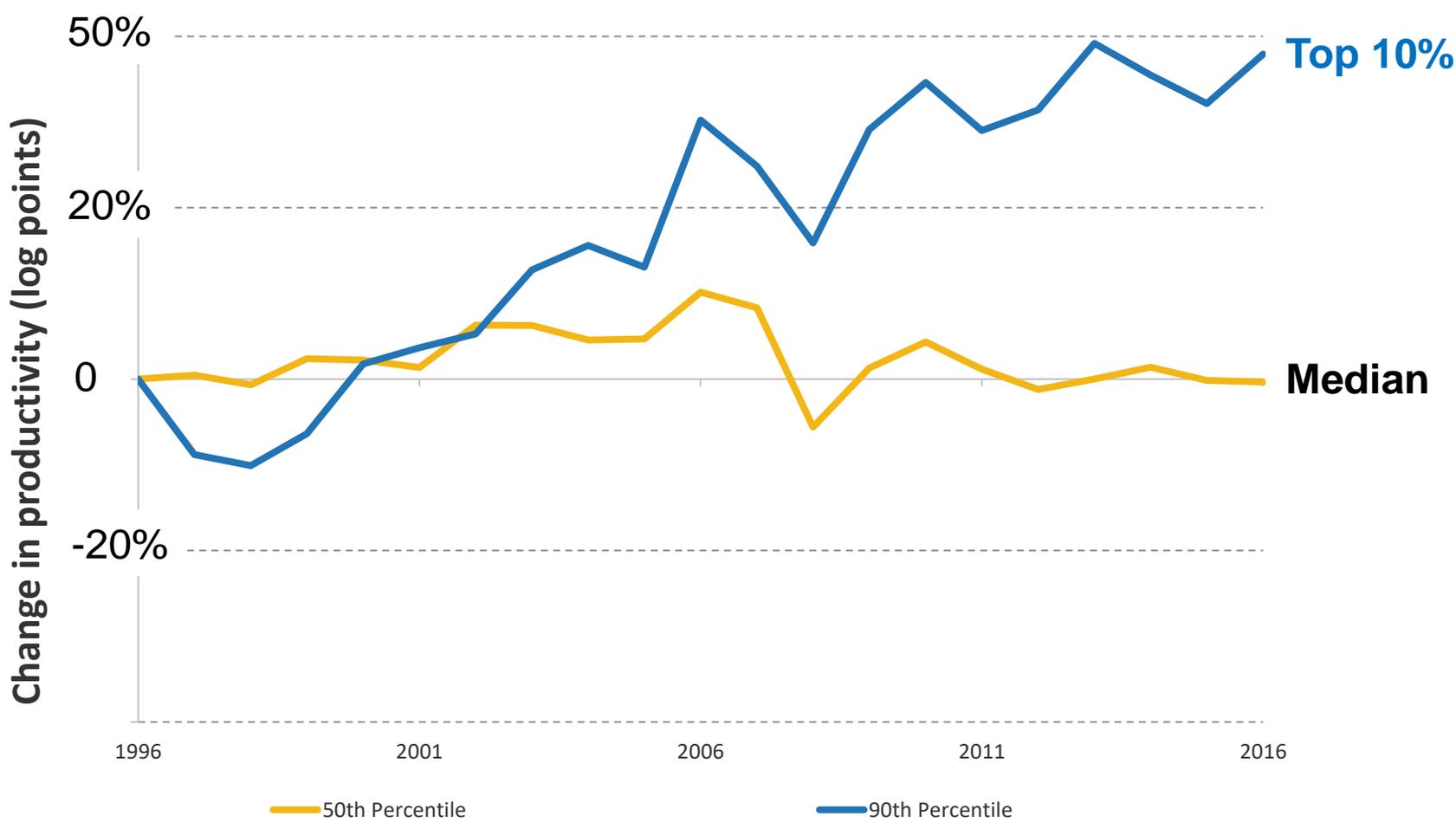
Notes: Coefficients on year dummies from regression of 90-10 log(productivity) within an industry-year cell in 16 OECD countries (AUS, AUT, BEL, CHL, DEU, DNK, FIN, FRA, HUN, ITA, JPN, NLD, NOR, NZL, PRT, SWE)

Productivity growth since 1996: Stagnation after Financial Crisis clear for median firm



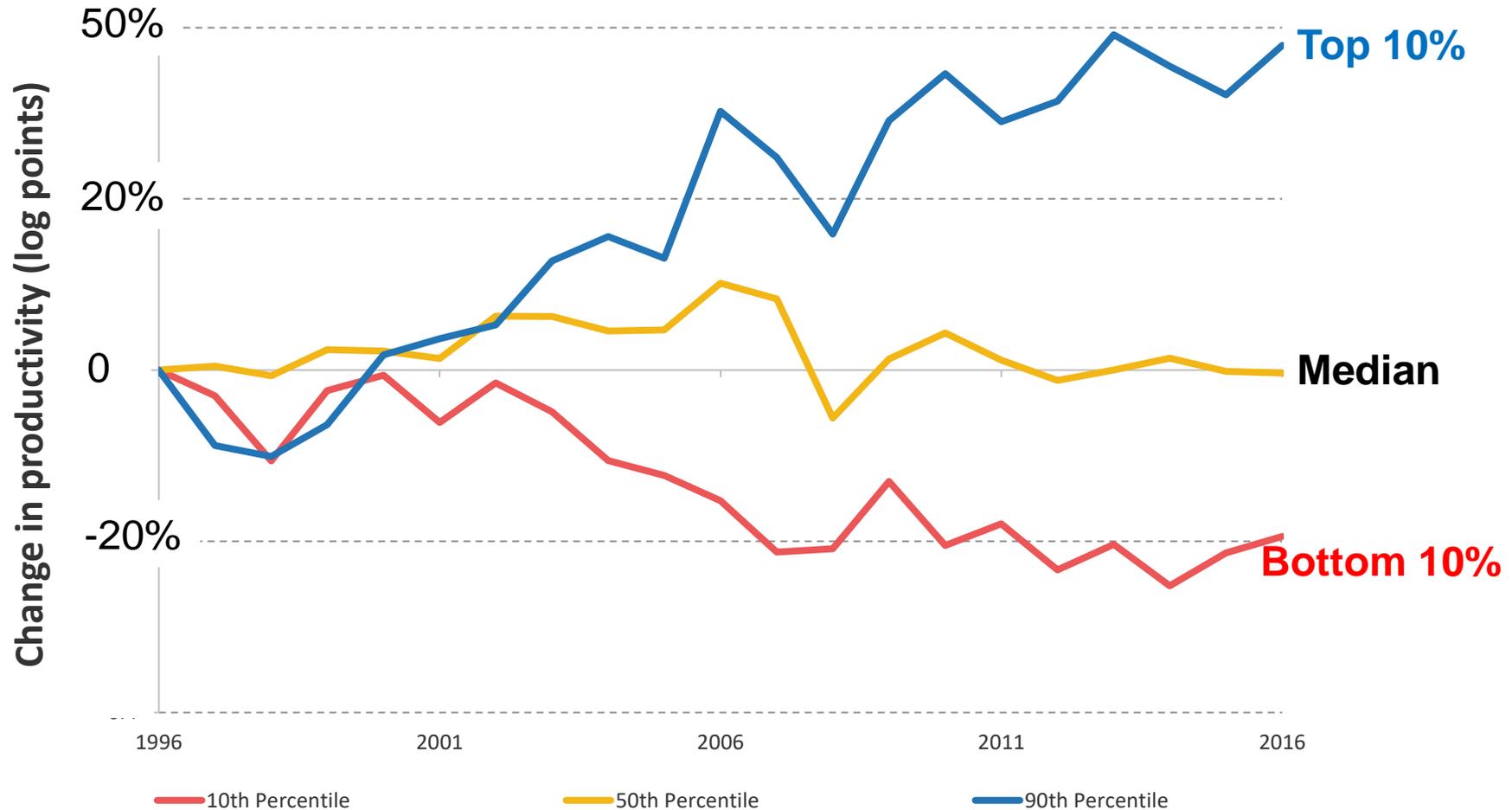
Notes: Historical ORBIS, $\ln(\text{value added}/\text{employee})$, quantiles weighted by firm employment; values indexed to zero in 1996; Changes in log points, so 0.05 = about 5% growth; $0.4 = (e^{0.04} - 1) * 100 = 50\%$

“The Best pull away from the Rest”: Superstar Firms have strong productivity growth



Notes: Historical ORBIS, $\ln(\text{value added}/\text{employee})$, quantiles weighted by firm employment; values indexed to zero in 1996; Changes in log points, so 0.05 = about 5% growth; $0.4 = (e^{0.04} - 1) * 100 = 50\%$

And poor productivity performance at the bottom of the distribution



Notes: Historical ORBIS, $\ln(\text{value added}/\text{employee})$, quantiles weighted by firm employment; values indexed to zero in 1996; Changes in log points, so 0.05 = about 5% growth; $0.4 = (e^{0.40} - 1) * 100 = 50\%$

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Methods for estimating (price-marginal cost) markups

- **Demand equation** approach + supply assumption (e.g. BLP)
 - Requires brand specific prices (unavailable across large parts of economy)
- **Production function** based approach (Hall, 1988, 2018)
 - Use “wedge” between output elasticity for a factor of production and its share in revenue
 - Accounting methods
 - Econometrically estimate production function (e.g. de Loecker and Warzynski, 2012)

Price-Cost Markups in US (listed firms)

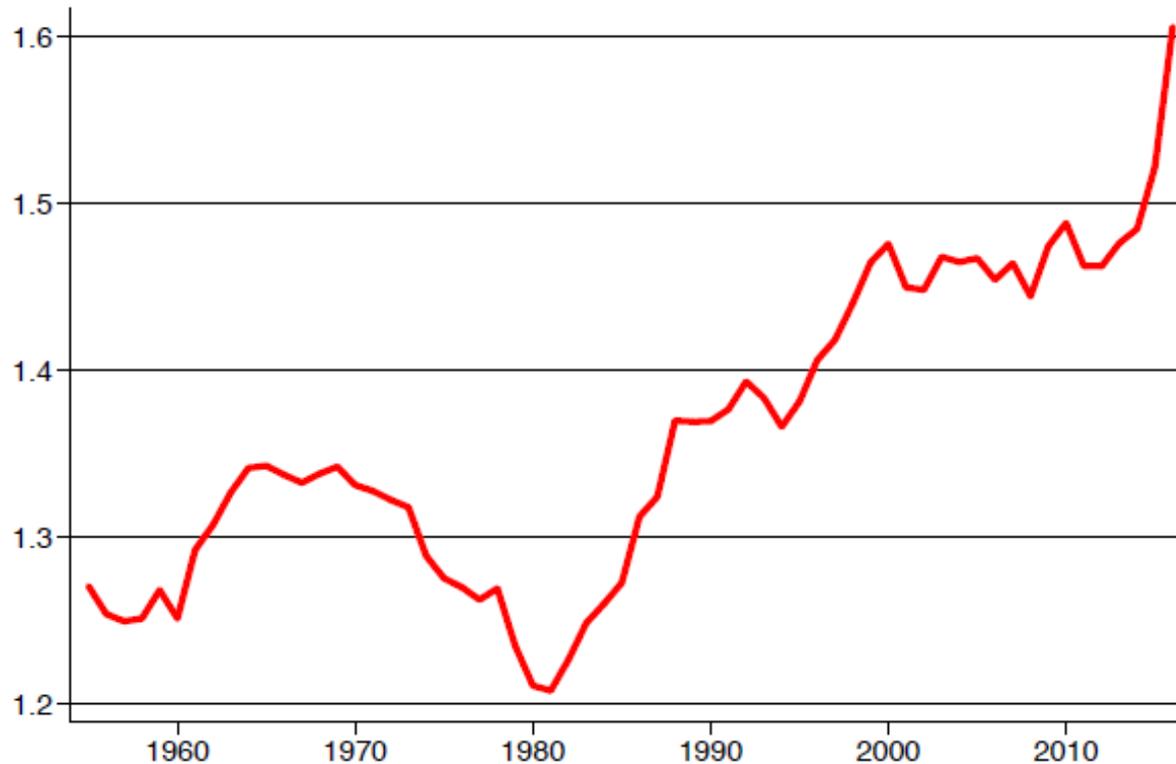
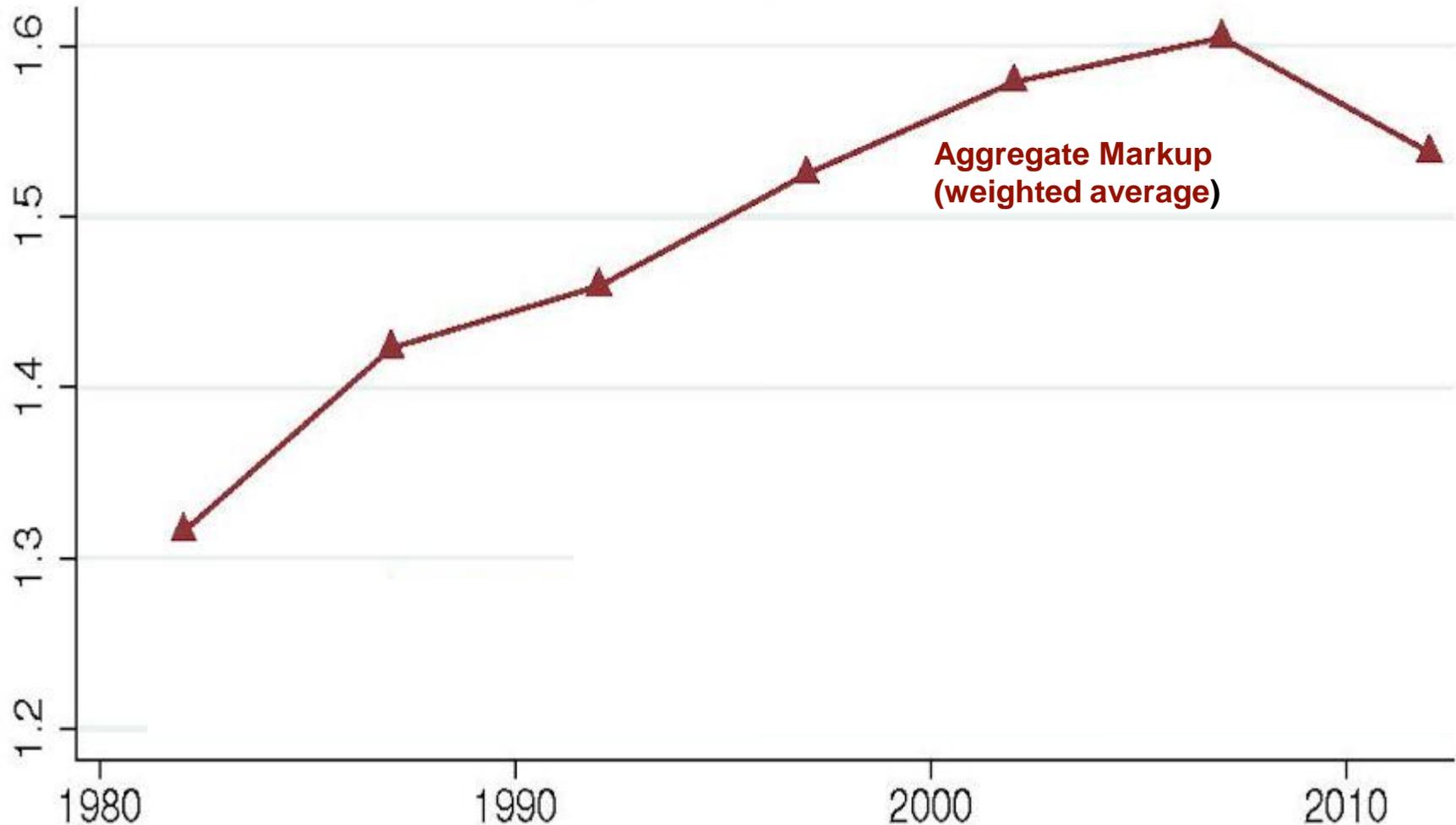


Figure 1: Average Markups for Conventional Production Function. Output elasticities θ_{st} from estimated PF1 are time-varying and sector-specific (2 digit). Average is sales weighted. Evolution 1955-2016.

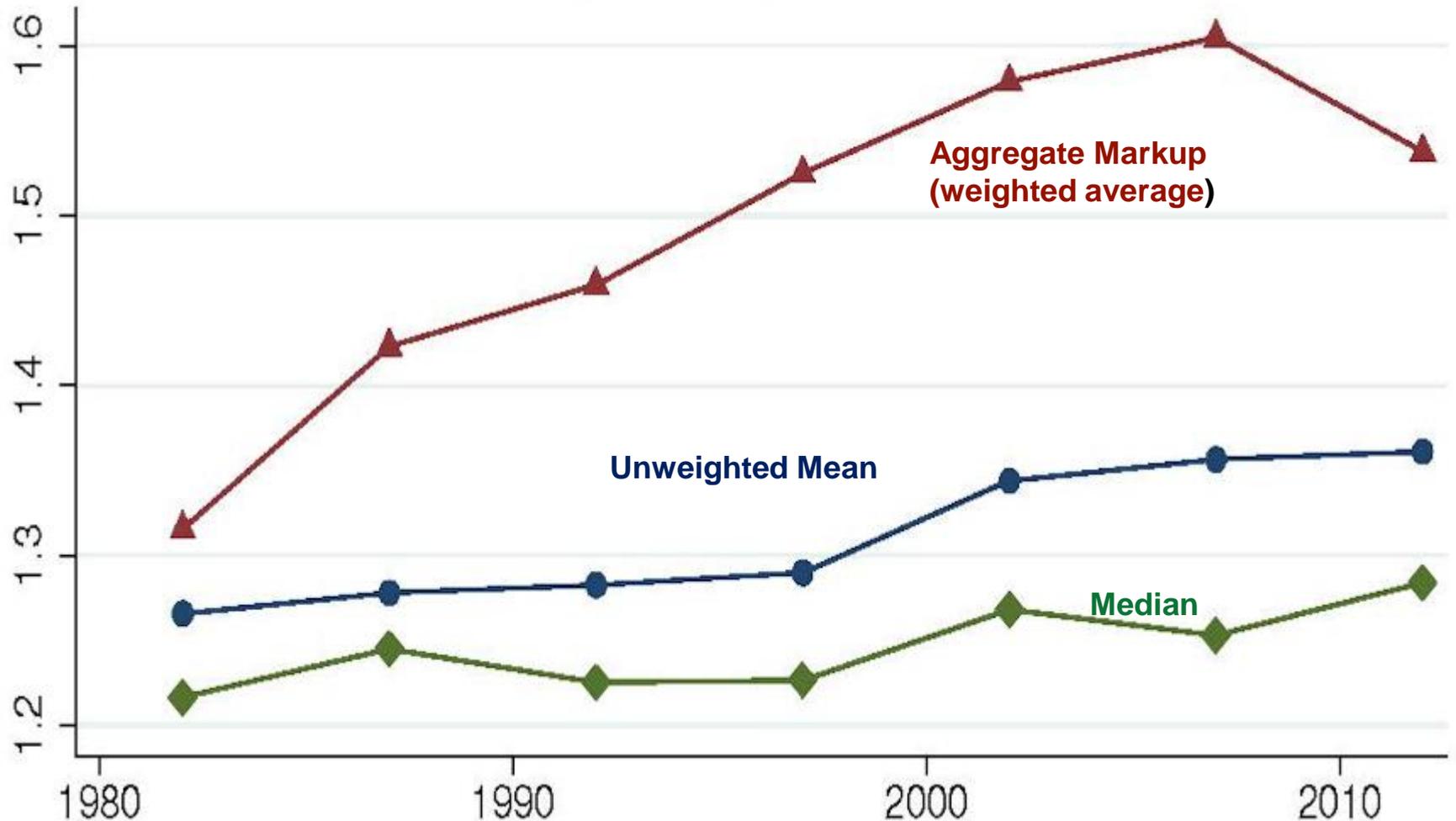
Source: de Loecker, Eeckhout and Unger (2020) on Compustat

Aggregate size-weighted markup also rises in US Census Data



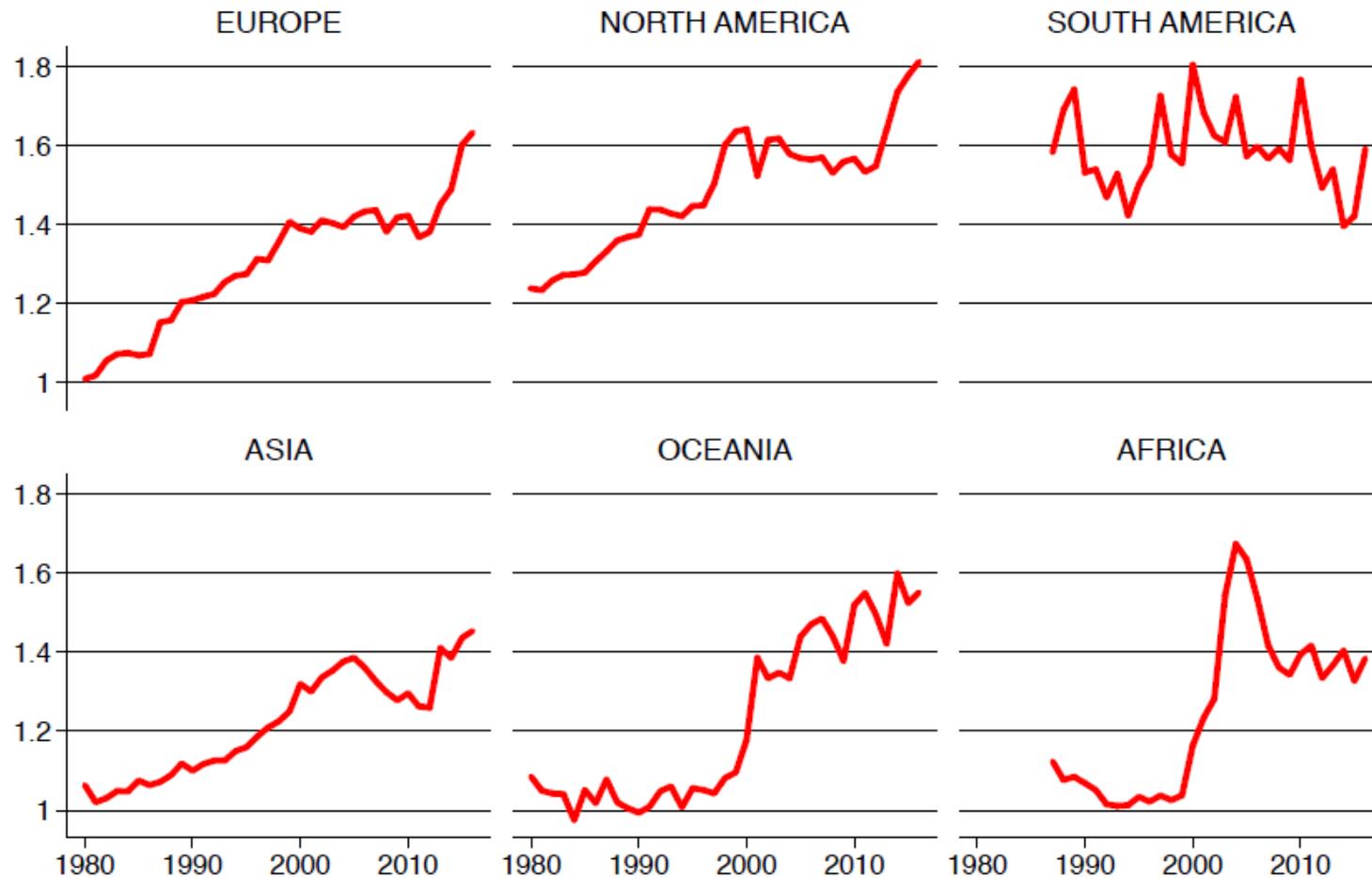
Notes: Accounting markup is defined as sales over variable costs. Weight is the sales share of the establishment. **Source:** Autor et al (2020) on Census of Manufactures

Aggregate US markup rises, but median does not (Census Data)



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Price-Cost Markups around the world (publicly listed firms)



Source: Eeckhout and de Loecker (2018) using Worldscope

Taking stock

- Industrial concentration has risen, especially for sales
- Markups over marginal costs have risen
- This has happened in other OECD countries like EU, as well as US

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Some Potential Explanations

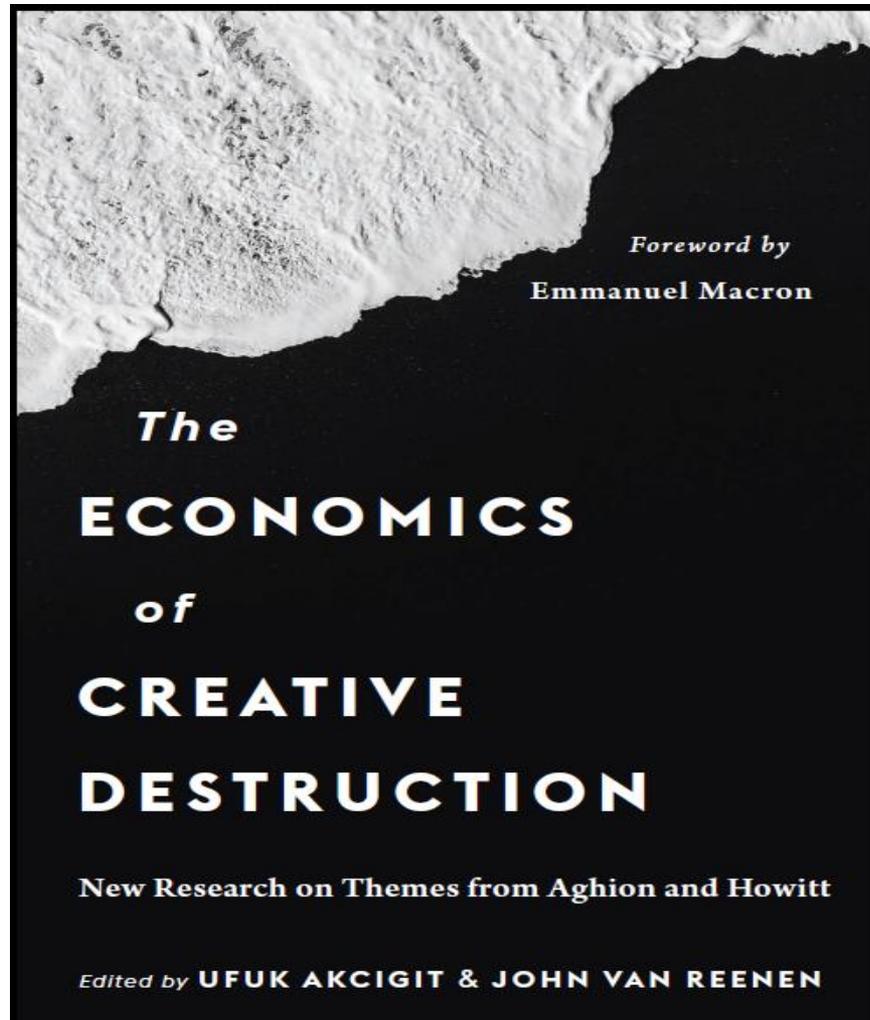
1. Weaker anti-trust enforcement (Philippon '19). Unlikely, given similar trends in EU and US
2. ***Increase in exogenous sunk costs: "Wal-Mart Story" e.g.*** larger firms have advantages in using **intangible capital such as software** (Besson '17; Eberly & Crouzet '21)
3. ***Increase in endogenous sunk costs "Google/Apple Story"*** Increased importance of **platform competition** (network effects, especially in **digital** markets)
4. **Globalization:** Allocates more market share to more productive firms
5. **Falling diffusion** of technology between leaders and followers (Akcigit & Ates, '21)

Are changes due to an innovation advantage of superstars?

- Firms who successfully innovate will tend to grow larger
- But no general reason to think that size (or market power) per se confers an innovation advantage
 - Ambiguous relationship in theory and empirics
- Large firm **advantages**:
 - Fixed costs of R&D
 - Complementary assets (e.g. marketing, skills, etc.)
- Large firm **disadvantages**
 - Bureaucratic
 - Lower powered incentives for inventors

Market power and innovation

- Griffith and Van Reenen (2022) survey of empirical work



Market power and innovation

- Market power **aids** innovation via ex post rents and ex ante cash flows (“Schumpeterian”)
- Market power **inhibits** innovation due to Arrow replacement effect and Hicksian “quiet life” effects
- Cross industry **empirics** inconclusive
- On balance, empirics suggest that competition tends to foster innovation (esp. in markets where anti-trust investigations take place)
 - Implies authorities’ pro-competition presumptions usually right for dynamic as well as static incentives
- But must be a market-by-market investigation

Has the environment shifted to favour innovation by larger firms?

- Many non-innovation reasons for the growth of superstars
- Tech adoption easier by large firms? “Wal-Mart” story of high fixed cost intangibles/software
 - Counter argument is that cloud computing has made fixed costs of ICT more like a variable cost
- Network effects, etc. creating more natural monopolies?
 - Not obvious why “winner take all” would lead to the same firms staying winners
- Diffusion of tech slowing from leaders to laggards? (Akcigit and Ates, 2022)
 - Surprising given falling costs of ICT
 - Large firms using strategies to reduce diffusion (patents, top talent, killer acquisitions, etc.)?

Has environment shifted to favour innovation by larger firms?

- **Bottom line**

- I think it is likely some shift to give large firms advantage in adoption of tech
- **Unclear** whether they have increasing advantages in generation of tech (R&D)

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Imperfect Competition in Labor & Product Market

- Generalizes model in Autor et al (2020)
 - Firms have heterogeneous productivity
 - Some product market power: firms face downward sloping (residual) product demand curve
- Also some labor market power: face upwards sloping labor supply curve (wage posting monopsony)

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- Generalizes model in Autor et al (2020)
 - Firms have heterogeneous productivity
 - Some product market power: firms face downward sloping (residual) product demand curve
- Also some labor market power: face upwards sloping labor supply curve (wage posting monopsony)
- Build on large recent literature, e.g.: Berger, Herkenhoff & Mongey (2021); Lamadon, Mogstad & Setzler (2021); Kroft, Luo, Mogstad & Setzler (2021); de Loecker, Eeckhout & Mongey (2021); Card, Cardoso and Kline (2018)
 - Builds on earlier literature: Kalecki (1938), Van Reenen (1996), Manning (2003, 2011), Bhaskar et al (2002)

A Simple Framework

- Static FOC wrt to labor yields labor (WL) share of revenue (PY) for firm i

$$S_i \equiv \left(\frac{WL}{PY} \right)_i = \frac{\alpha_i}{\mu_i \psi_i}$$

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- **(Inverse) Markdown**, $\psi_i = \left(\frac{MRPL}{w} \right)_i$: Marg. Prod. of L over Wage
 - Monopsony power depends on firm labor supply elasticities

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- Change in labor share for firm i

$$\Delta \ln S_i = \Delta \ln \alpha_i - \Delta \ln \mu_i - \Delta \ln \psi_i$$

Aggregate Labor Share, S

$$S \equiv \sum_i \omega_i S_i = \sum_i \omega_i \frac{\alpha_i}{\mu_i \psi_i}$$

- Where ω_i is the relative size (market share) of firm i
- Change in aggregate labor share depends on changes in the firm size distribution $F(\omega)$ & covariance of size with labor share

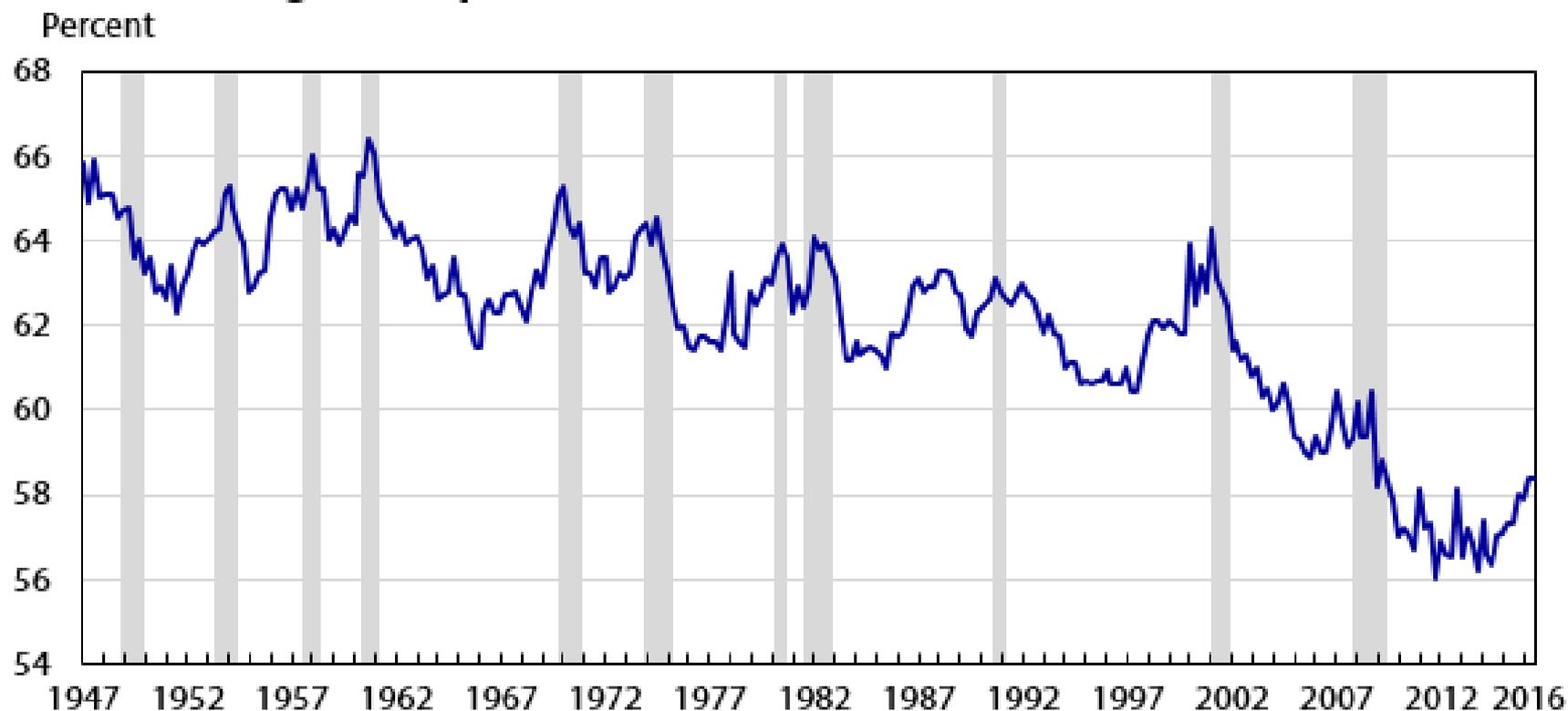
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- Where ω_i is the relative size (market share) of firm i
- Change in aggregate labor share depends on changes in the firm size distribution $F(\omega)$ & covariance of size with labor share
- If environment changes to favor superstars (who have higher markups) this can depress labor share without changes to individual α_i, μ_i , or ψ_i
- Implies that a rise in size-weighted markups will tend to depress the aggregate labor share.
 - Falling labor share matters due to effects on income inequality

US Labor Share of GDP

Figure 1. Labor's share of output in the nonfarm business sector, first quarter 1947 through third quarter 2016



Note: Shaded areas indicate recessions, as determined by the National Bureau of Economic Research.

Source: U.S. Bureau of Labor Statistics.

Falling Labor Share of Corporate sector Value-Added Evident in Many Countries

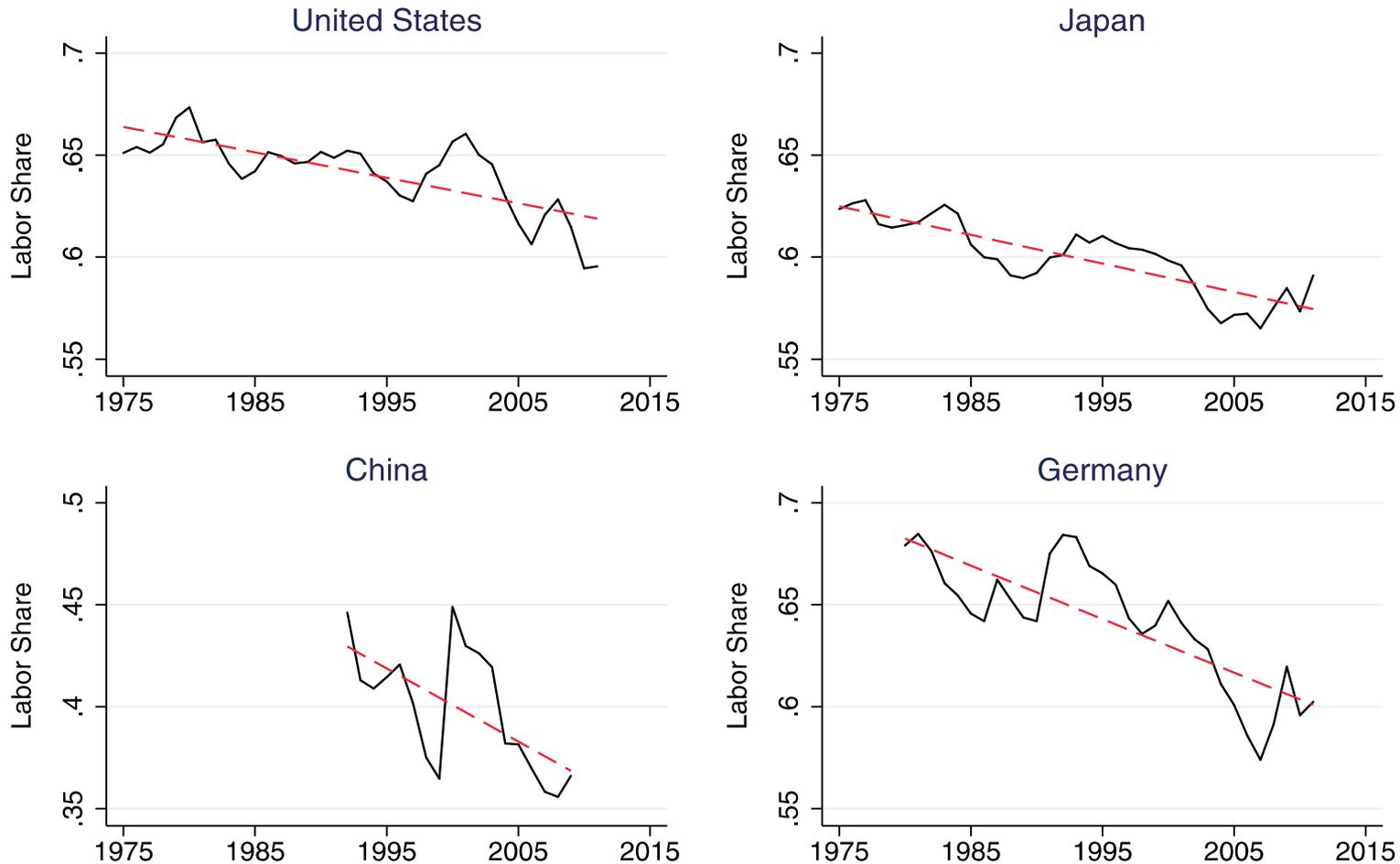
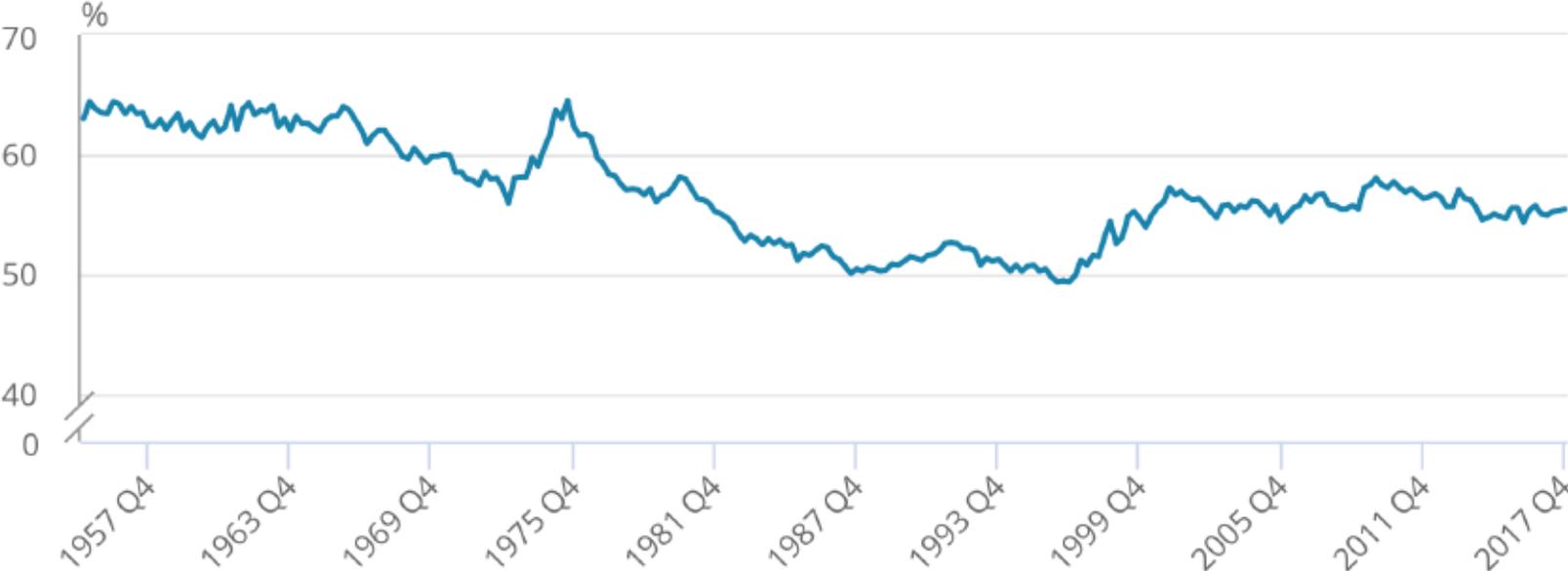


FIGURE II

Declining Labor Share for the Largest Countries

Labor Share of GDP in the UK



Source: Dunn, Heys and Sidhu, 2018; UK Office of National Statistics
Note: No adjustment for Mixed Income

Application of framework to UK (1981-2019)

- de Loecker, Obermeier & Van Reenen (2022).

Change in aggregate labor share $\Delta S = \Delta \left(\sum_i \omega_i \frac{\alpha_i}{\mu_i \psi_i} \right)$

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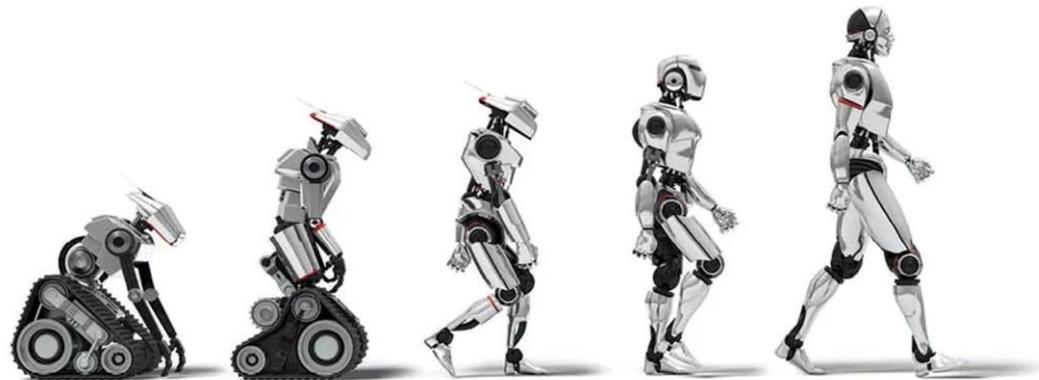
- If stable technological bias and mark-downs

$$\Delta S = \frac{\alpha}{\psi} \Delta \left(\sum_i \omega_i \frac{1}{\mu_i} \right)$$

- Size weighted markups rose by about 0.44% per annum
 - Implies a fall in labor share of **7.1 pp**
 - **Actual fall** was only about half this, **3.5 pp**

Application of framework to UK (1981-2019)

- So must be some offsetting factors, which in our framework is either technology or monopsony
- Technical change biased **towards** labor, $\Delta\alpha > 0$?
 - Unlikely as automation (e.g. robots) generally thought to be biased **against** labor (e.g. Acemoglu & Restrepo, 2019, 2020)



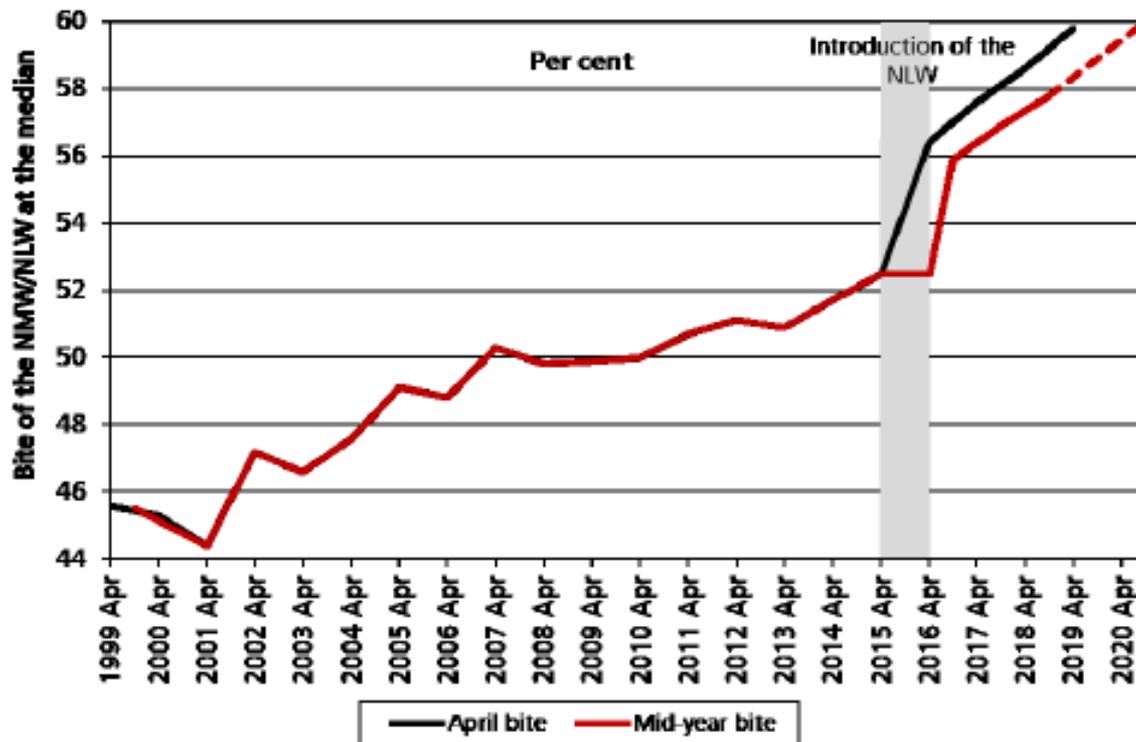
Monopsony Power in Labor Market

- **Fall in monopsony power** (smaller markdowns), $\psi < 0$?
 - UK introduced first National Minimum Wage in 1999.
“Bite” of this has become increasingly strong over time

Monopsony Power in Labor Market

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“Bite” of this has become increasingly strong over time

Chart 1.B: The ‘bite’ of the NMW/NLW for workers aged 25 and over (1999-2020)



Source: Dube (2019)

Monopsony Power

- **But** doesn't growth of Superstar firms imply more monopsony power? Not necessarily:
 - Sales concentration increases much more than employment concentration
 - In US, no increase in employment concentration at local level (Rinz, 2020)
 - And markdowns not simply due to concentration

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Policy (1/2)

- Knee-jerk restraints on superstar firm growth or breaking them up is likely to be very costly
- Even if superstars success not due to weaker institutions, in our “winner take most world”, important to modernize **anti-trust policy** to reduce risks of harm:
 - **Ex ante regulation**: EU Digital Markets Act, UK DMU, etc. Interoperability, data portability/access
 - Key role for **innovation/future competition** in assessing anti-trust enforcement
 - **Standards of proof** to shift more towards acquirers instead of government regulators
 - Finding ways to increase **structural competition** (e.g. EU Single Market for Services; trade agreements)

Policy (2/2)

- Counter-balancing power through **labor market policy**
- Institutions such as
 - Minimum wages
 - Collective bargaining
 - Labor standards (e.g. Gig economy)
- Strengthen job mobility (stopping non-competes; non-competes, etc.)
- Increasing human capital (especially through education and training)

Conclusions

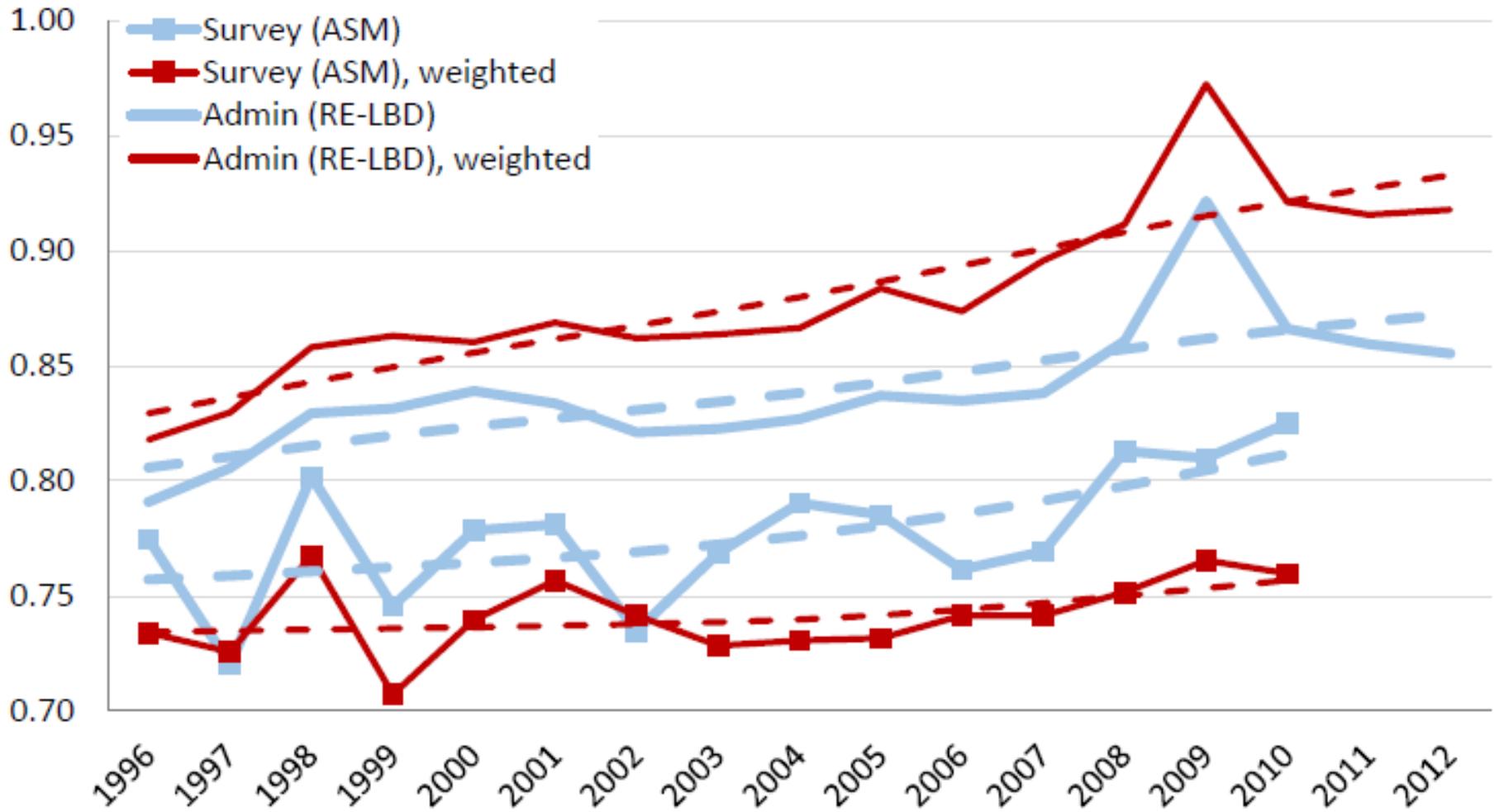
- Growing differences between superstar firms and rest of economy: e.g. increased concentration & markups
- Technology is dominant factor, esp. in digital producing sectors and industries/firms using ICT intensively
- Does not imply size/market power always confers an innovation advantage
- Important implications for labor markets
- Need to modernize competition and labor market policy

Thank you!

Further reading

- Griffith and Van Reenen (2023) “Product Market Competition, Creative Destruction and Innovation” Forthcoming in *Economics of Creative Destruction* (edited by Ufuk Akcigit and John Van Reenen) [POID Discussion Paper 22](#)
- de Loecker, Obermeier and Van Reenen (2022) “Firms and Inequality” IFS *Deaton Inequality Review*
<https://poid.lse.ac.uk/PUBLICATIONS/abstract.asp?index=9154>
- Autor, Dorn, Katz, Patterson and Van Reenen “The Fall of the Labor Share and the Rise of Superstar Firms” (2020) [Quarterly Journal of Economics](#)
- Bloom, Sadun, Schuh and Van Reenen (2021) “Management as Capital”
<http://cep.lse.ac.uk/pubs/download/dp1433.pdf>
- Scur, Sadun, Van Reenen, Lemos & Bloom (2021) “The World Management Survey at 18, *Oxford Review of Economic Policy*
<https://poid.lse.ac.uk/textonly/publications/downloads/poidwp002.pdf>
- Van Reenen (2018) “Increasing Difference Between Firms” *Changing Market Structures and Implications for Monetary Policy*, Jackson Hole Symposium 19-65
<http://cep.lse.ac.uk/pubs/download/dp1576.pdf> [NYT](#) [NPR](#)

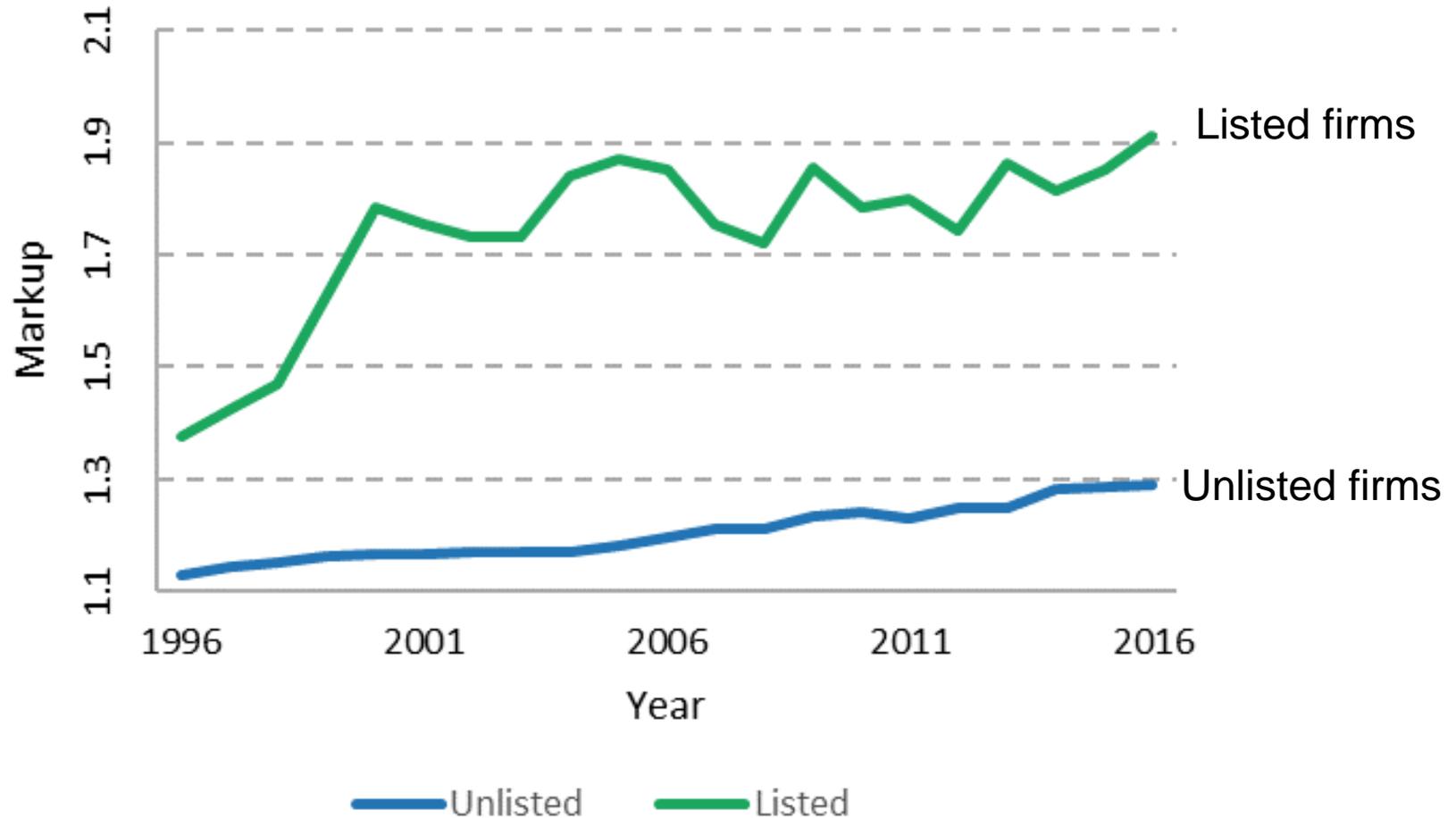
Rising US productivity dispersion (manufacturing)



Source: Decker, Haltiwanger, Jarmin & Miranda (2018, Figure A6)

Notes: Standard Deviation of log(real sales/employment) normalized in a NAICS 6 digit industry-year. HP filtered series in dashed lines. LBD is population whereas ASM is corrected for sample selection. Weights are employment weights.

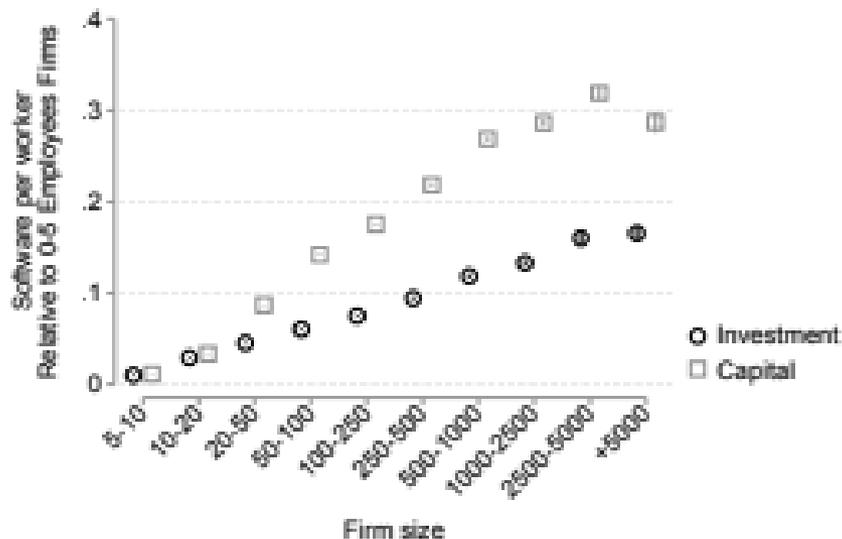
Aggregate Markups in UK population data also rise



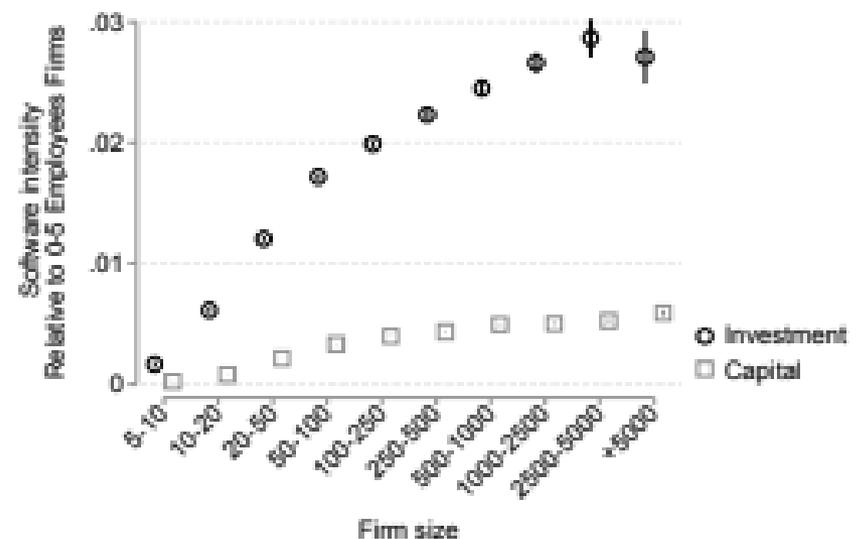
Source: de Loecker, Obermeier and Van Reenen (2022), Deaton Inequality Review

Relatively Greater ICT/Software Intensity in Larger Firms (French data)

Figure 4: Cross-sectional Relationship Between IT and Firm Size



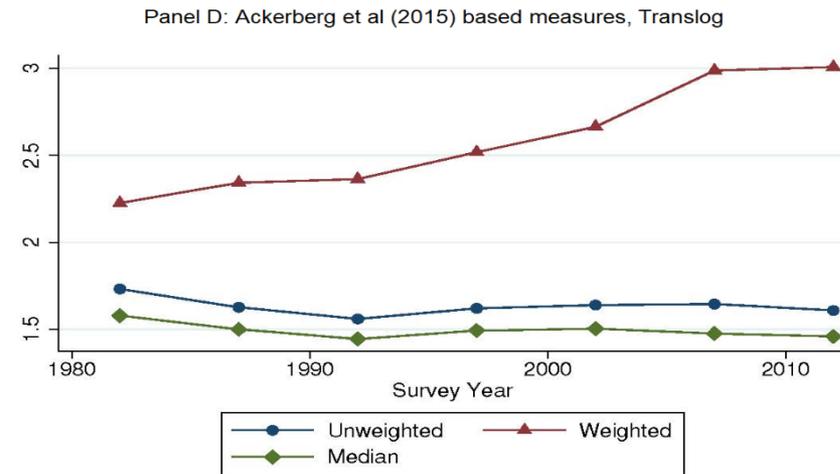
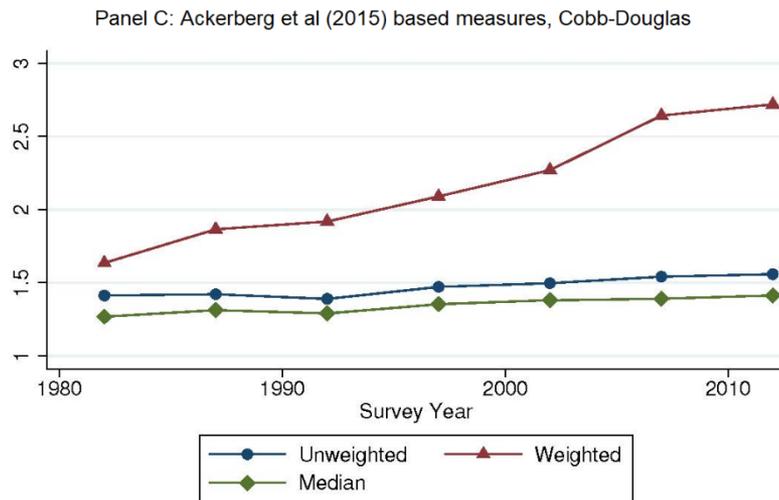
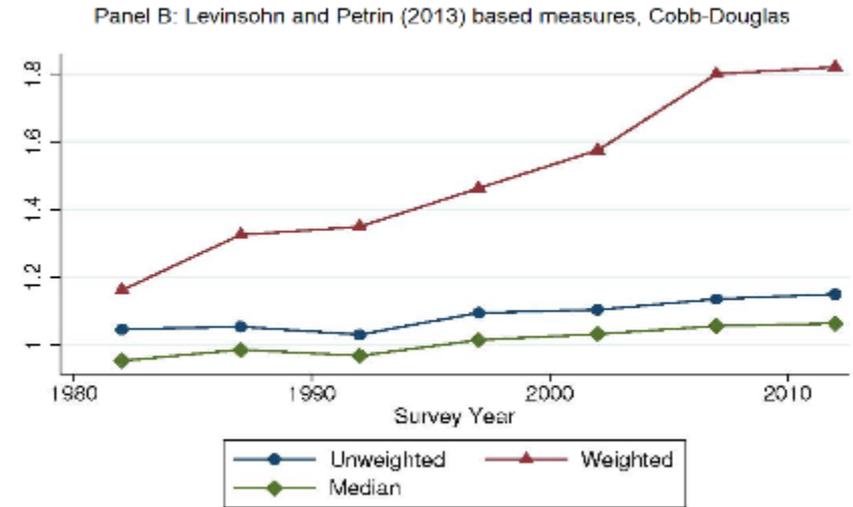
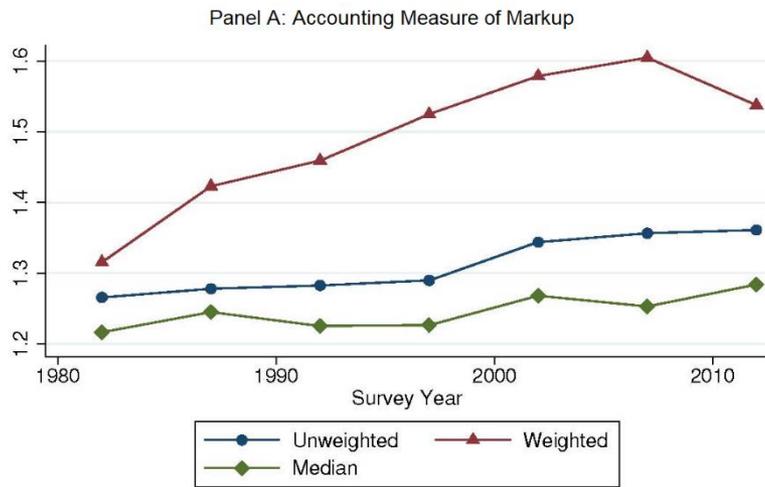
(a) Software Values (per worker)



(b) Software Relative Intensity

Notes: Greater ICT/Software adoption in larger firms in France (Lashkari, Bauer, Boussard '19)

Aggregate US Markup rises, driven by reallocation. Median firm markup stable



Source: Autor et al (2020); Census of Manufactures; **Notes:** Panel A uses Antras et al (2017) method; Panels B-D use production function, de Loecker and Warzynski (2012).

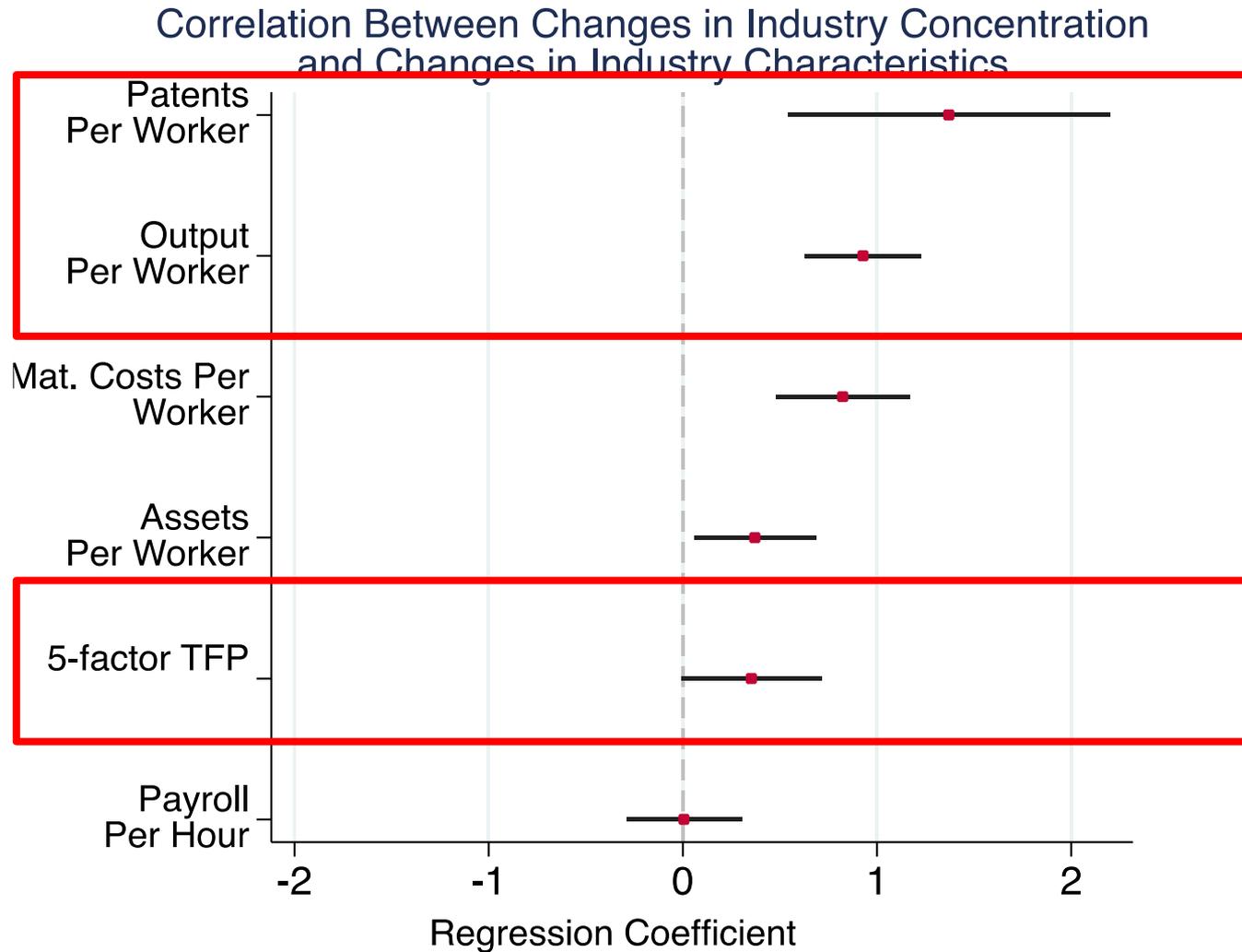
Implications for inequalities II: wage inequality

- Pay at the very top (Gabaix on CEOs)
- More generally on the wage distribution:
 - AKM two-way fixed effects models
 - Card, Heining & Kline (2013) find important component from increased variance of firm effects in Germany
 - Song et al (2018) find different result in US: it's almost all increased (i) correlation of high ability workers employed together; (ii) high ability workers employed in high fixed effects firms
 - But general issue of interpretation of AKM fixed effects

Concerns

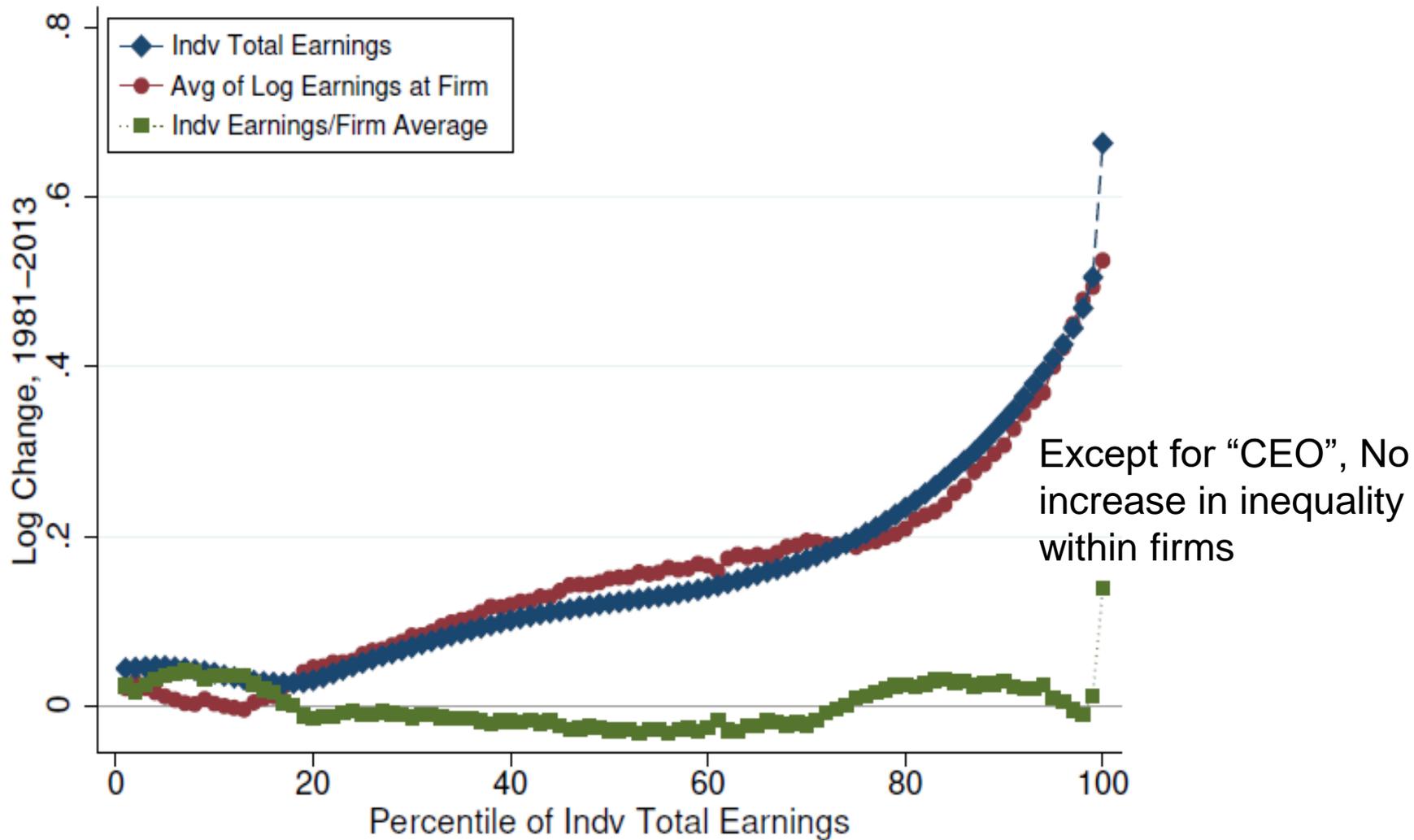
- Compustat covers a special sample of firms
 - Publicly listed (so covers under a third of US employees)
 - Only has very large firms, so very selected and type of firm listed differs a lot over time
 - Doesn't break down COGS into cost components (e.g. labor, intermediates, etc.)
 - Consolidated accounts (so includes overseas activity)
- Can replicate methods in Census Data which deals with all of these problems
 - Cleanest to do in Census of Manufactures

Industries with stronger growth of superstars see larger increases in Innovation & Productivity



Source: Autor, Dorn, Katz, Patterson & Van Reenen (2020)

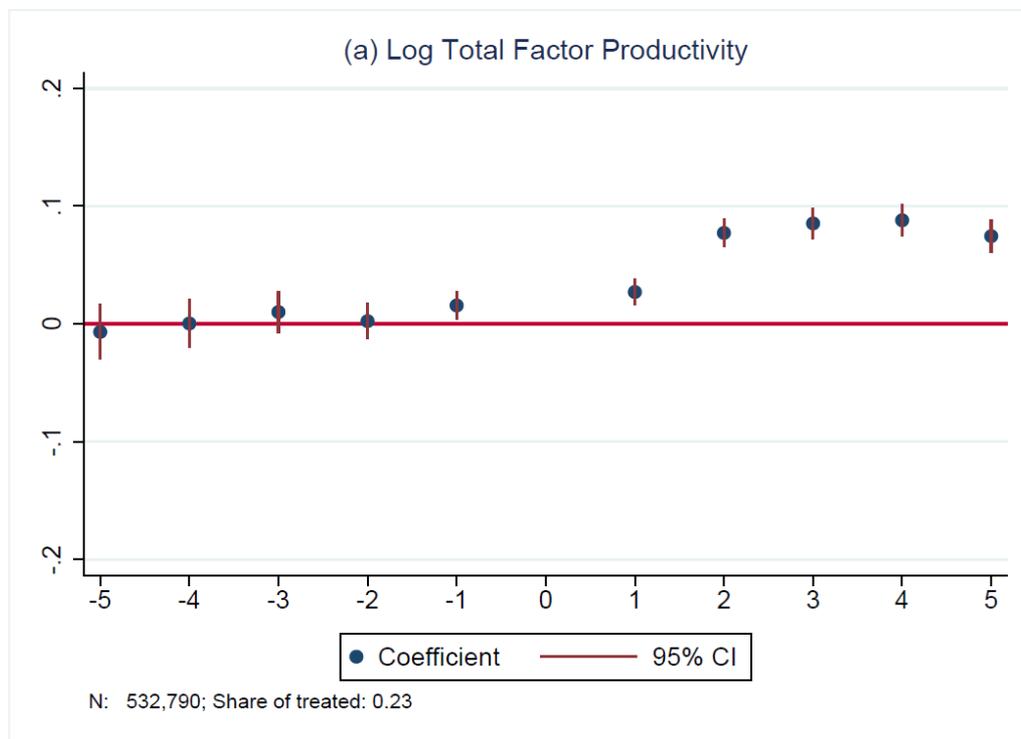
Change in individual US earnings inequality is almost all between firm (rather than within firm), 1981-2013



Source: Song et al (2019), SSA data

The spillover benefits of trading with Superstars

Selling to MNE firm increases TFP by ~8% after 4 years



Notes: $t = 1$ first year of treatment; $t = 5$ is all years ≥ 5 (i.e. 4+ years after event). Regressions include 4-digit industry by year dummies and firm fixed effects. TFP estimated by Wooldridge (2009) method.

Source: Amiti, Duprez, Konings and Van Reenen (2022); Event study Diff in Diffs 532,000 obs from Belgian B2B data 2002-14.