poid Programme on Innovation and Diffusion

30 YEARS Centre for Economic Performance

The Rise of Superstar Firms: Causes and Consequences

John Van Reenen (LSE and MIT)

16th Toulouse Digital Economics Conference

Suzanne Scotchmer Memorial Lecture

January 14th 2022

LSE THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

MIT

Suzanne Scotchmer, 1950-2014

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” (2017, 2020, QJE)
- 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

https://www.forbes.com/sites/zacharysmith/2022/01/03/apple-becomes-1st-company-worth-3-trillion-greater-than-the-gdp-of-the-uk/?sh=2468cc8d5603

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

Agenda

Introduction

Increasing differences across firms

Markups

Framework: product & labor markets

Assessment and Policy

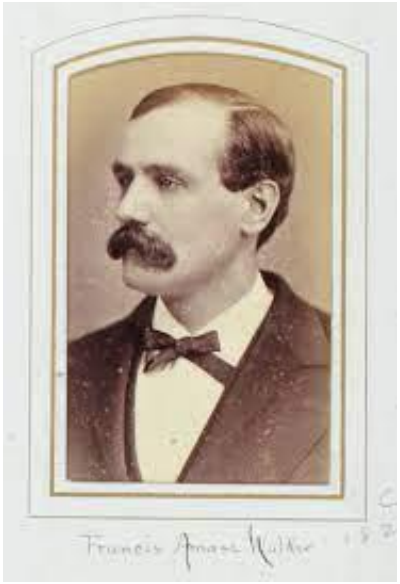
Introduction

- 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

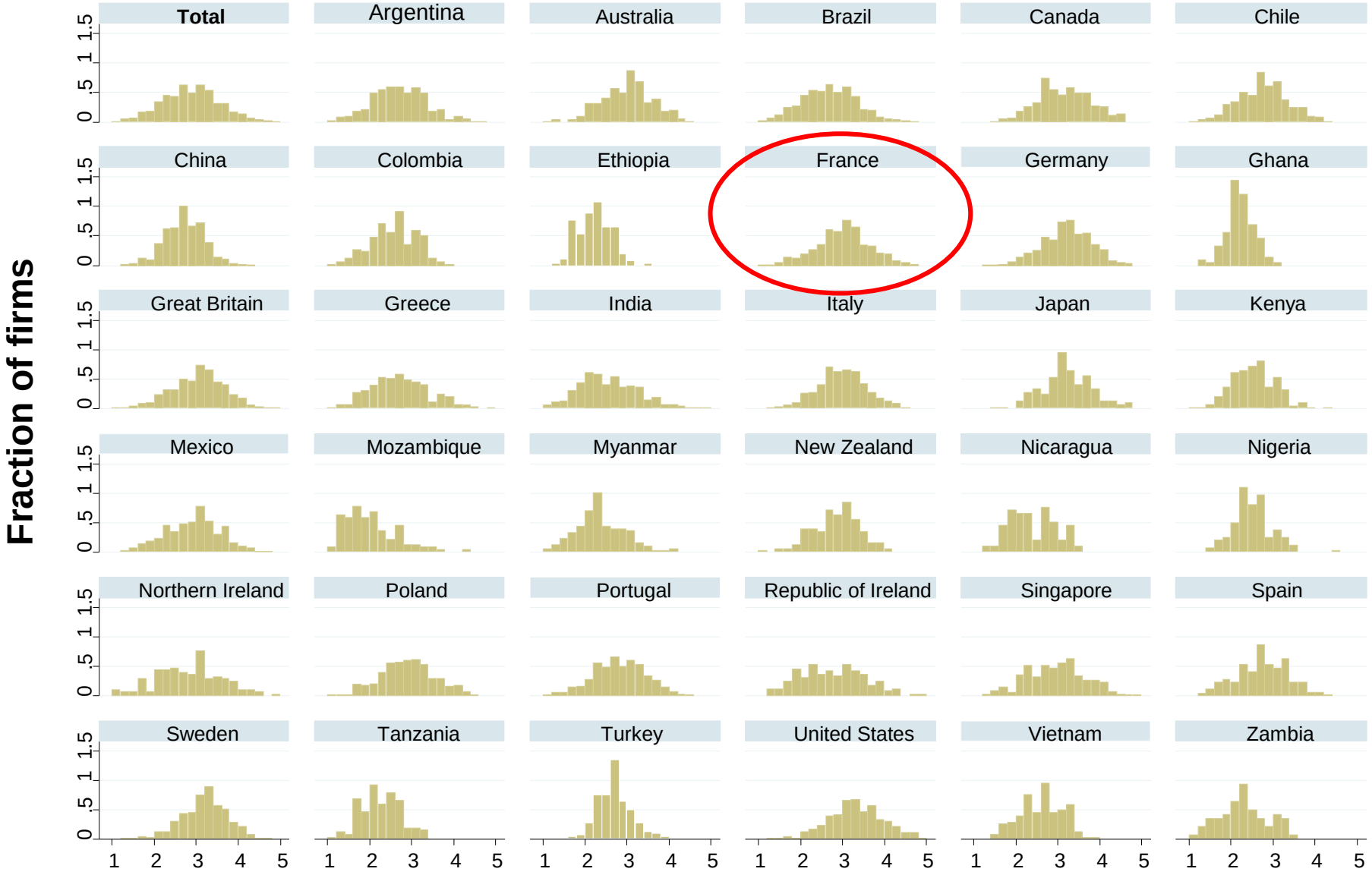
- Explosion of micro data on firms that shows huge cross-sectional differences in terms of size, productivity, exports, management practices….

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
- Aggregate size-weighted markups also seems to have increased
- Can be used to help explain some labor market changes (e.g. falling share of labor in GDP)
- **Caveat Emptor:** There are “moments” to be taken into account, need models to link to welfare.

Some Potential Explanations

1. ***Google/Apple Story.*** Increased importance of **platform competition** (network effects, especially in **digital** markets)

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3. **Falling competition?** Grullon et al. ’16; Philippon ‘19 on weaker US anti-trust enforcement
4. **Increasing competition? –** Example: Globalization, lower communication costs, trade liberalization, etc. These forces tend to allocate greater market share to more efficient firms. Melitz, ’03

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- Many macro models seeking to reconcile some/all of these facts (e.g. Akcigit & Ates, ’21; de Ridder ’21; Aghion et al, ‘21)
- But maybe different explanations in different industries

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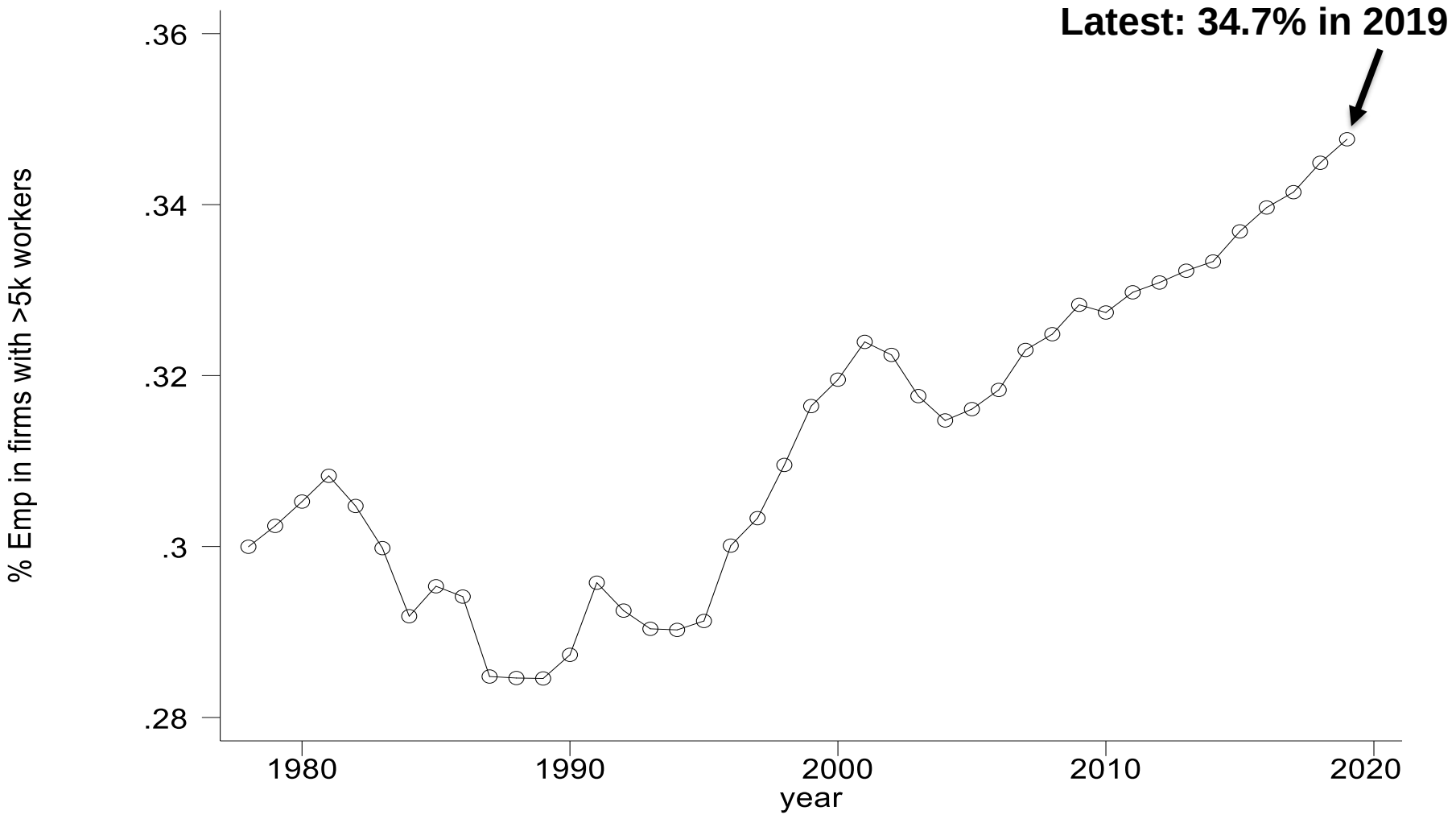
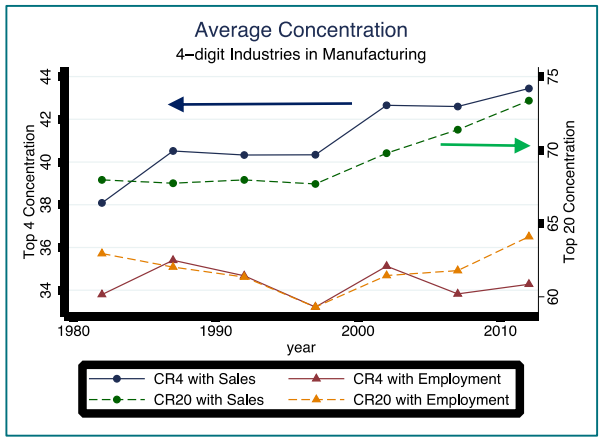
Since mid ’80s Big Firms getting bigger: % jobs in US firms with 5,000+ workers rose from ~28% in ‘87 to ~35% in 2019



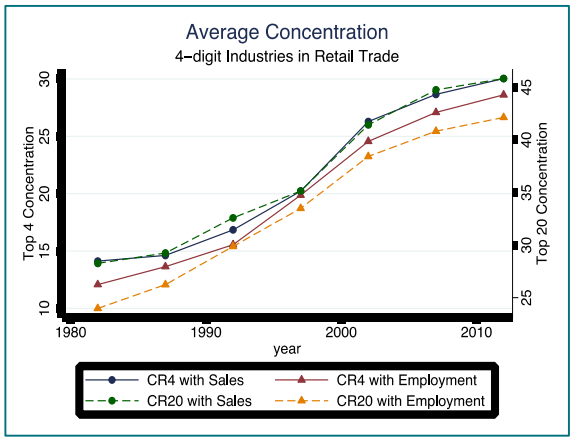
Source: US Business Dynamics Statistics (2021), https://www.census.gov/data/datasets/time-series/econ/bds/bds-datasets.html

Rising Sales Concentration in US SIC4 since 1982

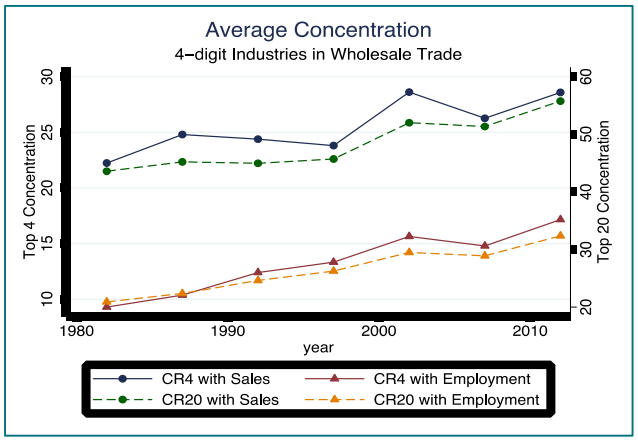
Manufacturing



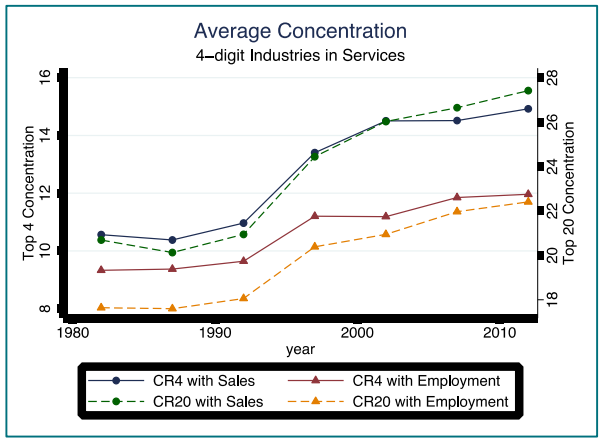
Retail Trade



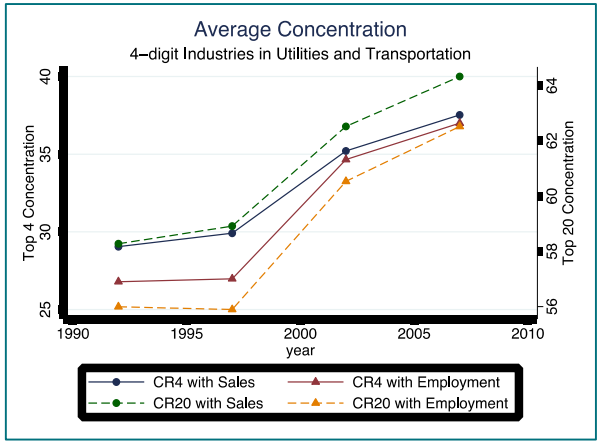
Wholesale Trade



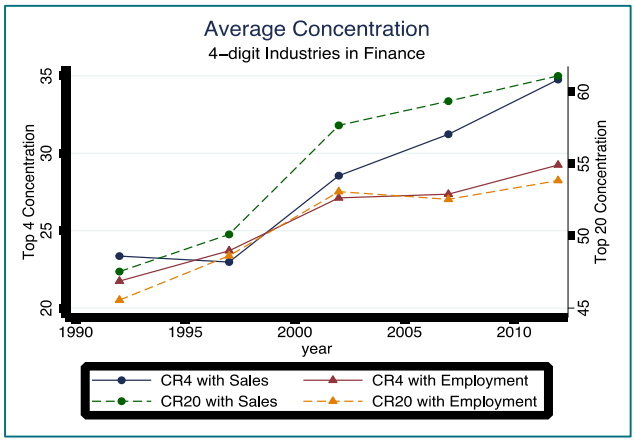
Services



Utilities + Transportation

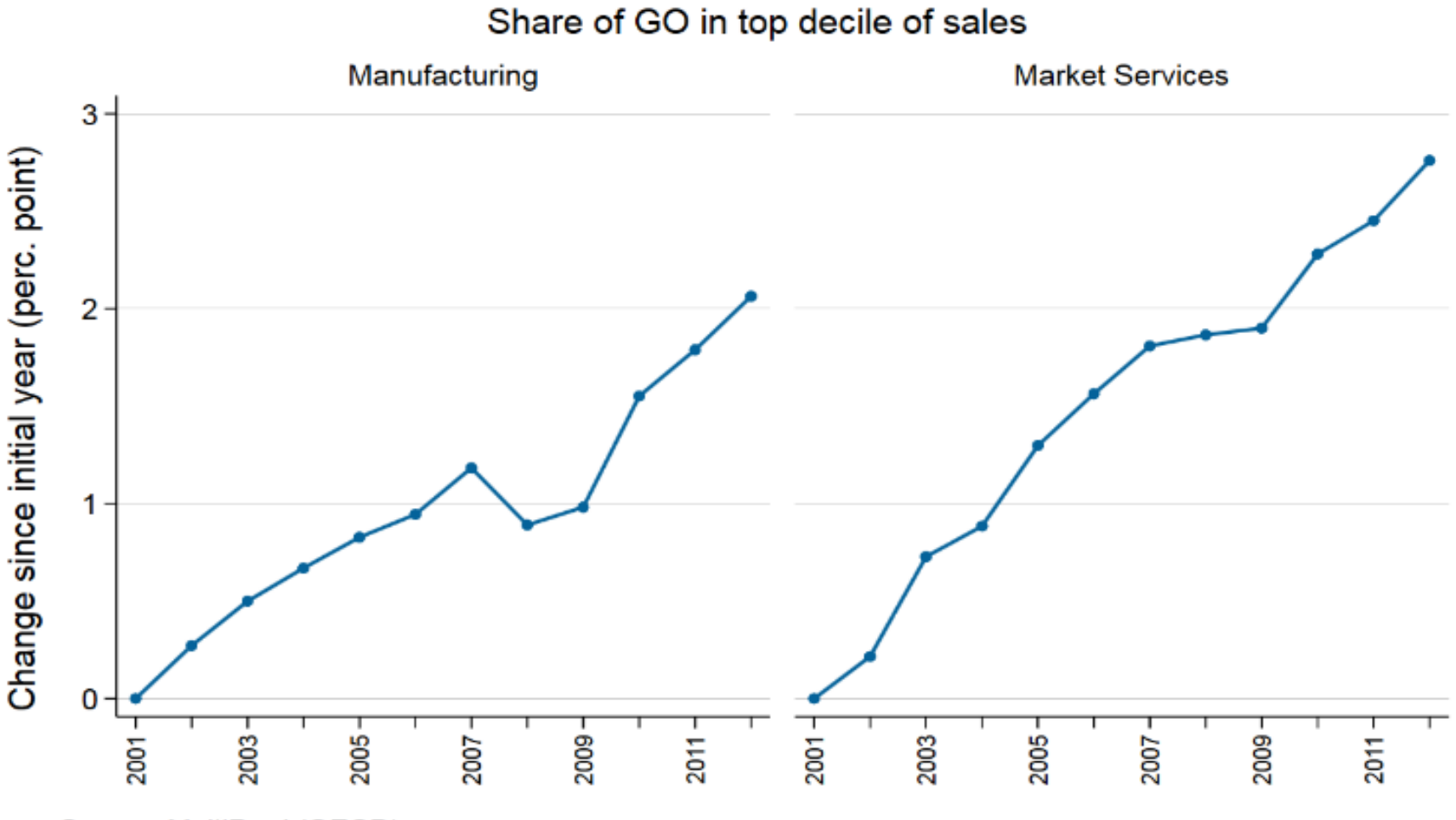


Finance



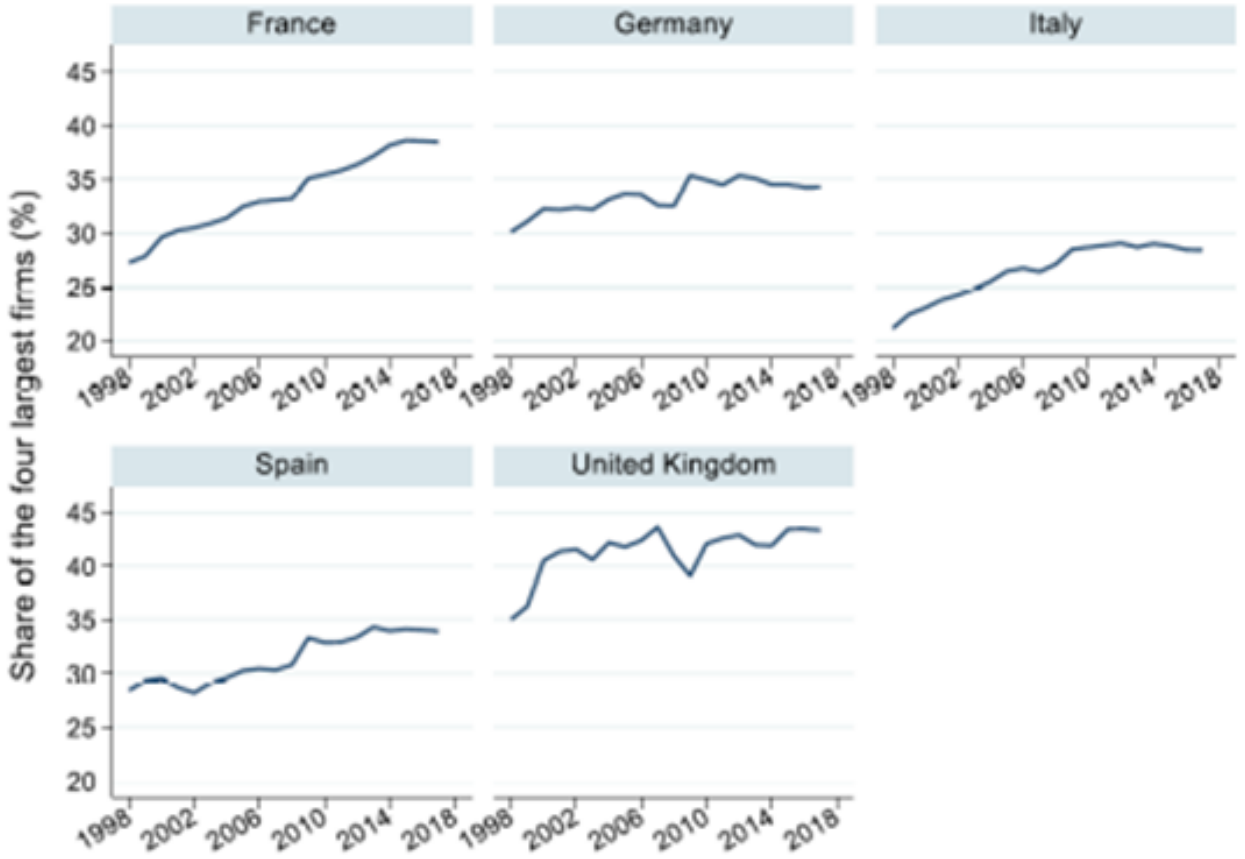
Notes: Autor, Dorn, Katz, Patterson & Van Reenen (2020) from Economic Census; Weighted av. of concentration across the SIC-4's within each sector. 676 SIC4 industries underlying this.

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 has also increased in Europe (company accounts data)



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

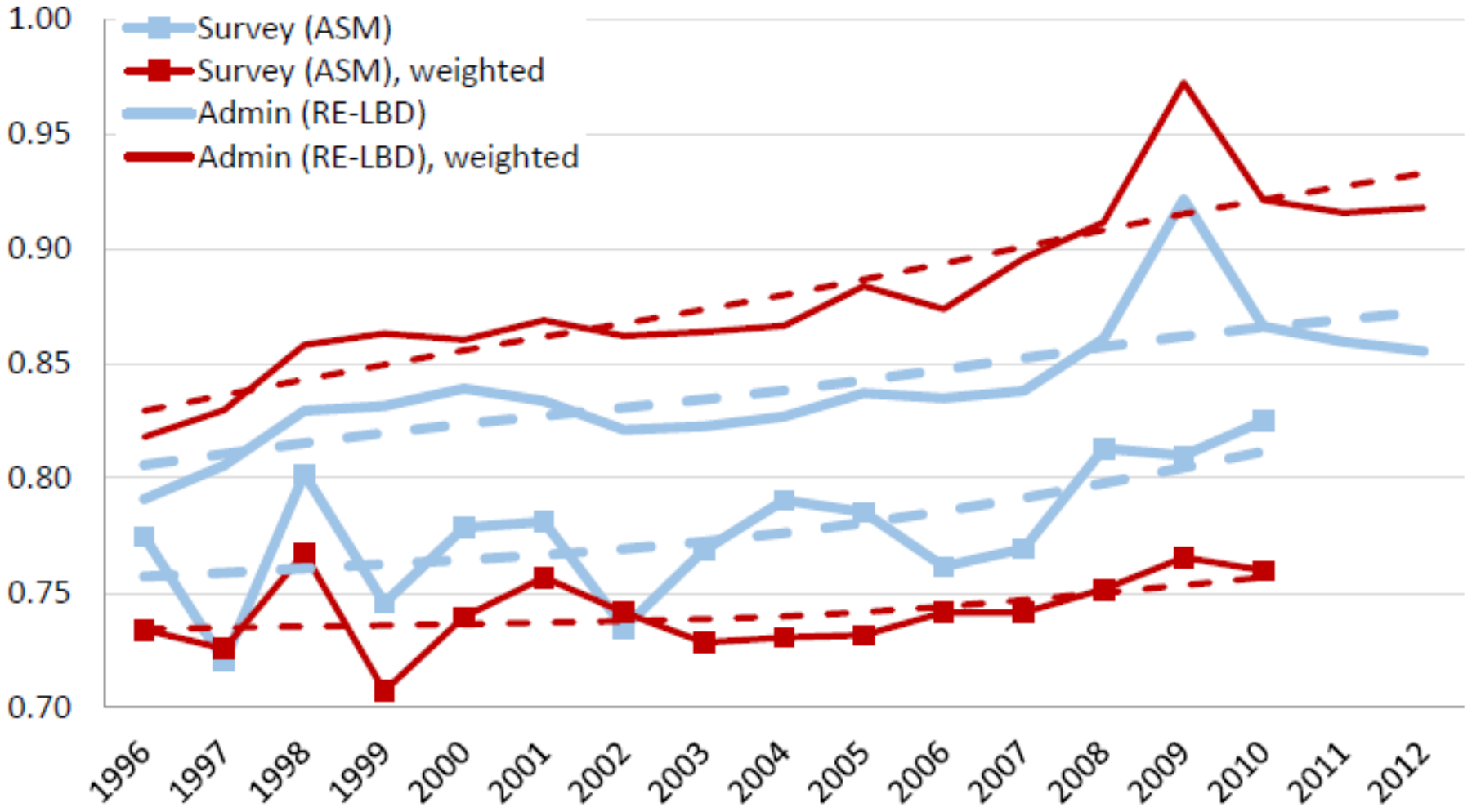
Source: Koltay, Lorincz and Valletti (2020) DG-COMP Chief Economist Team using ORBIS, Euromonitor Industrial Passport and STAN

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

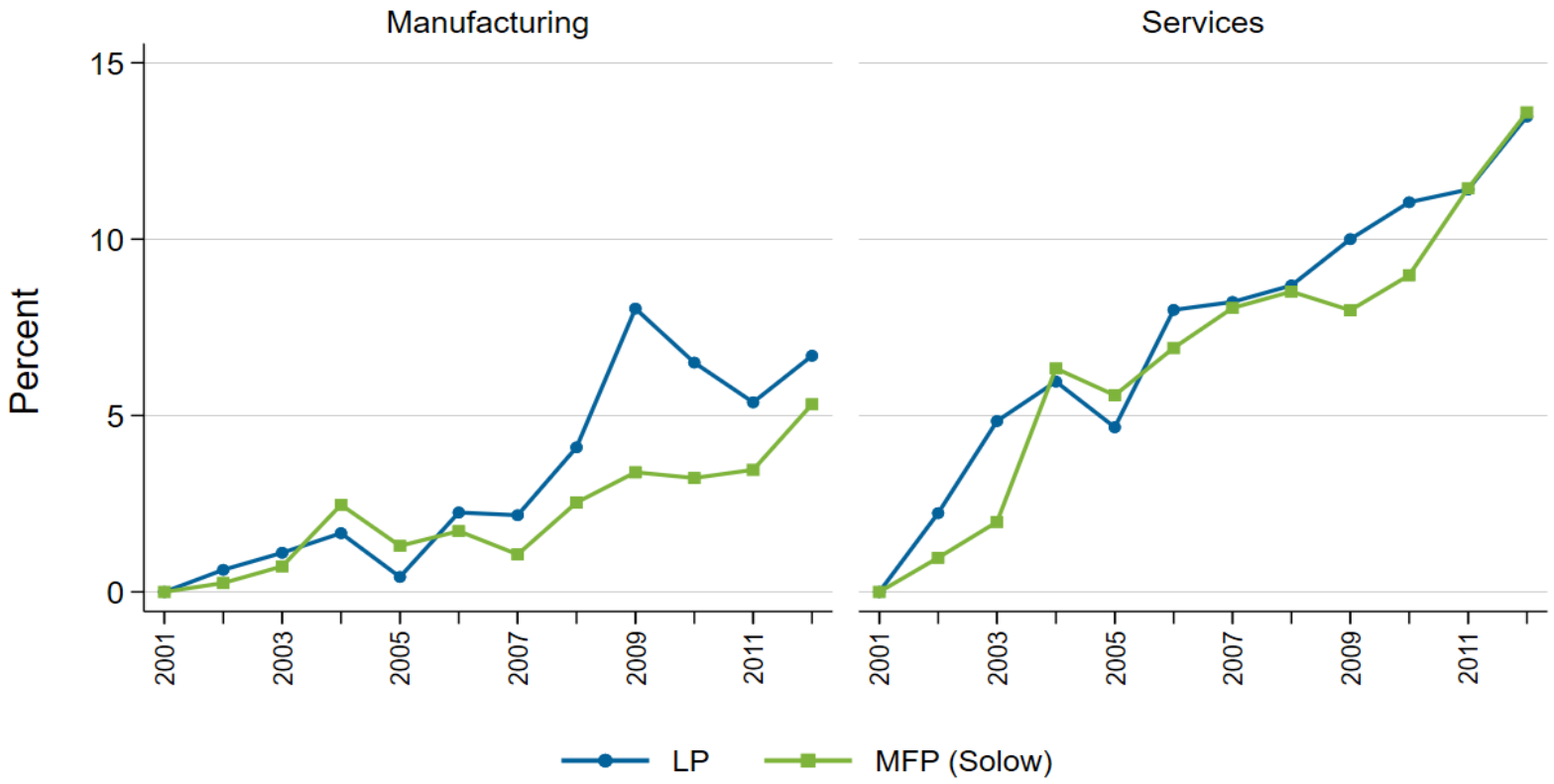
- **Quick digression:** Other dimensions of firm inequality (than size) also increased

Rising US productivity dispersion (manufacturing)



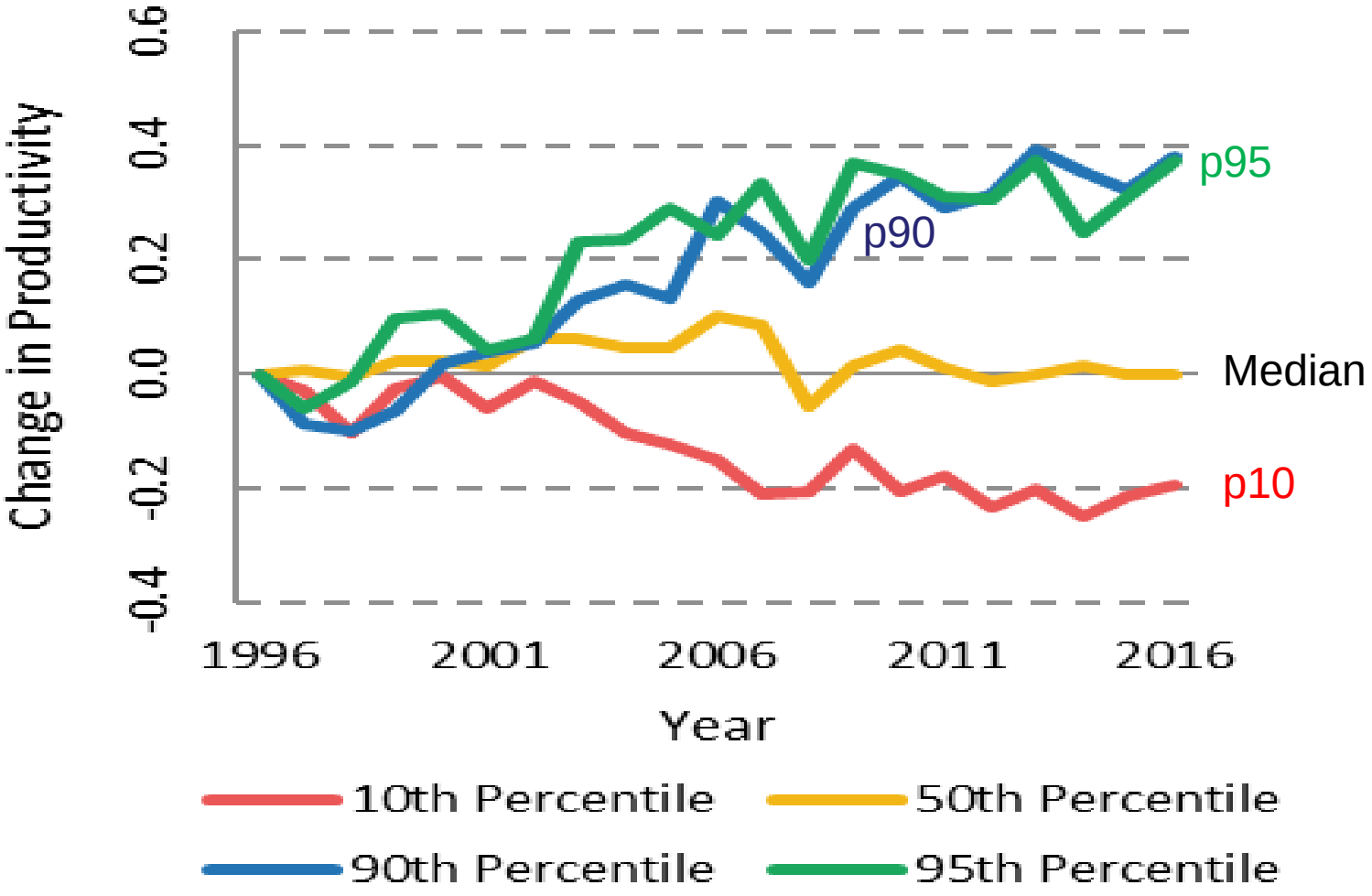
Source: Decker, Haltiwanger, Jarmin & Miranda (2018, Figure A6)
Notes: Standard Deviation of log(real sales/employment) normalized in a NAICS 6 digit industry-year. HP filtered series in dashed lines. LBD is population whereas ASM is corrected for sample selection. Weights are employment weights.

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



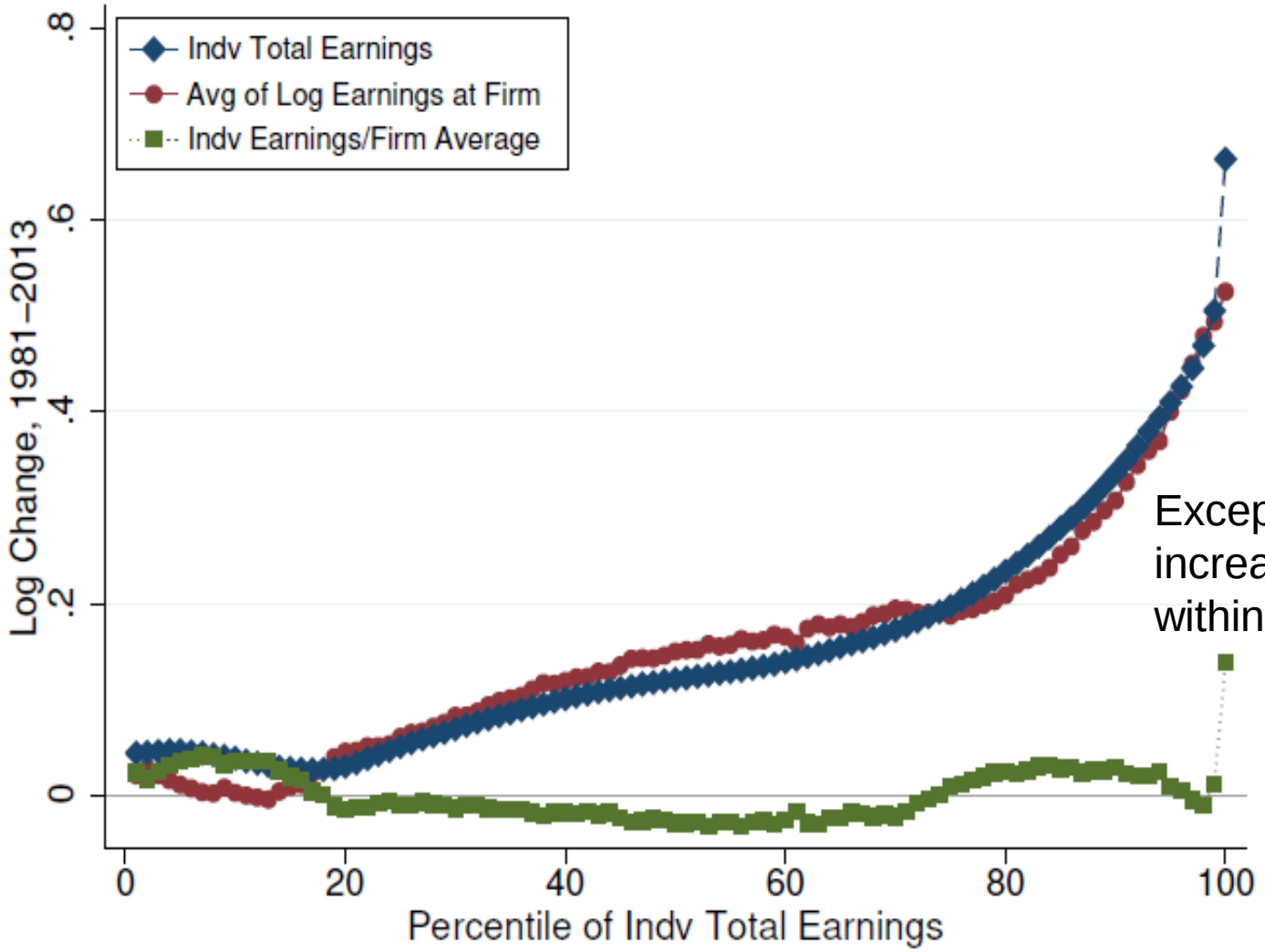
Source: OECD Multiprod, https://www.oecd.org/sti/ind/multiprod.htm
Notes: Coefficients on year dummies from regression of 90-10 log(productivity) within an industry-year cell in 16 OECD countries (AUS, AUT, BEL, CHL, DEU, DNK, FIN, FRA, HUN, ITA, JPN, NLD, NOR, NZL, PRT, SWE)

Rising UK productivity dispersion, 1996-2016



Source: de Loecker, Obermeier and Van Reenen (2022)
Note: Productivity is value added per worker. All quantiles weighted by firm size (employment). Historical ORBIS data.

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



Except for "CEO", No increase in inequality within firms

Source: Song et al (2019), SSA data

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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)

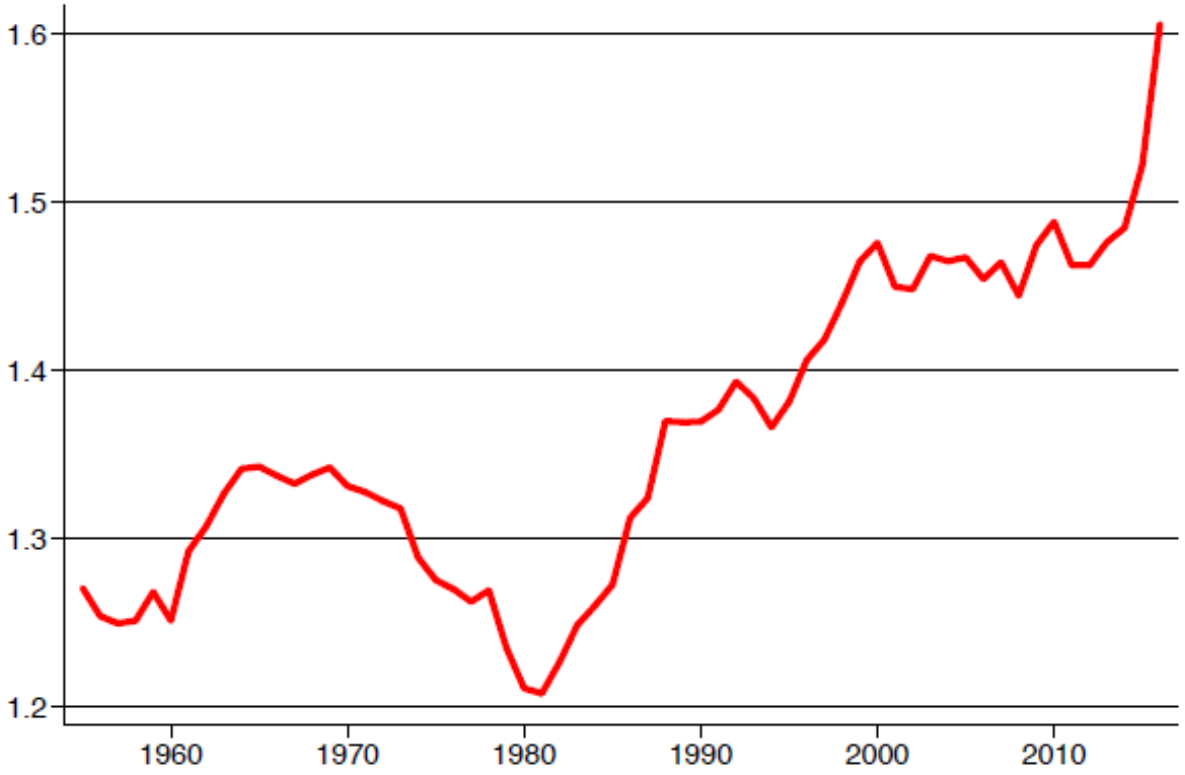
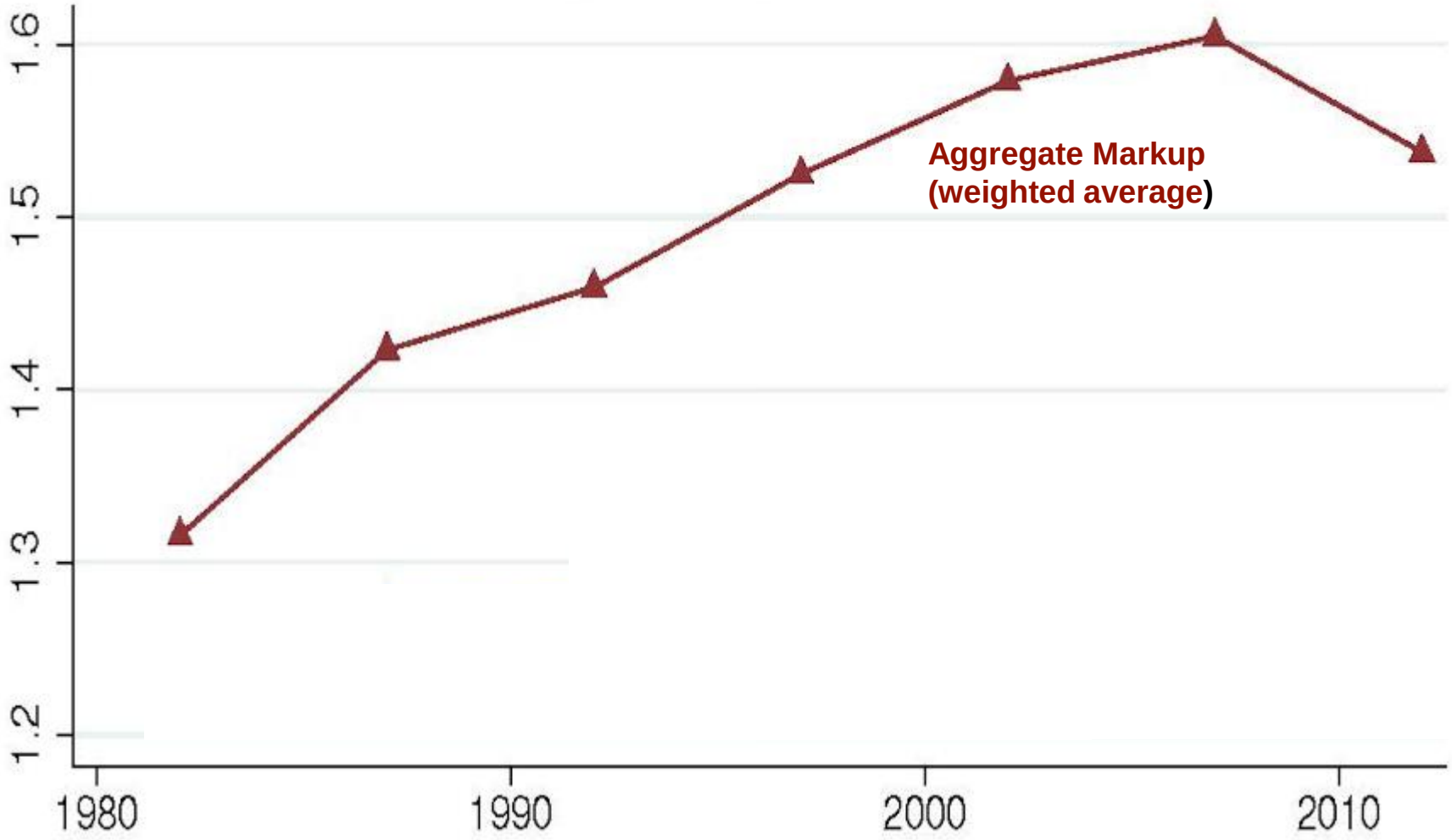


Figure 1: Average Markups for Conventional Production Function. Output elasticities θ_{st} from estimated PF1 are time-varying and sector-specific (2 digit). Average is sales weighted. Evolution 1955-2016.

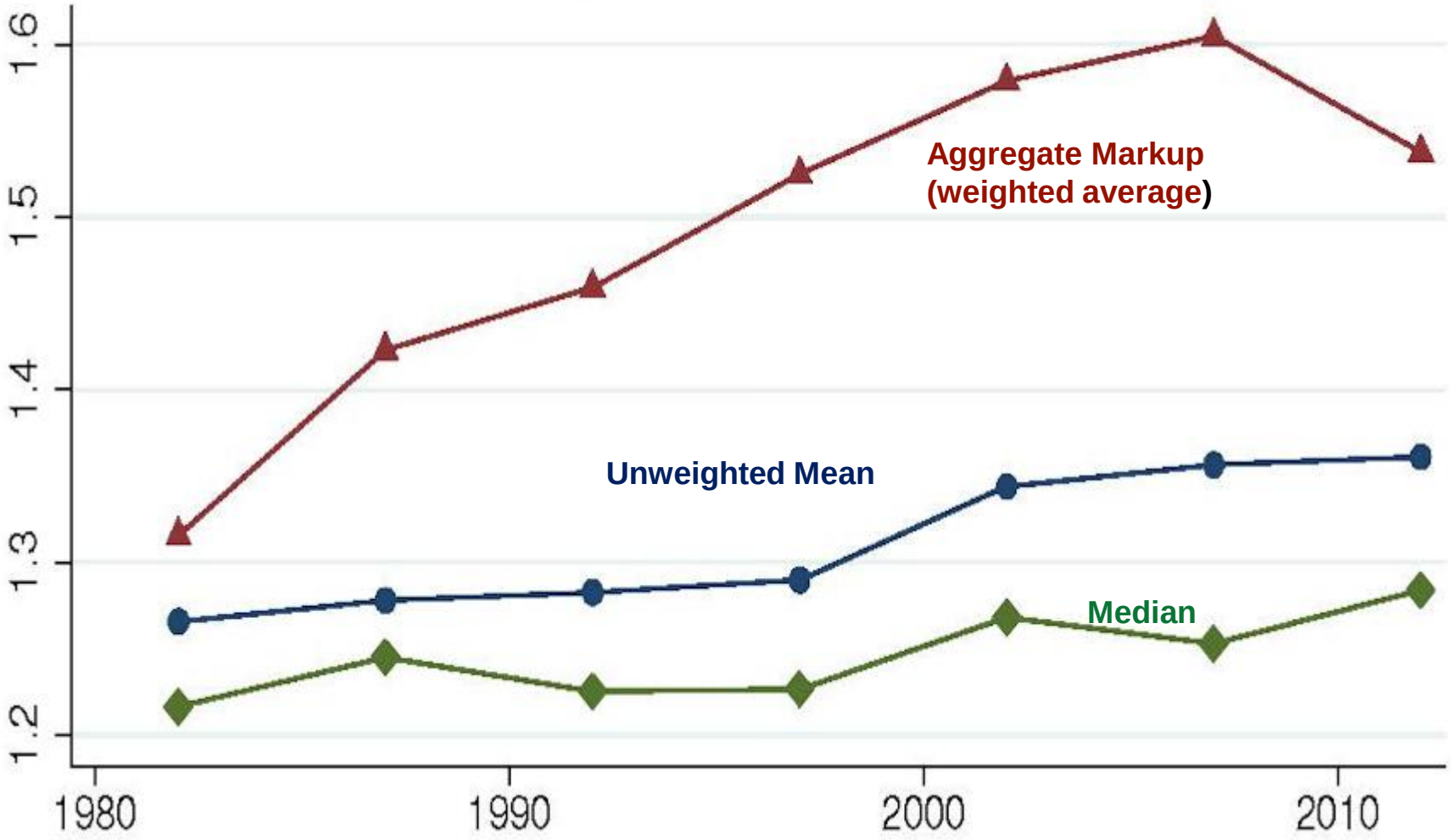
Source: de Loecker, Eeckhout and Unger (2020) on Compustat

Aggregate size-weighted markup also rises in US Census Data



Notes: Accounting markup is defined as sales over total 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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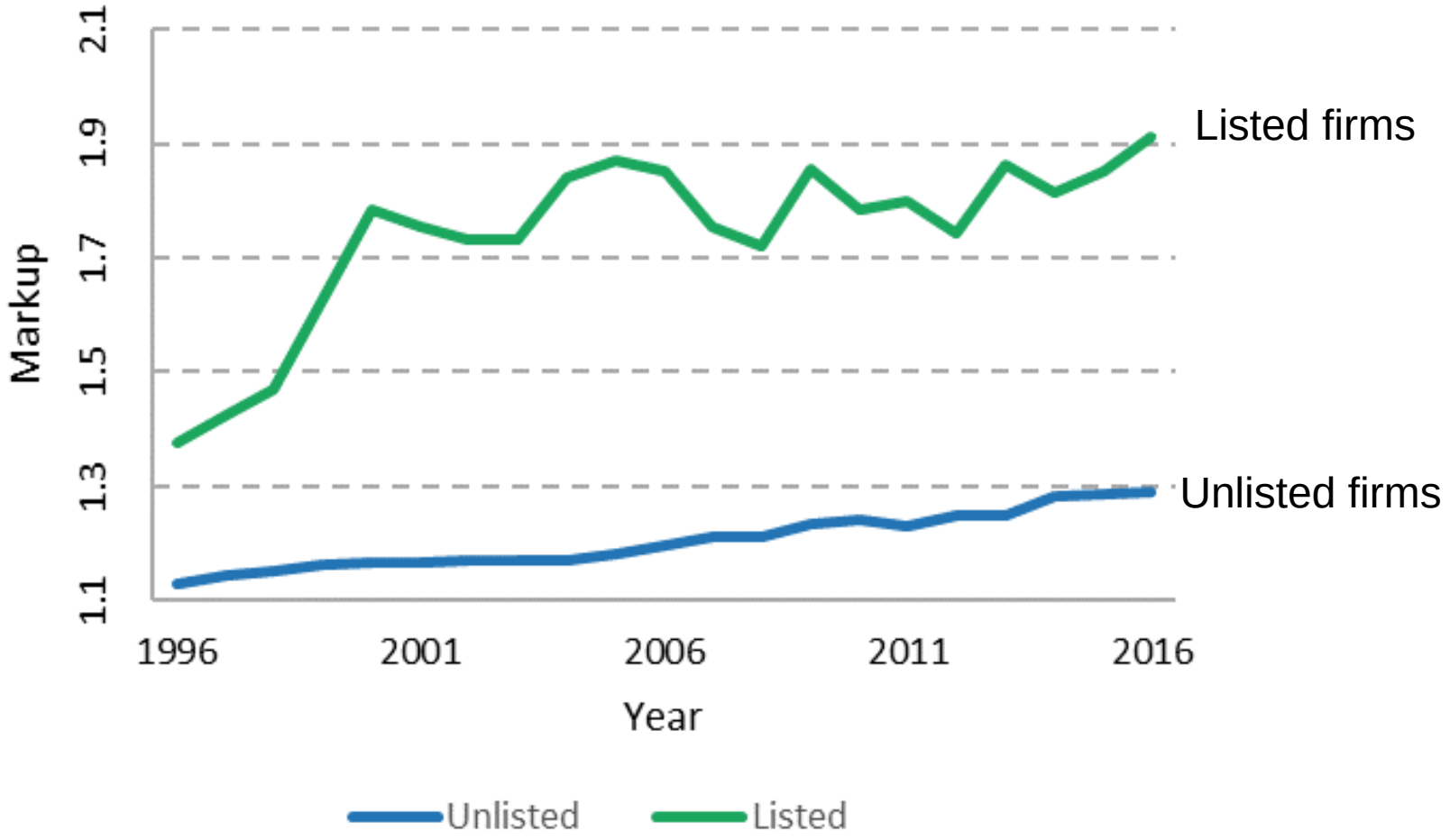
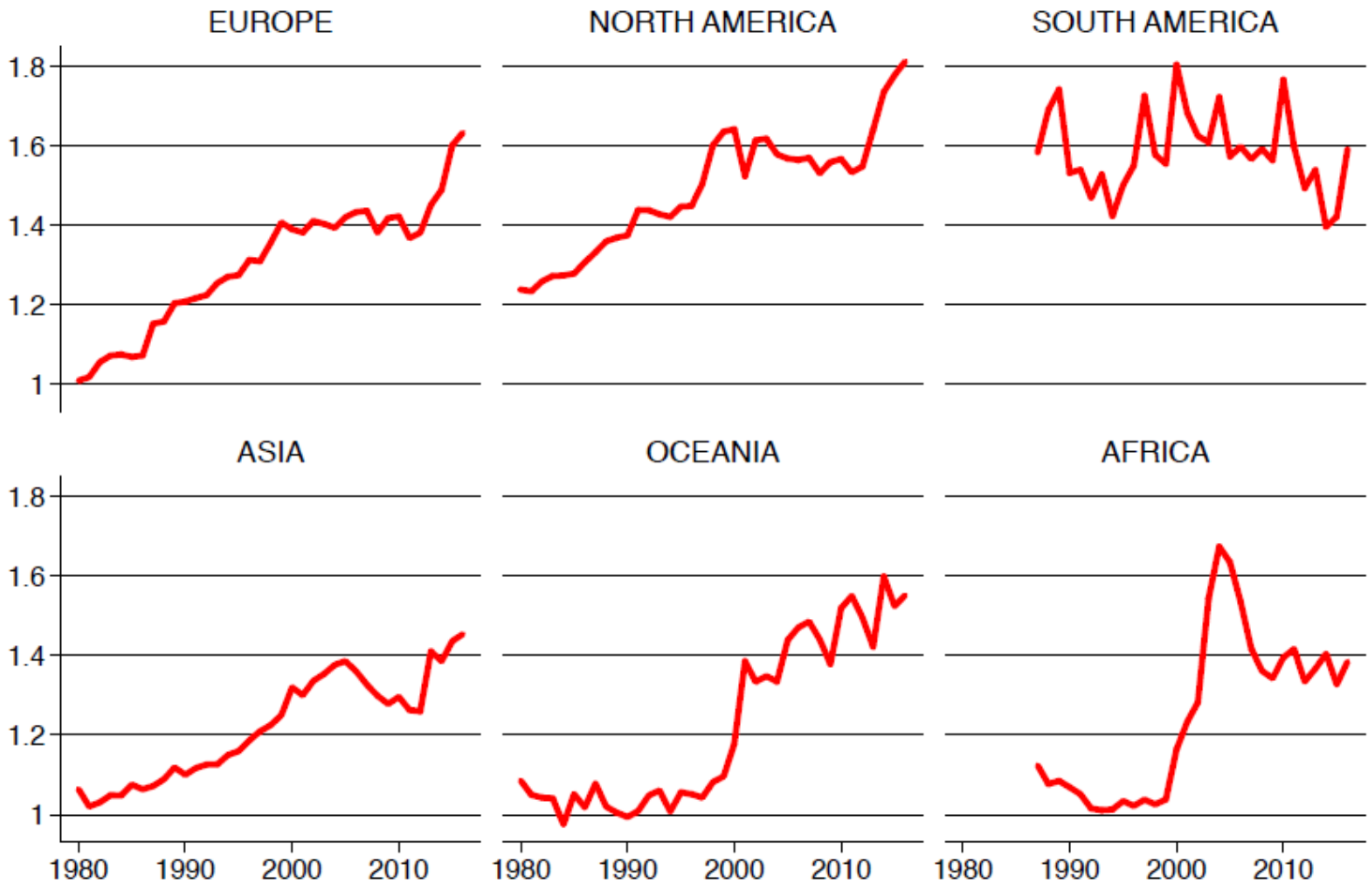
Aggregate Markups in UK population data also rise



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

Price-Cost Markups around the world (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 is mainly due to reallocation rather than a general rise in markups across all firms
- This has happened in other OECD countries like EU, as well as US

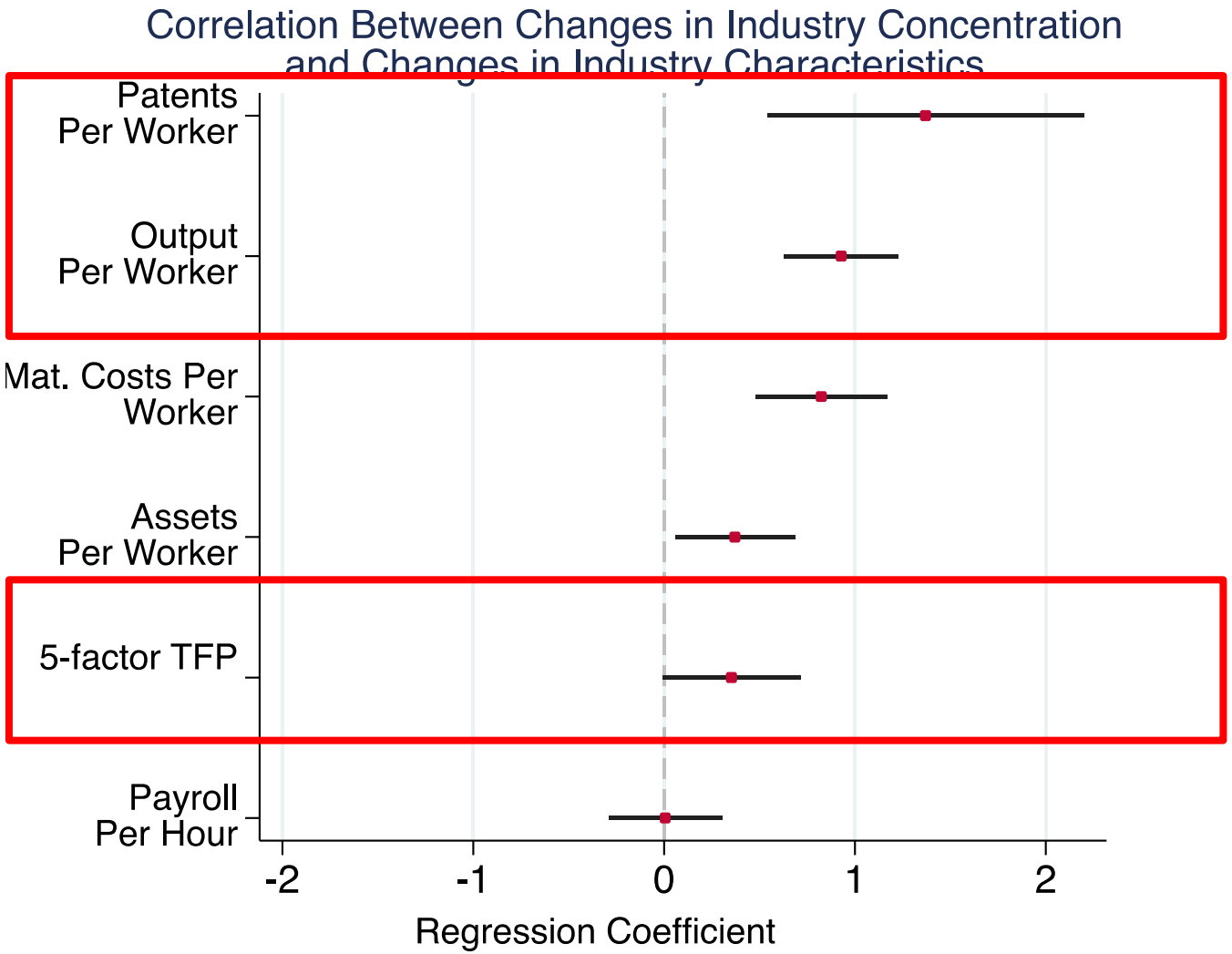
Is the rise of Superstar Firms good or bad?

Benefits

1. Superstar Firms more productive, so reallocation towards them implies higher aggregate productivity

2. Superstars not classical monopolists: lots of innovation and low prices

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



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

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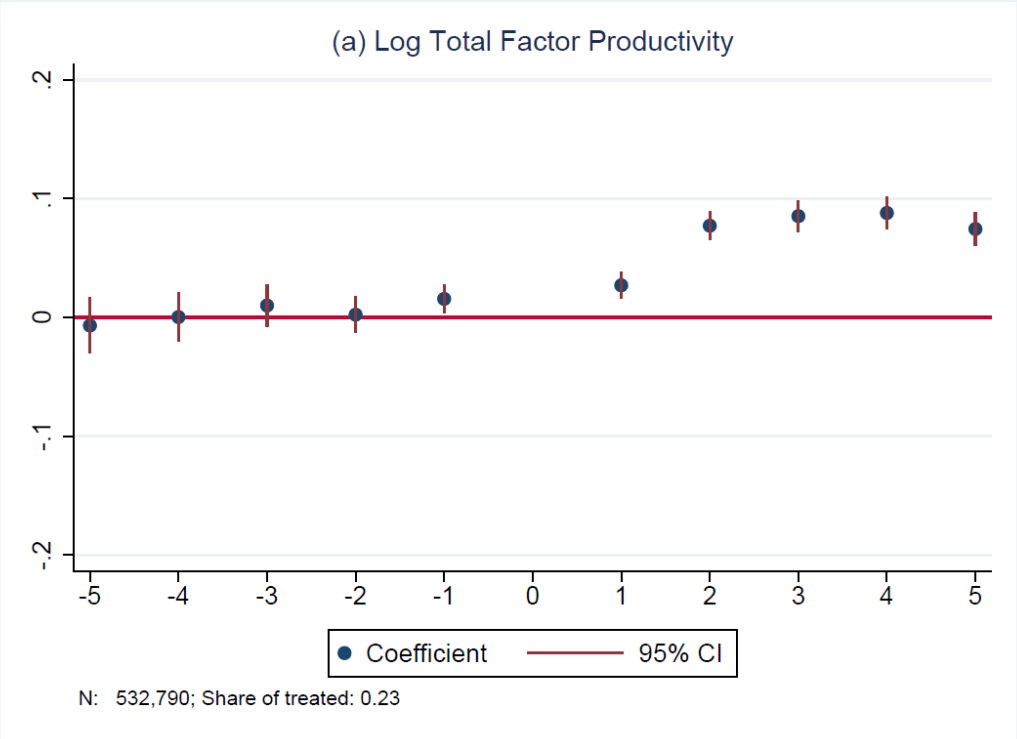
3. **Positive productivity spillovers? Examples of multinational literature**
   - Amiti, Duprez, Konings and Van Reenen (2022) see this for all Superstar firms, not just those who are globally engaged

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.

Is the rise of Superstar Firms good or bad?

Costs

- Ability to exercise market power could lead to negative outcomes: prices, wages, innovation
- Have Superstars attained their size due to exercise of this power? Are they becoming better at creating barriers to smaller rivals growing?
  - Patents/IP, etc to create barriers to diffusion
  - Lobbying to change rules of game (regulation, subsidies, anti-trust)
  - Tax arbitrage across countries
- Implications for labor markets and inequality

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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)

Imperfect Competition in Labor & Product Market

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  - 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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  - Monopsony power depends on firm labor supply elasticities
- Change in labor share for firm *i*

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

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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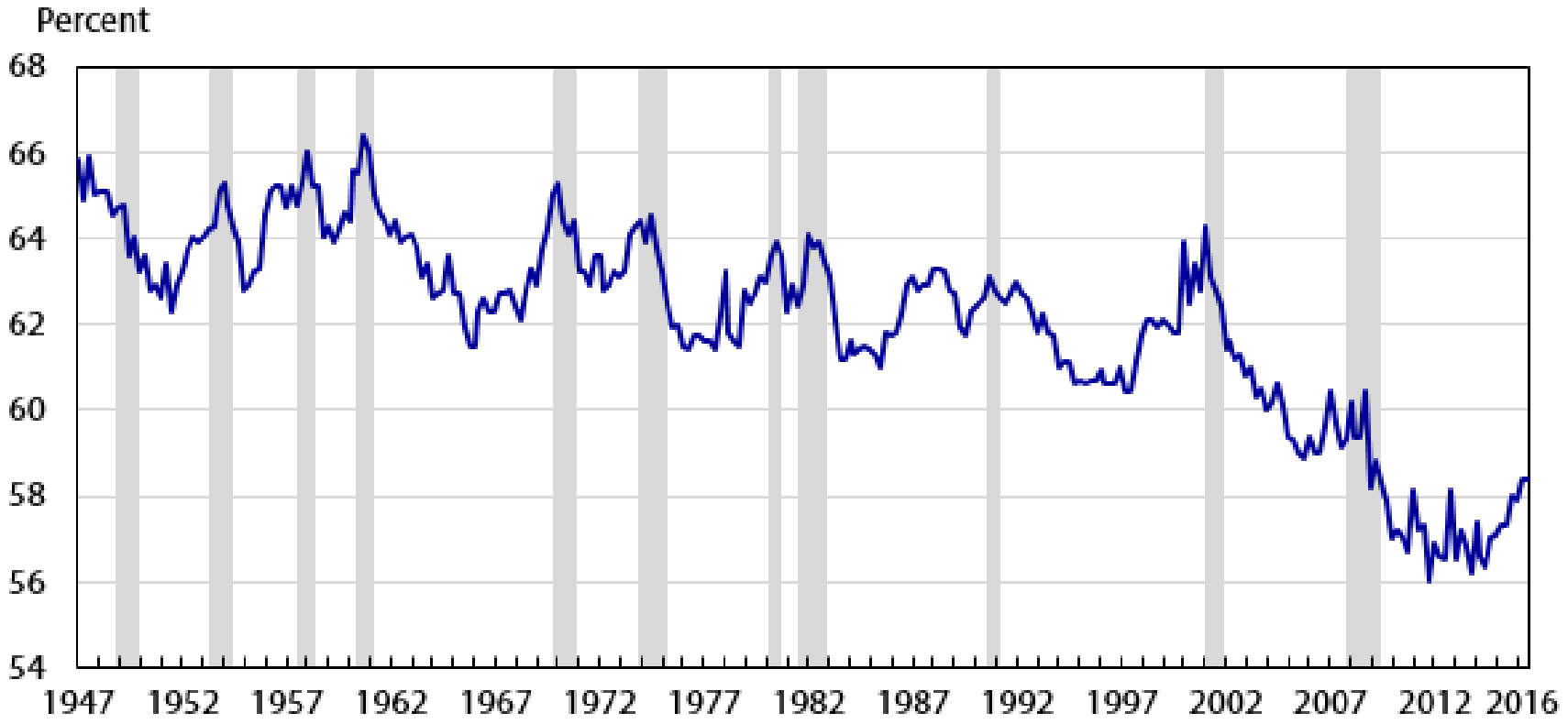
- Where ω_i is the relative size (market share) of firm *i*
- Change in aggregate labor share depends on changes in the firm size distribution $F(\omega)$ & covariance of size with labor share
- If environment changes to favor superstars (who have higher markups) this can depress labor share without 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.

Source: BLS https://www.bls.gov/opub/mlr/2017/article/estimating-the-us-labor-share.htm

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

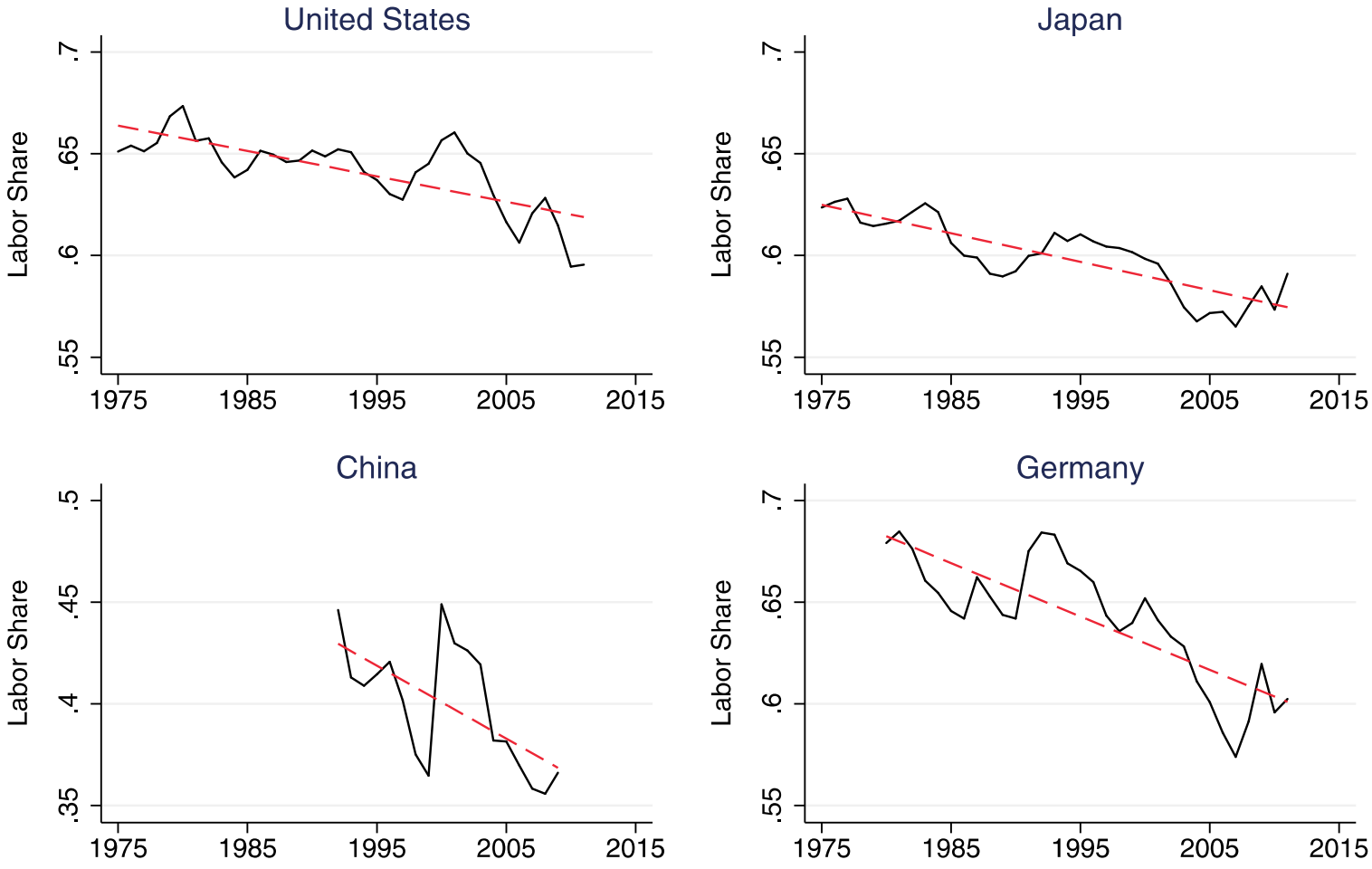
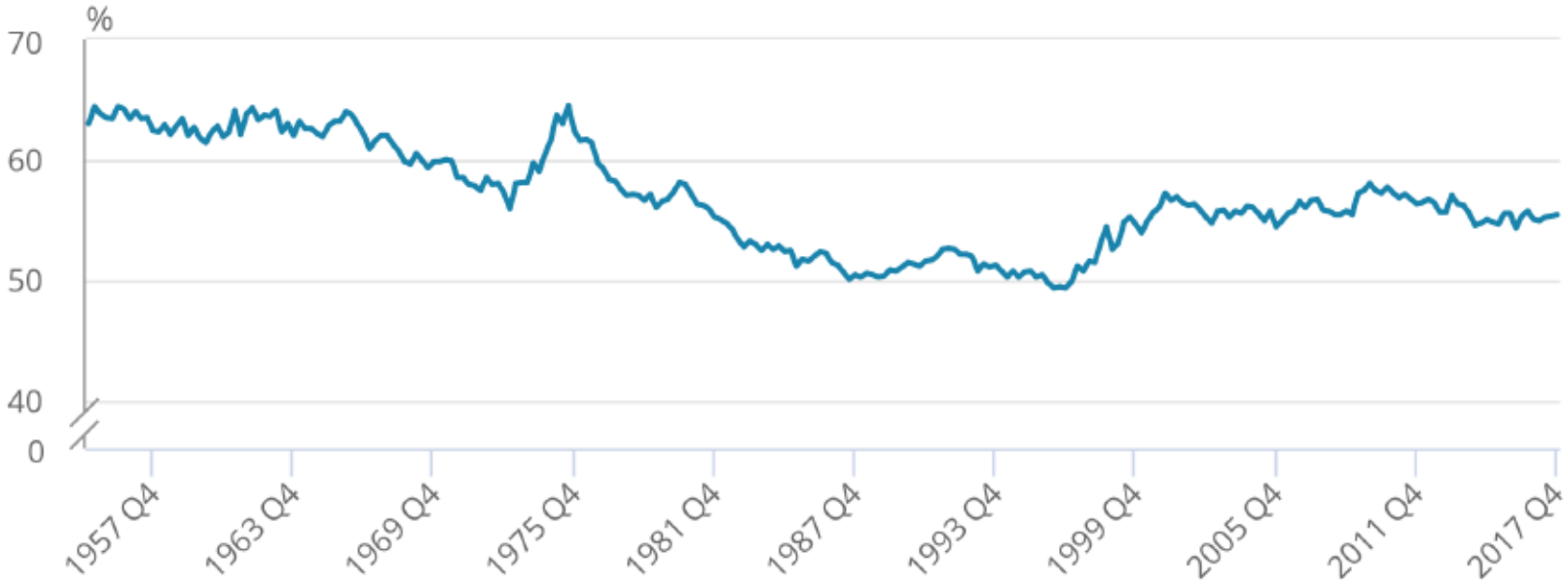


FIGURE II

Declining Labor Share for the Largest Countries

Source: Karabarbounis and Neiman, 2014

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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Change in aggregate labor share

$$\Delta S = \Delta\left(\sum_i \omega_i \frac{\alpha_i}{\mu_i \psi_i}\right)$$

- If stable technological bias and mark-downs

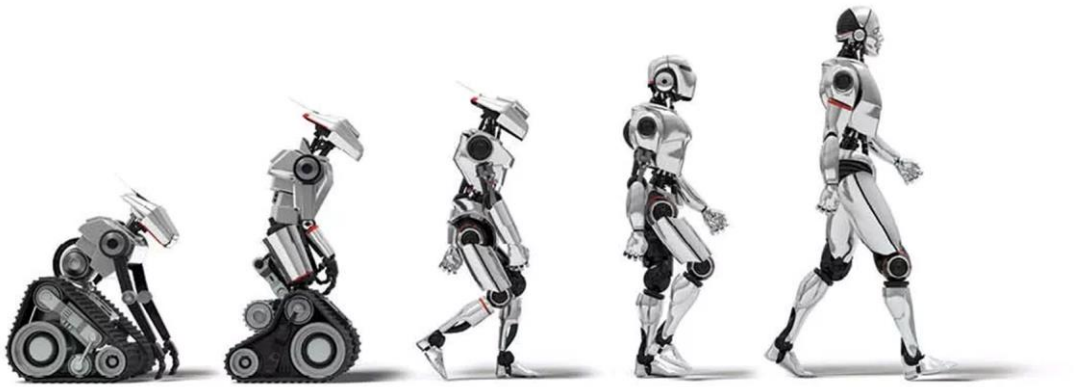
$$\Delta S = \frac{\alpha}{\psi}\Delta\left(\sum_i \omega_i \frac{1}{\mu_i}\right)$$

- Size weighted markups rose by about 0.44% per annum
  - Implies a fall in labor share of **7.2 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

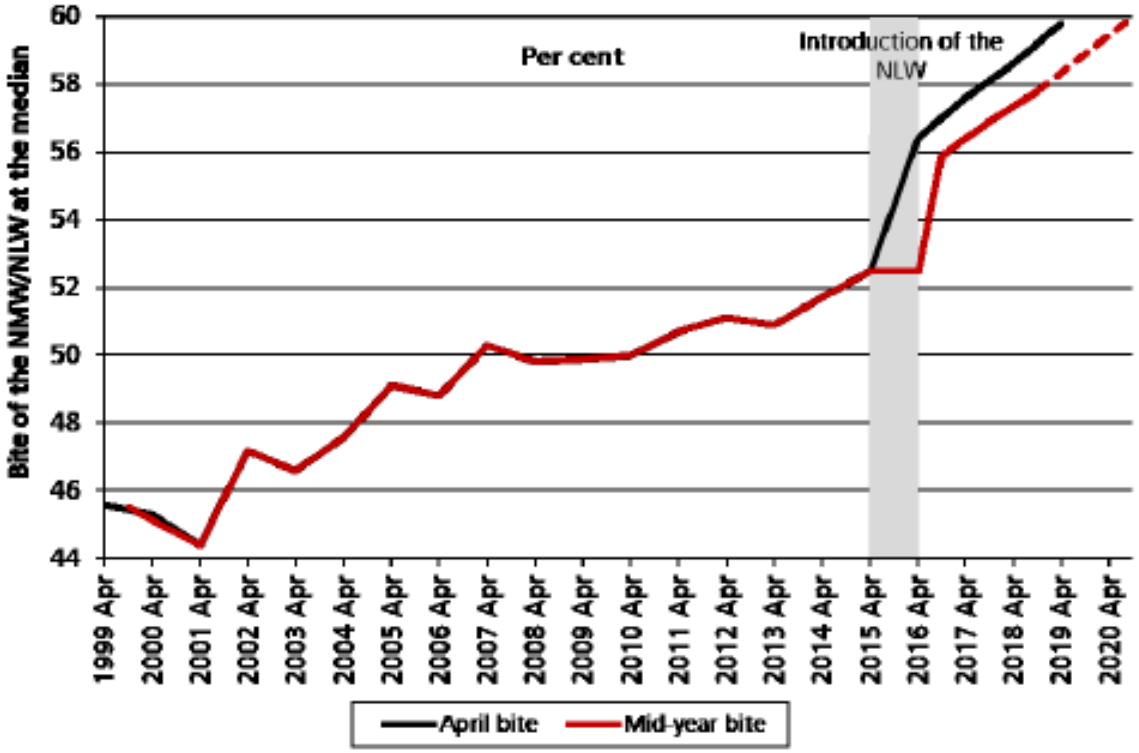
- Technical change biased **towards** labor, $\Delta\alpha > 0$?
  - Unlikely as automation (e.g. robots) generally thought to be biased **against** labor (e.g. Acemoglu & Restrepo, 2019, 2020)



Monopsony Power

- **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

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



Source: Dube (2019)

Monopsony Power

- **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
  - Evidence (e.g. Draca, Machin & Van Reenen, 2011) that this wage floor:
    - Increased **wages** at bottom of distribution without significantly reducing **jobs**
    - But **did** squeeze profits, especially when firms had some product market power

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

Agenda

Introduction

Increasing differences across firms

Markups

Framework: product & labor markets

Assessment

Causes/Explanations

- **Institutional**
  - Weak anti-trust enforcement, lowering competition

- **Technological**
  - Innovation (digital sectors)
  - Diffusion (adoption of ICT, digital)

- **Globalization**
  - Falling trade costs
  - Global Value Chains

Assessment

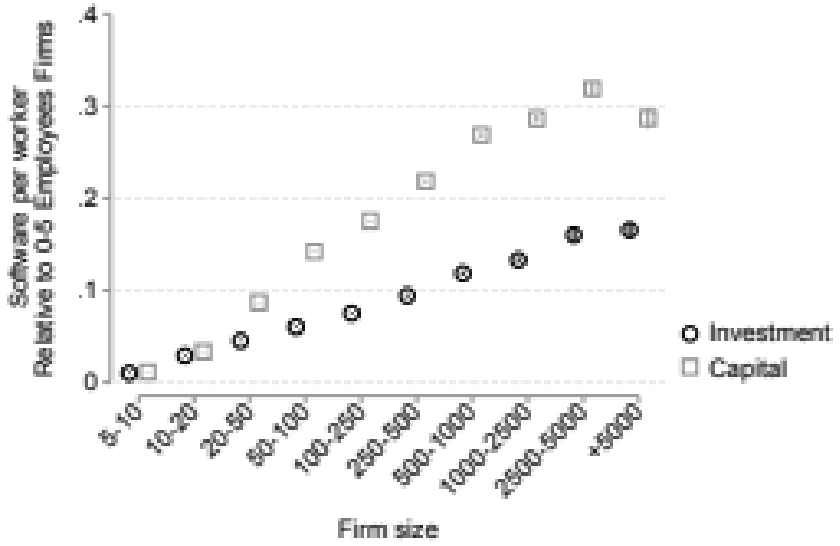
- The similar qualitative patterns across countries suggests some common underlying forces:

- Unlikely that country-specific institutions such as weaker US anti-trust enforcement are the dominant explanation (cf. EU DG-COMP)
  - Can help explain different magnitudes of some effects in different countries

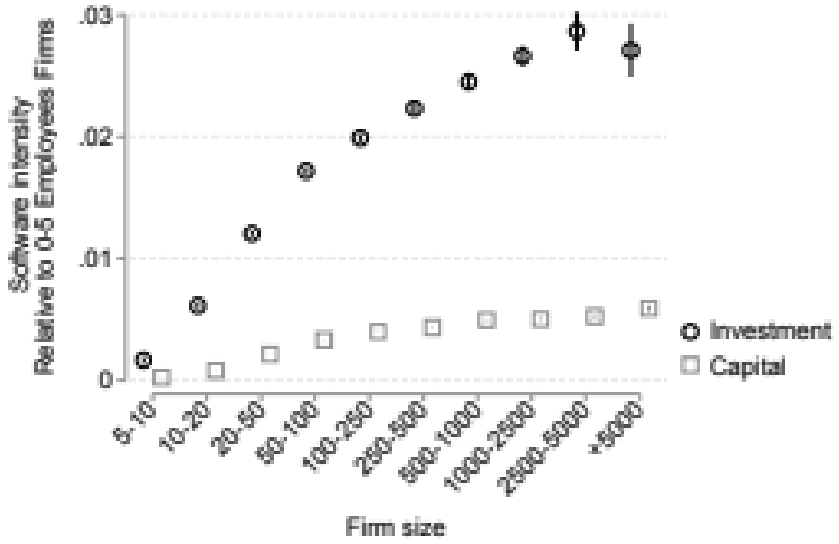
- Technology stories
  - Platform competition (sectors intensively producing digital, GAFAMs)
  - Adoption of digital, growth of intangible capital fixed costs (sectors intensive in using digital)

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)

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
- Helps explain falling labor share, but also need to consider imperfect competition in labor market
- Technology is dominant factor, esp. in digital producing sectors and industries/firms using ICT intensively
- Still some role for globalization and institutions, especially in specific sectors

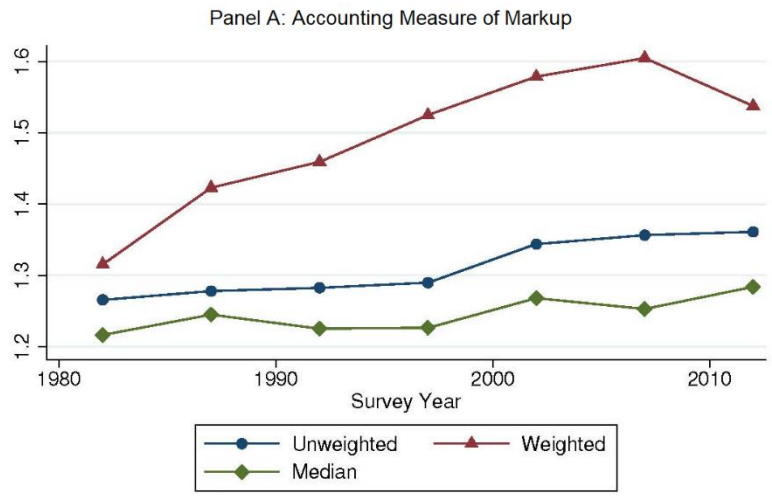
- A very rich research area for those interested in digital economy!

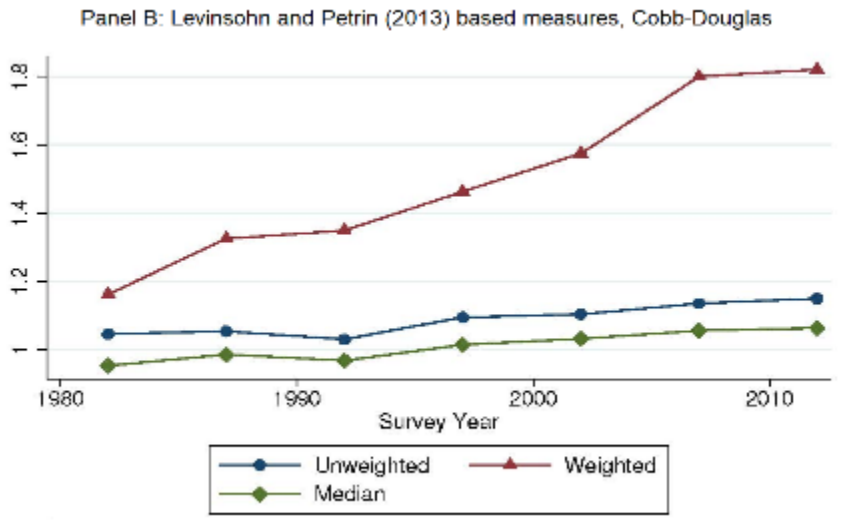
Thank you!

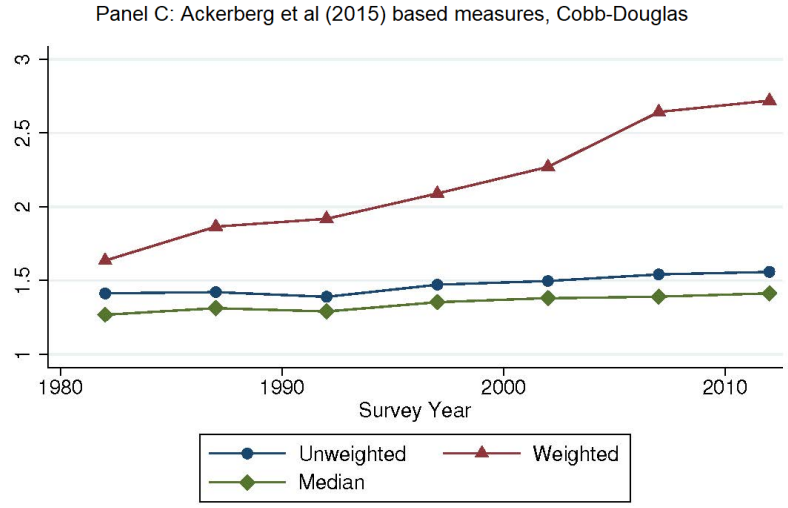
Further reading

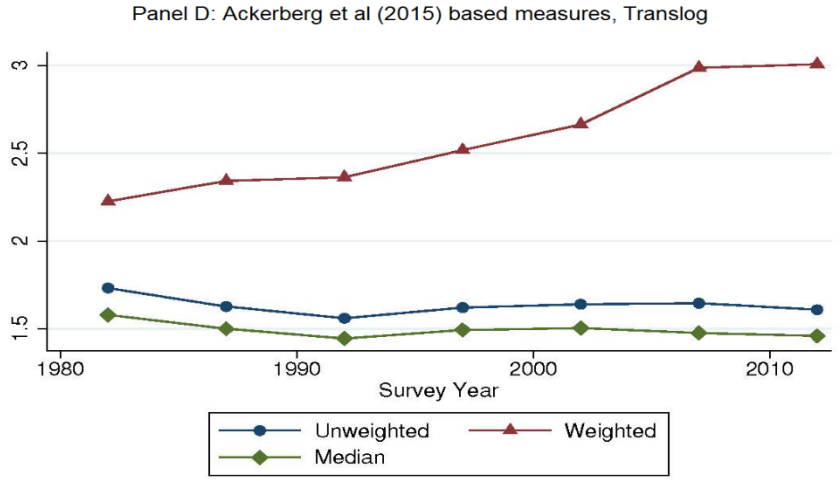
- de Loecker, Obermeier and Van Reenen (2022) “Firms and Inequality” *Deaton Inequality Review*
- Amiti, Duprez, Konings and Van Reenen (2022) “Superstar Spillovers”
- Autor, Dorn, Katz, Patterson and Van Reenen “The Fall of the Labor Share and the Rise of Superstar Firms” (2020) Quarterly Journal of Economics
- Bloom, Sadun, Schuh and Van Reenen (2021) “Management as Capital” http://cep.lse.ac.uk/pubs/download/dp1433.pdf
- Bloom, Nick and John Van Reenen)“Measuring and Explaining Management practices across firms and nations” *Quarterly Journal of Economics* (2007) 122(4), 1351–1408.
- 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
- World Management Survey http://worldmanagementsurvey.org/
- 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
- Draca, Mirko, Steve Machin & John Van Reenen (2011) “The Impact of the National Minimum Wage on firm profitability” *American Economic Journal: Applied Economics* 3(1) 129-51 http://cep.lse.ac.uk/pubs/download/dp0715.pdf

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







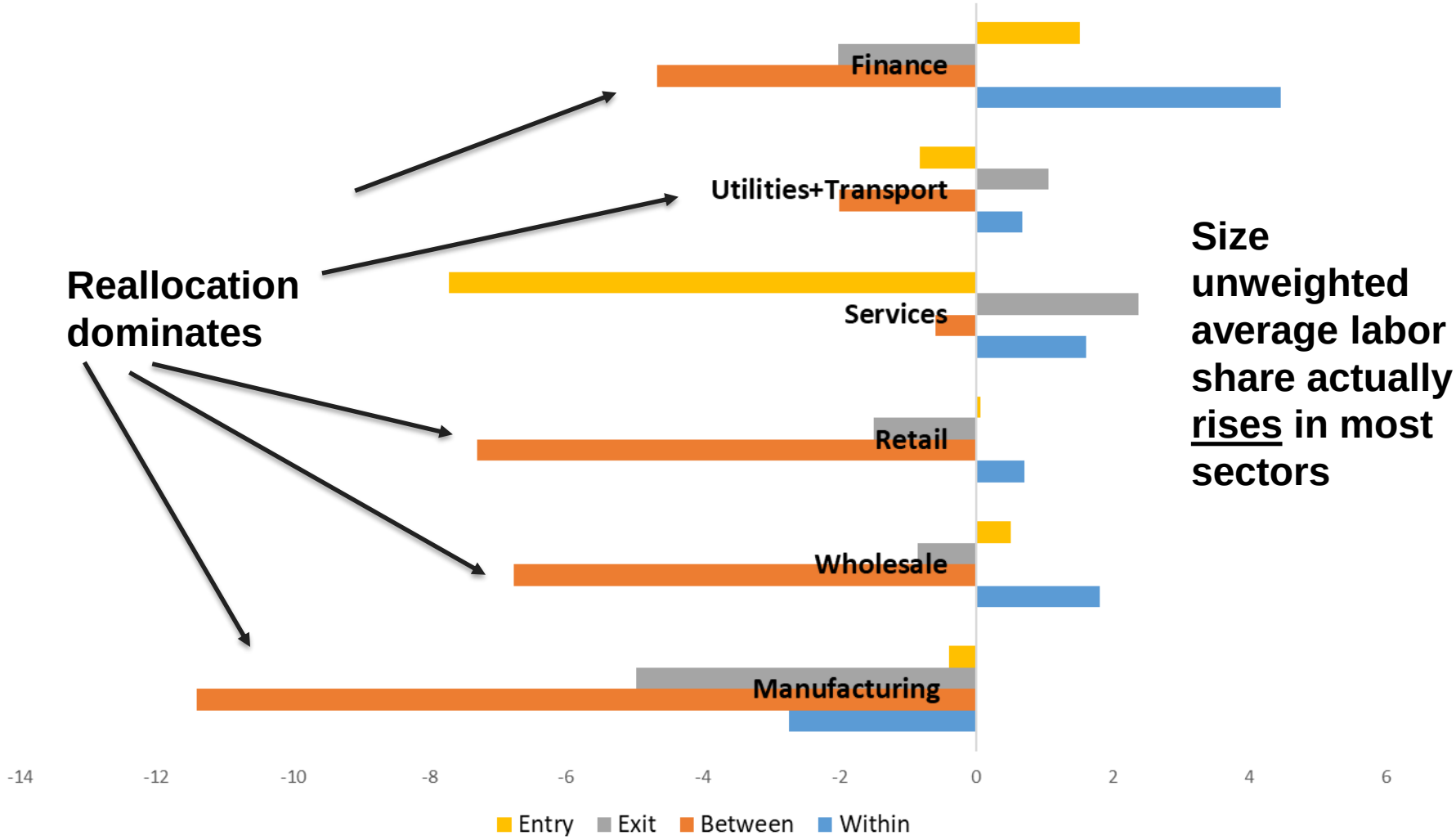


Source: Autor et al (2020); Census of Manufactures; **Notes:** Panel A uses Antras et al (2017) method; Panels B-D use production function, de Loecker and Warzynski (2012).

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

Firm-level Census decompositions of labor share fall: It's all reallocation



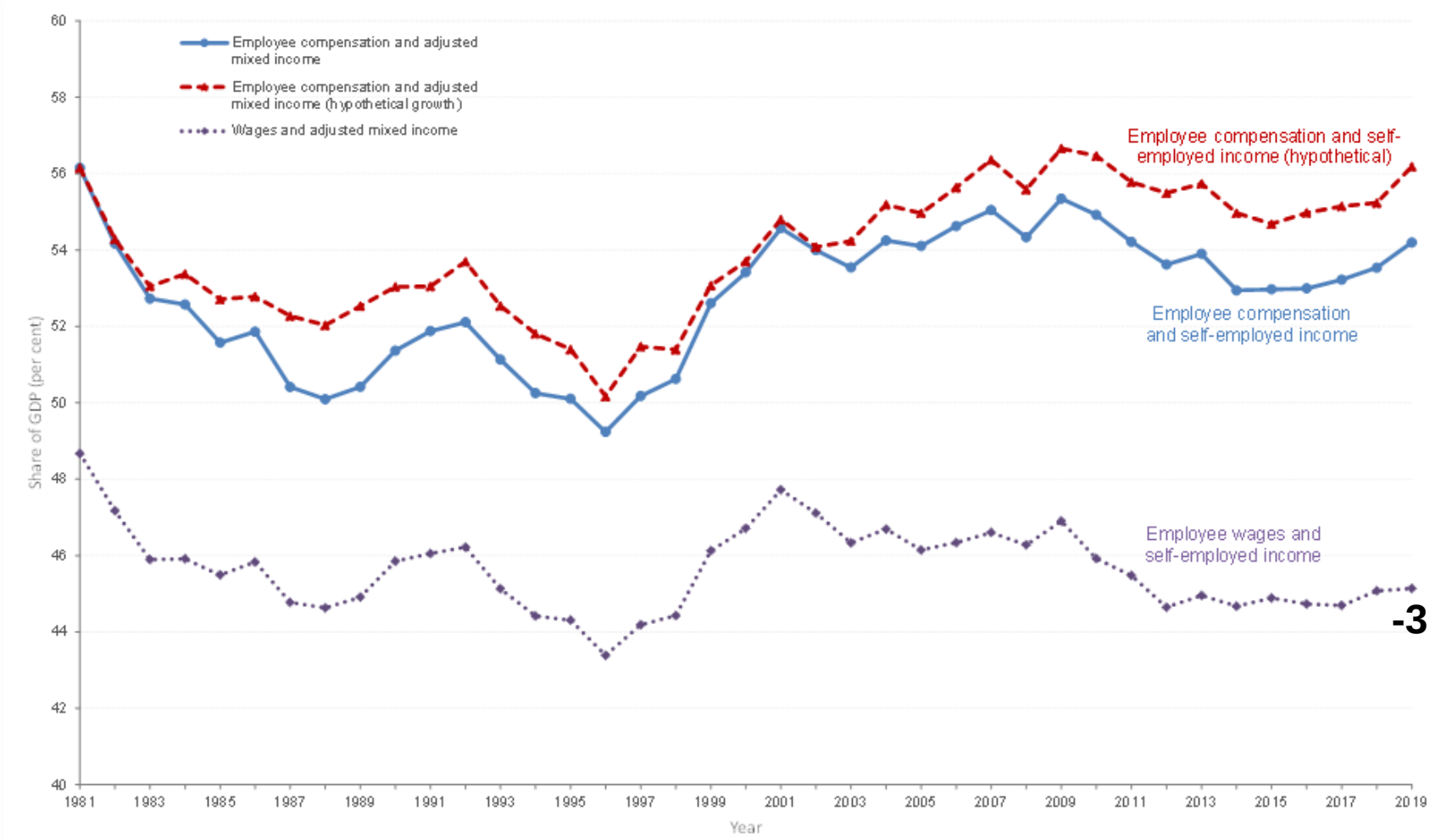
Size unweighted average labor share actually <u>rises</u> in most sectors

Notes: Meltitz-Polanek (2015) decompositions 2012-1982. Use NIPA to adjust Census for intermediates (~4 million firms); Autor et al (2020)

Concerns

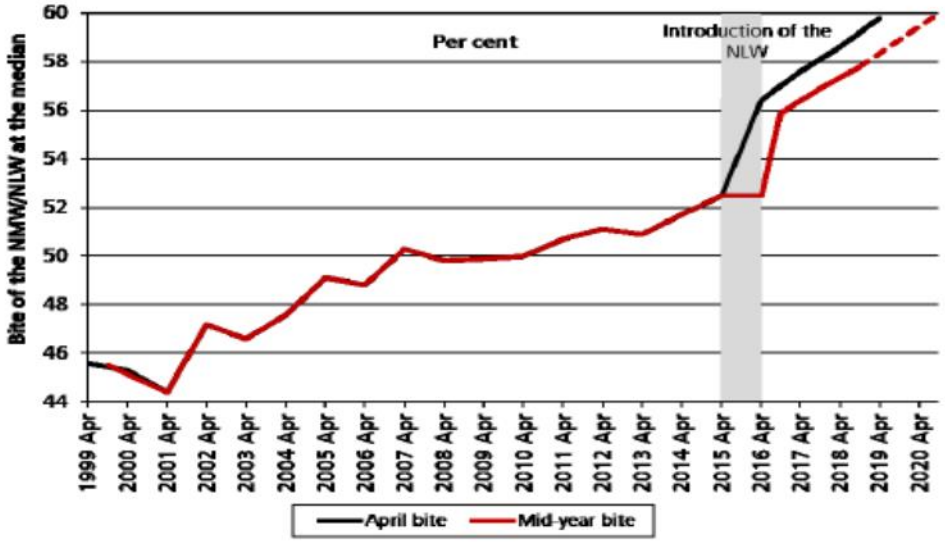
- Compustat covers a special sample of firms
  - Publicly listed (so covers under a third of US employees)
  - Only has very large firms, so very selected and type of firm listed differs a lot over time
  - Doesn't break down COGS into cost components (e.g. labor, intermediates, etc.)
  - Consolidated 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

UK Labor Share, 1981-2019



Source: Teichgraeber and Van Reenen (2022)

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



Source: Figure 2.5 in LPC (2018). National Minimum Wage: Low Pay Commission Report 2018. LPC estimates using adjusted earnings data based on ONS data: ASHE without supplementary information, April 1999-2004; ASHE with supplementary information, April 2004-06; ASHE 2007 methodology, April 2006-11; and ASHE 2010 methodology, April 2011-18, standard weights, UK; and earnings forecasts from HM Treasury panel of independent forecasts (2018), and Bank of England average earnings forecasts (2018). Notes: a. Bites (the ratios of the NMW/NLW to median hourly earnings) from mid-year 2018 are based on earnings forecasts and may change when out-turn data is available. b. Data include all apprentices (as it is not possible to identify apprentices prior to 2013).