Programme on Innovation and Diffusion

Centre for Economic Performance

Policies to Raise Pay and Productivity: Innovation and Diffusion

No. 10 Policy Unit

January 27th 2022

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LSE and MIT

THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

OUTLINE OF TALK

Productivity and Pay in the UK

Innovation Policy

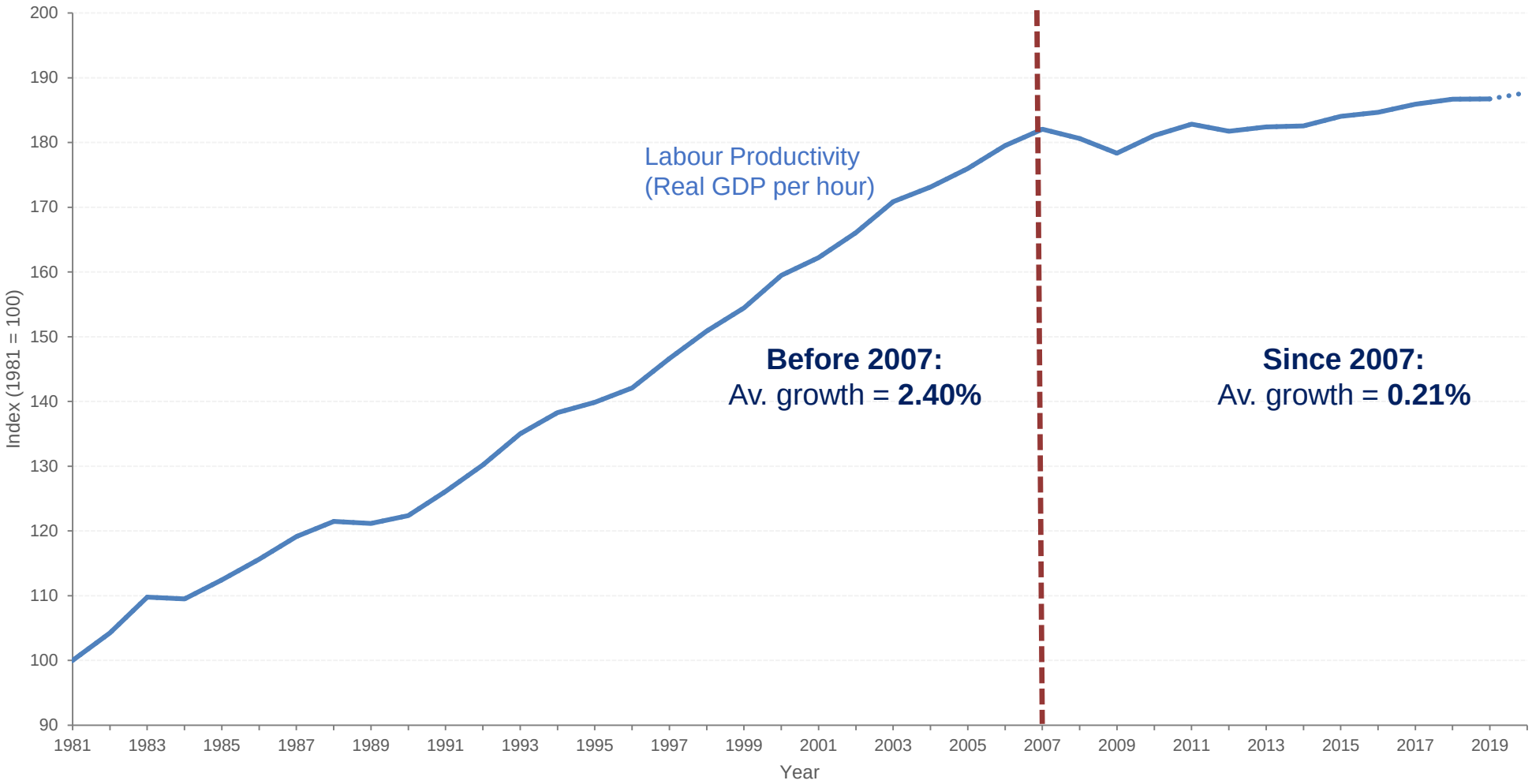
Diffusion Policy: Management

Growth Plan 2.0

UK Labour productivity in increased by about 87% over last four decades (1981-2019)

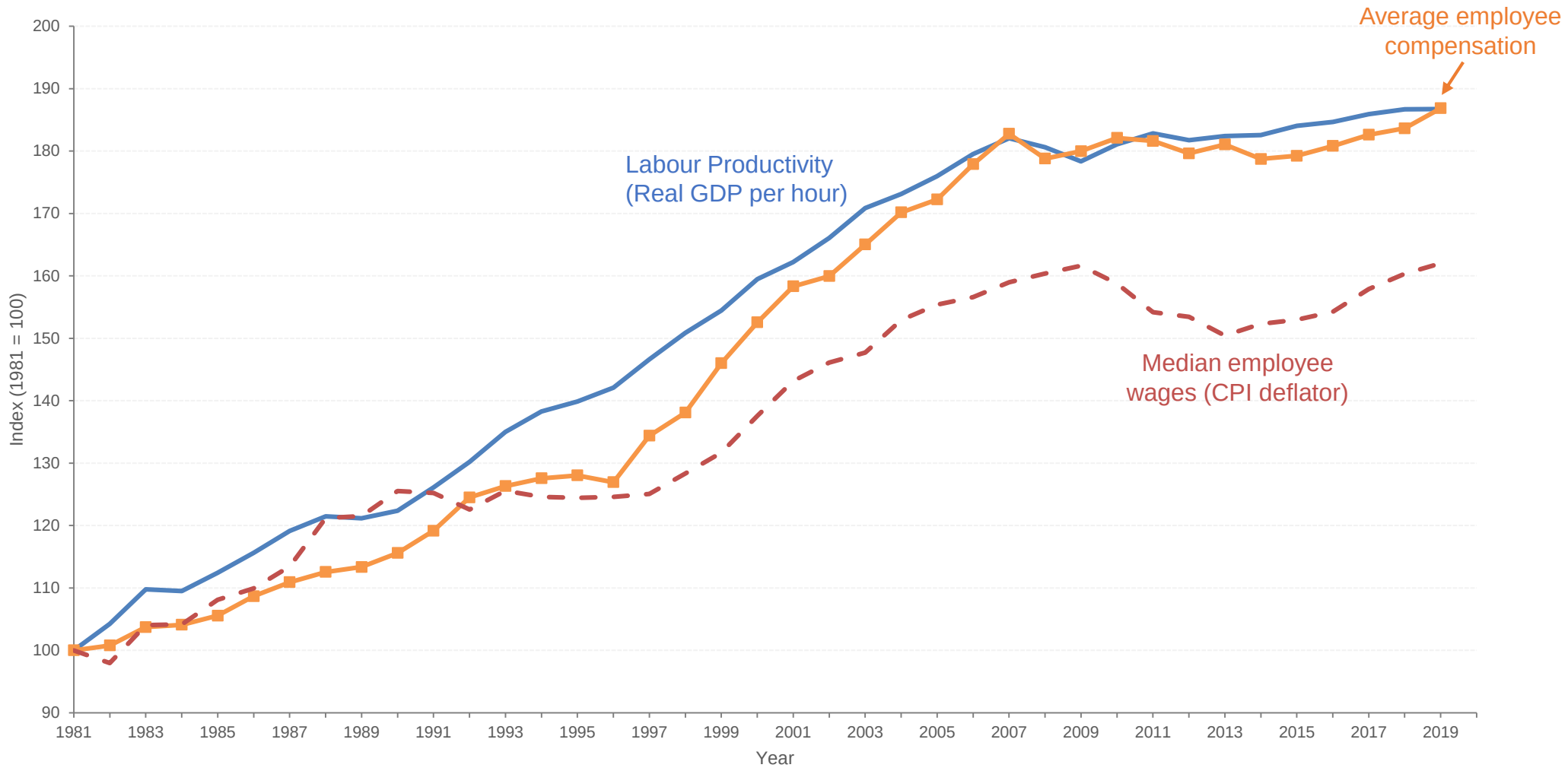
Source: ONS
Notes: Labour productivity is defined as real GDP (using the GDP deflator) divided by total hours worked.

…But productivity growth slowed down a lot after the Global Financial Crisis



Source: ONS
Notes: The dotted line extends the blue line to include 2020 COVID period.

And mean and median employee pay growth also stagnated: UK's major problem is low productivity



Source: ONS, LFS, and OECD

Notes: Employee compensation = Employee wages + non-wage compensation (employers' NI contributions, employers' pension contributions…). Median wages are deflated with the CPI deflator, all other series with the GDP deflator.

Drivers of Aggregate Productivity

- Pushing out the **technological frontier**
  - Important for advanced country like UK, but not the only thing…

- **Catching Up** to frontier
  - **Diffusion** of technology & management best practices
  - Reducing **Misallocation**

- These interact, of course:
  - Example: “2 faces of R&D” Griffith, Redding & Van Reenen (2004). R&D helps both frontier innovation & catching up.

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Innovation Policy: The “Lightbulb” Table

(1)	(2)	(3)	(4)	(5)	(6)
Policy	**Quality of evidence**	**Conclusivenes s of evidence**	**Benefit - Cost**	**Time frame:**	**Effect on inequality**

Source: Bloom, Van Reenen and Williams (2019, JEP)

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Direct R&D Grants	Medium	Medium	💡💡	Medium-Run	↑
R&D tax credits	High	High	💡💡💡	Short-Run	↑
Patent Box	Medium	Medium	Negative	n/a	↑

"Demand"

Source: Bloom, Van Reenen and Williams (2019, JEP)

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Patent Box	Medium	Medium	Negative	n/a	↑
Skilled Immigration	High	High	💡💡💡	Short to Medium-Run	↓
Universities: incentives	Medium	Low	💡	Medium-Run	↑
Universities: STEM Supply	Medium	Medium	💡💡	Long-Run	↓
Exposure Policies	Medium	Low	💡💡	Long-run	↓
Trade and competition	High	Medium	💡💡	Medium-Run	↑

"Demand"

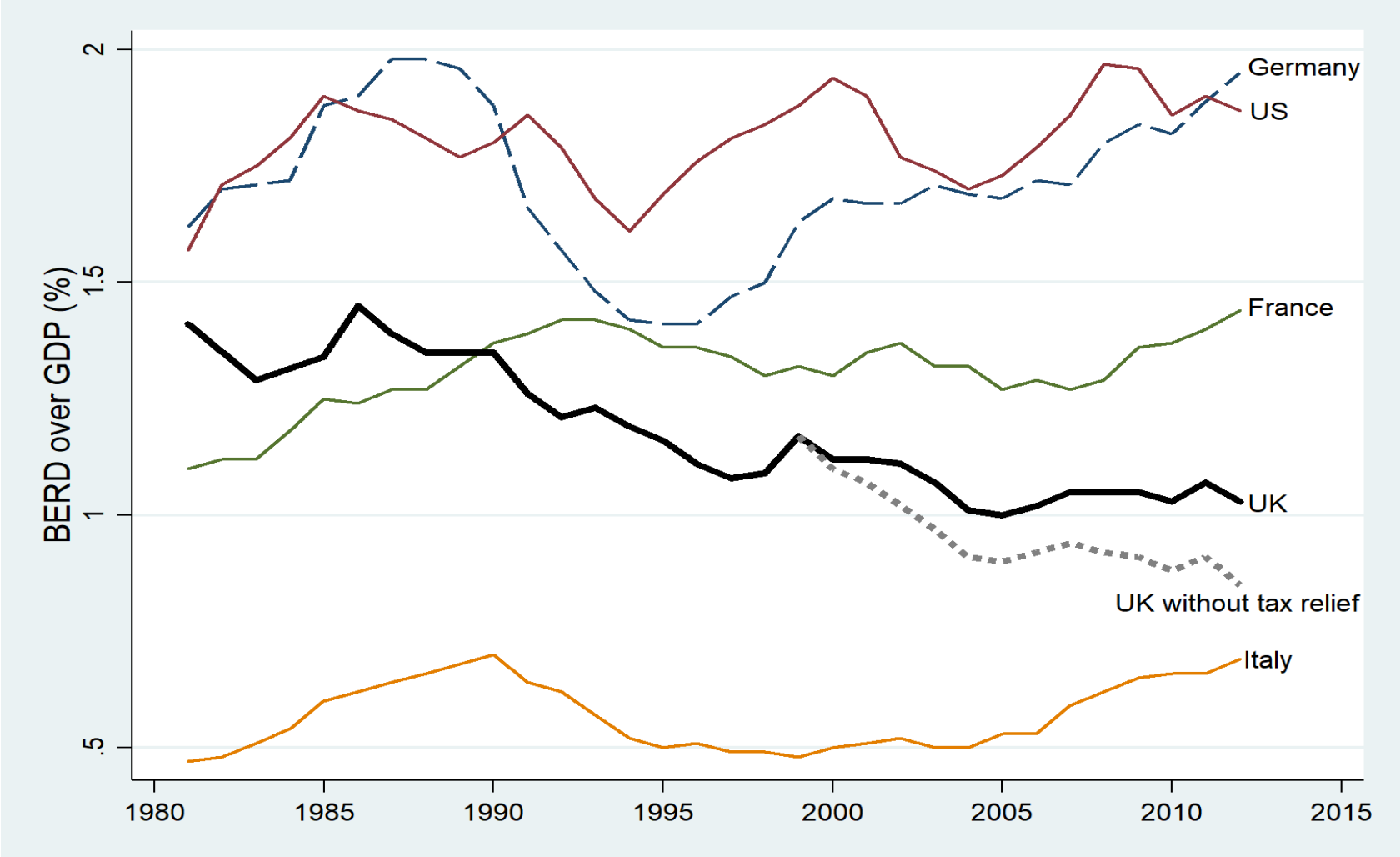
"Supply"

Source: Bloom, Van Reenen and Williams (2019, JEP)

Successful Innovation Policies: Tax Reform

- **R&D tax credits**
- Direct government grants
- Human capital supply
  - Expanding STEM workforce
  - Universities
  - Immigration
  - “Lost Einsteins”
- Competition and trade policy

UK Business R&D/GDP would have fallen by 16% more without R&D tax policy



Note: The data is from OECD MSTI. The dotted line ("UK without tax relief") is the counterfactual R&D intensity in the UK that we estimate in the absence of the R&D Tax Relief Scheme. **Source:** Dechezlepretre et al (2021)

Successful Innovation Policies: Grants

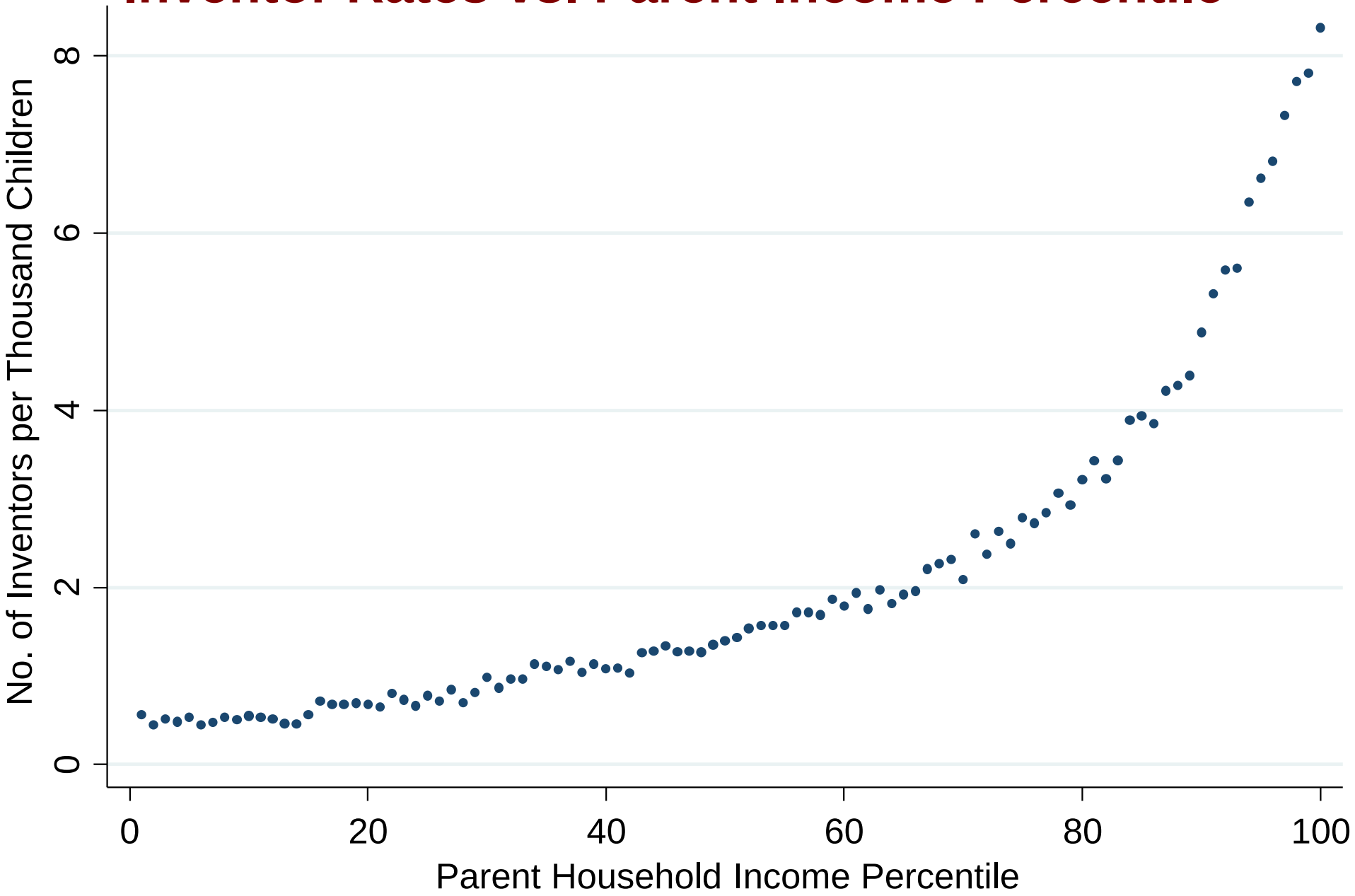
- **Direct government grants (in theory, can be targeted better than tax incentives).** Examples: Health (Azoulay et al ‘19); Green Energy (Howell, ’17)
  - Well designed public R&D **crowd-in** private innovation (Moretti et al ’20 use **defense shocks:** 10% more public stimulates 5% more private sector R&D in long-run)

- Quality as well as quantity. Example of OPEN reforms to US military innovation procurement (Howell et al, ‘21).
  - DASA “**Open**” **Call for Innovation**
  - ARIA

Successful Innovation Policies: Skill supply

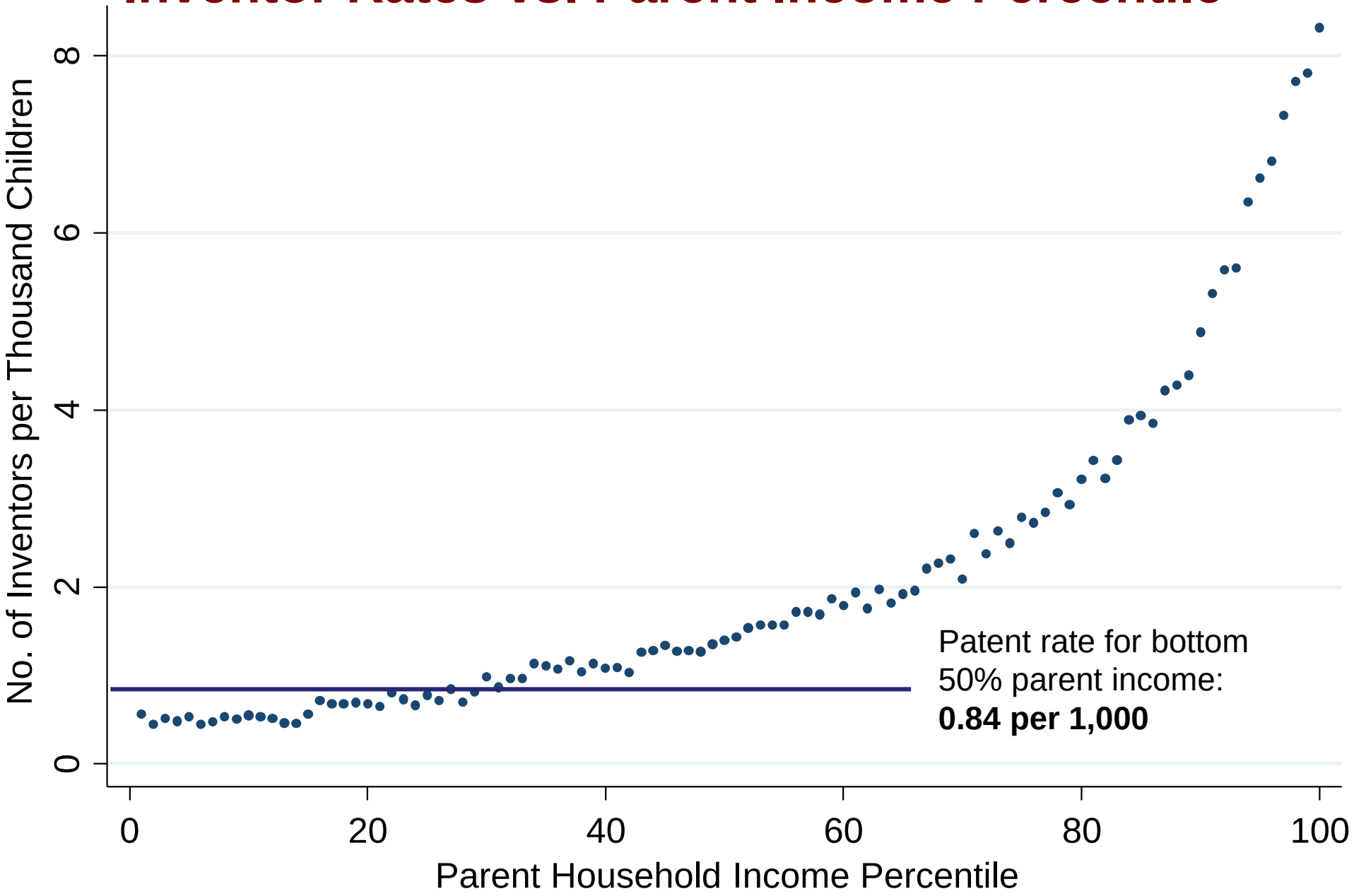
- R&D tax credits
- Direct government grants
- **Human capital supply**
  - Expanding STEM workforce
  - Universities
  - Immigration
  - **“Lost Einsteins”:** Levelling Up Innovation. Few women, minorities & poorer kids become inventors = big loss of talent (Bell, Chetty, Jaravel, Petkova & Van Reenen, 2019)
- Competition and trade policy

Inventor Rates vs. Parent Income Percentile



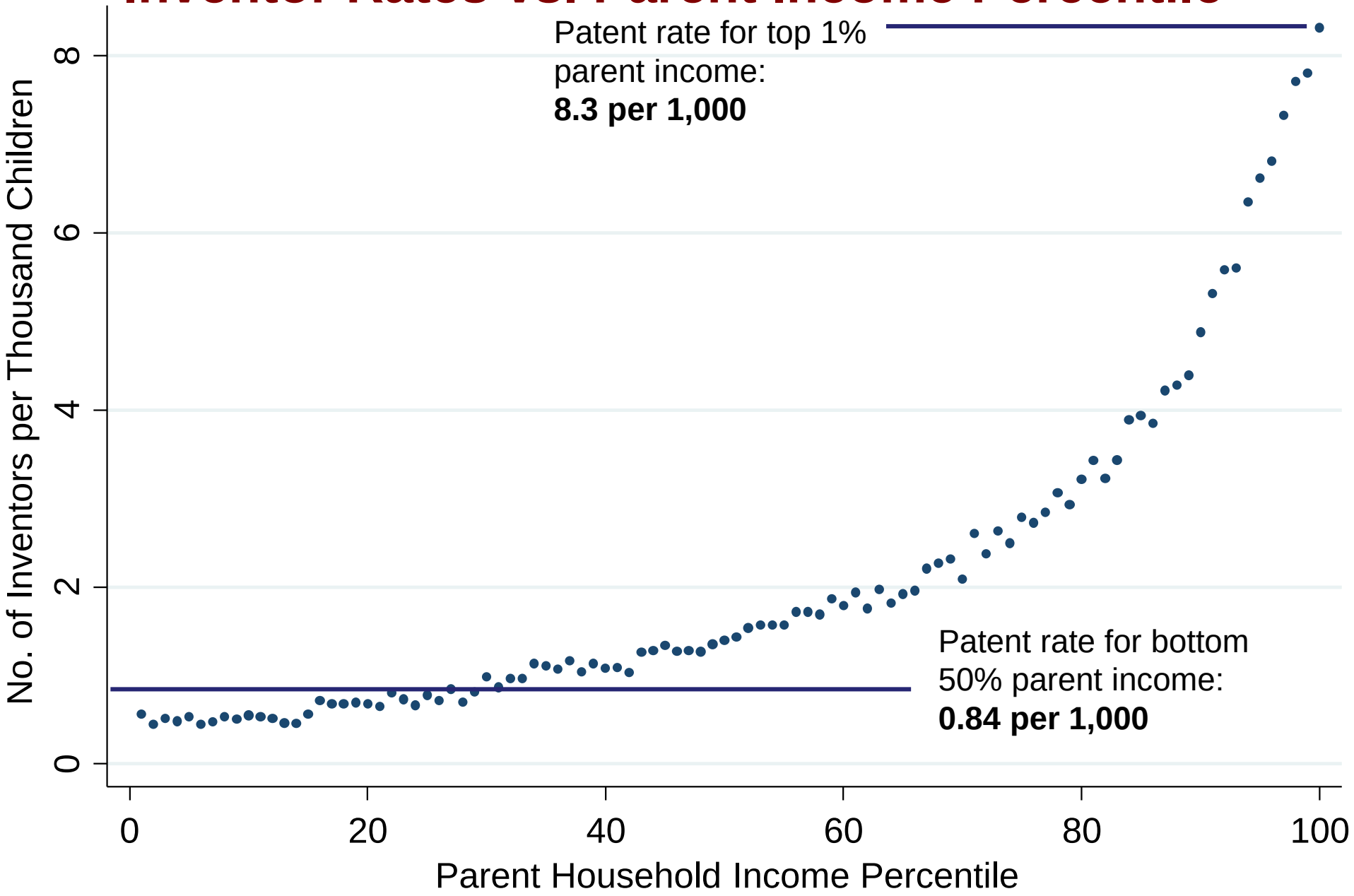
Note: Sample of children is 1980-84 birth cohorts. Inventors are named on patents. **Source:** Bell et al (2019, QJE)

Inventor Rates vs. Parent Income Percentile



Note: Sample of children is 1980-84 birth cohorts. **Source:** Bell et al (2019)

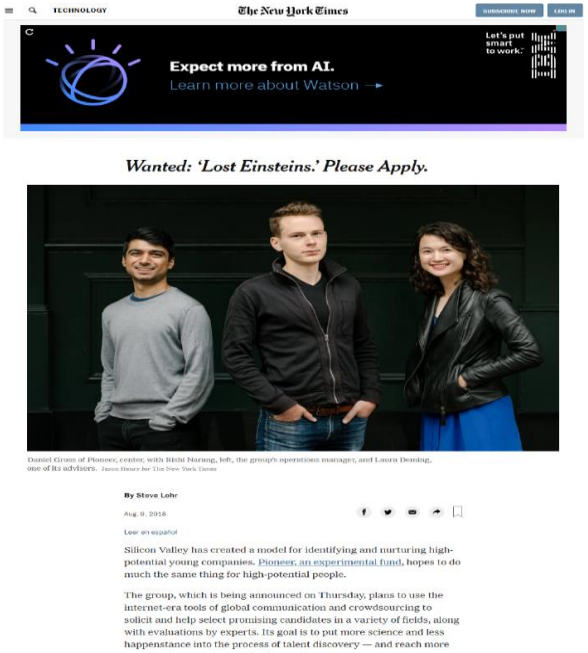
Inventor Rates vs. Parent Income Percentile

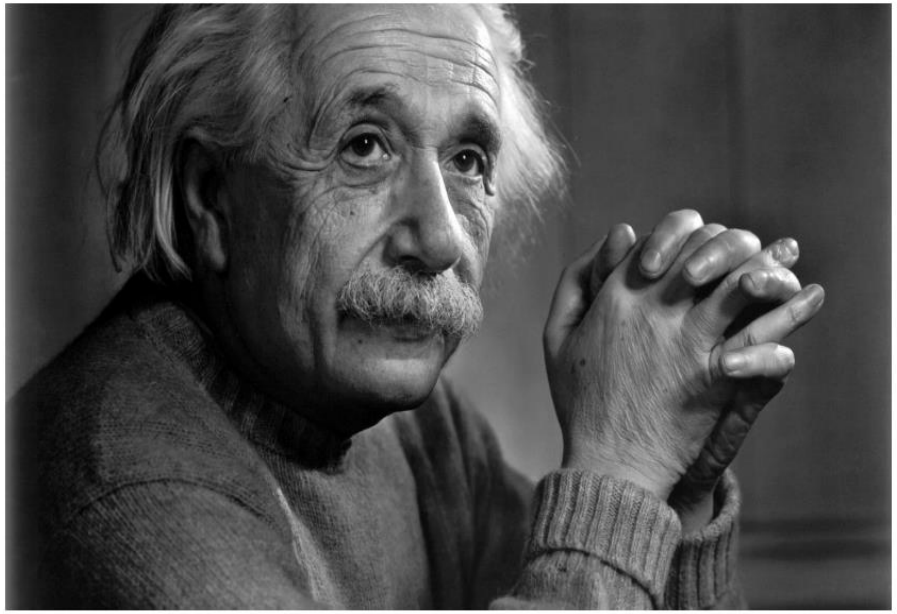


Note: Sample of children is 1980-84 birth cohorts. **Source:** Bell et al (2019)

Finding the “Lost Einsteins and Marie Curies”

- Unlocking this hidden talent could quadruple innovation rate: An example of policies that help growth <u>and</u> equity
- COVID risk to disadvantaged pupils: National Tutoring Programme problems
- **“Track and Trace Talent”** within schools: Card & Giuliano (2016) Houston; Cohodes (2020) AWC: 15pp increase in university attendance





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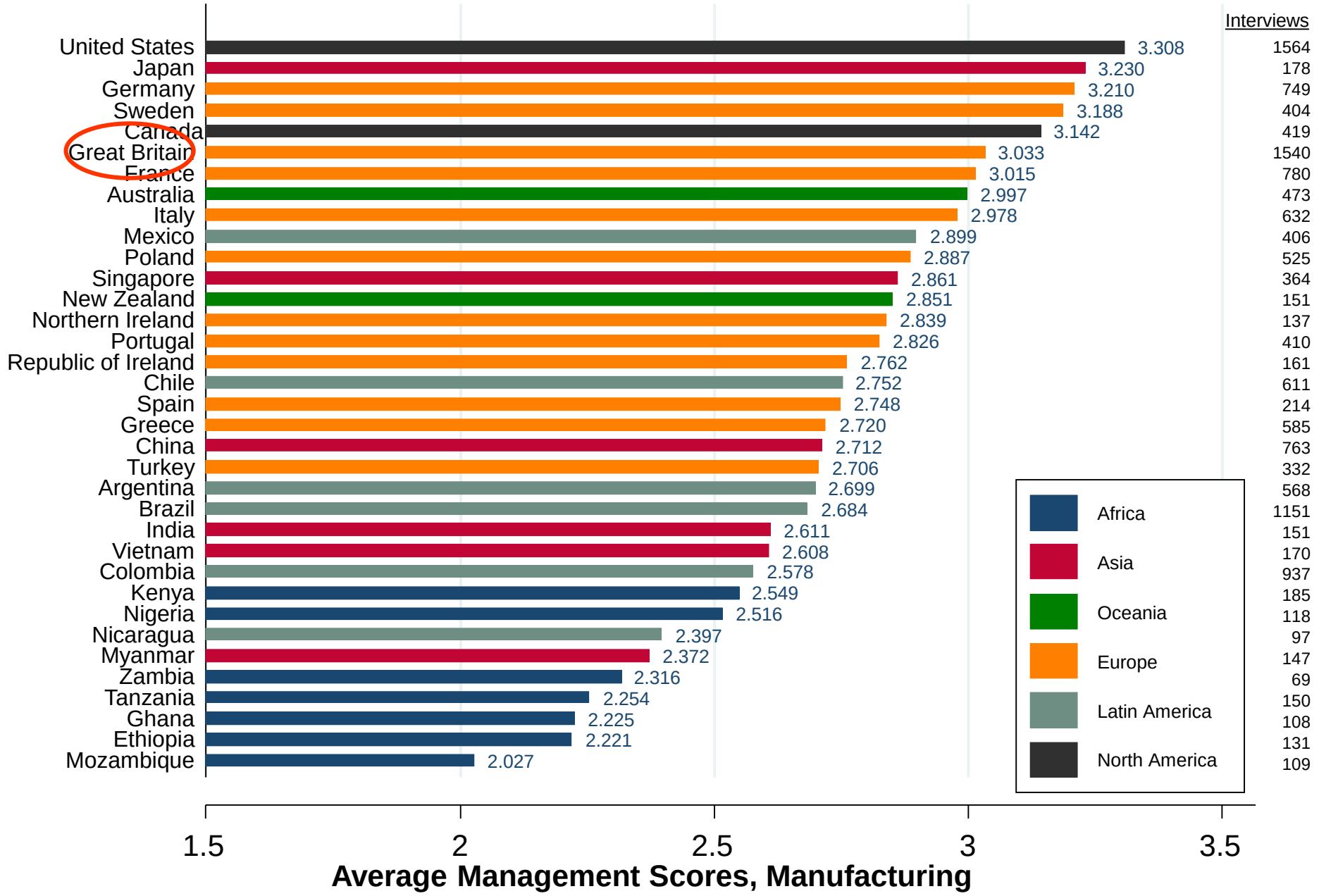
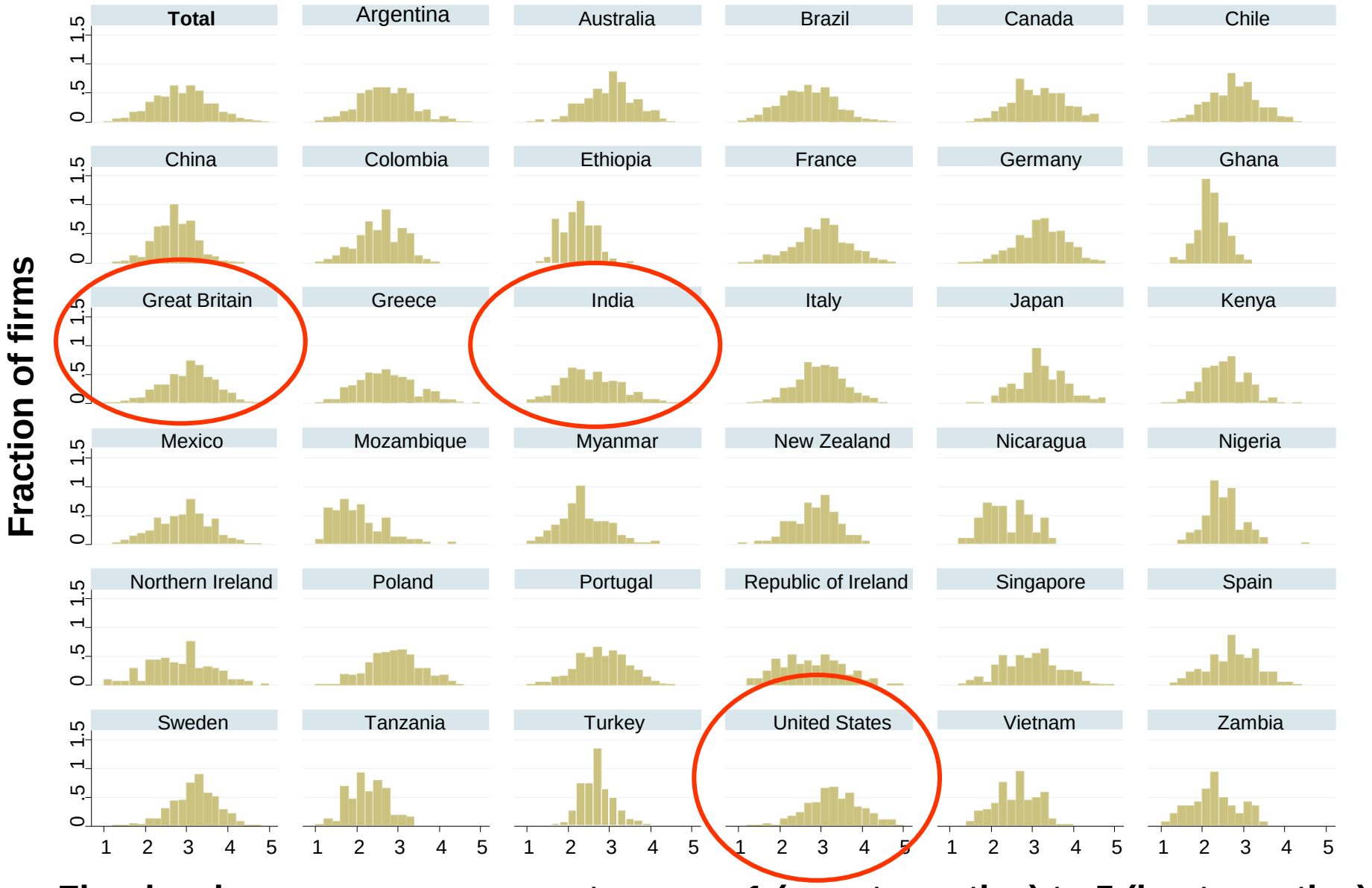
Management varies a lot across countries



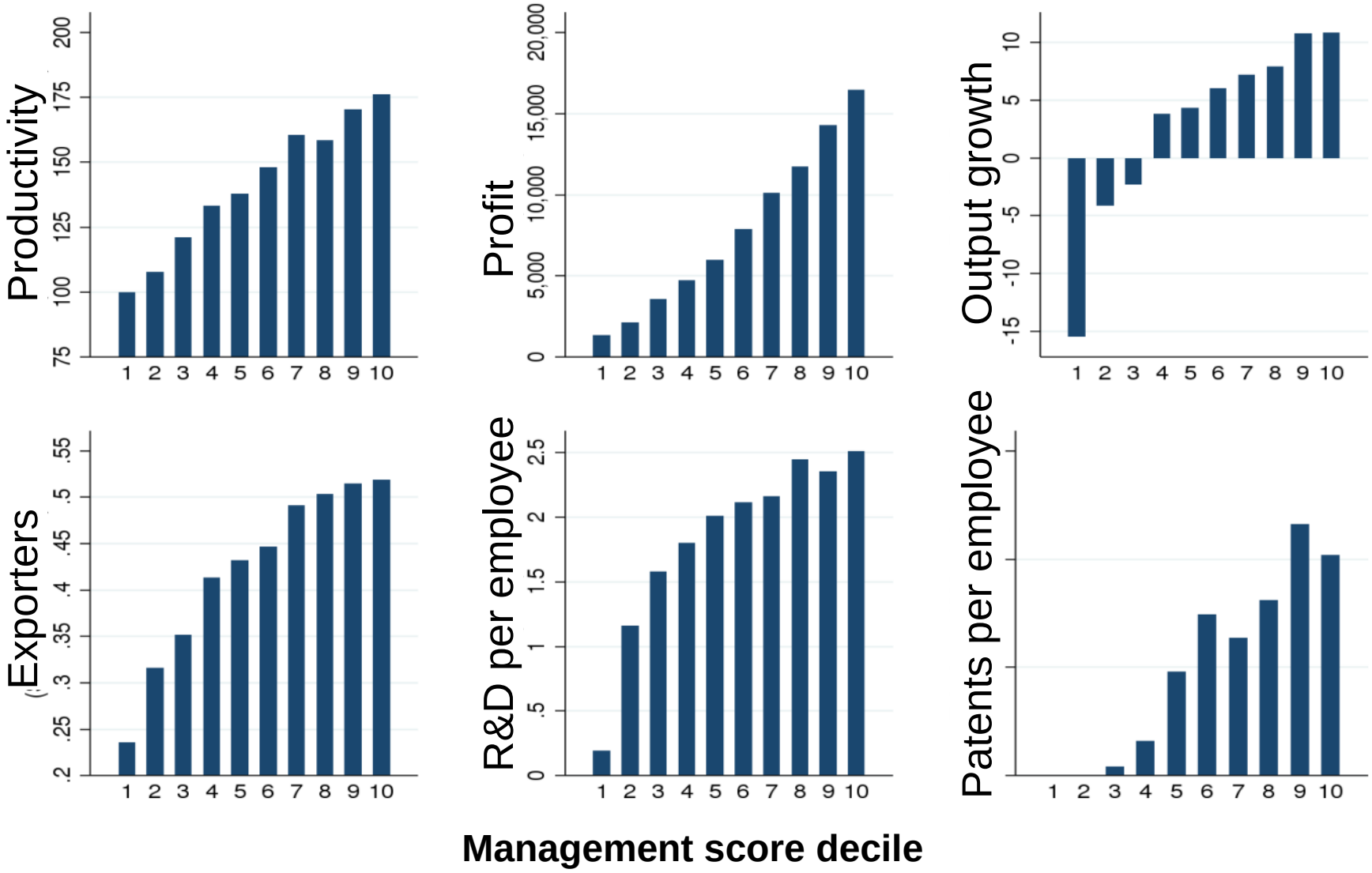
Source: Bloom, Sadun & Van Reenen (2020) **Note:** WMS Average management scores; # interviews in right column (total = 15,489); all waves pooled (2004-2014)

Management also varies heavily within countries



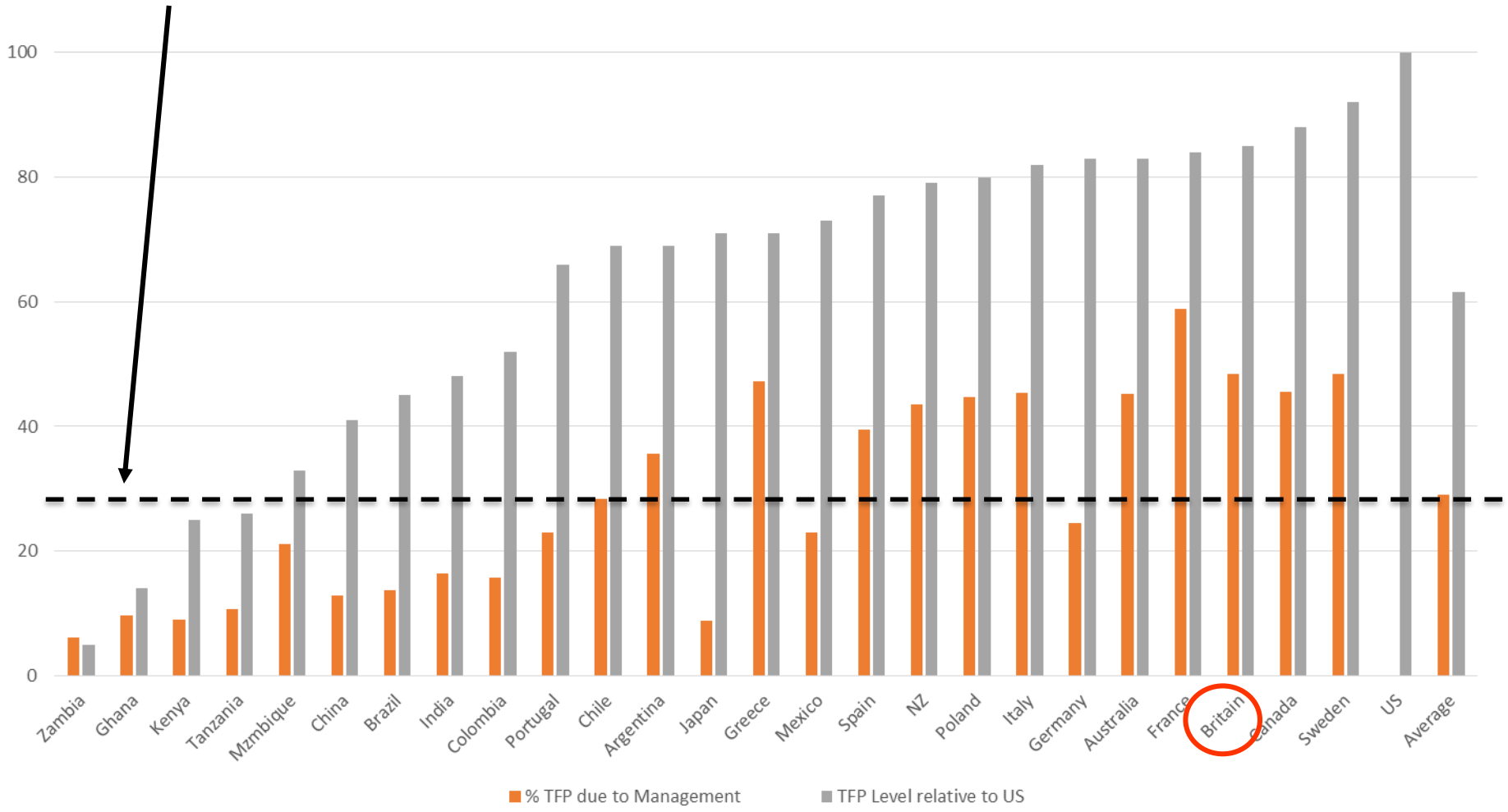
Source: Scur, Sadun, Van Reenen, Lemos and Bloom (2021)

Management scores positively correlated with many other measures of firm performance, including innovation



Source: Bloom, Brynjolfsson, Foster, Jarmin, Patnaik, Saporta-Eksten & Van Reenen (2019, AER). MOPS

About half of US-UK productivity gap due to management (compared to ~30% for typical country)



Source: Bloom, Sadun & Van Reenen "Management as a Technology"

Notes: TFP gaps from Penn World Tables; fraction accounted for by management uses the weighted average management scores and an assumed 10% impact of management on TFP

Toolkit of Management policies

L = Low; Not politically easy
M = medium
H = Highly possible

Policy type	Strength of evidence	Policy Net benefit (out of 5)	Difficulty of implementation	Time frame
Structural				
Competition	H	❂❂❂❂❂	M	medium
Trade and FDI	H	❂❂❂❂☾	L	medium
Education	M	❂❂	M	long
Governance	M	❂❂❂❂	M/L	long
Direct				
Training - consulting	H	❂❂❂	H	short
Training - formal classroom	M	❂❂	H	medium
Information/benchmarking	L/M	❂❂❂	H	medium

Source: Scur, Sadun, Van Reenen, Lemos & Bloom (2021)

Reforms to Direct Management Policies

- “Help to Grow” policy £0.5 billion to improve investment in management and digital
  - Needs proper evaluation

- Needs to go beyond just classroom based & have more consultancy type interventions
  - Set aside 10% (£50 million) for an “Experimental Fund”

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Misallocation

Growth Plan 2.0

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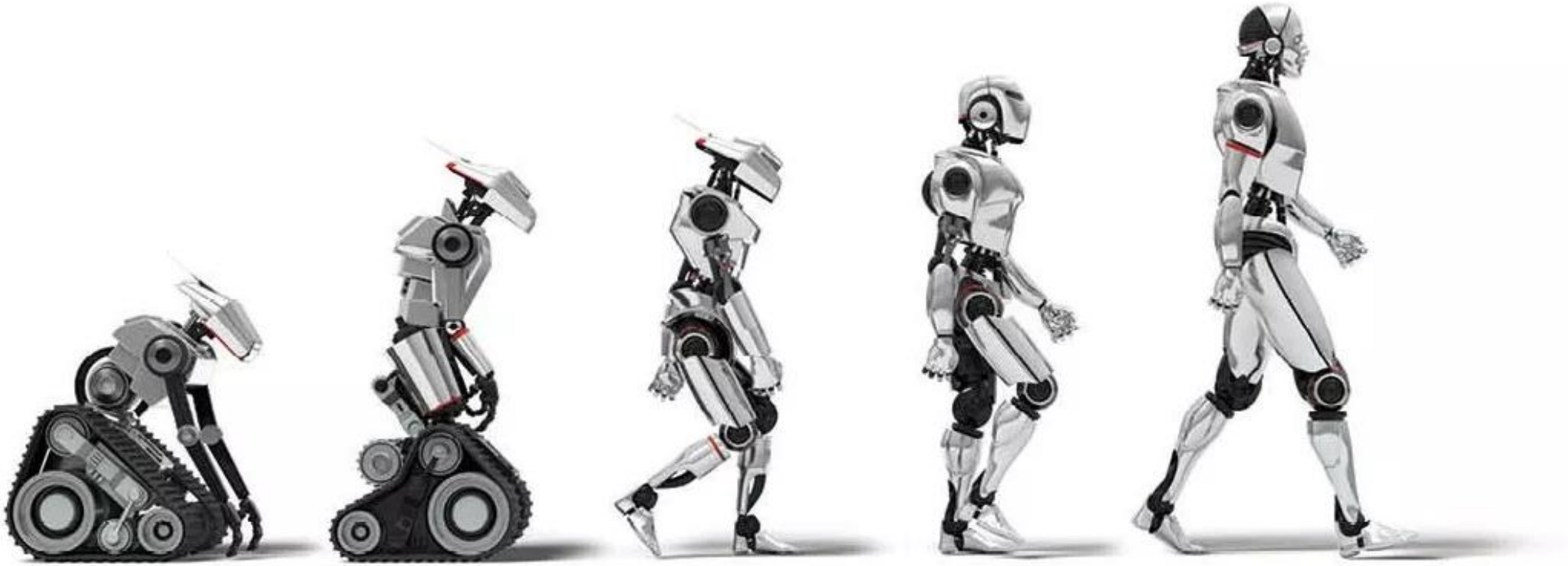
- **Short Run** Post-COVID policies balance reallocation & protection
- **Long run** policies
  - *Structural* (competition, trade, skills, infrastructure, tax & subsidies)
  - *Direct* (e.g. management information and training)
- Use evidence:
  - Toolkits for innovation & management policy
- Bind together in a **mission**
  - Climate Change; Defense; Health

THANKS!



Some Further Reading (and viewing)

"Innovation Policies to Boost Productivity" (Van Reenen, 2020) Hamilton Policy Proposal 2020-13 https://www.hamiltonproject.org/assets/files/JVR_PP_LO_6.15_FINAL.pdf webinar

"A Toolkit of Policies to promote Innovation" (Nick Bloom, Heidi Williams and John Van Reenen), *Journal of Economic Perspectives (2019)* 33(3) 163–184 http://cep.lse.ac.uk/pubs/download/dp1634.pdf

"Why Do We Undervalue Competent Management" (Raffaella Sadun, Nick Bloom and John Van Reenen) *Harvard Business Review* (2017), September-October

"Measuring and Explaining Management practices across firms and nations" (Nick Bloom and John Van Reenen) *Quarterly Journal of Economics* (2007) 122(4), 1351–1408.

"The Costs and Benefits of Brexit" (Swati Dhingra, Hanwei Huang, Gianmarco Ottaviani, Joao Pessoa, Tom Sampson and John Van Reenen) *Economic Policy* (2017), 32(92) 651–705 Vox

"Who Becomes an Inventor in America? The Importance of Exposure to Innovation" (Alex Bell, Raj Chetty, Xavier Jaravel, Neviana Petkova and John Van Reenen), http://cep.lse.ac.uk/pubs/download/dp1519.pdf Data *Quarterly Journal of Economics* (2019)134(2) 647–713, New York Times Vox Atlantic Fortune Conversation VoxUS Economist VC Centrepiece INET

"Mapping the Two Faces of R&D: Productivity Growth in a panel of OECD industries" (Rachel Griffith, Stephen Redding & John Van Reenen) *Review of Economics and Statistics*, (2004) 86(4) 883-895. http://cep.lse.ac.uk/textonly/people/vanreenen/papers/wp0002.pdf

Further reading

- “The World Management Survey at 18” (Scur, Sadun, Van Reenen, Lemos & Bloom, 2021), *Oxford Review of Economic Policy* https://poid.lse.ac.uk/textonly/publications/downloads/poidwp002.pdf

- World Management Survey http://worldmanagementsurvey.org/

- “Increasing Difference Between Firms” *Changing Market Structures and Implications for Monetary Policy*, Jackson Hole Symposium (Van Reenen, 2018) 19-65 http://cep.lse.ac.uk/pubs/download/dp1576.pdf NYT NPR

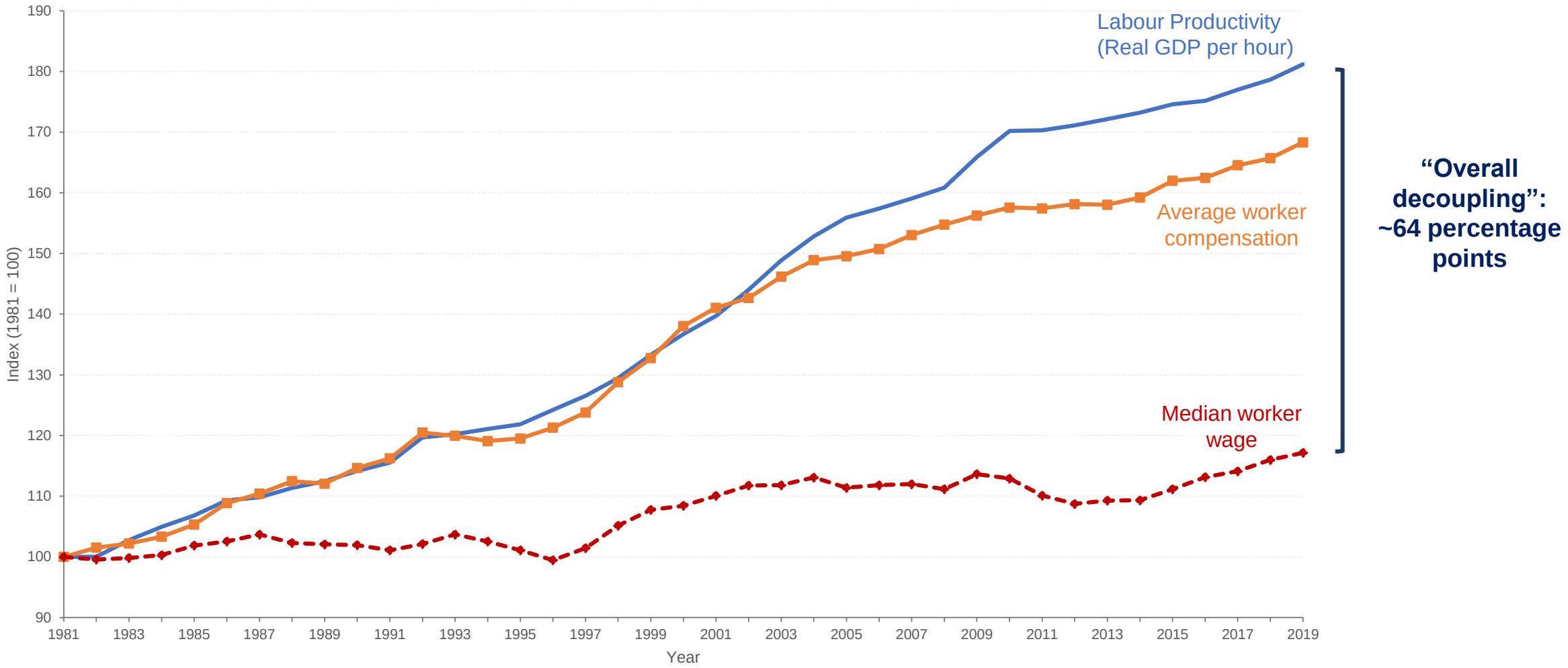
- LSE Growth Commission Final Report (Aghion et al, 2013)

http://www.lse.ac.uk/researchAndExpertise/units/growthCommission/documents/pdf/GCReportSummary.pdf

- “Management as a Technology” (Bloom, Sadun and Van Reenen, 2017): http://cep.lse.ac.uk/pubs/download/dp1433.pdf

- “Do Fiscal Incentives increase innovation? An RD Design for R&D” (Antoine Dechezlepretre, Elias Einio, Ralf Martin, Kieu-Trang Nguyen and John Van Reenen, 2021), CEP Discussion Paper 1413 Vox, http://cep.lse.ac.uk/pubs/download/dp1413.pdf

In the US, median hourly wage (& mean compensation) have partly "decoupled" from labour productivity growth.



Data Source: Bivens and Mishel (2021), with data from BEA and BLS.
Notes: "Worker" includes both employees and self-employed. GDP and average compensation are deflated by the GDP deflator, median compensation by the CPI-U-RS.

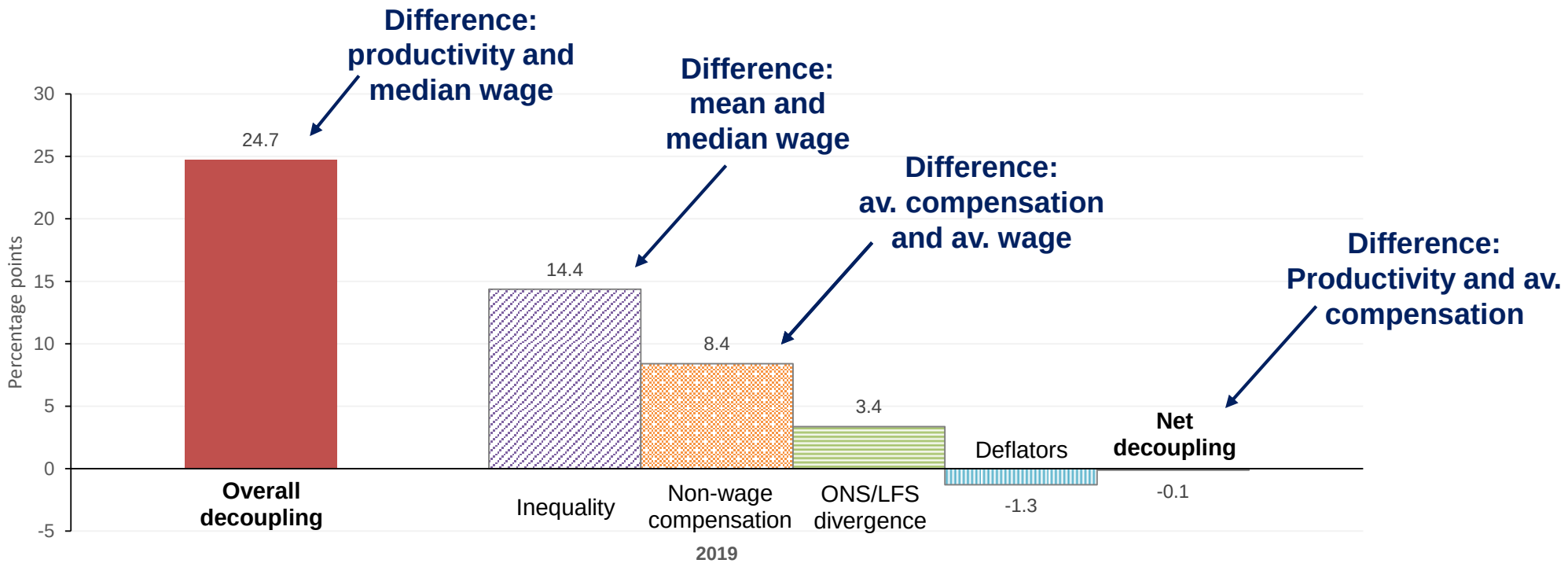
Since 1981 median employee wage growth grew by only 62%: some decoupling from productivity

"Overall decoupling": 25 percentage points

Source: ONS, LFS, and OECD

Notes: Median hourly employee wages from the UK Labour Force Survey (LFS). Median wages are deflated with the CPI deflator, labour productivity with the GDP deflator.

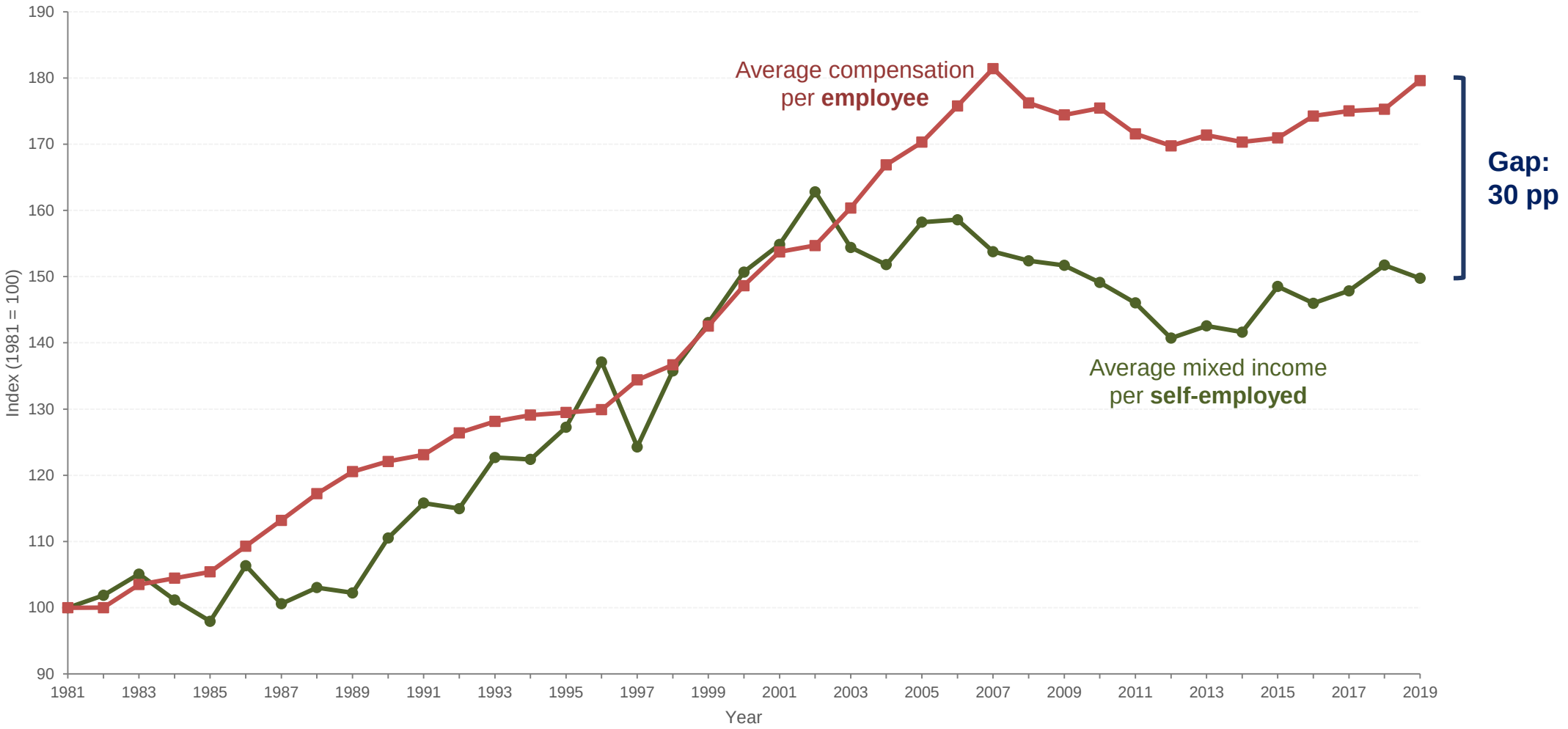
Inequality & growth of non-wage compensation (e.g. pension costs) account for almost all employee decoupling



Source: ONS, LFS, and OECD, 1981-2019

Notes: ***Inequality:*** Difference between LFS mean hourly earnings (GDP deflator) and LFS median hourly earnings (GDP deflator); ***Non-wage comp.:*** Difference between employee comp. per hour (GDP deflator) and ONS mean hourly wage (GDP deflator); ***ONS/LFS divergence*:** Difference between ONS mean hourly wage (GDP deflator) and LFS mean hourly earnings (GDP deflator); ***Deflators:*** Difference between LFS median hourly earnings (GDP deflator) and LFS mean hourly earnings (CPI deflator); ***Net decoupling*:** Difference between GDP per hour (GDP deflator) and Employee compensation per hour (GDP deflator)

But Self-Employed income has grown much slower than that of employees



Source: ONS and OECD

Notes: Average compensation is total employee compensation divided by number of employees. Average mixed income is total mixed income divided by number of self-employed. Both series are deflated with the CPI.