The COVID Recovery and Beyond: Technology and Management

Re-imagining Management and Productivity in a post-pandemic World,

Nottingham, September 14th 2021

John Van Reenen (LSE and MIT)

The Argument (Valero and Van Reenen, 2021)

- To properly recover from COVID, we must get back to sustainable productivity growth
  - This was a problem even before COVID (which has starkly revealed political and economic weaknesses)

- Technological progress at the heart of productivity, but history & evidence shows that using tech well needs good management

- COVID has ambiguous effects in theory on tech adoption, but (small) evidence suggests it has stimulated greater diffusion. But:
  - Translating this into productivity requires new policies
  - R&D may have suffered, even if diffusion up

- Ideas for a new Growth Plan

OUTLINE OF TALK

The Challenge

Understanding Growth

COVID Impact on technology

A Growth Plan

The Pandemic's Big Hit on growth

Figure 1: UK GDP is estimated to have grown by 0.1% in July 2021, and remains 2.1% below its pre-pandemic level (February 2020)

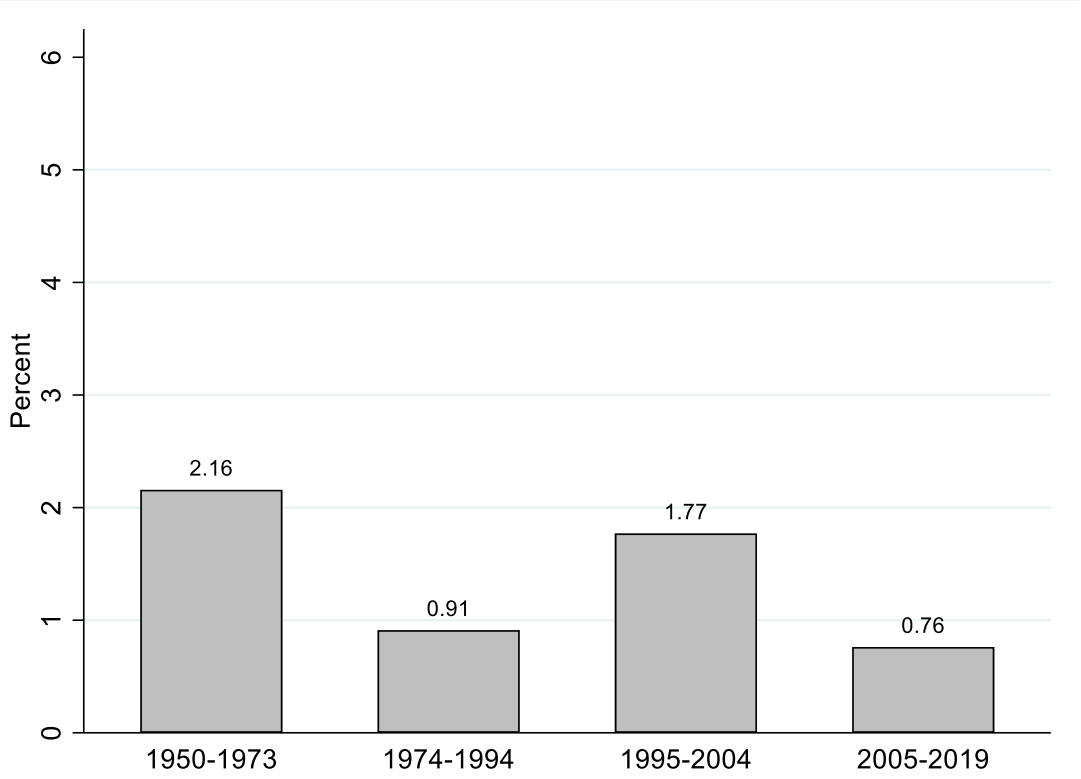
Monthly index, January 2007 to July 2021, 2018 = 100

https://www.ons.gov.uk/economy/grossdomesticproductgdp/bulletins/gdpmonthlyestimateuk/july2021

Source: Office for National Statistics, GDP monthly estimate

Slowing Productivity growth preceded COVID crisis by at least 15 years (TFP 1950-2019)

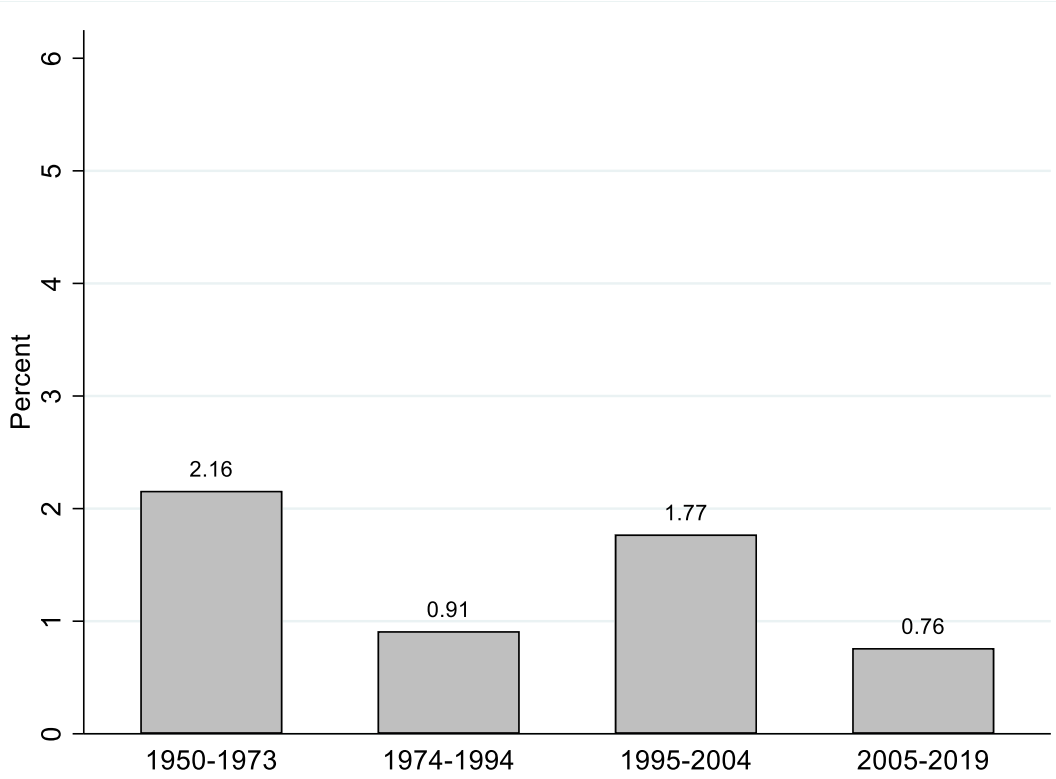
Panel A: US



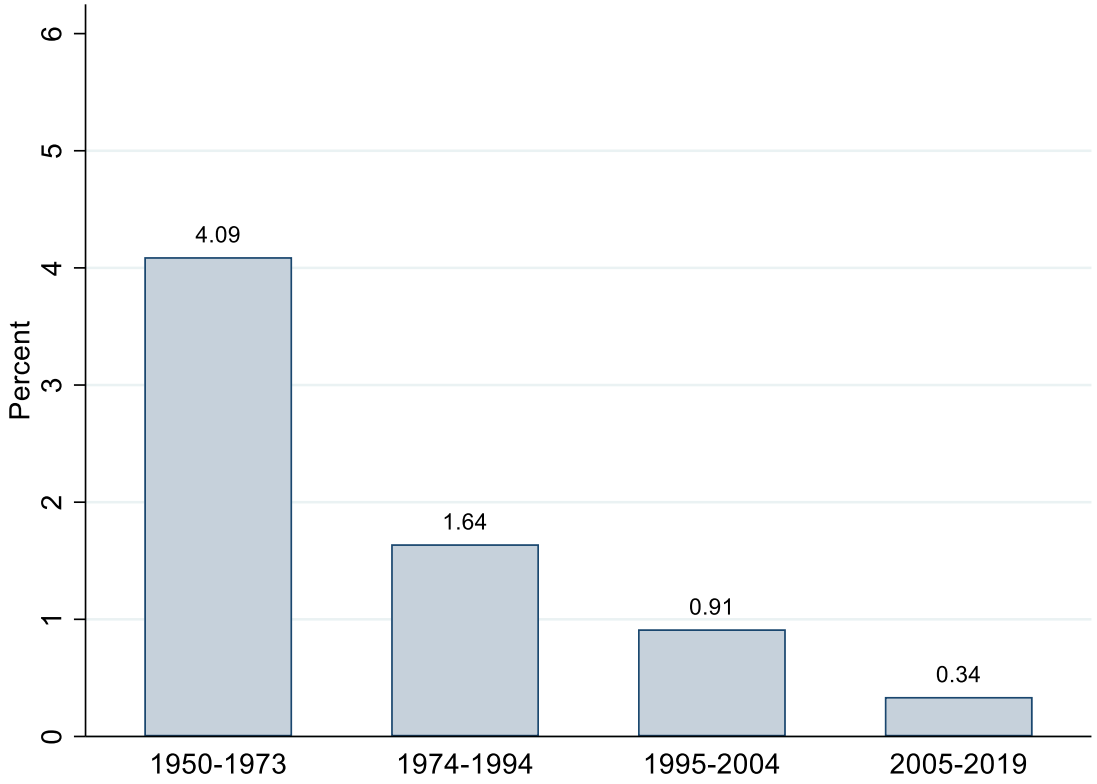
Source: TFP growth based on updated data from Bergeaud, Cette, and Lecat
Note: "Euro Zone" is Germany, France, Italy, Spain, Netherlands, and Finland.

Slowing Productivity growth preceded COVID crisis by at least 15 years (TFP 1950-2019)

Panel A: US

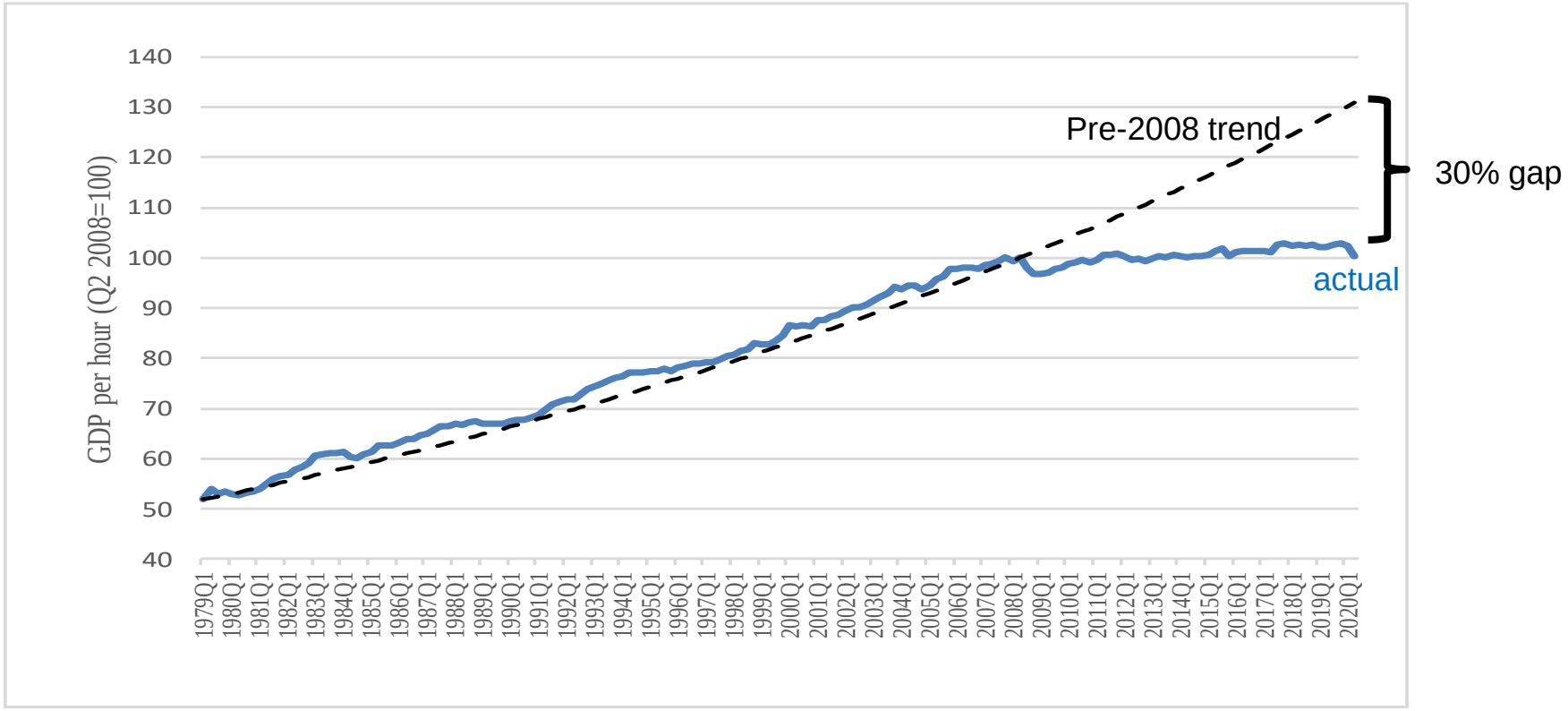


Panel B: Euro zone



Source: TFP growth based on updated data from Bergeaud, Cette, and Lecat.
Note: "Euro Zone" is Germany, France, Italy, Spain, Netherlands, and Finland.

The UK Productivity Disaster, GDP per hour, 1979-2020



Notes: Whole Economy GDP per hour, seasonally adjusted. *ONS Statistical Bulletin*, Labour Productivity Q2 2021, release 4/11/2020 (Q2 2008=100). Predicted value after Q2 2008 is the dashed line assuming a historical average growth rate of 2.2%.

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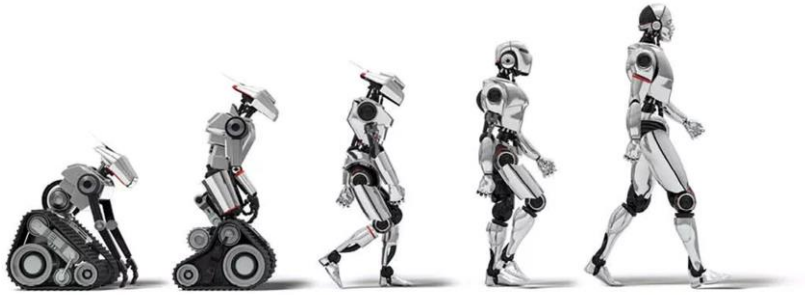
TFP growth is not just frontier advances

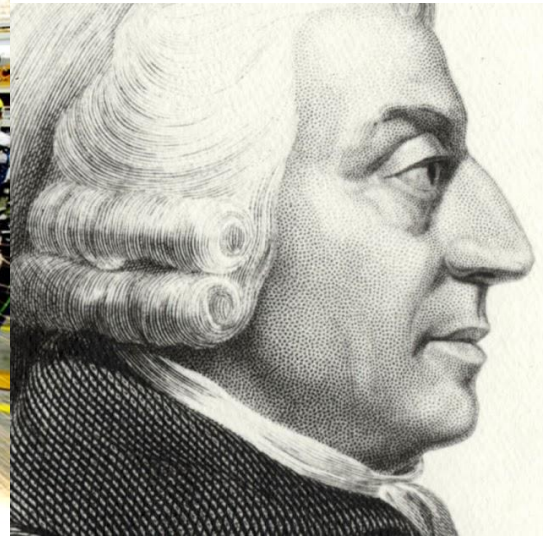
- In advanced economies like UK, **frontier innovation is very important**, but still room for improvement without frontier growth
  - **Diffusion** of technology (adoption of best practice)
  - Reducing **Misallocation** (too little market share going to the most productive firms)

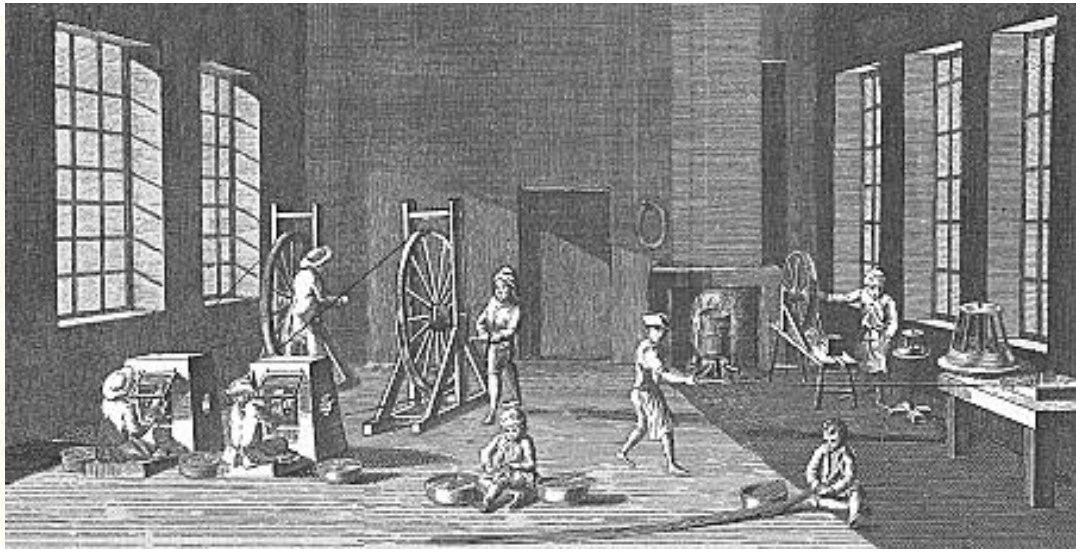
Growth Analytics: Two fundamental sources of growth

- **Technology**
- **Management practices**



Toyota Plant

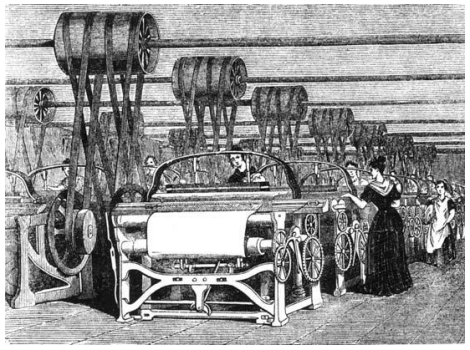




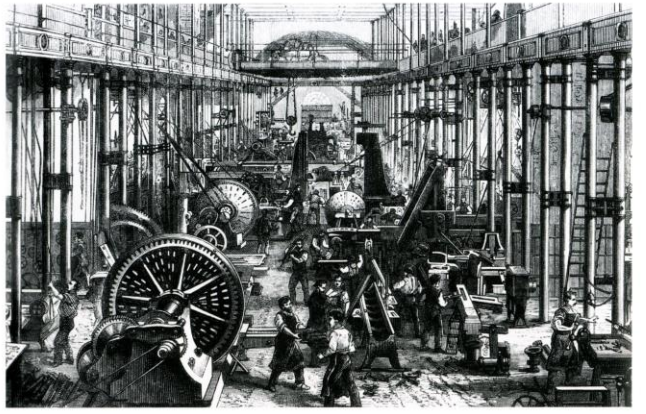
Adam Smith and the Pin Factory

Industrial revolutions

- **First Industrial Revolution: ~1760-1840**
- Second Industrial Revolution: 1870-1914
- Third Industrial Revolution: 1996-2004; Digital
- Fourth Industrial Revolution: ???



James Watt
(1736-1819)



Industrial revolutions

- First Industrial Revolution: ~1760-1840
- **Second Industrial Revolution: ~1870-1914**
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- Fourth Industrial Revolution: ???

Lightbulb
Thomas Edison, 1879

Internal Combustion Engine
Karl Benz, 1879

Wireless, David Edward Hughs, 1879

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www.shutterstock.com · 110678570

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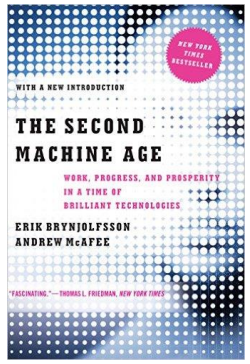
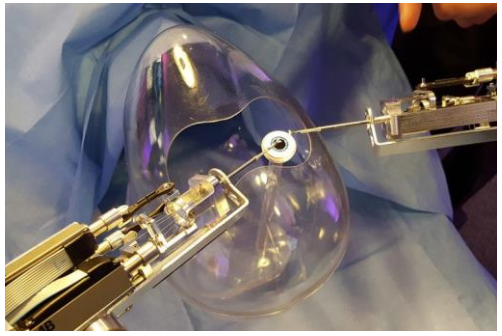
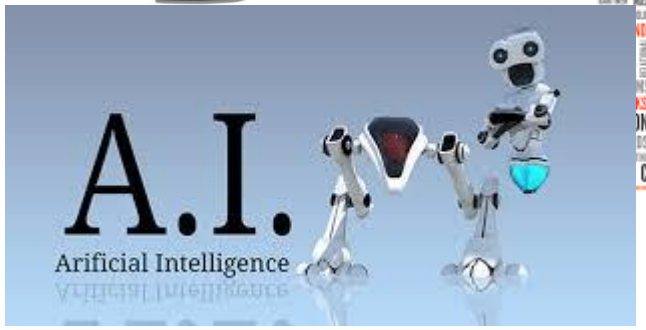
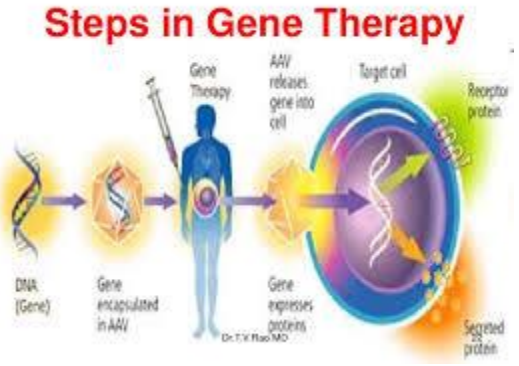


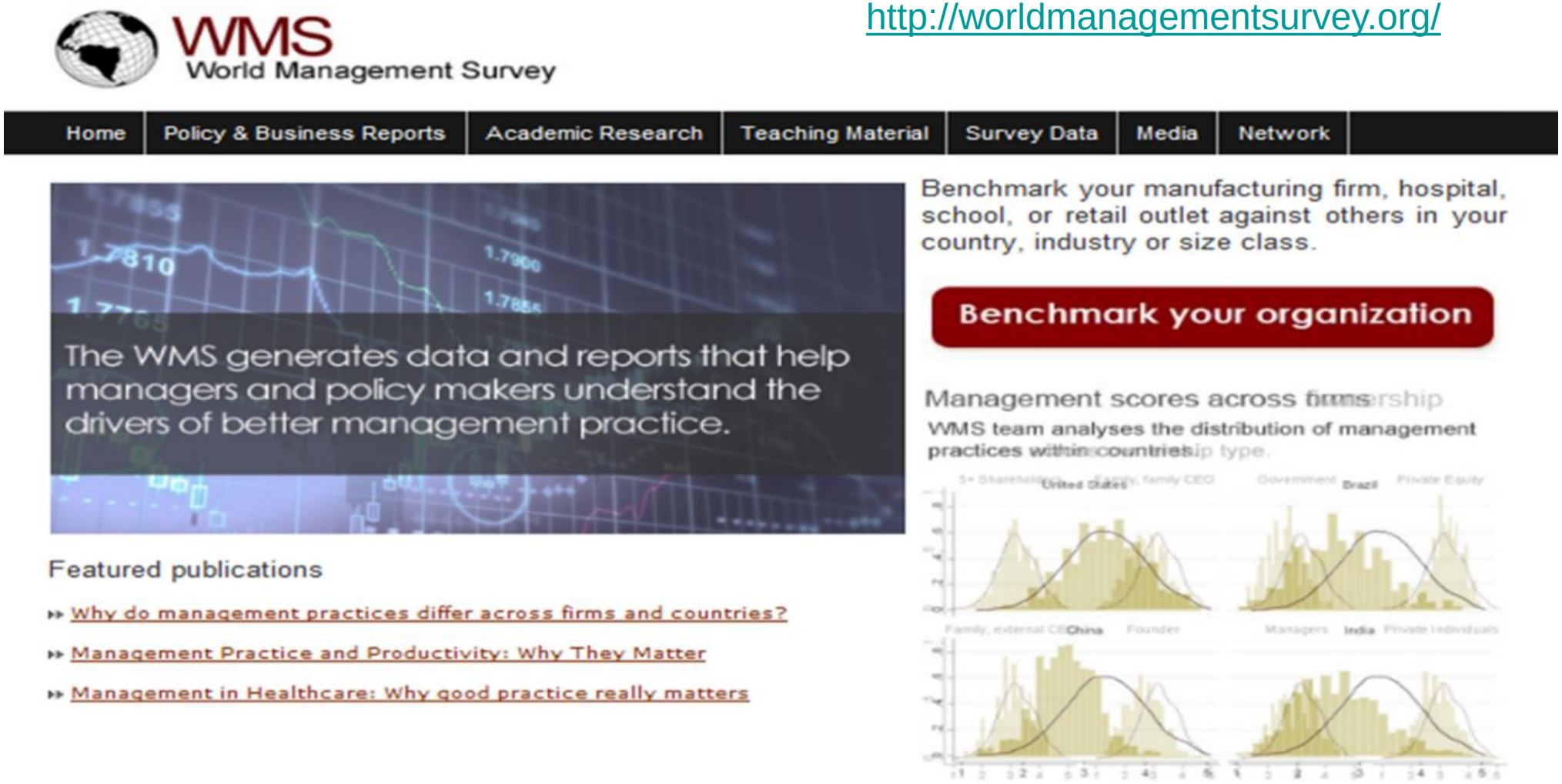






World Management Survey (~25k interviews, 34 countries since 2004)

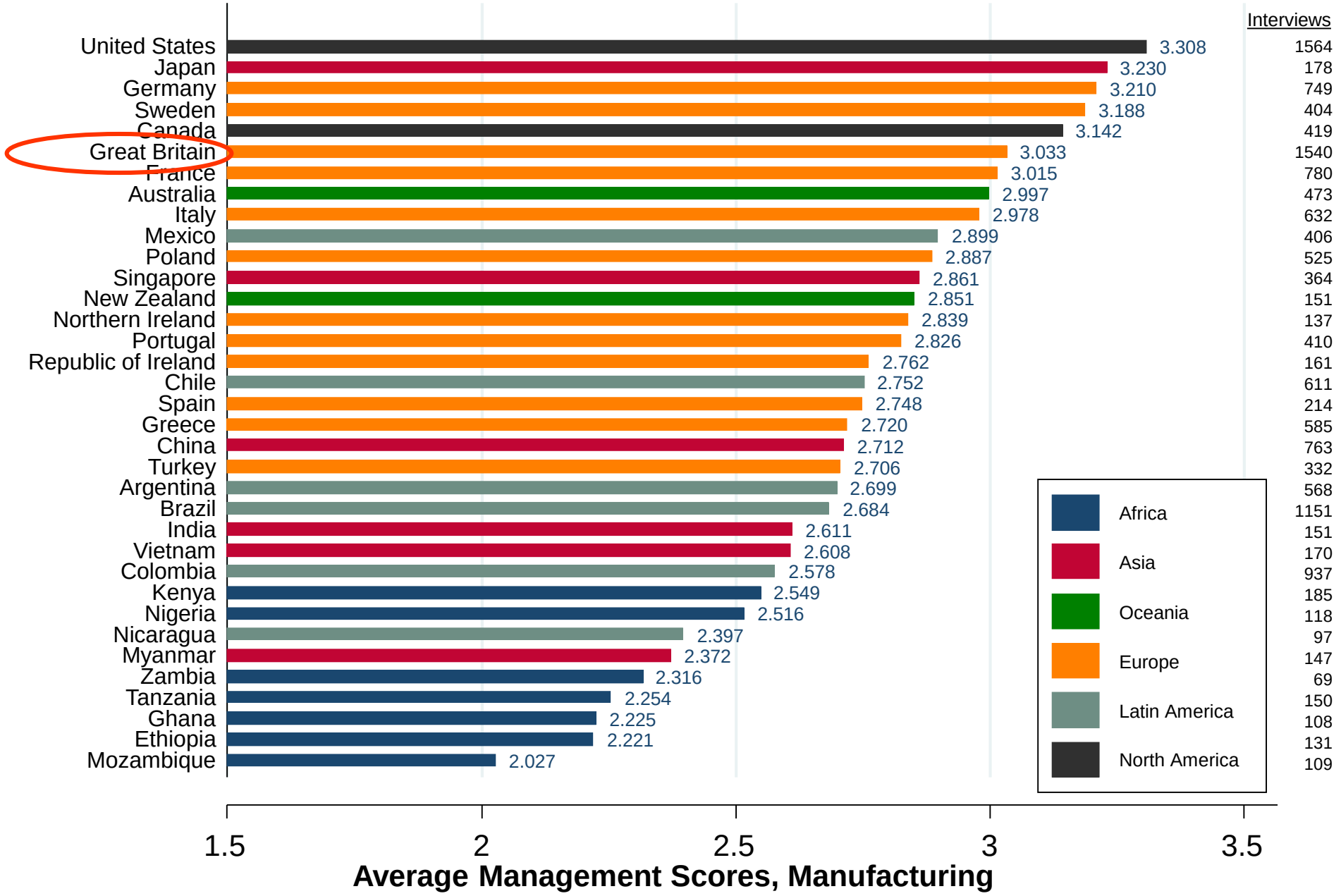
http://worldmanagementsurvey.org/



Medium sized manufacturing firms(50-5,000 workers, median≈250)

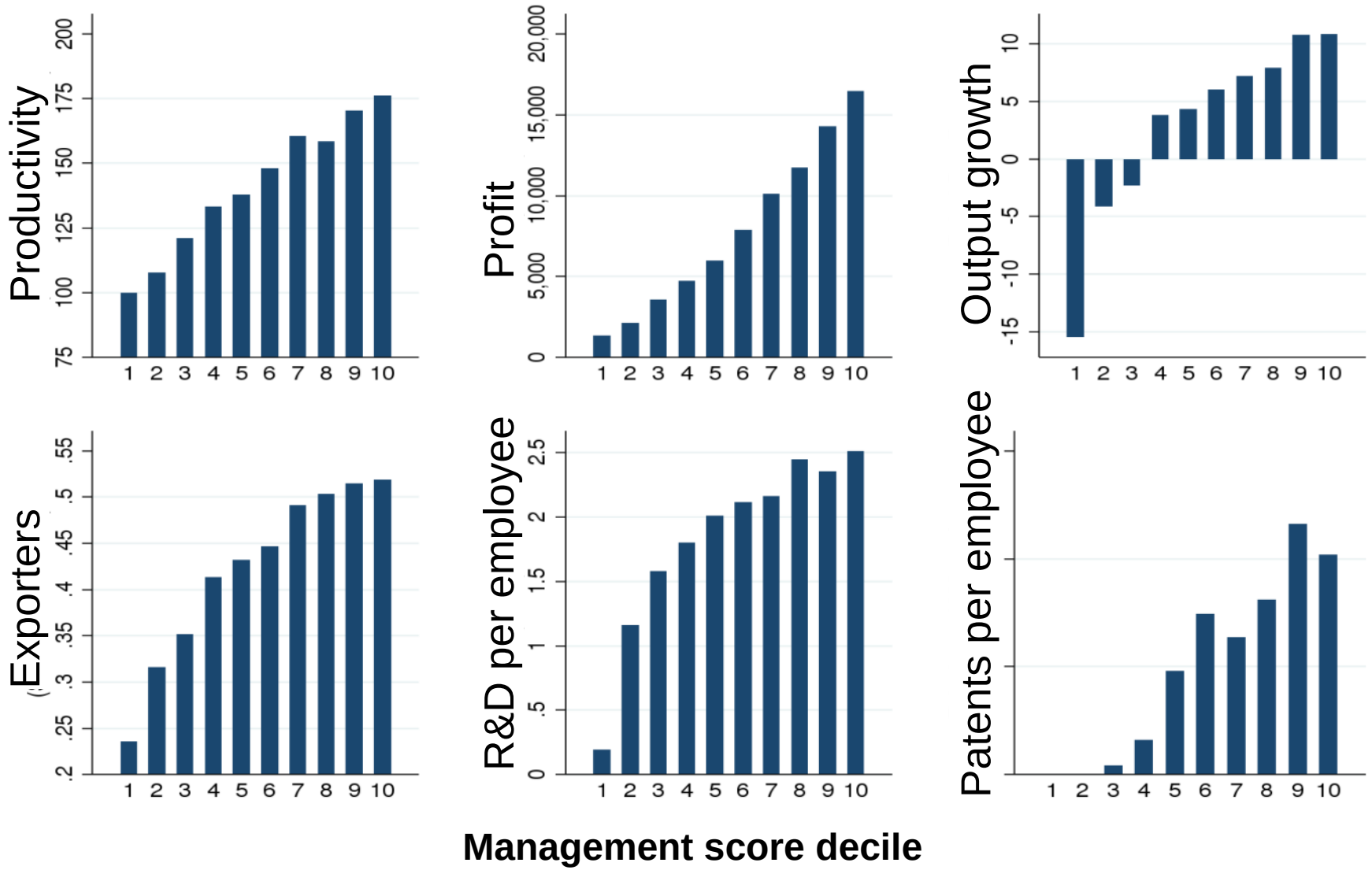
Now extended to Hospitals, Retail, Schools, etc.; non-manufacturing in UK MOPS

WMS Management Scores by Country similar to productivity



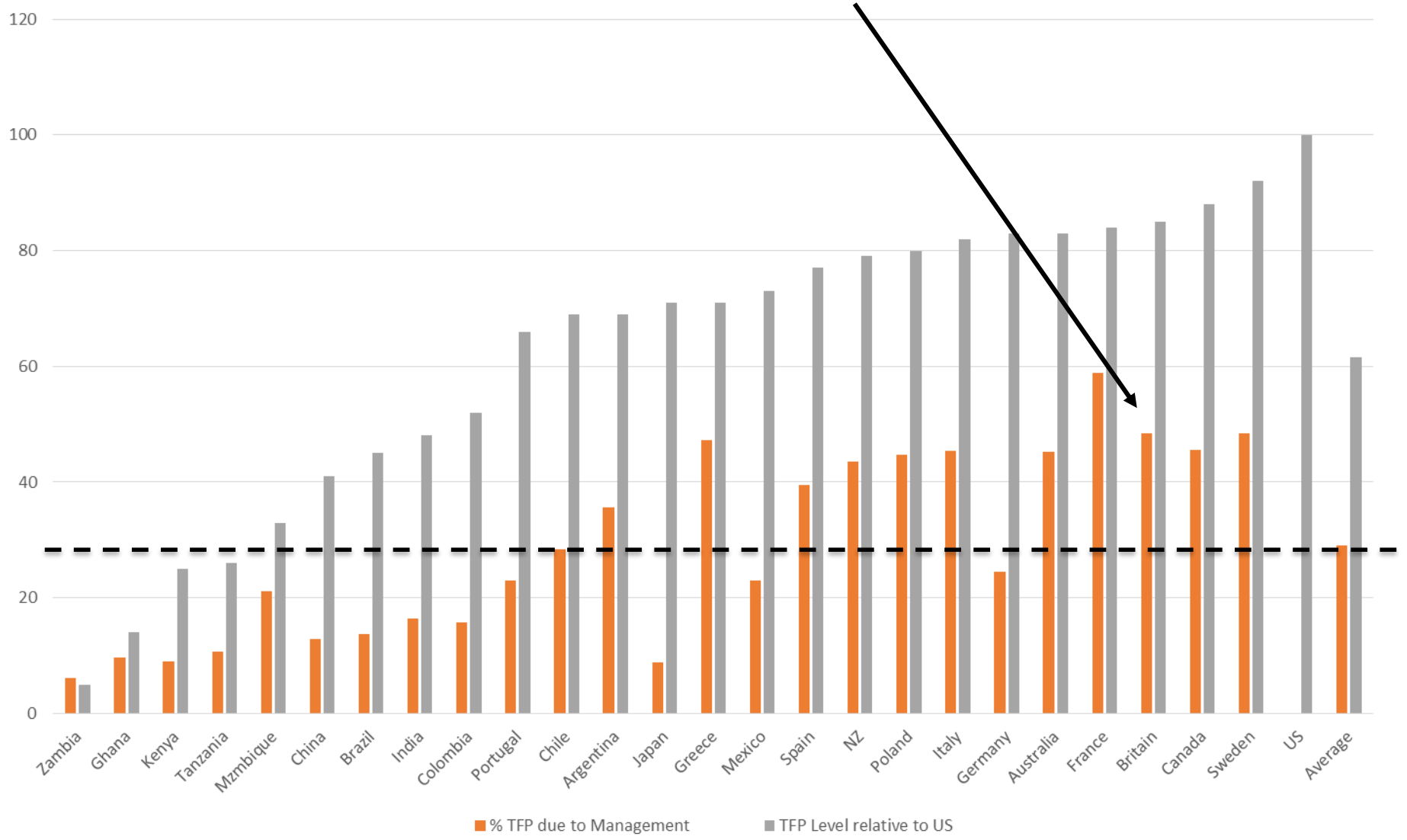
Source: Bloom, Sadun & Van Reenen (2020). **Note:** Unweighted average management scores; # interviews in right column (total = 15,489); all waves pooled (2004-2014)

Firm and establishment level Management scores positively correlated with many measures of firm performance



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

About half of UK TFP Gap with US related to poor management

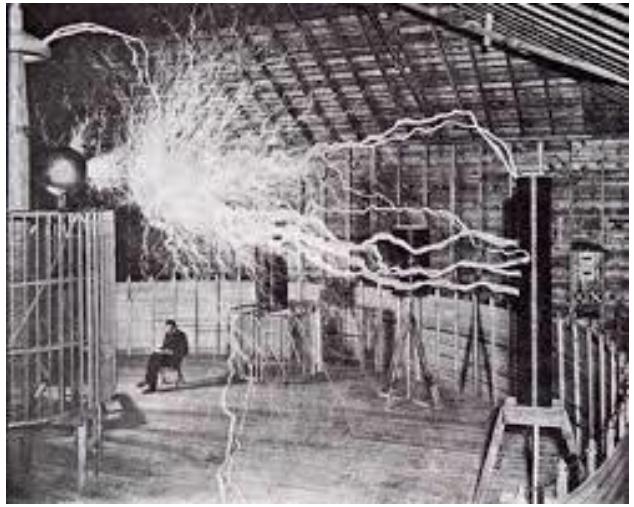


Source: Bloom, Sadun & Van Reenen (2020) “Management as a Technology”

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

Getting the most out of technology requires better management

- Strong management needed to make most of technological innovation
  - Paul David (1990) on electricity and computers



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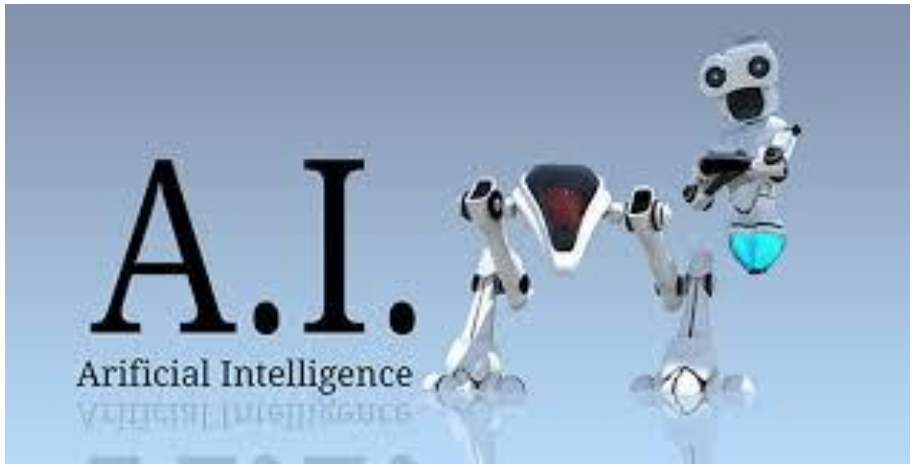
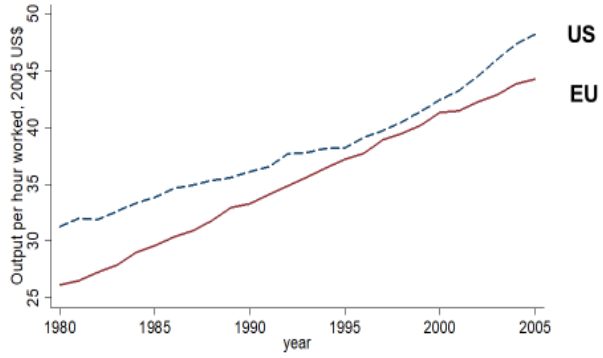
  - Complementarity between ICT and management (Bresnahan et al, 2002; Caroli and Van Reenen, 2001; Bloom et al, 2012)
  - Lessons for AI (Brynjolfsson et al, 2019)



Why did productivity growth accelerate in US 1995-05, but not in EU?



Source: Bloom, Sadun and Van Reenen (2012) "Americans Do I.T. Better"

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  - Lessons for AI (Brynjolfsson et al, 2019)
- Organizations can waste **a lot** of money on tech

theguardian

"Abandoned NHS IT system has cost £10 billion"

Sept 17, 2014

The bill for abortive plan, described as 'the biggest IT failure ever seen', was originally estimated to be £6.4bn

An abandoned NHS patient record system has so far cost the taxpayer nearly £10bn

NHS

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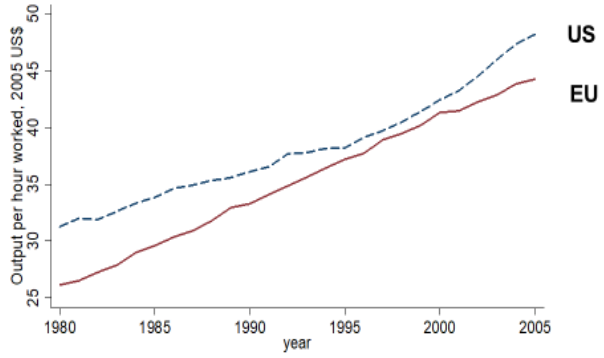

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The Effect of COVID on technical change: Some Theory

- **A Blocker of technology?**
  - Less incentive to adopt
    - Low demand
    - More uncertainty
  - Less ability to adopt
    - More financial constraints
    - Distraction of managerial time

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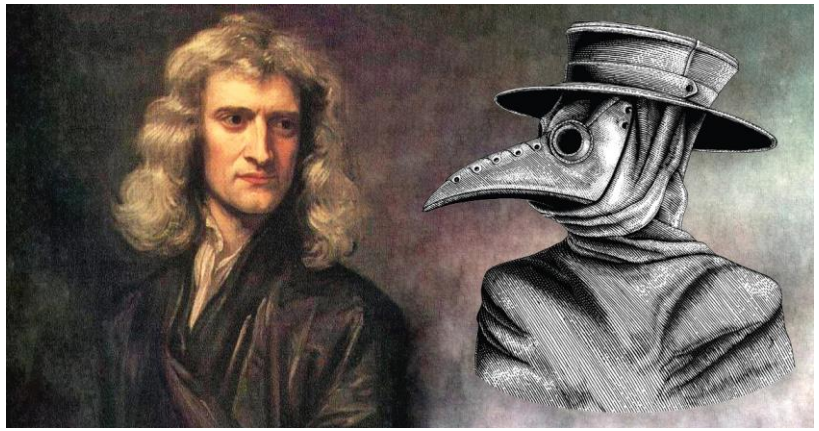
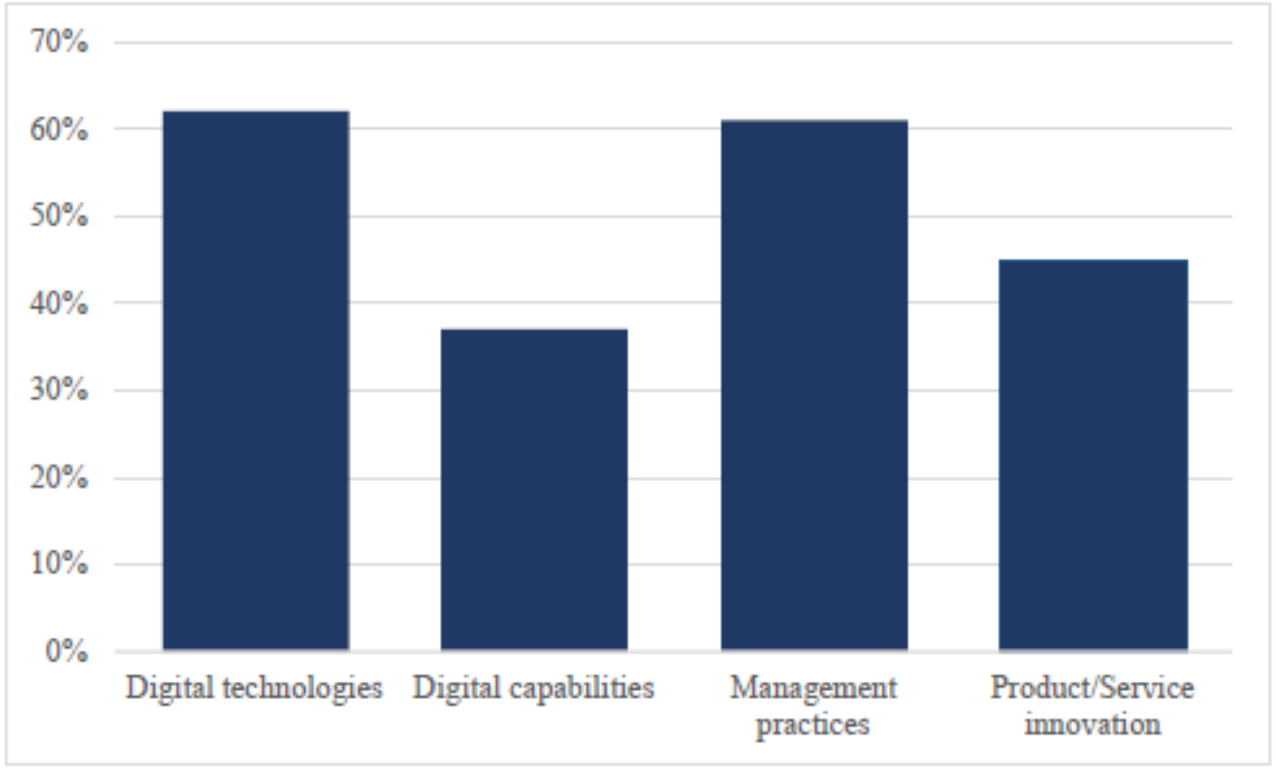


Newton's "years of wonder" were during the Great Plague

- **An enabler of Technology?**
  - Online platforms enable consuming and working at distance
  - Fewer workers forces automation (Autor & Reynolds, 2020)
  - More experimentation due to lower opportunity costs of ("Pit-stop" theory), cf. Tube Strikes

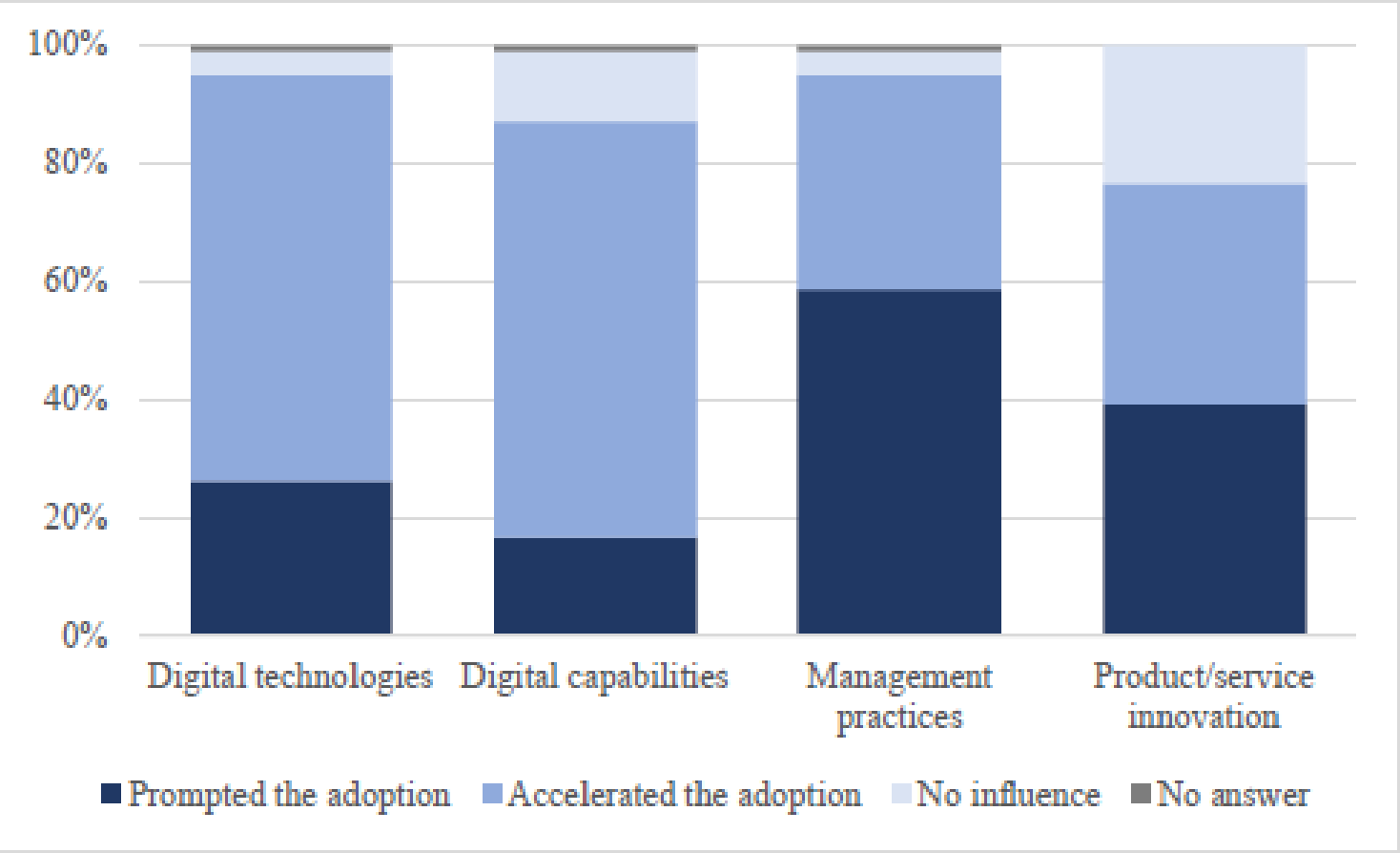
The Effect of COVID on technical change: UK Evidence shows a lot of innovation (and up on pre-crisis trends)



Source: Riom and Valero (2021), CEP-CBI Survey

https://cep.lse.ac.uk/pubs/download/cepcovid-19-009.pdf

Firms overwhelmingly say that Pandemic accelerated/prompted the changes



Source: Riom and Valero (2021), CEP-CBI

https://cep.lse.ac.uk/pubs/download/cepcovid-19-009.pdf

Adoption up, but R&D down?

- Roper and Vorley (2020) 80% of Innovate UK grant holders stopped/reduced R&D activity
- McKinsey (2020) less focus on long-term issues like innovation
  - So although direction of R&D may be shifting (e.g. WFH tech) overall, long term innov might fall

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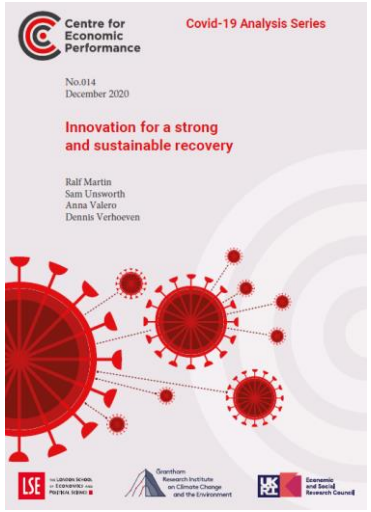
Policy

- A New Marshall Growth Plan
  - Institutional Changes to end policy ADD
  - Short Run Policies
    - Balance between protection & reallocation
  - Long run policies
    - *Structural* (competition, trade, skills, infrastructure, tax & subsidies)
    - *Direct* (e.g. management information and training)
- Use evidence!
  - Toolkits for innovation & management policy

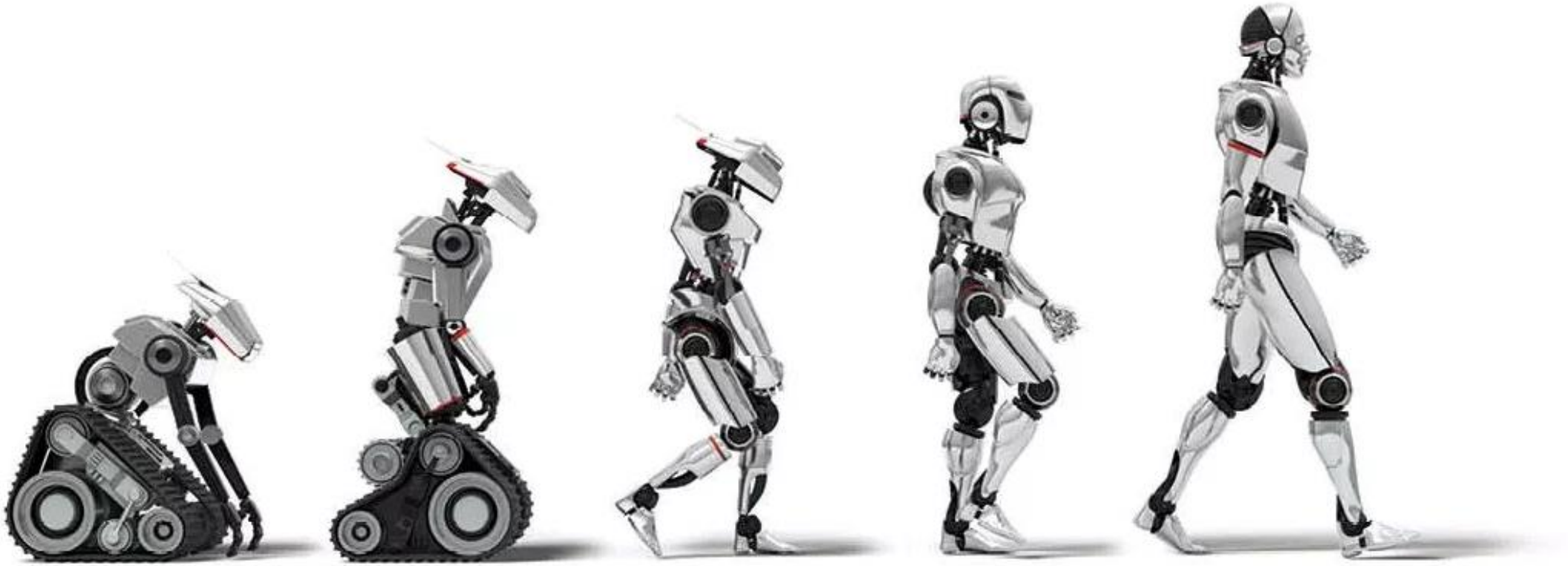


Management Policy Toolkit

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
Labour Deregulation	M	❂❂❂	L	medium
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 and Bloom (2021), https://academic.oup.com/oxrep/article-abstract/37/2/231/6311333

THANKS!



Some Further Reading (and viewing)

"Innovation Policies to Boost Productivity" (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

"The new empirical economics of management" (Nick Bloom, Renata Lemos, Raffaella Sadun, Daniella Scur and John Van Reenen), *Journal of the European Economic Association* (2014) 12: 835–76,

"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

COVID-19: "A major wave of UK business closures by April 2021? The scale of the problem and what can be done." (Peter Lambert and John Van Reenen) 2021 CEP COVID analysis https://cep.lse.ac.uk/_NEW/PUBLICATIONS/abstract.asp?index=7711 IGA Radio Carona MIT Technology Review

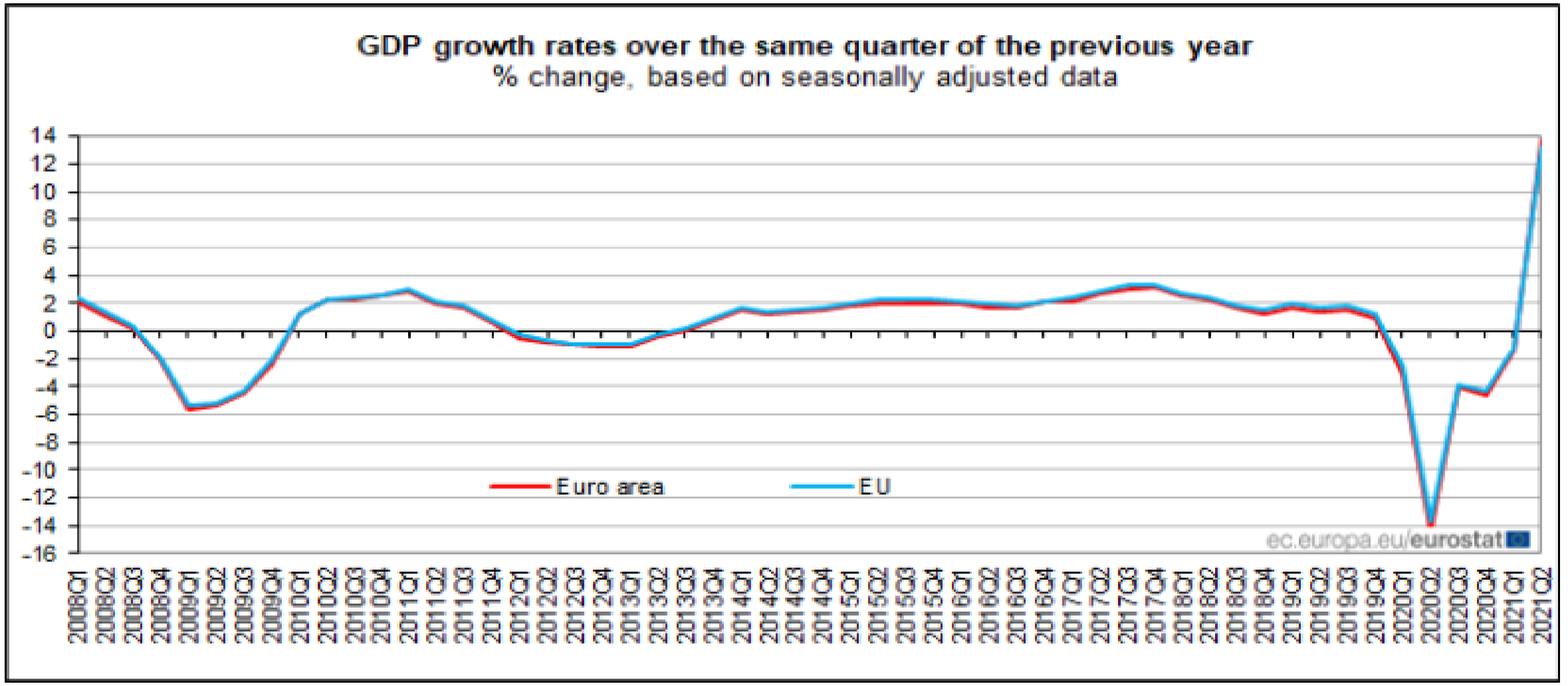
Further reading

- “The World Management Survey at 18” (Bloom, Lemos, Sadun, Scur & Van Reenen, 2021), Oxford Review of Economic Policy https://poid.lse.ac.uk/textonly/publications/downloads/poidwp002.pdf
- World Management Survey http://worldmanagementsurvey.org/
- “The Effects of COVID on the adoption of new technology” (Valero and Van Reenen, 2021) https://www.economicsobservatory.com/how-covid-19-affecting-firms-adoption-new-technologies
- LSE Growth Commission Final Report

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

- “Management as a Technology” (Bloom, Sadun and Van Reenen, 2020): http://mitsloan.mit.edu/shared/ods/documents/?DocumentID=2685

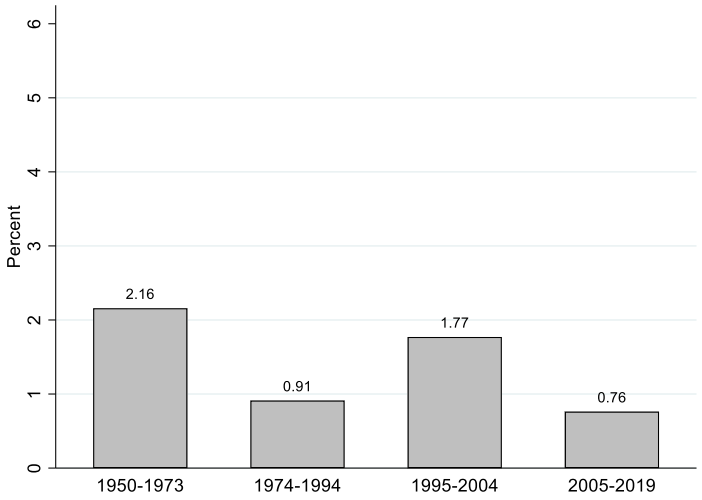
The Pandemic's Big Hit on growth



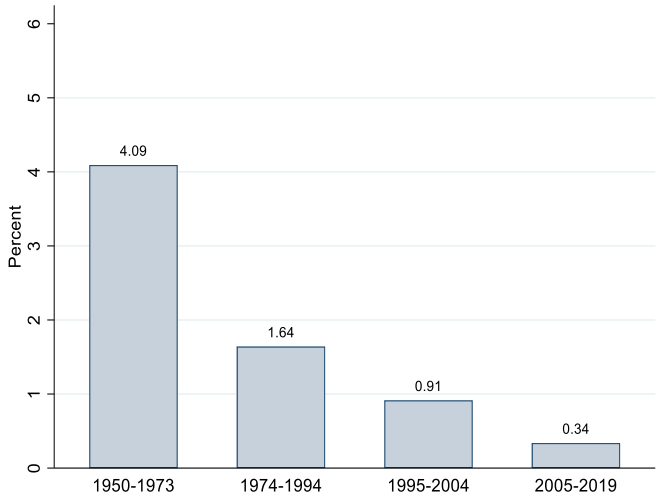
Source: Eurostat, July 30th 2021 https://ec.europa.eu/eurostat/documents/2995521/11563211/2-30072021-BP-EN.pdf/0567c280-b56c-2734-2a4b-e4af85a55bf5?t=1627630313030

TFP growth 1950-2019, US, Euro-area and UK

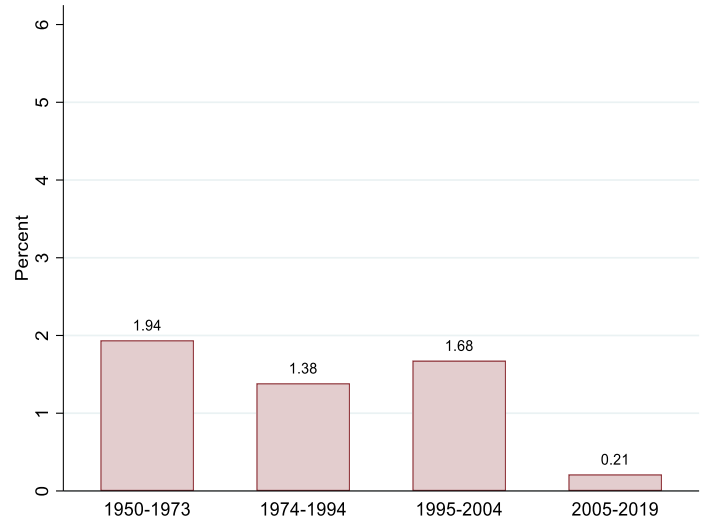
A. United States



B. Euro Area



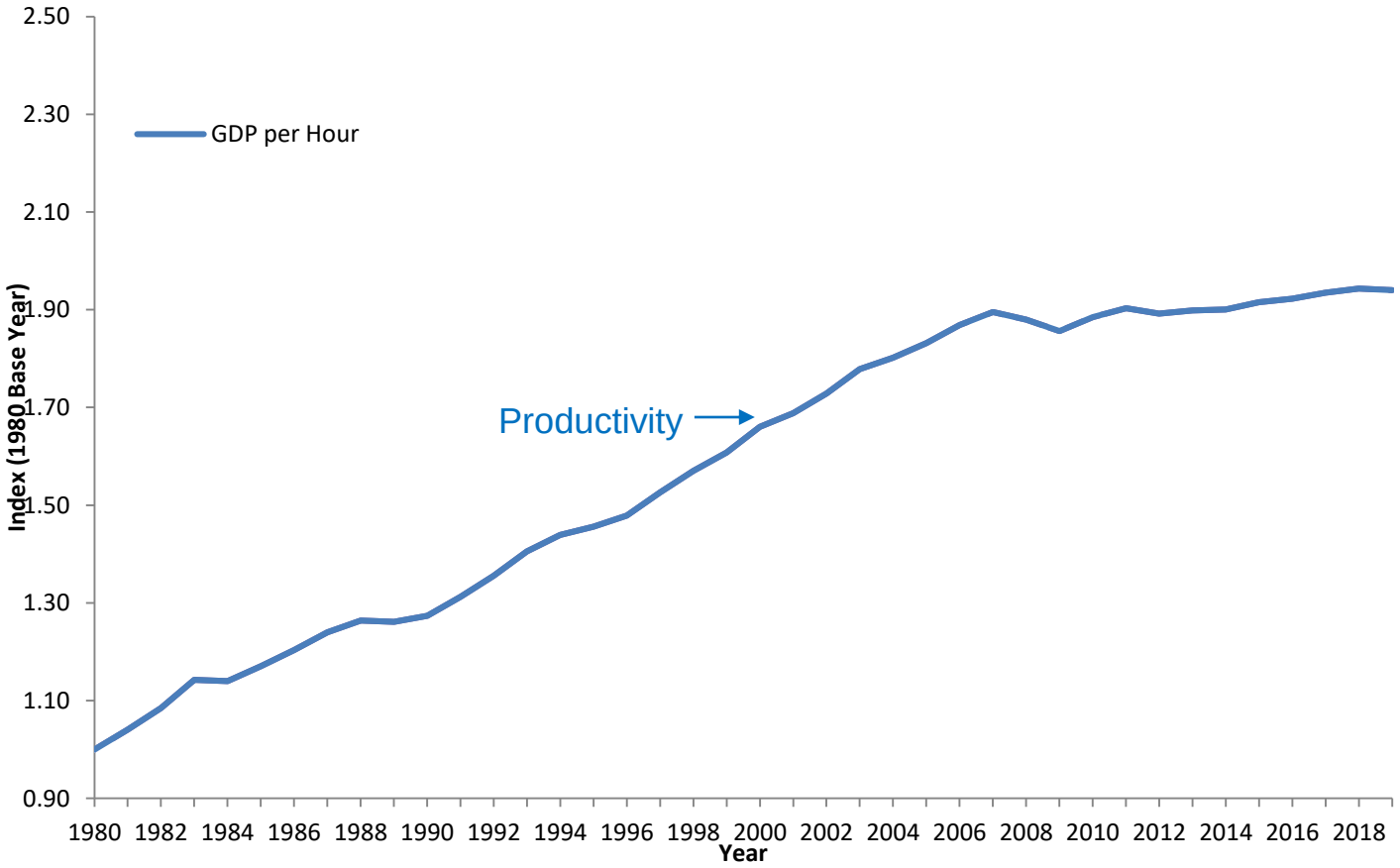
C. United Kingdom



Source: Data updated from Bergeaud, Cette, and Lecat (2016). Data publicly available at: http://www.longtermproductivity.com/

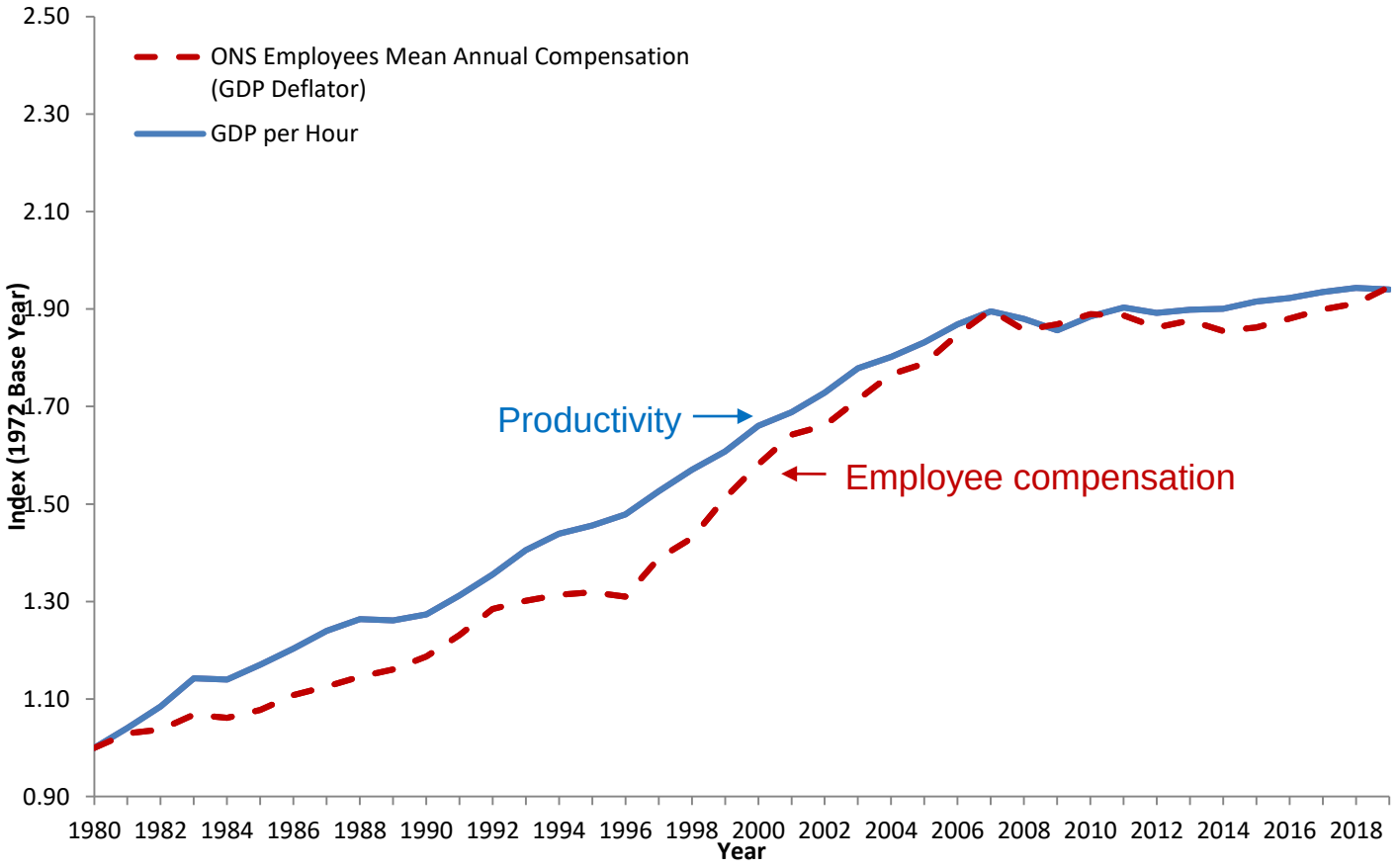
Notes: Shown is the average annual TFP growth in the US (panel A), Euro-area (panel B), and UK (panel C). Insufficient data for whole EU, so we use Euro-area, represented by Germany, France, Italy, Spain, Netherlands, and Finland.

Why does slowing UK Productivity (GDP per hour) matter?



Source: Teichgraeber and Van Reenen (2021) using ONS data; Series based at 1 in 1980,

UK Employee Compensation tracks Labour Productivity Growth



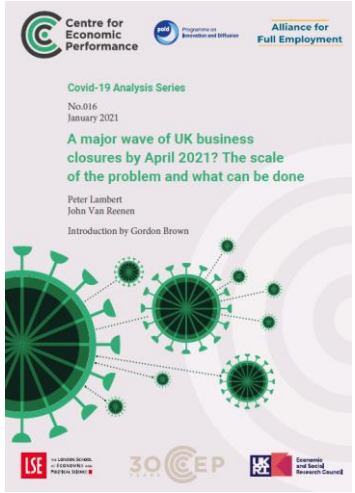
Source: Teichgraeber and Van Reenen (2021) using ONS data; Series both based at 1 in 1980, both employee compensation and productivity approximately doubled over the four decades

Principles for Inclusive and Sustainable Growth: Short-run

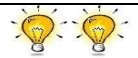
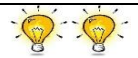
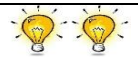
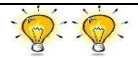
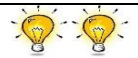
- Avoiding premature **austerity** prolonging depressed demand

- Balancing **Protection** and **Reallocation**
  - As we move into post COVID era, need to facilitate reallocation of jobs between firms.

- Avoid overly sharp cliff edges for needed support packages (e.g. in UK, CJRS, CGILS, BBLS, etc.)
  - Smooth the wind-down of worker and business support (reduces loss of viable skills and firms)
  - Will need some debt restructuring: debt-for-equity & write-offs
  - Combine with support for startups/growth



We summarize evidence in a Policy "Lightbulb" Table

(1) Policy	(2) Quality of evidence	(3) Conclusiveness of evidence	(4) Benefit - Cost	(5) Time frame:	(6) Effect on inequality
Direct R&D Grants	Medium	Medium		Medium-Run	↑
R&D tax credits	High	High		Short-Run	↑
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	↑
Grand Innovation Challenge	Low	Low		Medium-Run	↓

Source: Bloom, Van Reenen and Williams (2019)

Understanding Growth

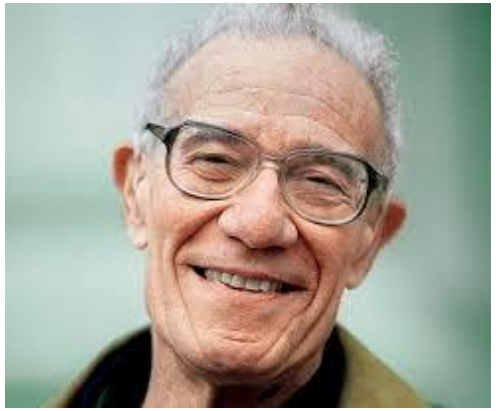
- Growth is a story of innovation rather than the accumulation of people and capital

- **US Output per hour grew at ~2.5% per annum since WW2**

Jones (2015) Growth Accounting decomposition

  - 0.1% from capital deepening
  - 0.4% from labour composition
  - 2.0% from TFP (“Solow Residual”)

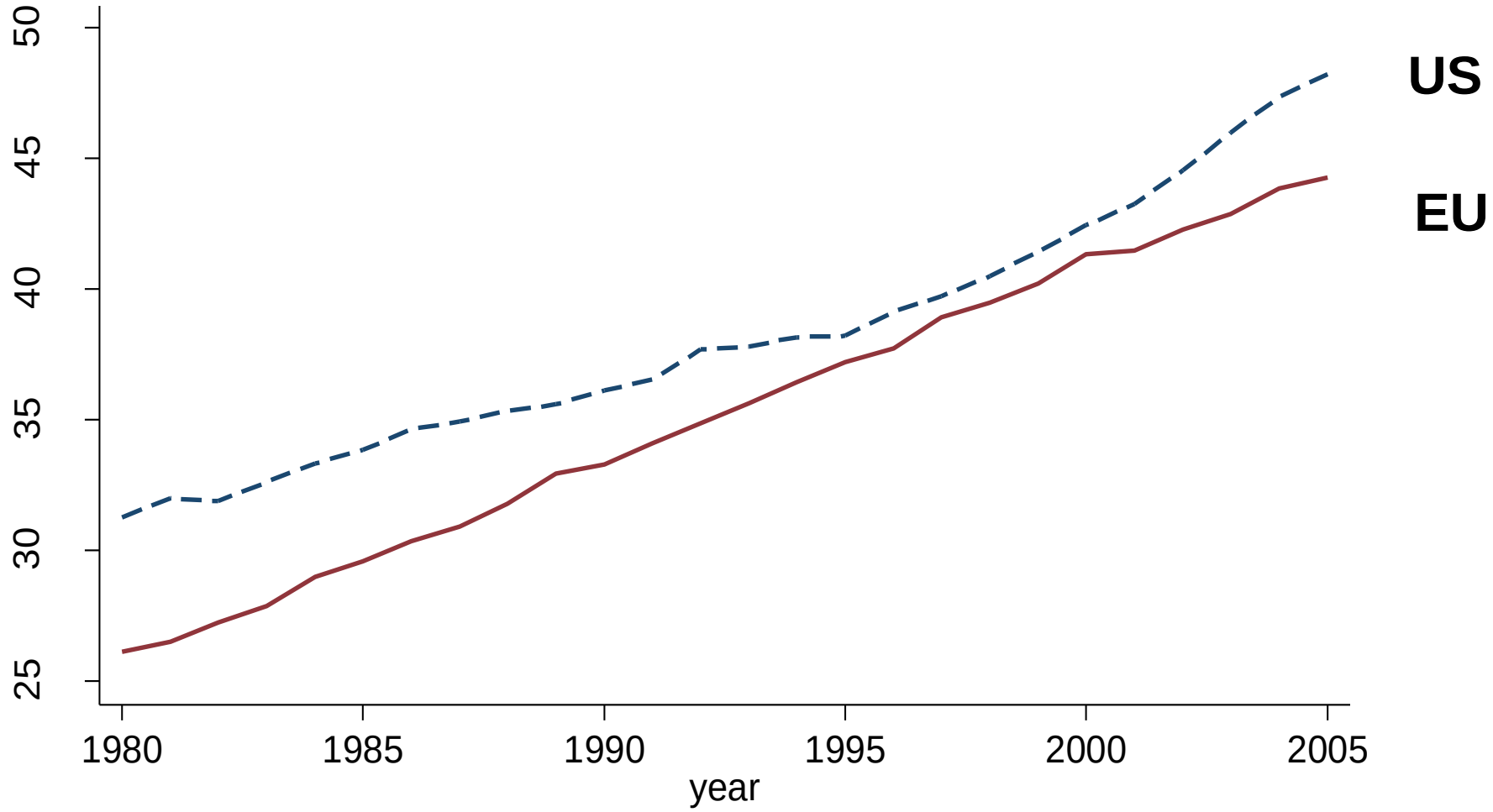
Nobel Laureate Bob Solow, MIT



Successful Policies towards improving management

- Strong Competition
- Openness to Trade and FDI
- Governance
- Managerial training
- Information/benchmarking

Why did productivity growth accelerate in US 1995-05, but not in EU?



Source: Bloom, Sadun and Van Reenen (2012) “Americans Do I.T. Better”

US productivity miracle linked to use of IT

- Prices of IT fell rapidly post 1995, and IT using sectors showed rapid TFP growth in the US

- US firms have higher scores on people management so able to use IT better. European firms low scores and struggled to adapt

- Test this by examining US multinationals in Europe. Find:
  - US multinationals much higher impact of IT on output compared to non-US multinationals
  - True even after take-overs with about a 3 year lag
  - Once control for management explains the US advantage

US management ≈ 50% of faster TFP growth than EU after 1995