

What is holding back UK productivity?

Lessons from decades of measurement

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Background & Overview

- **Much policy focus on UK productivity**
 - Reflecting poor performance and the importance of productivity in driving wages and living standards
 - Productivity plan, HMT 2015; Industrial Strategy; Fat lower tail of low productivity firms (Haldane, 2017); BEIS Productivity Review
- **Review potential explanations and consequences**
 - Through the lens of developments in economic measurement
 - Particular focus on work by NIESR colleagues drawing on NIER November 2018
- **Cross-country industry data and business micro-data**

A story of two gaps – levels and recent growth

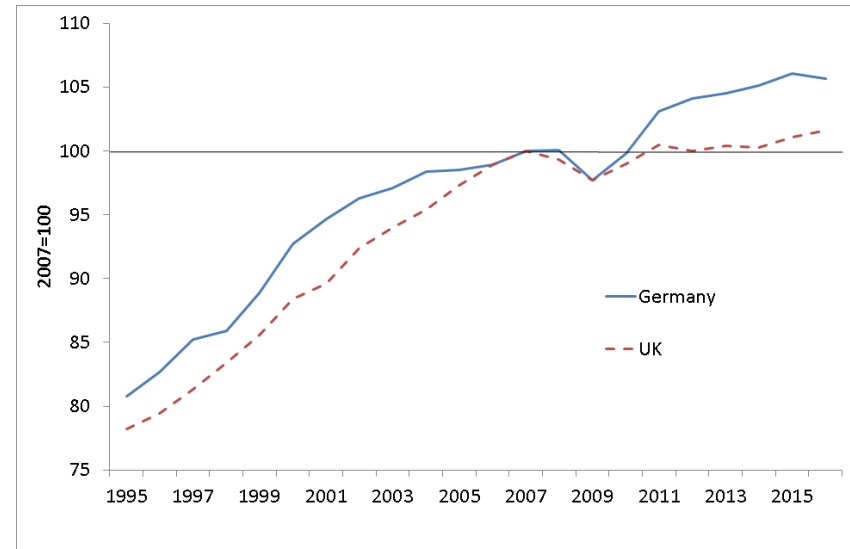
**Levels of output per hour worked in the market economy.
1950-1996. UK =100**

	US	France	Germany ¹	Japan ²
Market Sectors				
Productivity Levels (UK = 100)				
1950	188	68	74	35
1960	217	90	102	44
1973	173	110	126	71
1979	162	123	140	74
1989	136	130	131	80
1996	125	120	130	81

Notes: 1. Former West Germany; 2. The data series for Japan start in 1953.

Source: Mason, O'Mahony and Riley (2018), What is holding back UK productivity? lessons from decades of measurement, *National Institute Economic Review* No. 246, pp. R24-R35.

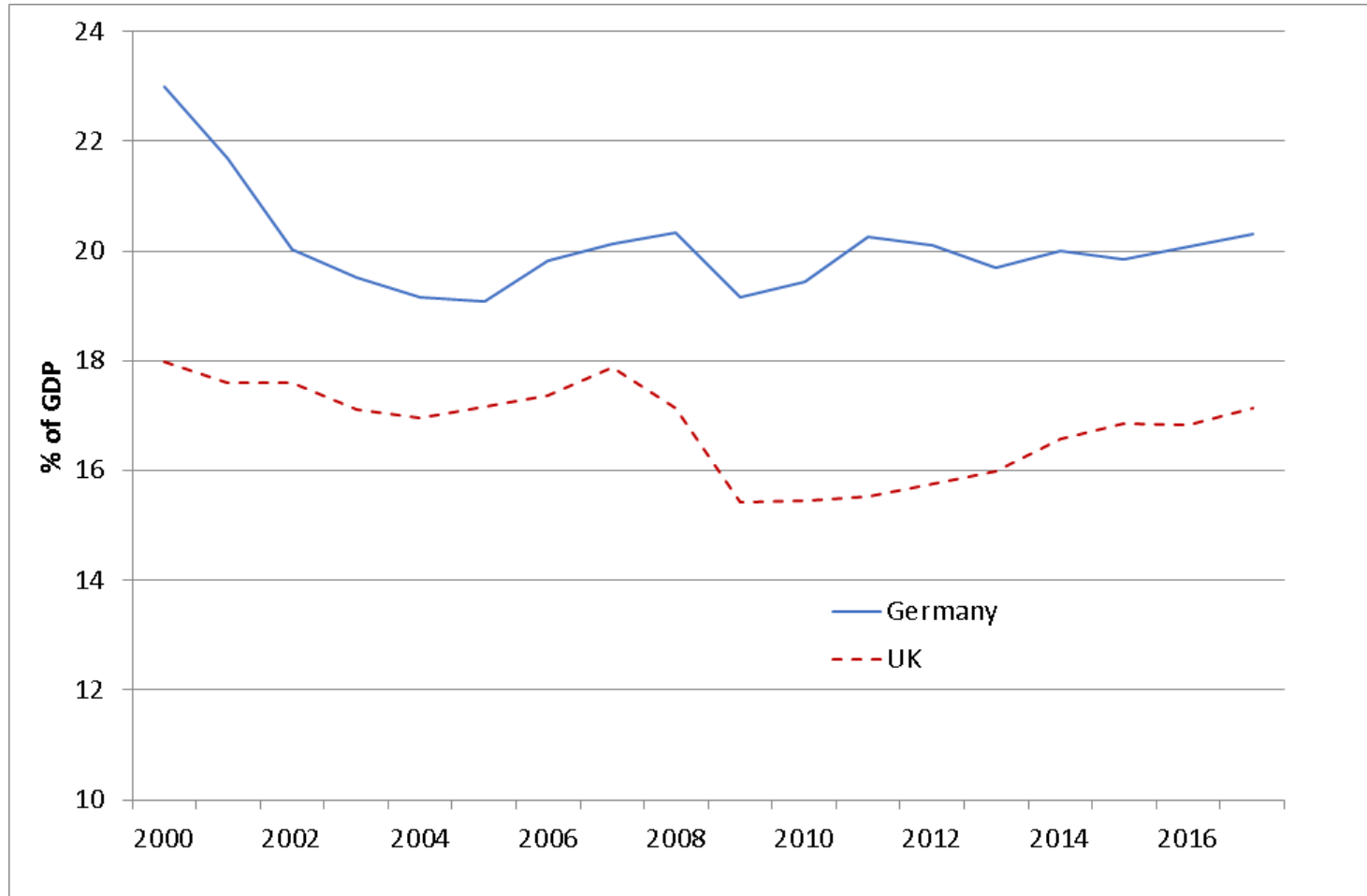
**GDP per hour worked (labour productivity),
constant prices**



Source: ONS ICP

A difference in investment behaviours?

Gross Fixed Capital Formation (per cent of GDP)

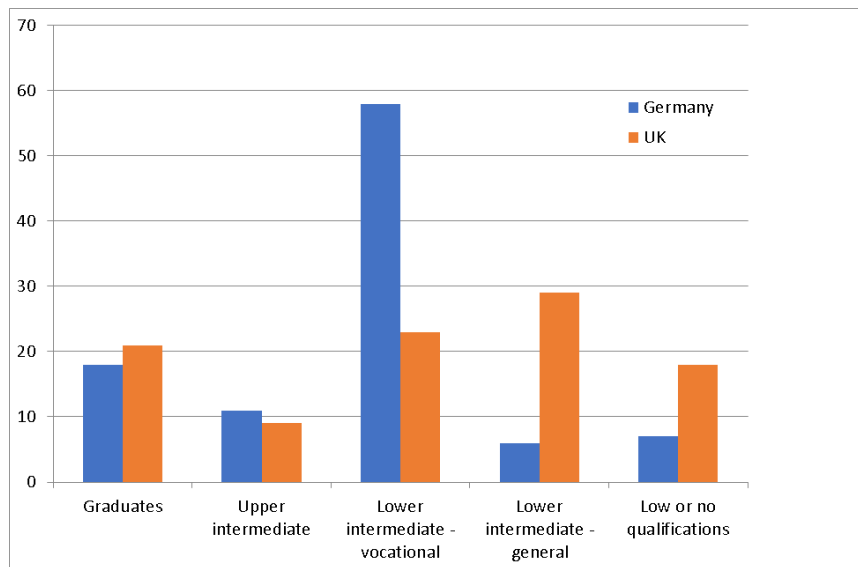


Source: Eurostat

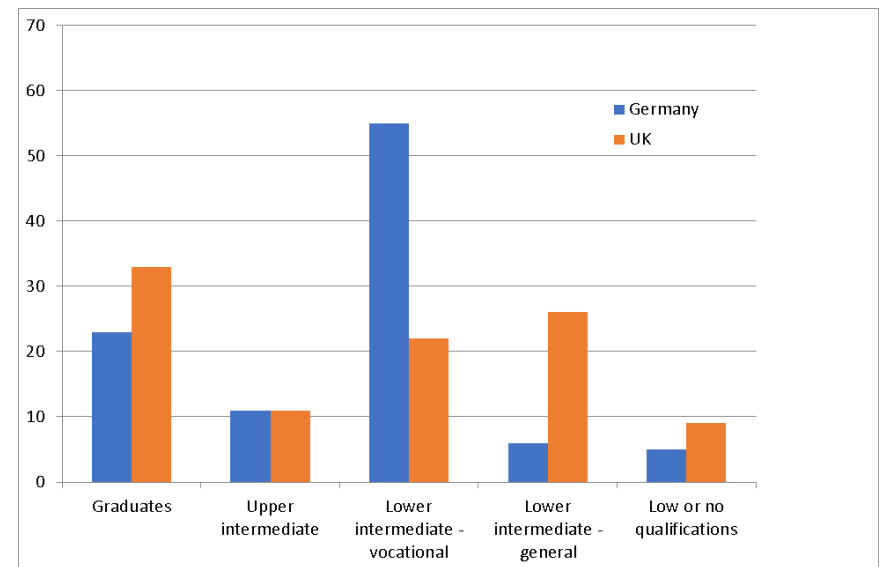
A difference in investment in human capital?

Share of employment by skill group

2002



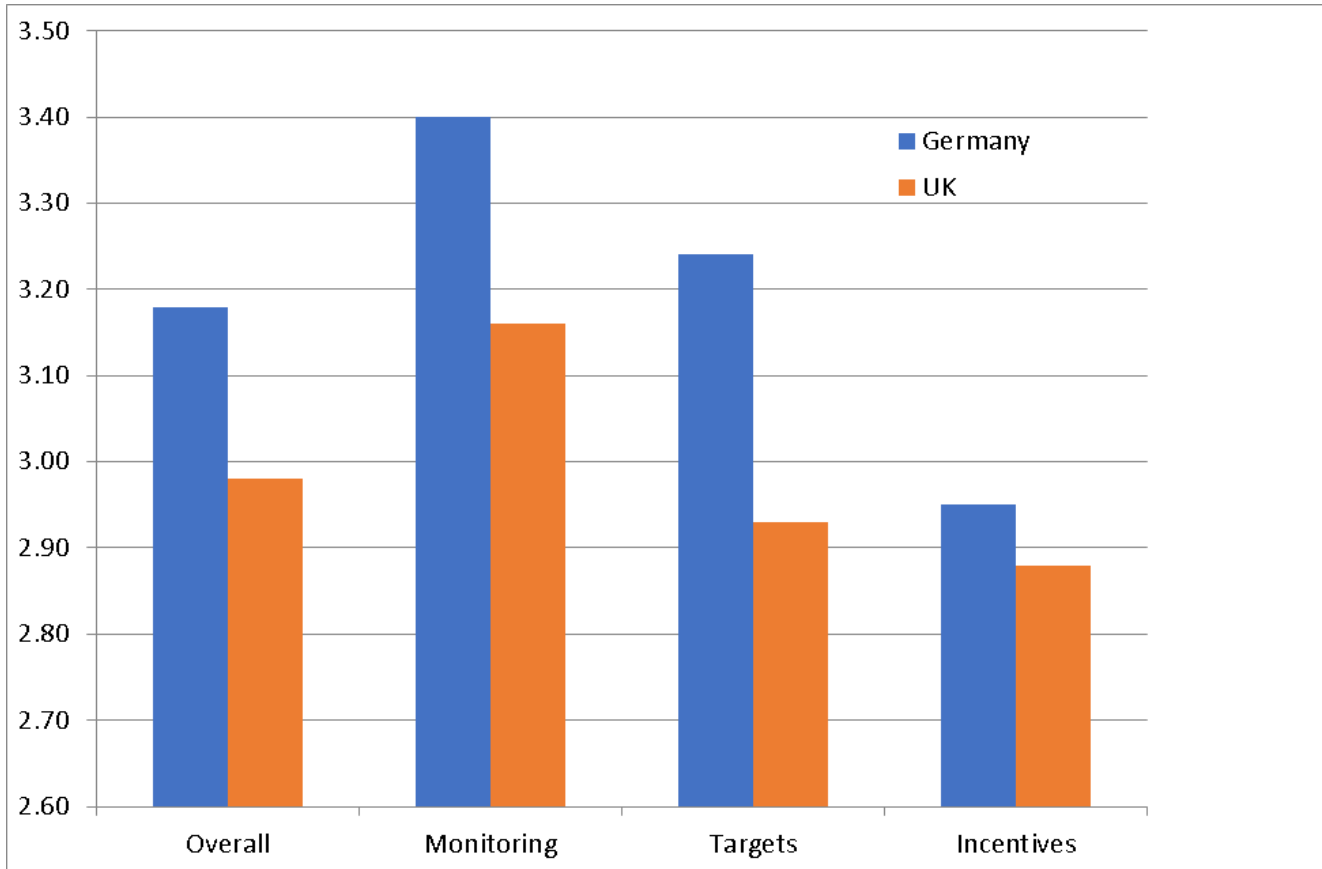
2012



Source: Mason, O'Mahony and Riley (2018), What is holding back UK productivity? lessons from decades of measurement, *National Institute Economic Review* No. 246, pp. R24-R35.

A difference in management practices?

Management Practices Score

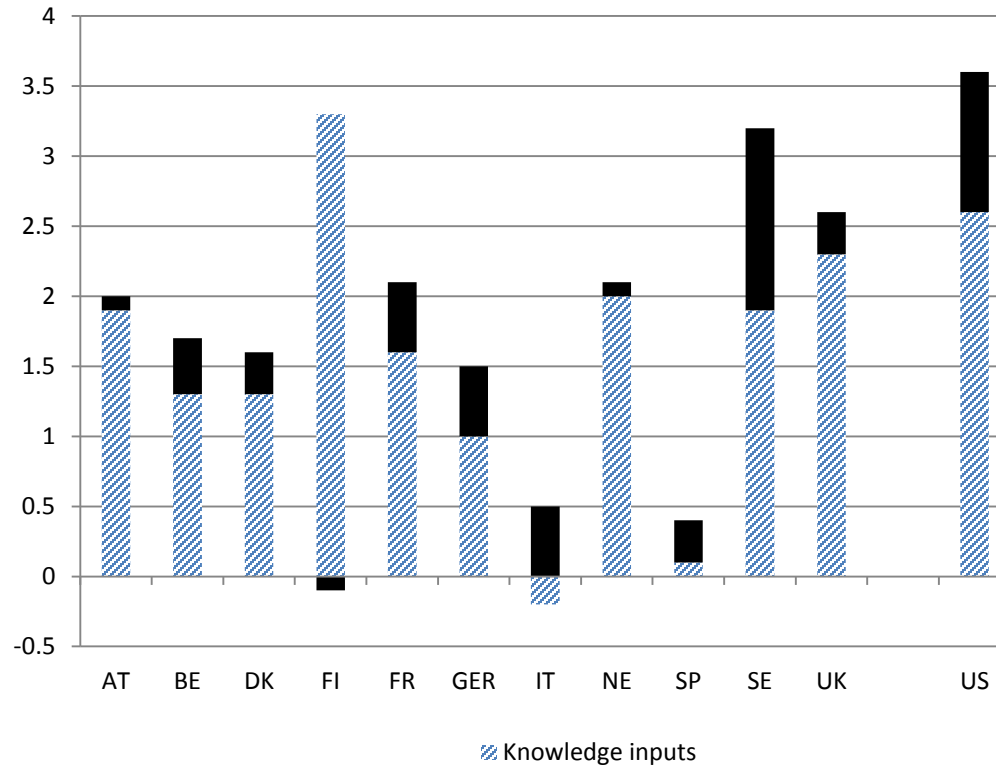


Source: Bloom, N. and Van Reenen J., (2008), Why Do Management Practices Differ across Firms and Countries?, *Journal of Economic Perspectives* No. 246, pp. R24-R35.

Catch-up in the decade before the global financial crisis

... due to growth in knowledge inputs

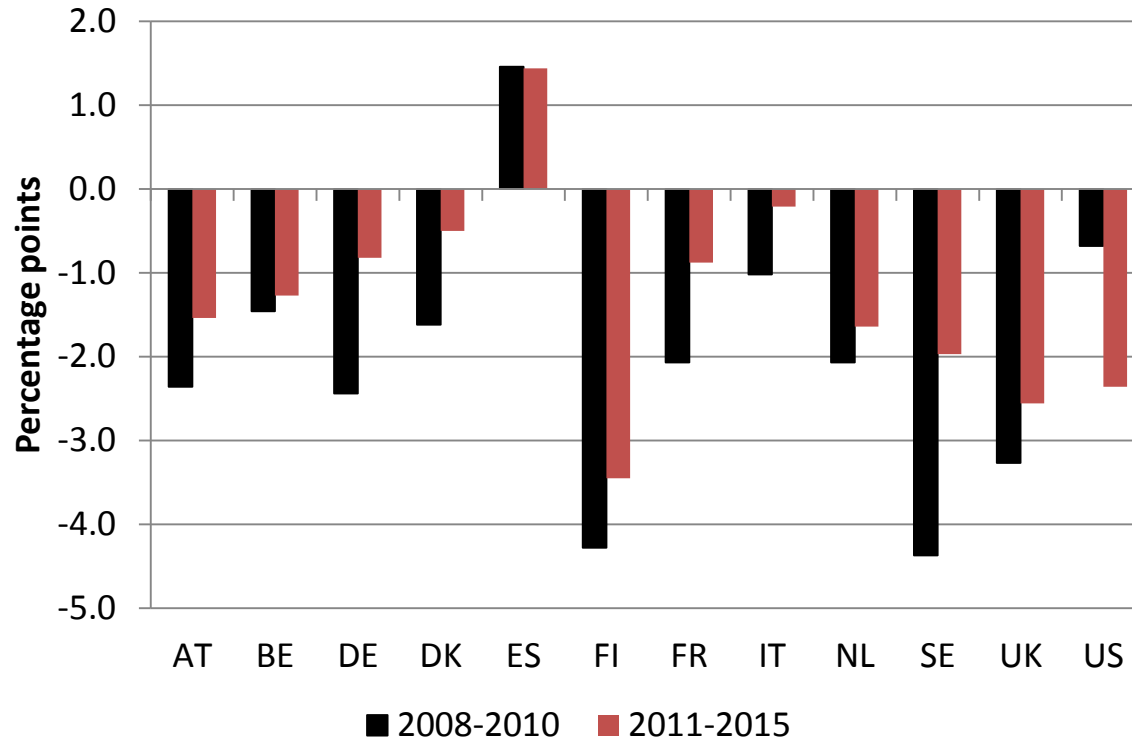
Labour productivity growth and contributions of knowledge inputs, annual average 1995-2005



Notes: Market sector. O'Mahony & Timmer, EUKLEMS.

A hard fall in the decade after the global financial crisis

Annual labour productivity growth: difference from 1999-2007

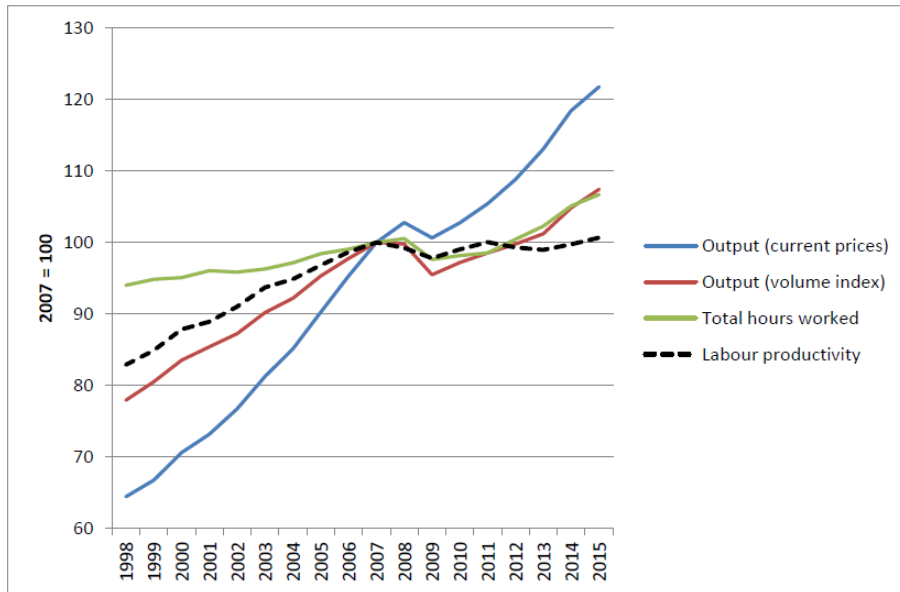


Source: EUKLEMS 2017 release (August 2017); Riley, Rincon-Aznar and Samek (2018).

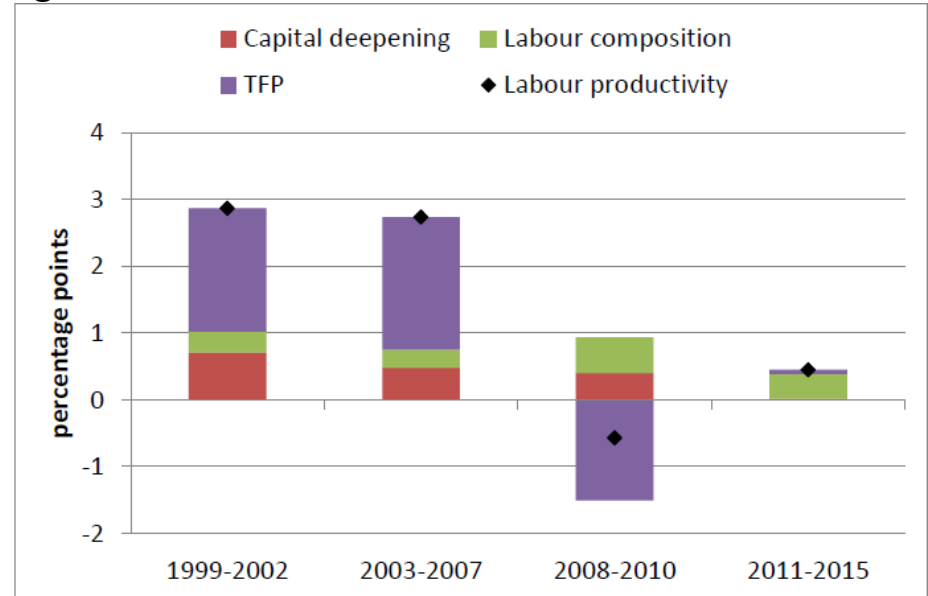
Notes: NL data from 2001 onwards. Market sector.

UK Growth in a Digital Era

Output, hours worked and labour productivity:
2007=100, UK economy, 1998-2015



Contributions to annual labour productivity
growth, UK market sector



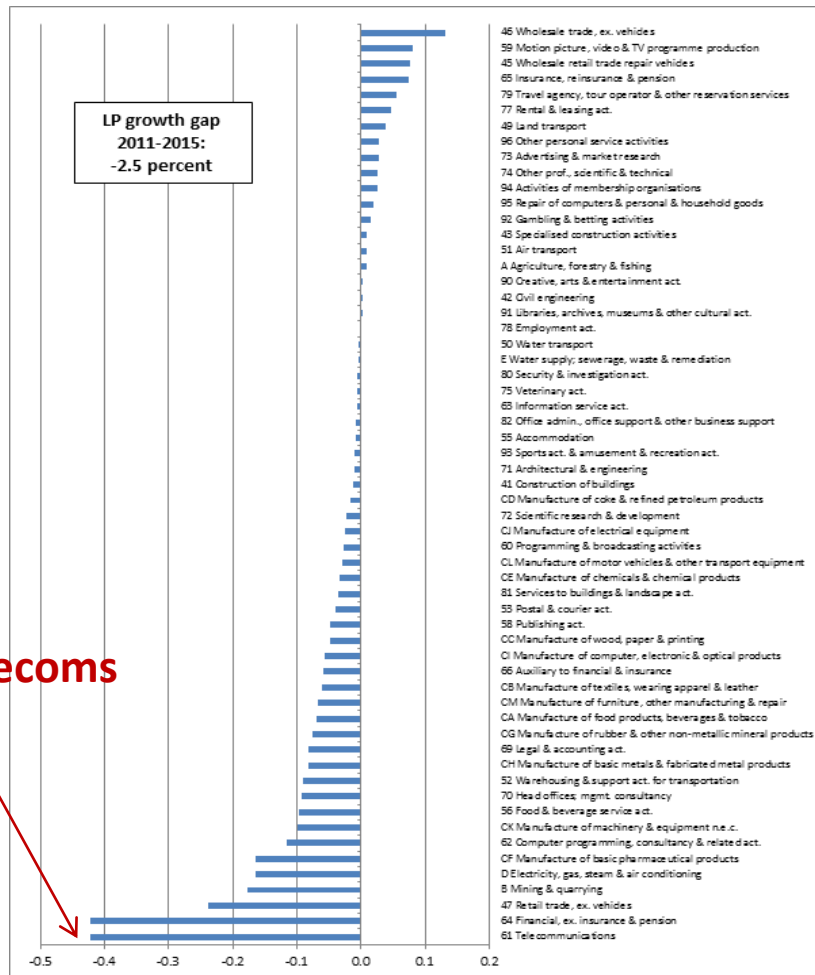
Source: Riley, Rincon-Aznar and Samek, 2018

Strong productivity growth 1998-2007 (led by Finance, ICT & Professional Services, Manufacturing) disappeared after the financial crisis.

TFP growth vanished and investment (per hour worked) stalled, particularly in those sectors that had led growth before.

Composition of the 'UK' Productivity Puzzle

Industry contributions to the labour productivity growth gap



Information and Communication

- Accounts for 20% of the UK productivity growth gap and less than 10% of output
 - UK market sector 2011-2015 compared to 1999-2007
- Similar pattern in many advanced economies
 - 15% of the market sector productivity growth gap 2008-2015
 - UK, US/NL average, US/EU15 weighted average
- Waiting for the effects of a digital GPT to feed through to productivity?

Source: Riley, Rincon-Aznar and Samek (2018)

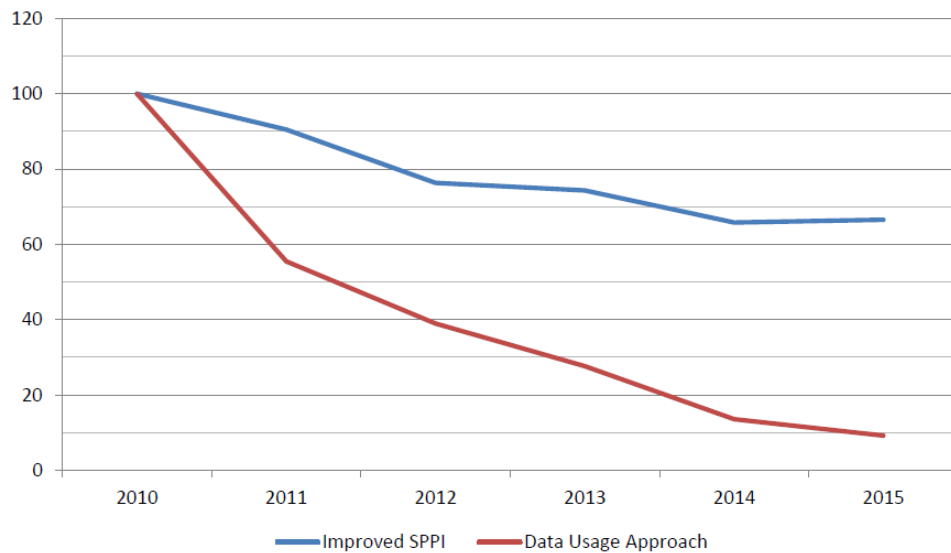
Notes: UK Market sector excluding Real Estate; Average annual labour productivity growth 2011-2015 compared to 1999-2007.

Fading ICT boom or mismeasurement?

Quality improvements in telecoms are generally not accounted for.

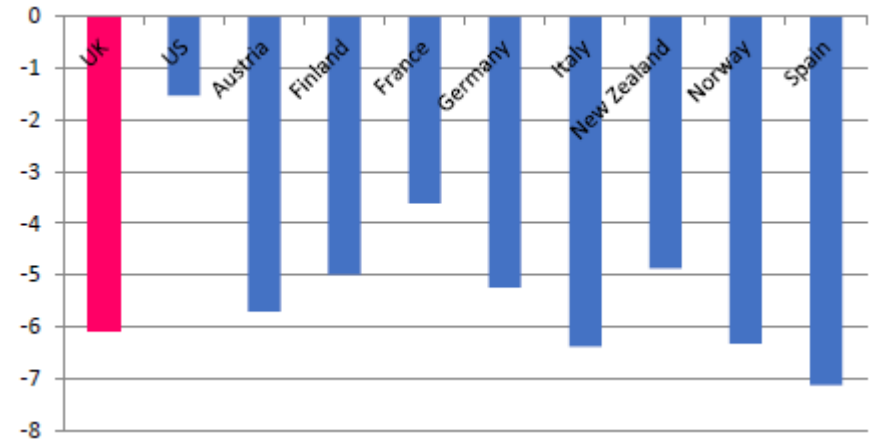
- associated with substantial advances in and the spread of mobile technology during the post-recession period

Comparing Different Telecoms Deflators



Source: Abdirahman, Coyle, Heys and Stewart (2017).

Business Telecoms: Relative Price change 2006-2016

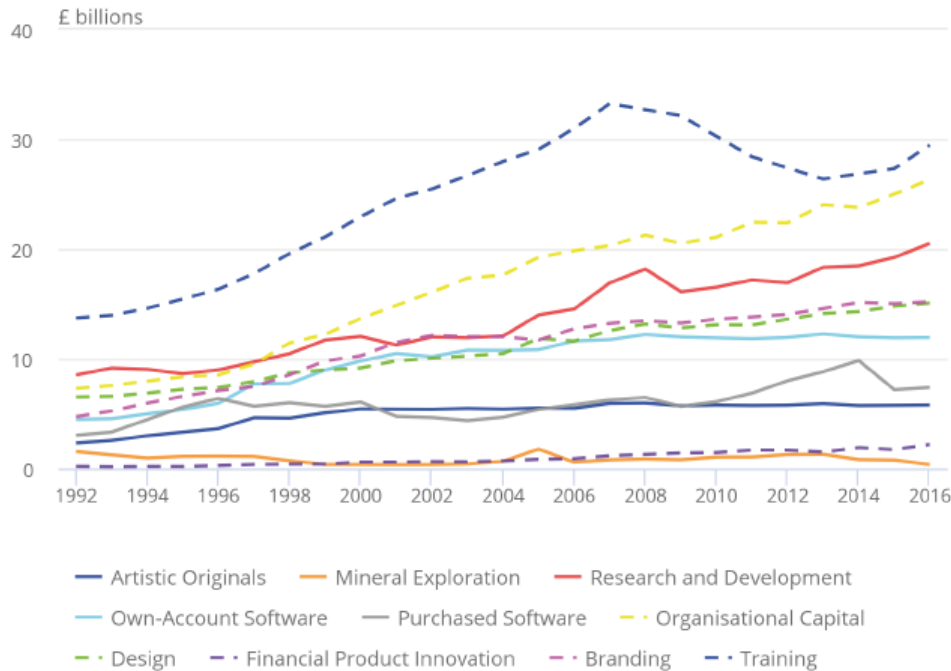


Source: O'Mahony and Samek (2017).

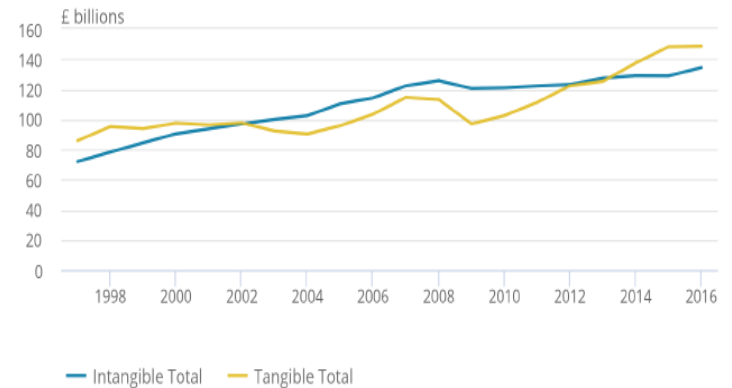
Measures of Intangible Investment

How well do we capture investments in digital (software and data) and their contributions to productivity? - valuing data, cross-border issues, cloud-computing

Market sector investment by intangible asset, current prices, UK



Market sector intangible and tangible investment, current prices, UK



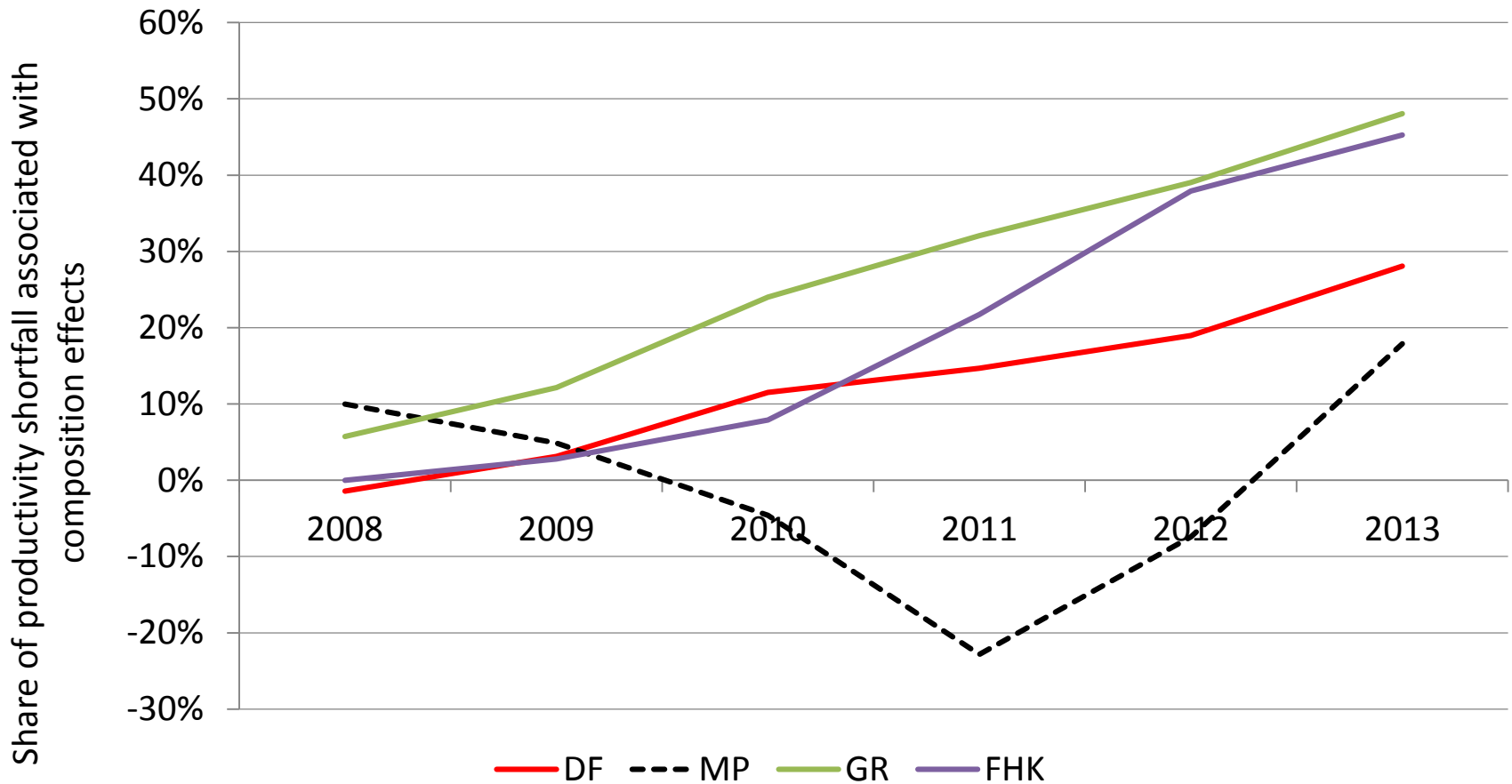
Source: ONS (2019), *Developing Experimental Estimates of Investment in Intangible Assets in the UK: 2016*.

Productivity growth decompositions: Within firm changes and business demographics

$$\begin{aligned} & \text{Overall productivity growth} \\ & = \\ & \text{Average productivity growth *within* surviving businesses} \\ & + \\ & \text{Reallocation towards more productive surviving businesses} \\ & \quad \text{(*between*)} \\ & + \\ & \text{Reallocation towards new businesses (*entry*)} \\ & + \\ & \text{Reallocation from exiting businesses (*exit*)} \end{aligned}$$

Less efficient resource (re)allocation after the crisis?

Methodology matters

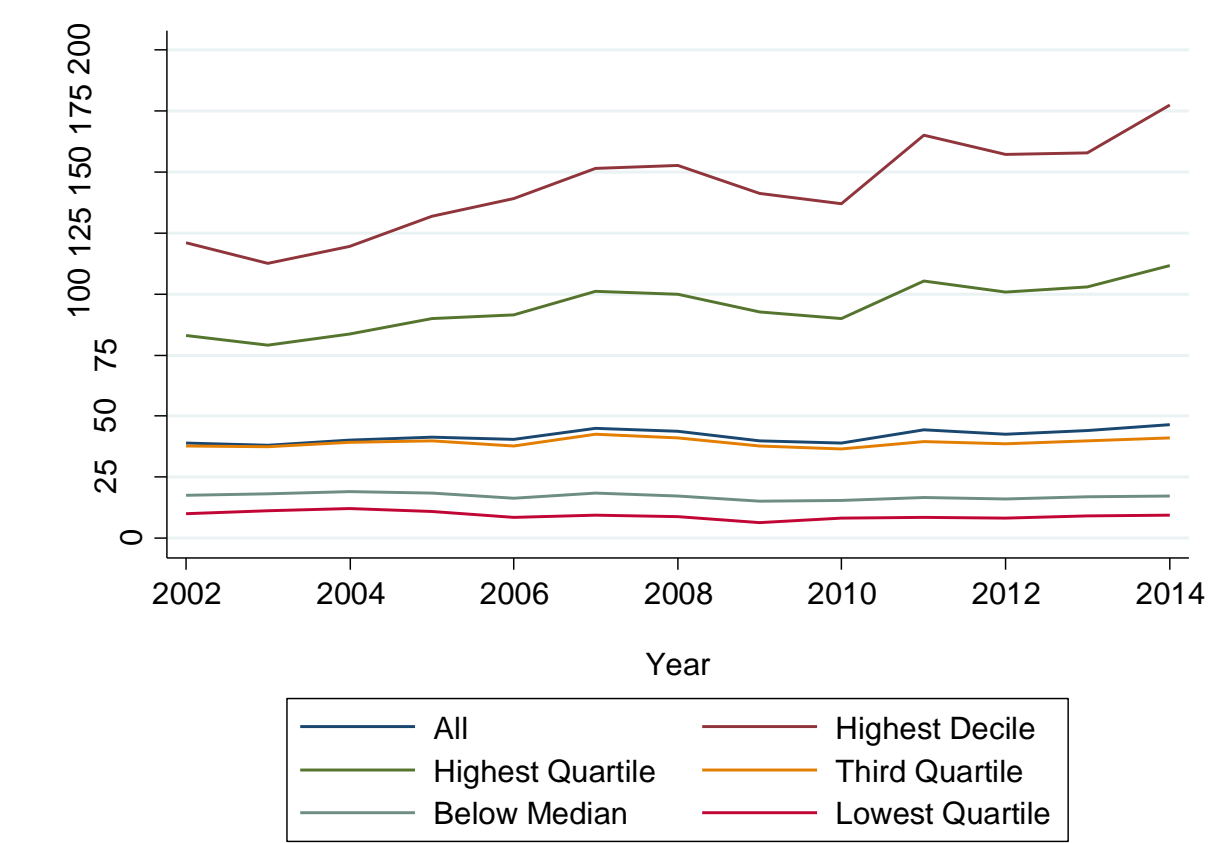


Source: Riley, R., Rosazza Bondibene, C., and Young, G. (2015) 'The UK Productivity Puzzle 2008-2013: Evidence from British Businesses', Bank of England Working Paper No. 531.

Notes: Derived from decompositions of labour productivity growth to different time horizons. Non-farm non-financial market sectors excluding mining & quarrying, utilities and real estate activities. Britain.

Mean labour productivity by segment of the productivity distribution

(2002-2014, £thousand 2010 prices)

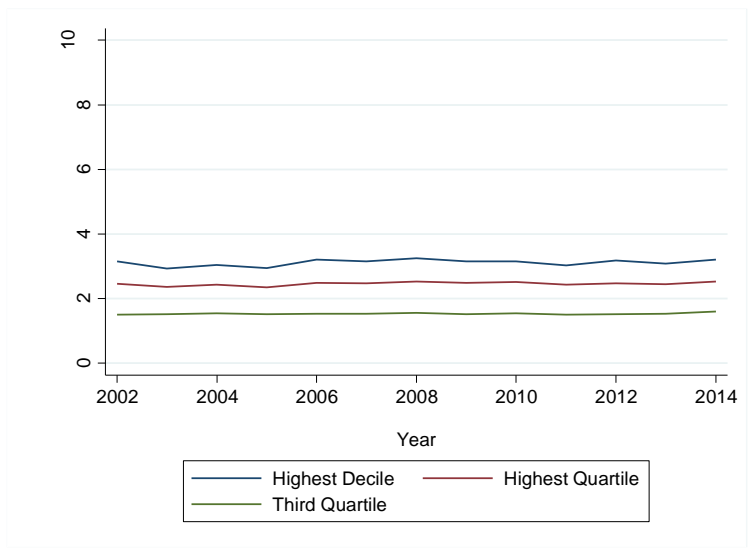
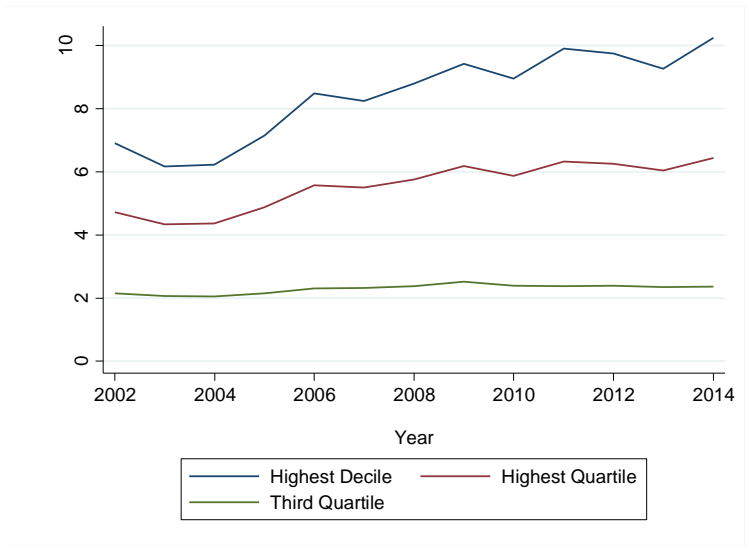


The productivity distribution is calculated within 2-digit SIC group. This is similar to the methodology used by OECD in classifying global and national frontier firms.

Note: Trends are sensitive to treatment of outliers etc.

Trends in productivity distribution driven by capital and/or TFP

Mean labour productivity and labour costs by segment of the labour productivity distribution relative to firms with below median values

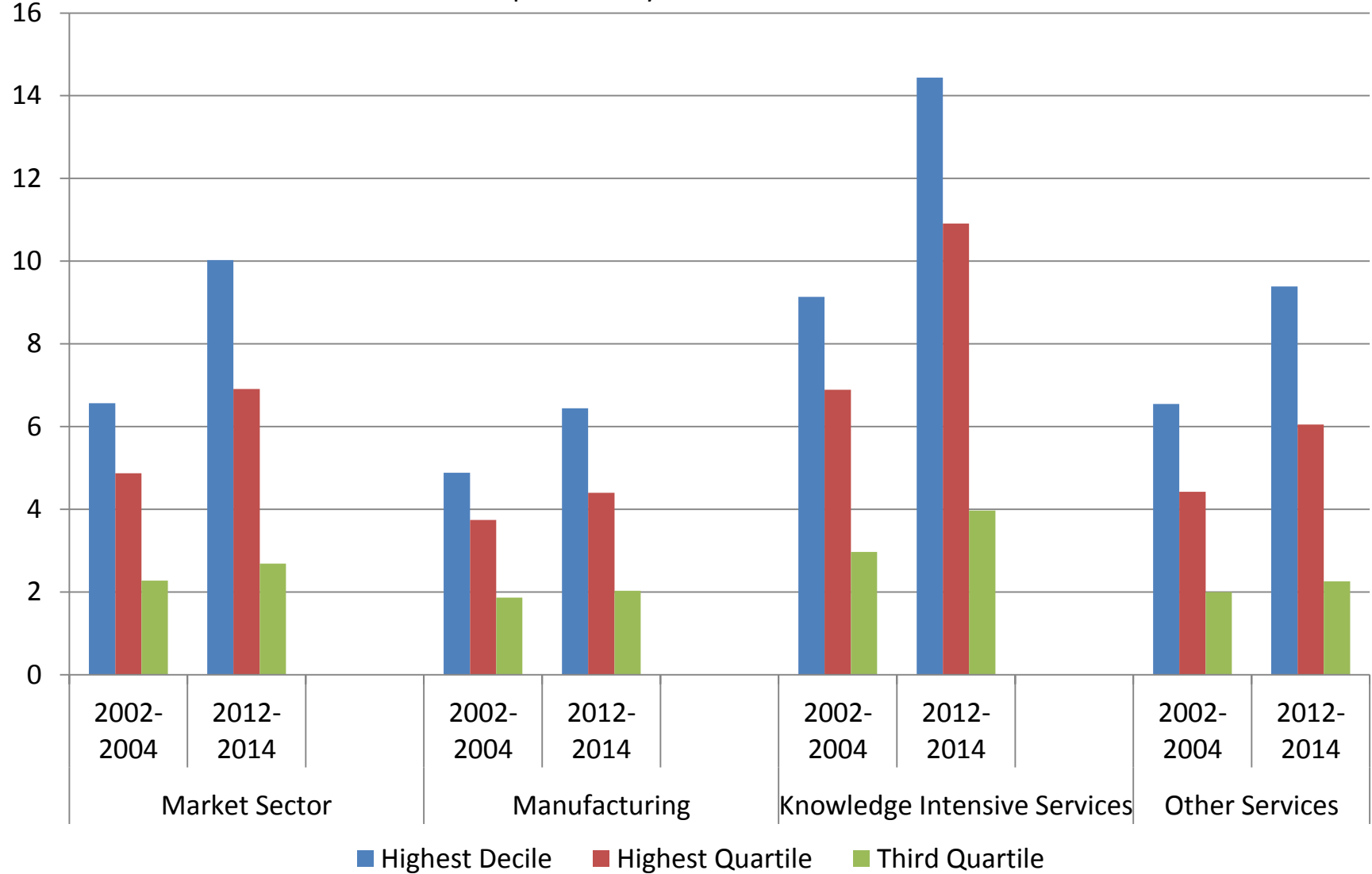


Note: Trends are sensitive to treatment of outliers etc.

PRELIMINARY RESULTS – PLEASE DO NOT CITE WITHOUT PERMISSION

Fanning out at the top in all sectors, but particularly in knowledge intensive services

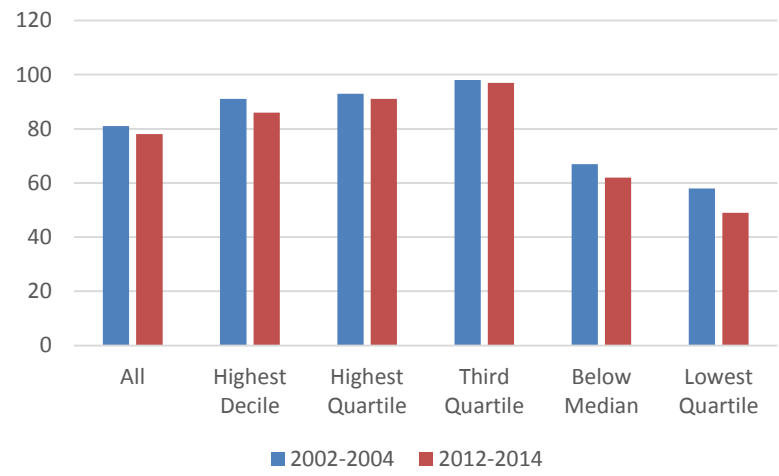
Mean labour productivity by segment of the labour productivity distribution relative to firms with below median productivity



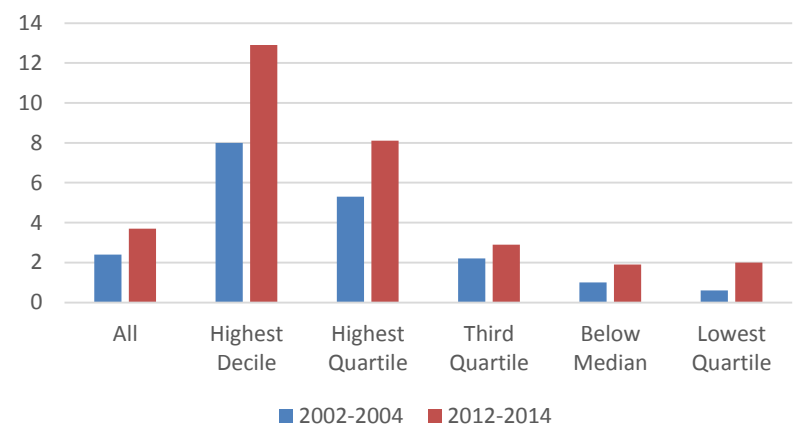
PRELIMINARY RESULTS – PLEASE DO NOT CITE WITHOUT PERMISSION

Top firms are not necessarily larger in terms of employment, but invest more than other firms

Employment



Investment per employee, £1000 in 2010 prices

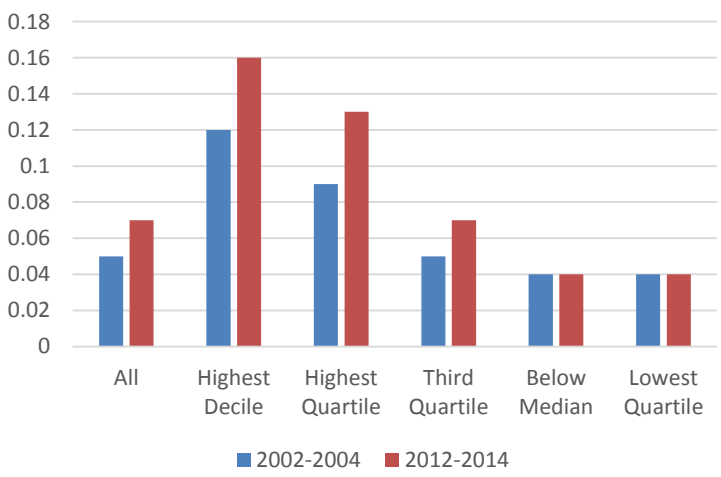


Investment includes tangible investment including land and buildings, as well as software and databases.

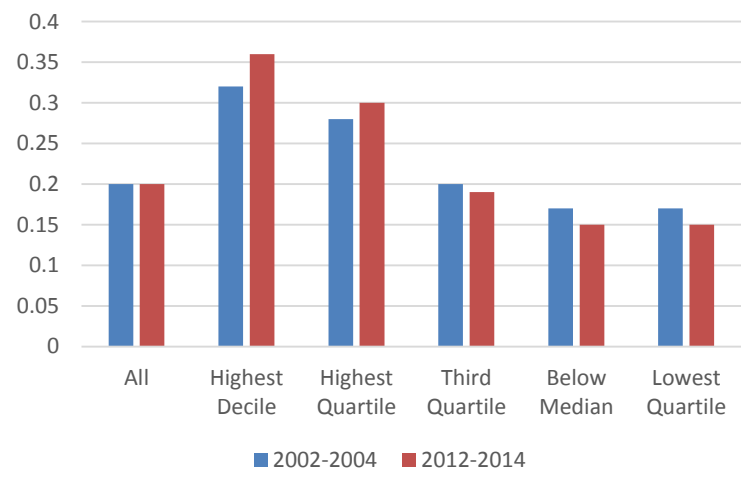
PRELIMINARY RESULTS – PLEASE DO NOT CITE WITHOUT PERMISSION

Increased foreign ownership and consolidation at the top during the last decade

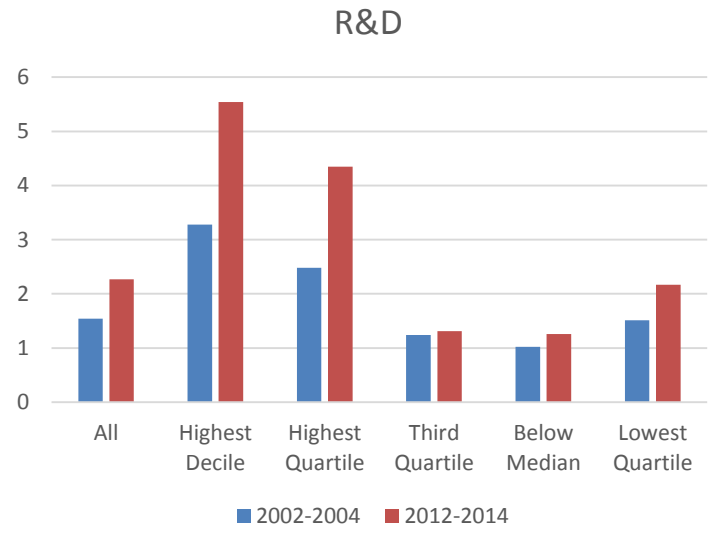
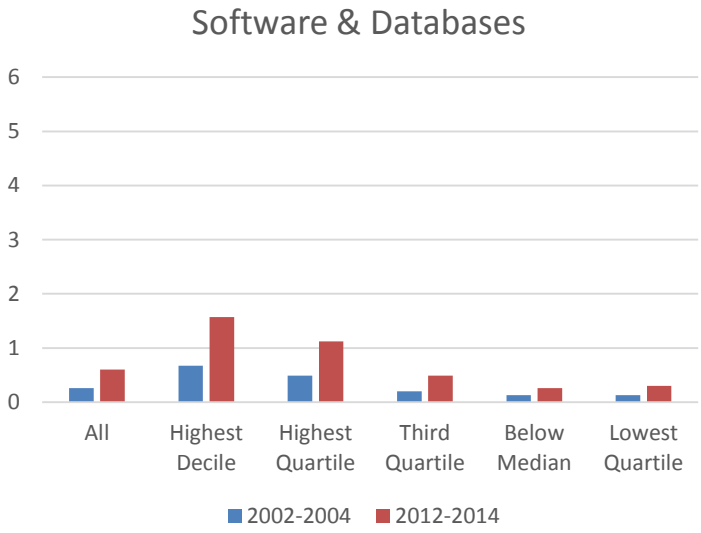
Foreign Ownership



Part of multi-establishment group



Top Performers are Embracing New Tech ...



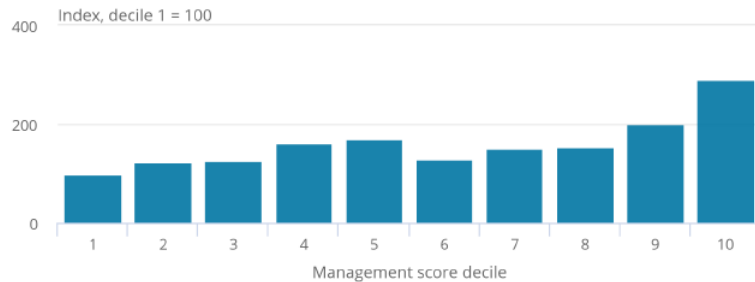
Investment per employee for firms in different parts of the productivity distribution

Source: Riley and Rosazza Bondibene, 2018
Notes: Firms with 250 or more employees. The productivity distribution is calculated on firms with 10 or more employees. Investment per employee in £1000 in 2010 prices.

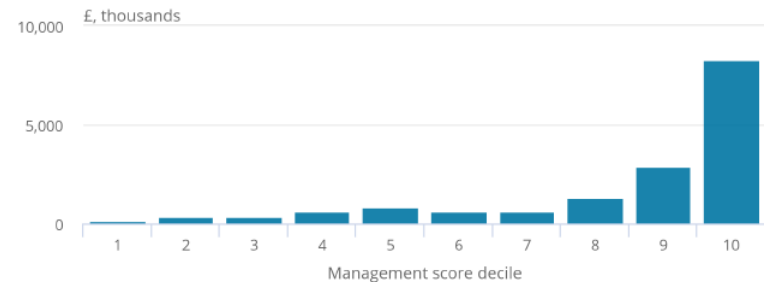
The productivity distribution is fanning out at the top
Within industries, but particularly within knowledge intensive services

... and Better Management Practices

Labour Productivity by Management Score Decile, Great Britain, 2016



Gross Operating Surplus (GOS) by Management Score Decile, Great Britain, 2016



Source: ONS (2018) *Management practices and productivity in British production and service industries – initial results from Management and Expectations Survey: 2016*

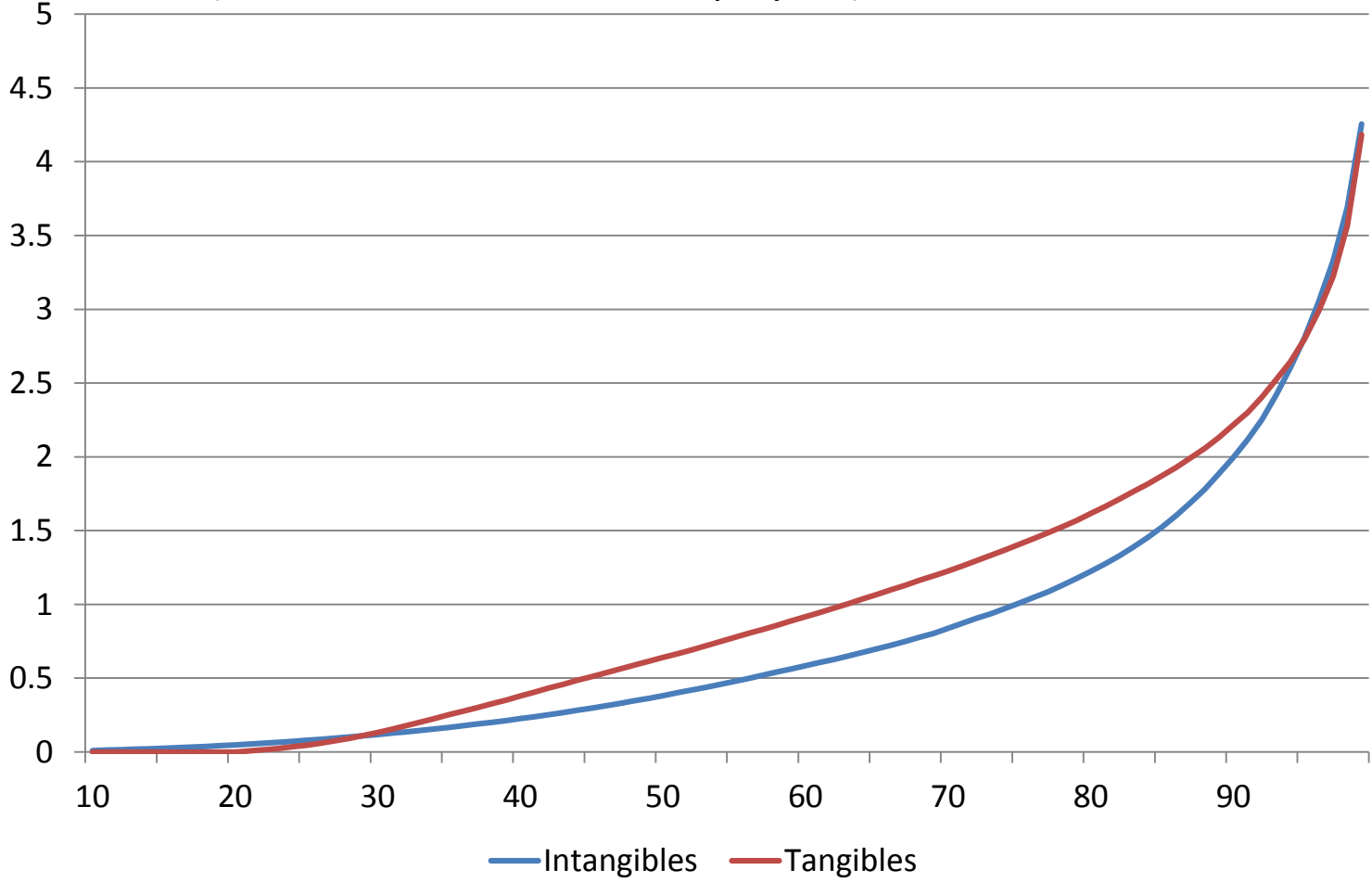
Policy focus on encouraging the adoption of technologies (digital) and best practice amongst SMEs in the fat tail of lower productivity firms
(BEIS Business Productivity Review, Industrial Strategy)

- Business Basic Programme – BEIS, Be the Business, Innovate UK

PRELIMINARY RESULTS – PLEASE DO NOT CITE WITHOUT PERMISSION

Intangible investment appears even more concentrated amongst a few firms than tangible investment does

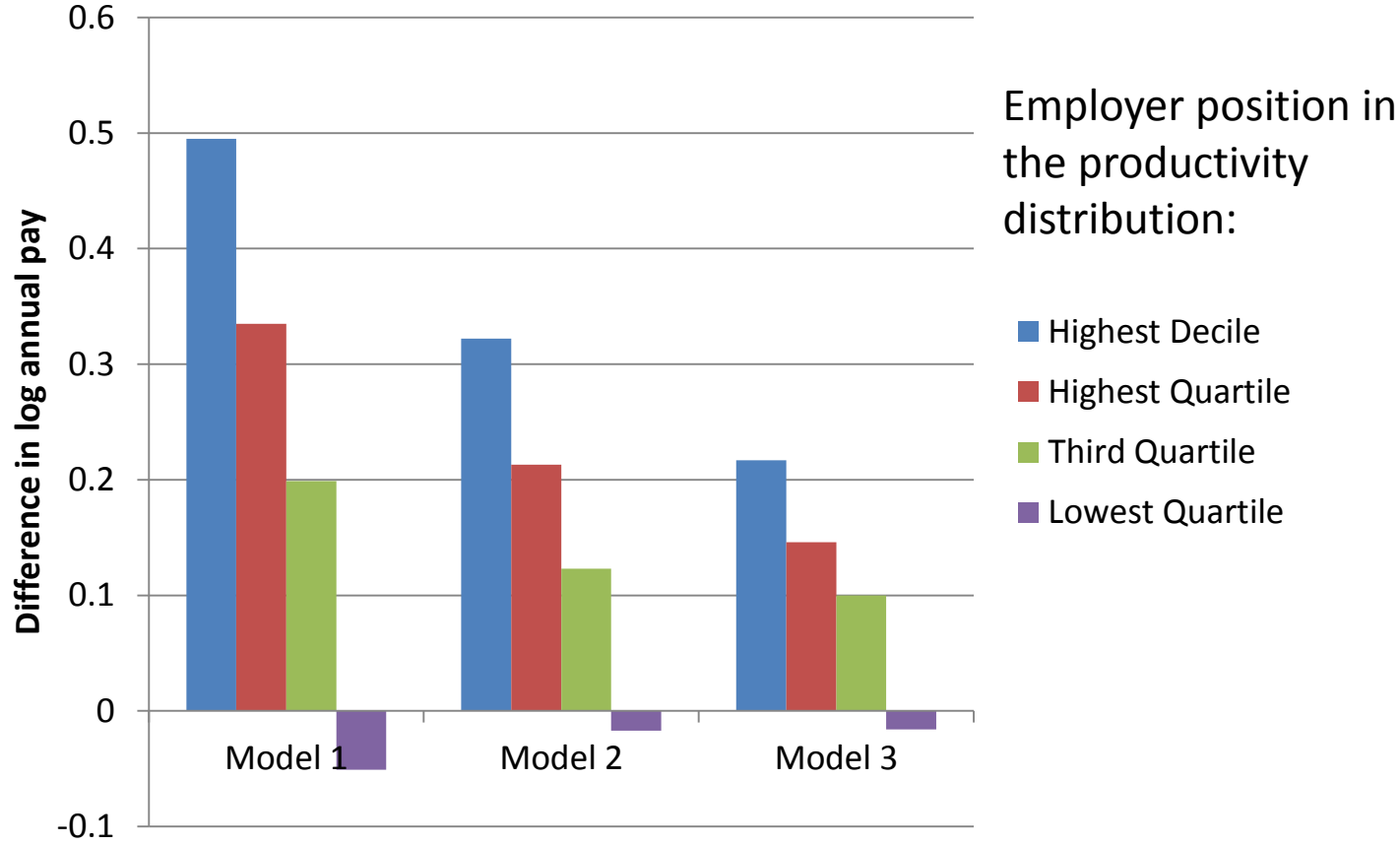
Cumulative distribution of investment per employee
(Firms with 250 or more employees)



Note: investment per employee in logs $[\ln(1+inv/emp)]$.

Top firms pay workers a premium

(even when we account for worker characteristics and the occupational mix)



Regression of log annual pay on worker and employer characteristics.

- Model 1 includes industry and year dummies;
- Model 2 also controls for firm size and region of work, age, age squared, female, part-time working, and being employed in the same job last year;
- Model 3 also includes 4-digit occupational controls.

Source: ASHE, ARDX, own calculations.

Occupations involved in the production of knowledge assets

- Digitised Information
 - ICT professionals & managers
- Intellectual Property
 - Natural & Social Science professionals & managers
 - Architects, Engineering professionals, Business research professionals
 - Highly skilled artistic workers, designers
- Organisational Capital (Economic Competencies)
 - **HRM:** human resources managers and directors, vocational and industrial trainers
 - **BRAND:** sales, marketing, advertising & public relations managers
 - **MANAGEMENT:** chief executive and senior officials, production & operations department managers

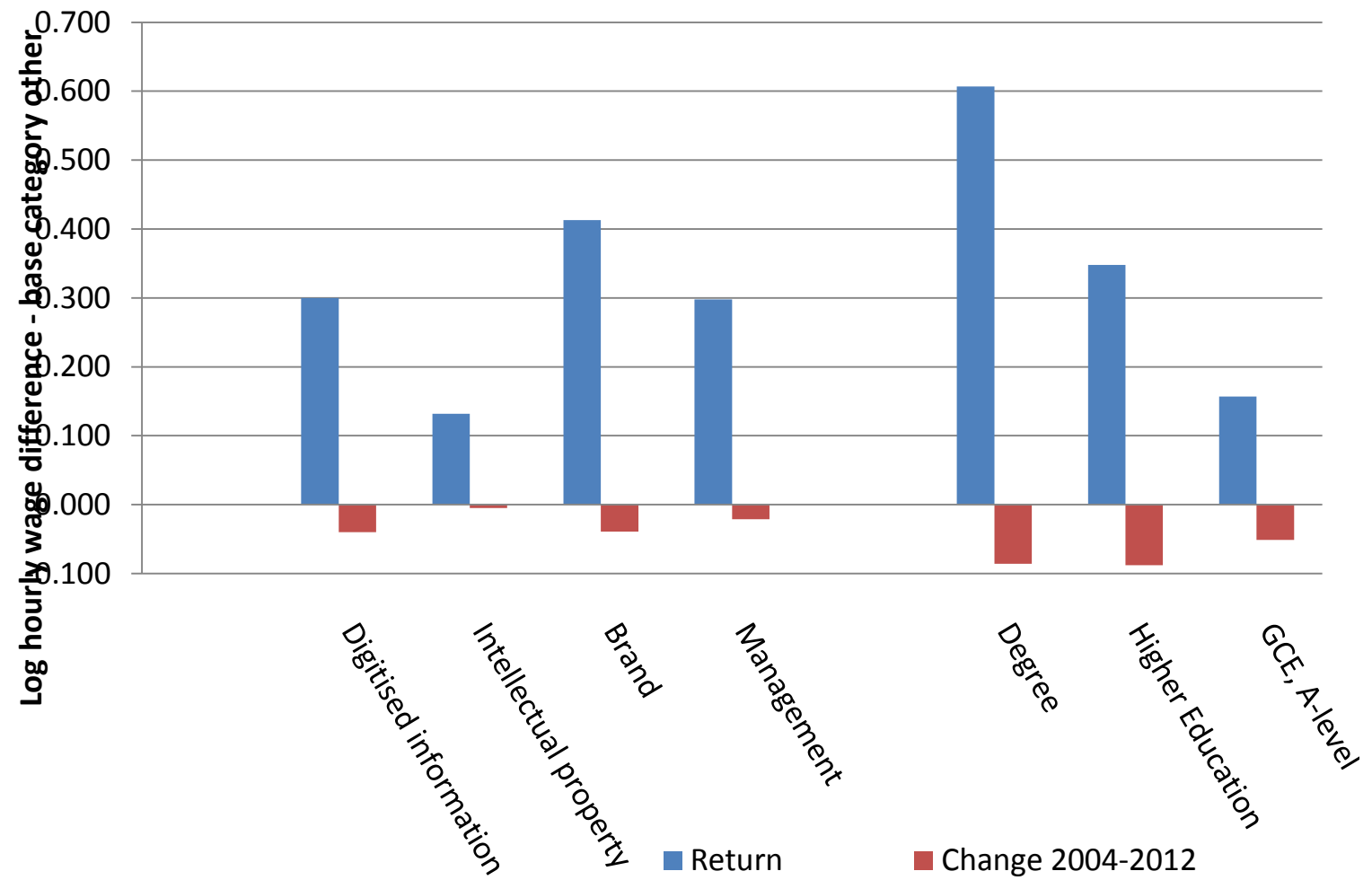
For related , but broader, occupational classifications of occupations involved in the production of intangibles see FP7 INNODRIVE and Riley and Robinson (2011) *Skills and Economic Performance: The Impact of Intangible Assets on UK Productivity Growth*, UK Commission for Employment and Skills.

“Intangibles producing” occupations typically taken by highly qualified individuals

<i>Intangible Occupations</i>		share with Highest Educational Qualification			
		Degree	Higher Education	GCE, A-level	Other
Digitised information	2004	0.530	0.124	0.180	0.167
	2012	0.630	0.098	0.148	0.124
Intellectual property	2004	0.558	0.157	0.165	0.120
	2012	0.631	0.133	0.143	0.093
Organisational Brand	2004	0.412	0.115	0.208	0.265
	2012	0.521	0.099	0.187	0.192
Management	2004	0.198	0.110	0.289	0.403
	2012	0.352	0.120	0.226	0.302
<i>Other Occupations</i>	<i>2004</i>	<i>0.177</i>	<i>0.097</i>	<i>0.235</i>	<i>0.491</i>
	<i>2012</i>	<i>0.266</i>	<i>0.096</i>	<i>0.238</i>	<i>0.400</i>

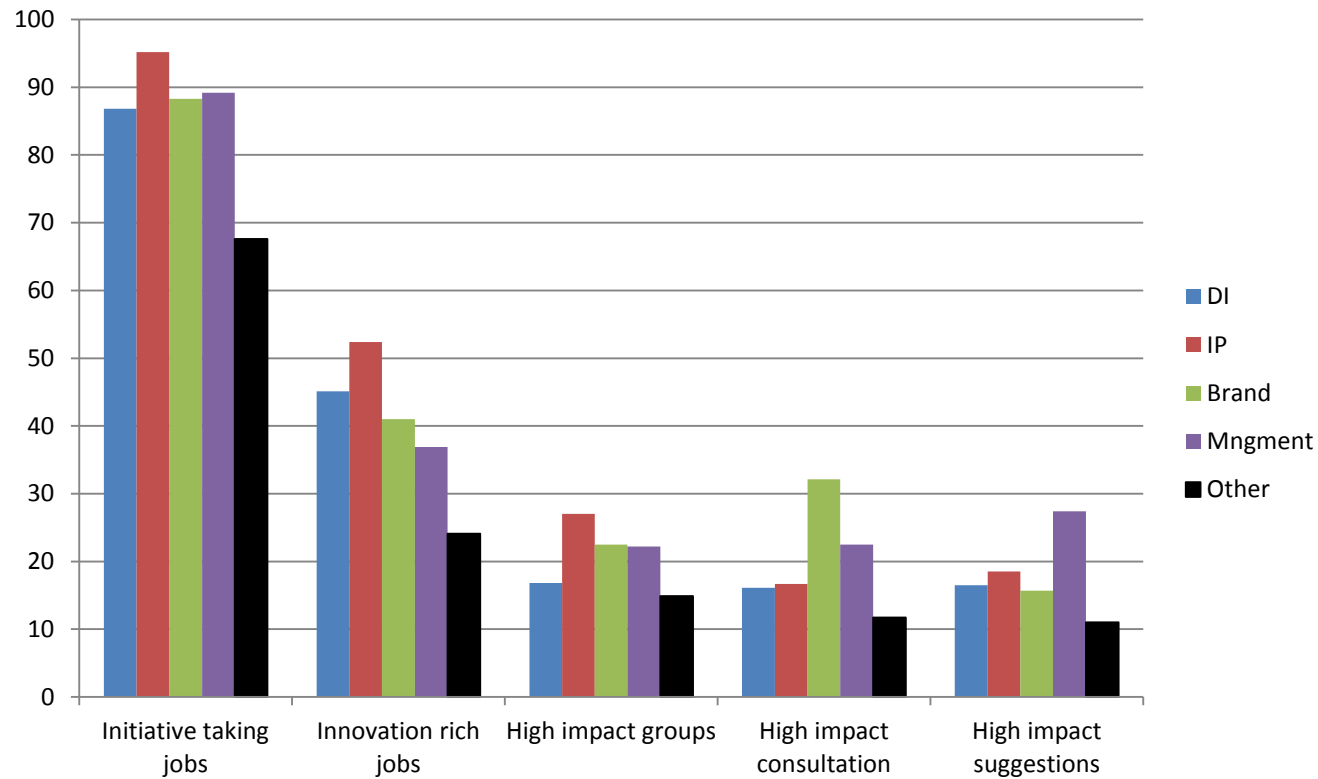
Source: Labour Force Survey; Authors' calculations

The returns to working in “intangibles producing” occupations are high and are not declining



Mincer earnings regression using LFS data.

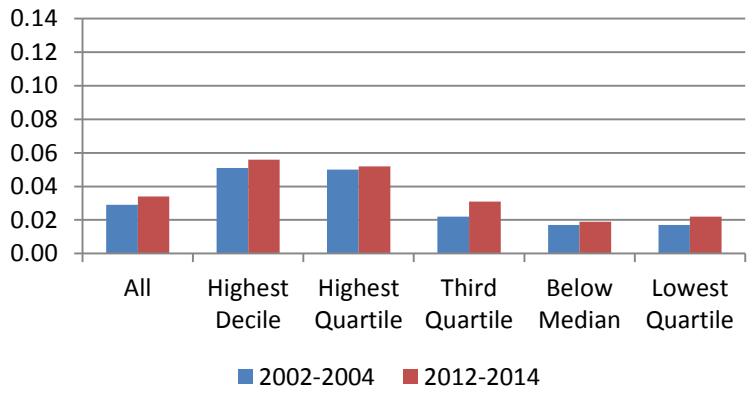
Workers in these occupations are more likely to drive innovation and productivity in the workplace



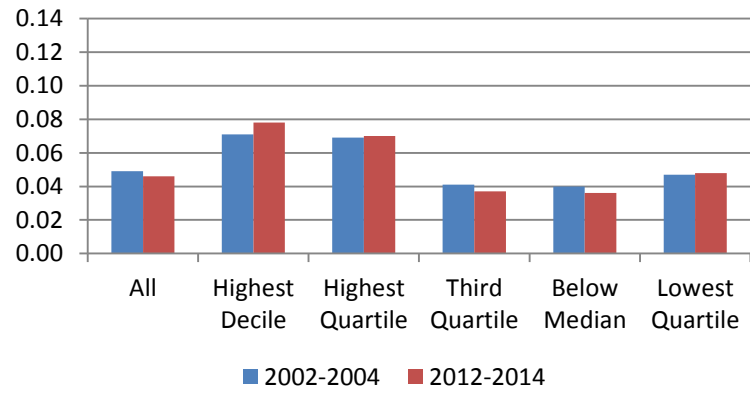
Source: Skills and Employment Survey 2017, Alan Felstead

Top firms employ a higher share of workers in “intangibles producing” occupations

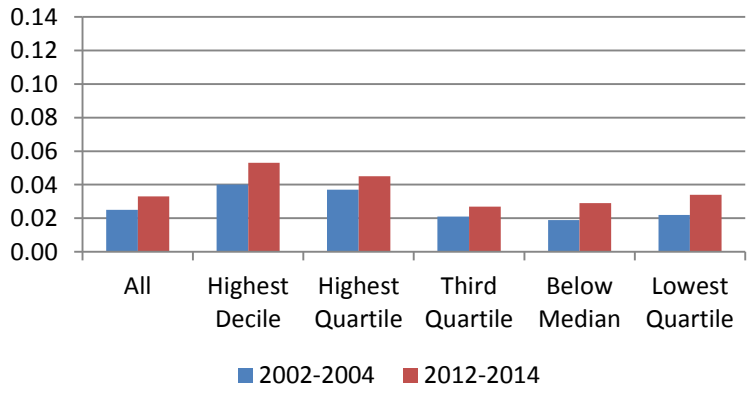
Digitised Information



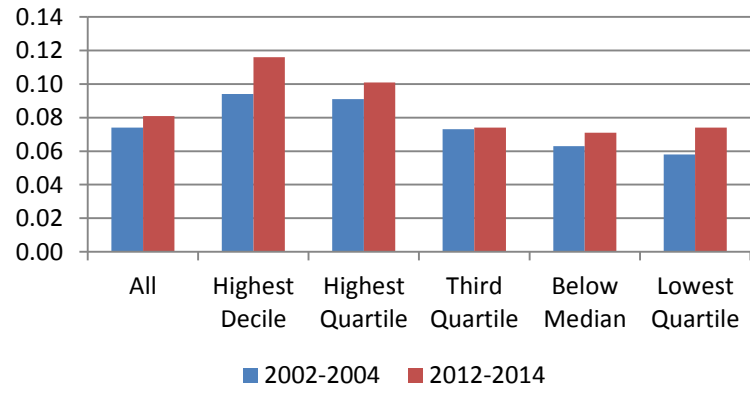
Intellectual Property



Brand



Management



Summary

- Longstanding differences in UK productivity to that elsewhere
 - Evident from successive and coordinated efforts to measure inputs and outputs at country and sector level
 - Due to lack of investment in different forms of capital and deficiencies in the skills base
 - Magnitudes are potentially exaggerated by measurement issues
- The recent UK productivity slump reflects international trends
 - But is particularly stark in the UK following a decade of catch-up that was driven by knowledge inputs and may be exacerbated by measurement issues
 - Understanding of the productivity puzzle will require a better understanding of this international puzzle (including impacts of measurement)
- Further insights to be gained from business micro-data
 - Some evidence that business dynamism has weakened
 - Intangible investment is increasingly associated with business (and worker) success, evident in micro-data
 - Better data on workers and firms will help disentangle these patterns

Data References

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