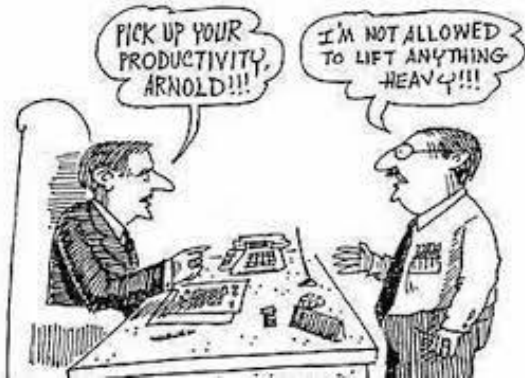


# Productivity

John Van Reenen (Director of Centre for Economic Performance,)

May 5<sup>th</sup> 2016, Society for Business Economists

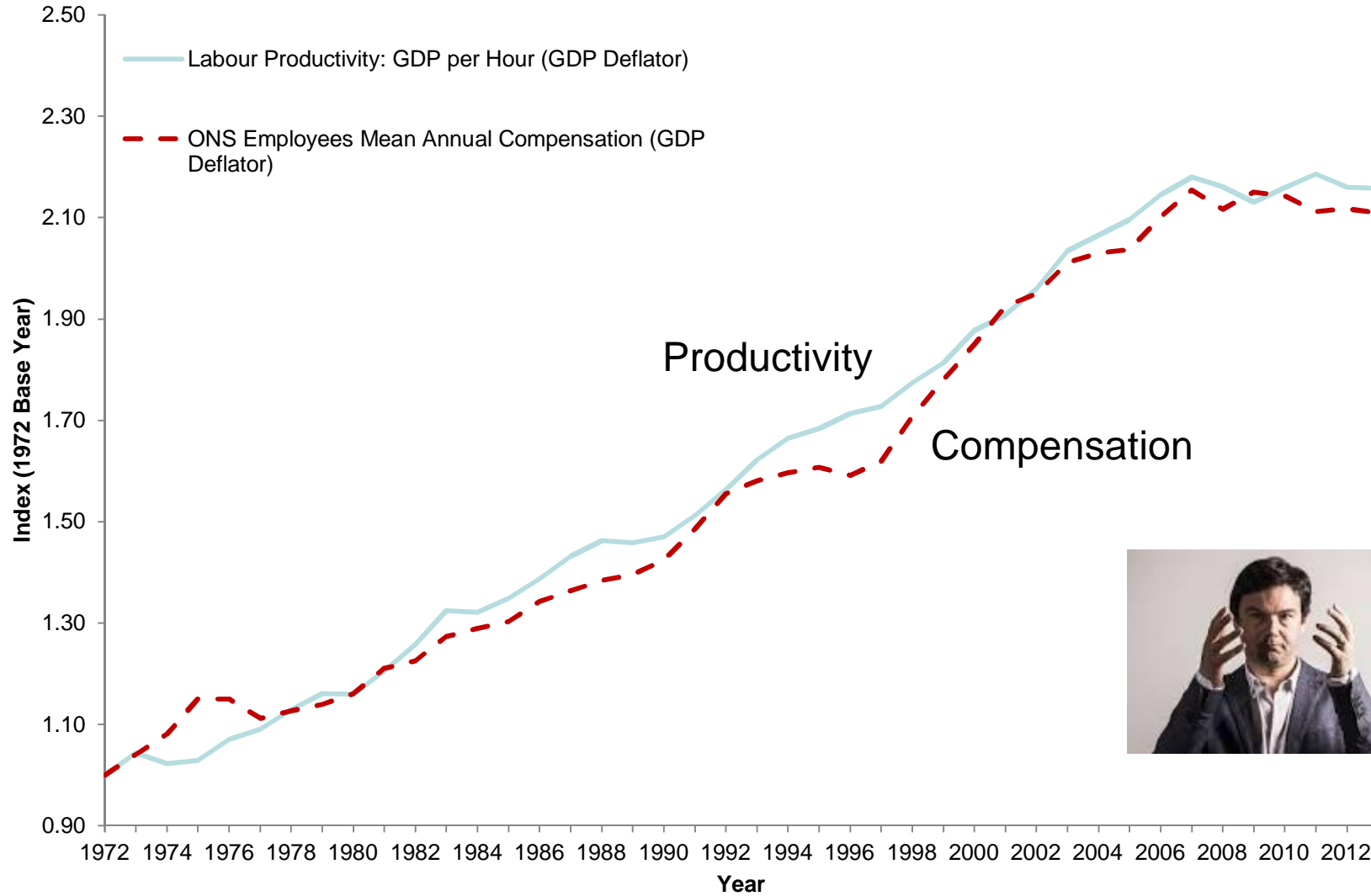


CENTRE *for* ECONOMIC  
P E R F O R M A N C E

# WHAT IS PRODUCTIVITY? WHY DOES IT MATTER?

- Productivity is basically how much output you can get from your inputs (e.g. labour)
  - Determines size of “economic pie”
- Absolute growth of the size of an economy isn't so important for economic welfare (e.g. population)
- But output per person does matter for living standards
  - This is largely driven by productivity
- **Downsides to productivity growth?**
  - Inequality
  - Environment
  - Happiness

# EMPLOYEE COMPENSATION GROWTH CLOSELY TRACKS LABOUR PRODUCTIVITY GROWTH, UK 1972-2013



**Source:** Bell (2016) based on UK ONS data; 1972=100

## Downsides to productivity growth?

- Inequality
- Environment
- Happiness



# **Measuring Productivity** (& a UK productivity puzzle)

Productivity Comparisons

Drivers of Productivity

Business & Public Policy

# Productivity Accounting Method 1 - Bodies

Basic “material welfare” measure



$$\frac{GDP}{Capita} = \frac{GDP}{employee} \times \frac{Employees}{population}$$

Labour productivity

Employment Rate

# Productivity Accounting Method 2 - Hours



Basic “welfare” measure

$$\frac{GDP}{Capita} = \frac{GDP}{hours} \times \frac{hours}{employee} \times \frac{employees}{population}$$

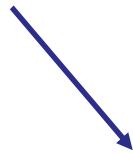
Labour productivity

“Effort”

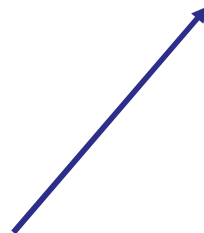
Employment  
Rate

# Productivity Accounting Method 3 – TFP

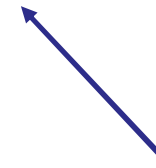
Labour productivity



$$\frac{GDP}{Hour} = Efficiency \times \frac{other\_inputs}{hours}$$

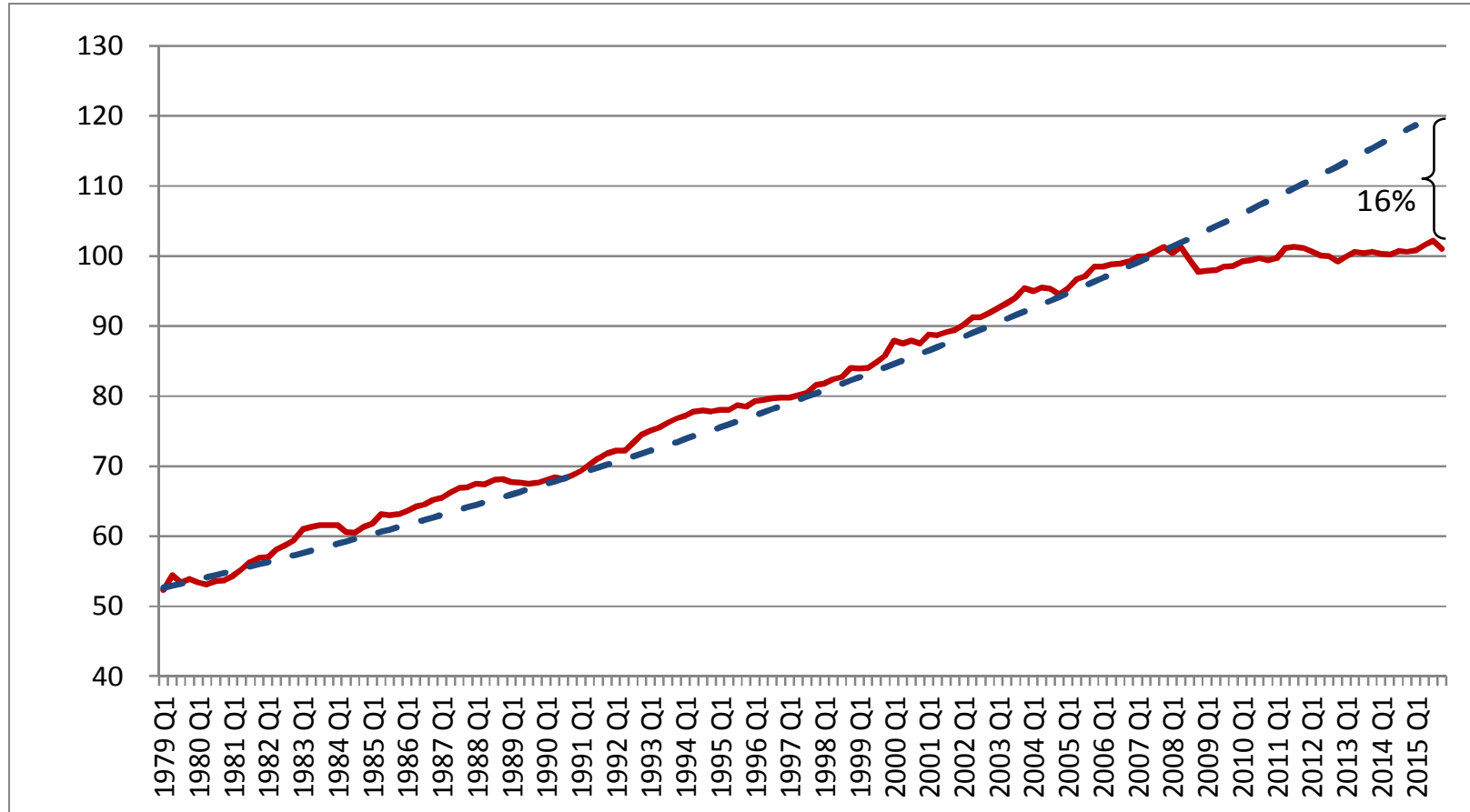


Total Factor  
Productivity (TFP)



Example:  
Capital/hour

# UK PRODUCTIVITY PUZZLE AFTER 2008, 1979q1-2015q4 ~16% BELOW TREND



**Source:** Whole Economy GDP per hour worked, seasonally adjusted. ONS Statistical bulletin, Labour Productivity, Q4 2015, release date 7 April 2016. Downloaded 28 April 2016.

**Notes:** Q2 2010=100. Predicted value after Q2 2008 is the dashed line calculated assuming a historical average growth rate of 2.3%.

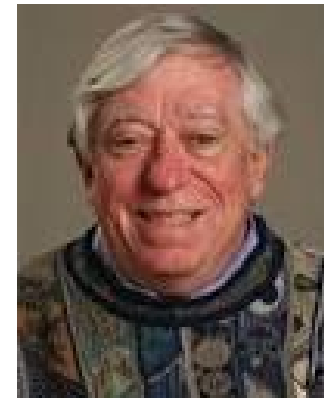
# POSSIBLE REASONS FOR UK PRODUCTIVITY PUZZLE

- World productivity slowdown (Gordon, 2016)
- Measurement (Bean Review, 2016)
- Cyclical demand effects
- Banking Sector Problems (zombies, SMEs)
- Private investment
- Public investment
- ?

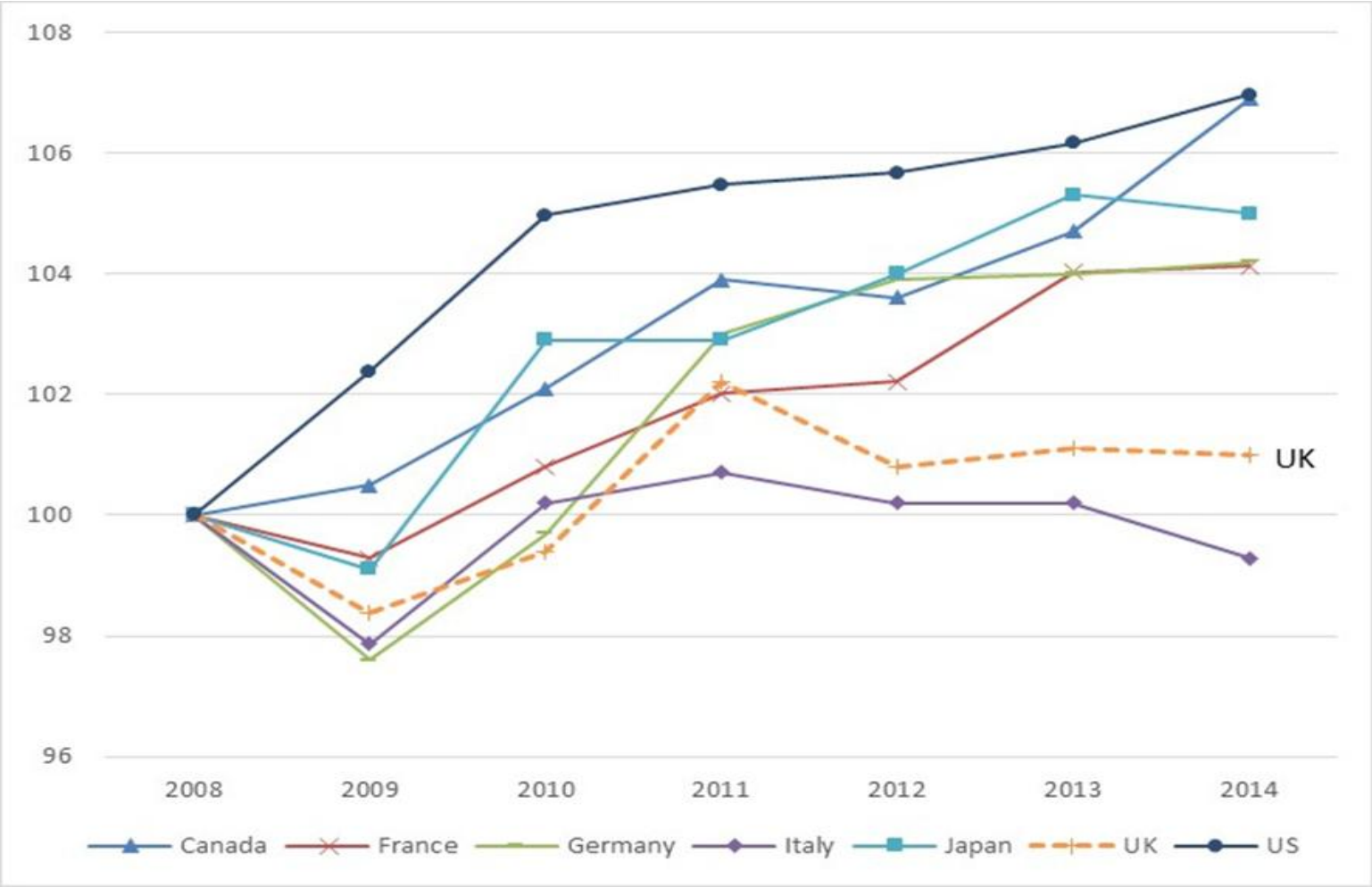


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- Measurement (Bean Review, 2016)
- Cyclical demand effects
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- Public investment



# SLOW PRODUCTIVITY GROWTH SINCE GLOBAL CRISIS



**Source:** ONS (2016) International Comparisons of Productivity, Final Estimates 2014 Table 3: Constant price GDP per hour worked, 2008=100. Downloaded 28 April 2016.

# POSSIBLE REASONS FOR UK PRODUCTIVITY PUZZLE

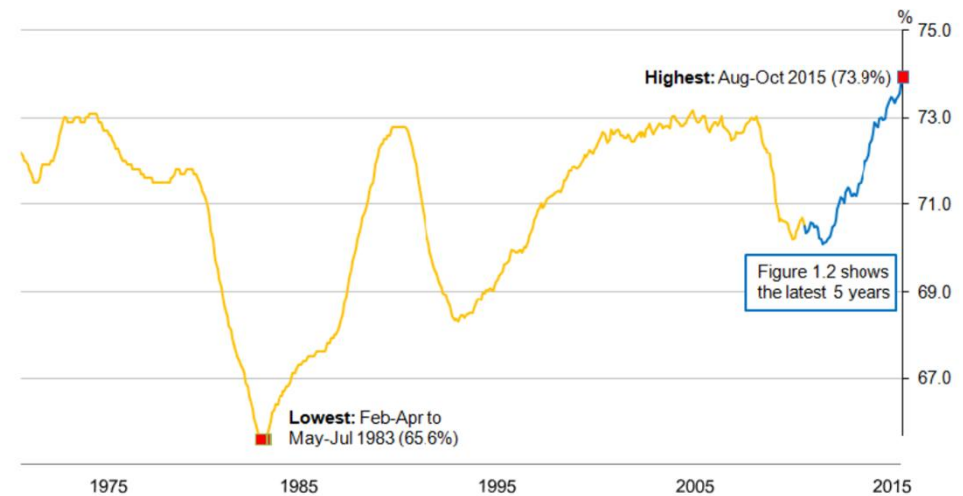
- World productivity slowdown (Gordon, 2016)
- **Measurement (Bean Review, 2016)**
- Cyclical demand effects
- Banking Sector Problems (zombies, SMEs)
- Private investment
- Public investment



# POSSIBLE REASONS FOR UK PRODUCTIVITY PUZZLE

- World productivity slowdown (Gordon, 2016)
- Measurement (Bean Review, 2016)
- **Cyclical demand effects**
- Banking Sector Problems (zombies, SMEs)
- Private investment
- Public investment

Figure 1.1: UK Employment rate (aged 16 to 64), seasonally adjusted  
January to March 1971 to August to October 2015



Source: Labour Force Survey - Office for National Statistics

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- Cyclical demand effects
- **Banking Sector Problems (Zombies, SMEs)**
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- Public investment

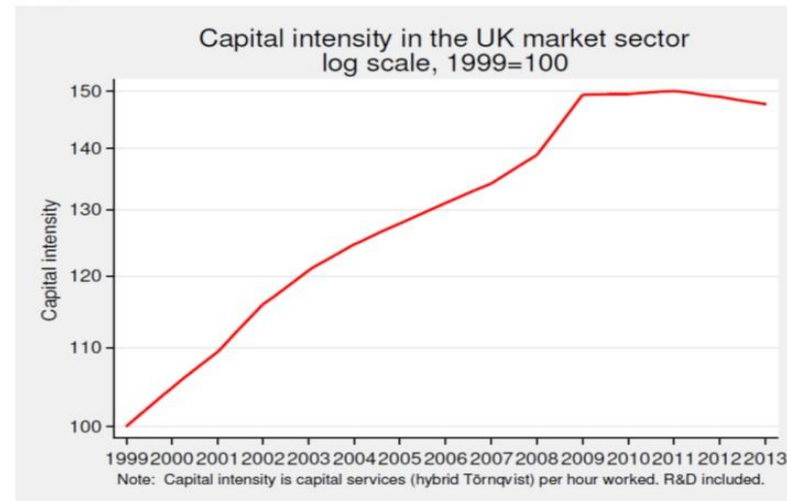


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- World productivity slowdown (Gordon, 2016)
- Measurement (Bean Review, 2016)
- Cyclical demand effects
- Banking Sector Problems (zombies, SMEs)
- **Private investment (credit, uncertainty)**
- Public investment

POST 2009 STAGNATION OF CAPITAL SERVICES PER HOUR

Chart 8



# POSSIBLE REASONS FOR UK PRODUCTIVITY PUZZLE

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- Measurement (Bean Review, 2016)
- Cyclical demand effects
- Banking Sector Problems (zombies, SMEs)
- Private investment (credit, uncertainty)
- **Public investment**
- ?

Measuring Productivity

**Productivity Comparisons**

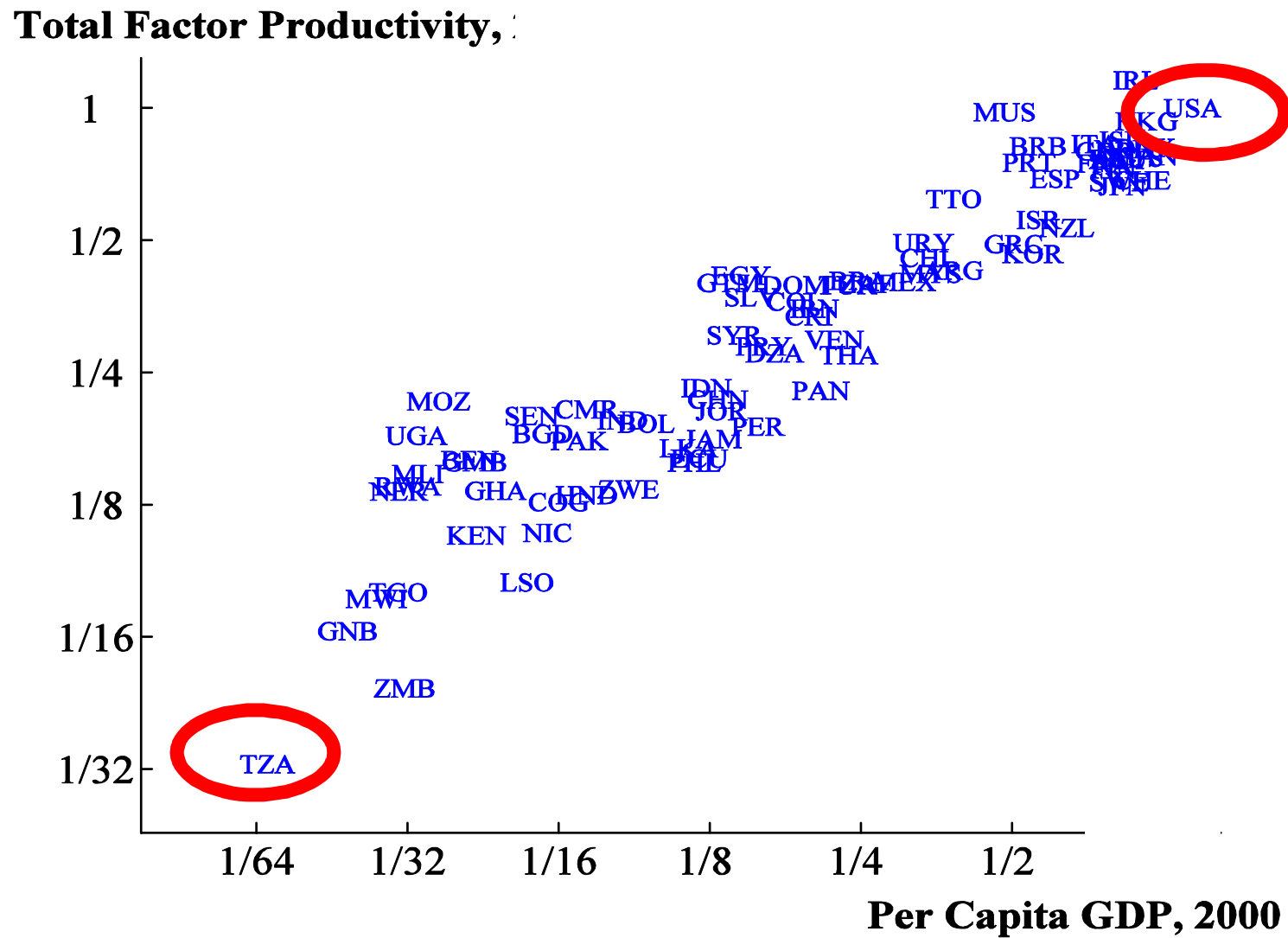
Drivers of Productivity

Business & Public Policy

# PRODUCTIVITY COMPARISONS

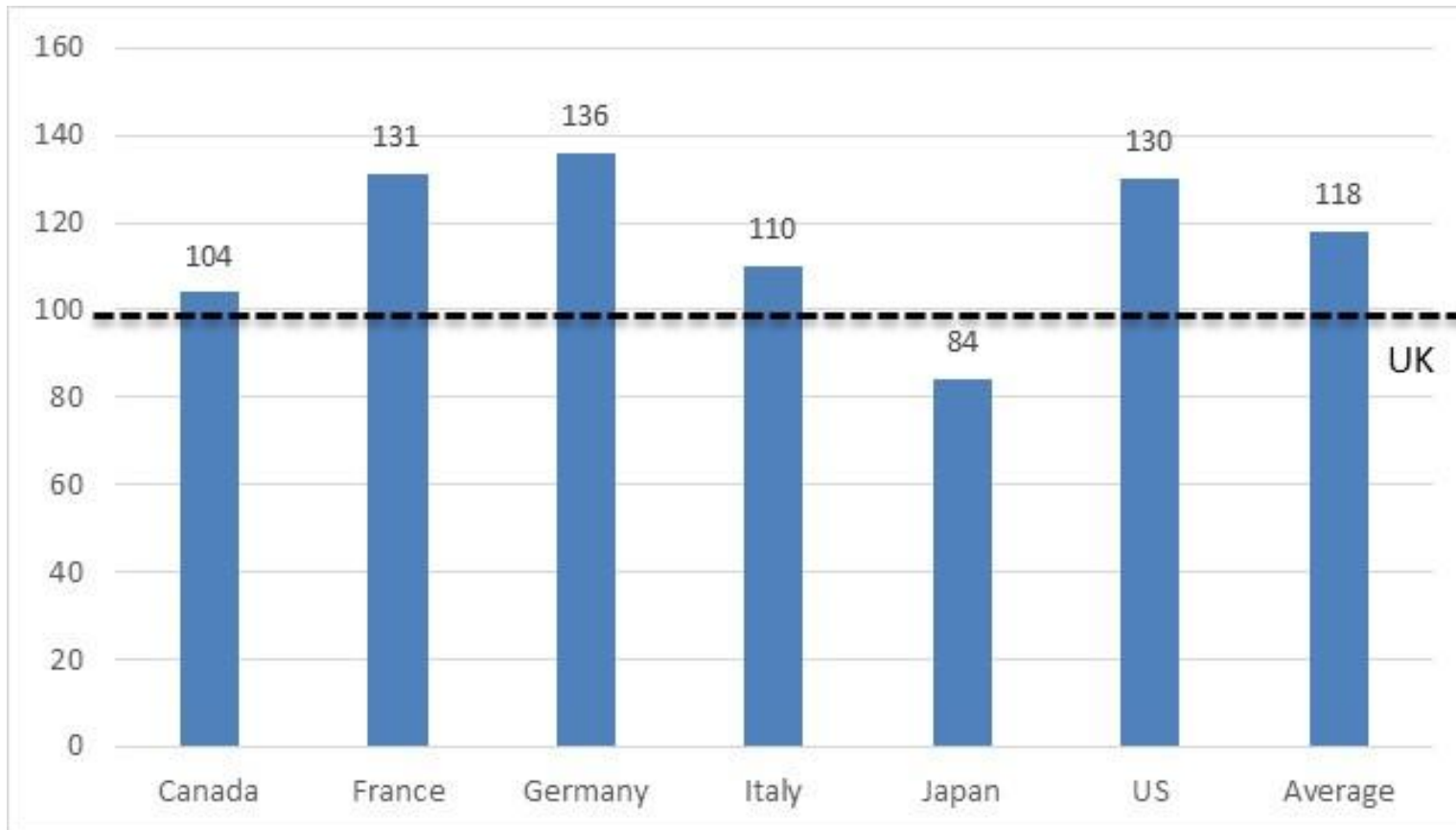
1. **Across Countries**
2. Over time (e.g. Solow 1957)
3. Across firms

# LARGE PRODUCTIVITY DIFFERENCES BETWEEN COUNTRIES



Source: Jones and Romer (2010). US=1

# UK PRODUCTIVITY LEVEL IS LOW COMPARED TO OTHER COUNTRIES (2014)



**Source:** ONS International Comparisons of Productivity, Final Estimates 2014, 18 February 2016, Table 1: Current price GDP per hour worked, UK=100. Downloaded 28 April 2016.

# PRODUCTIVITY COMPARISONS

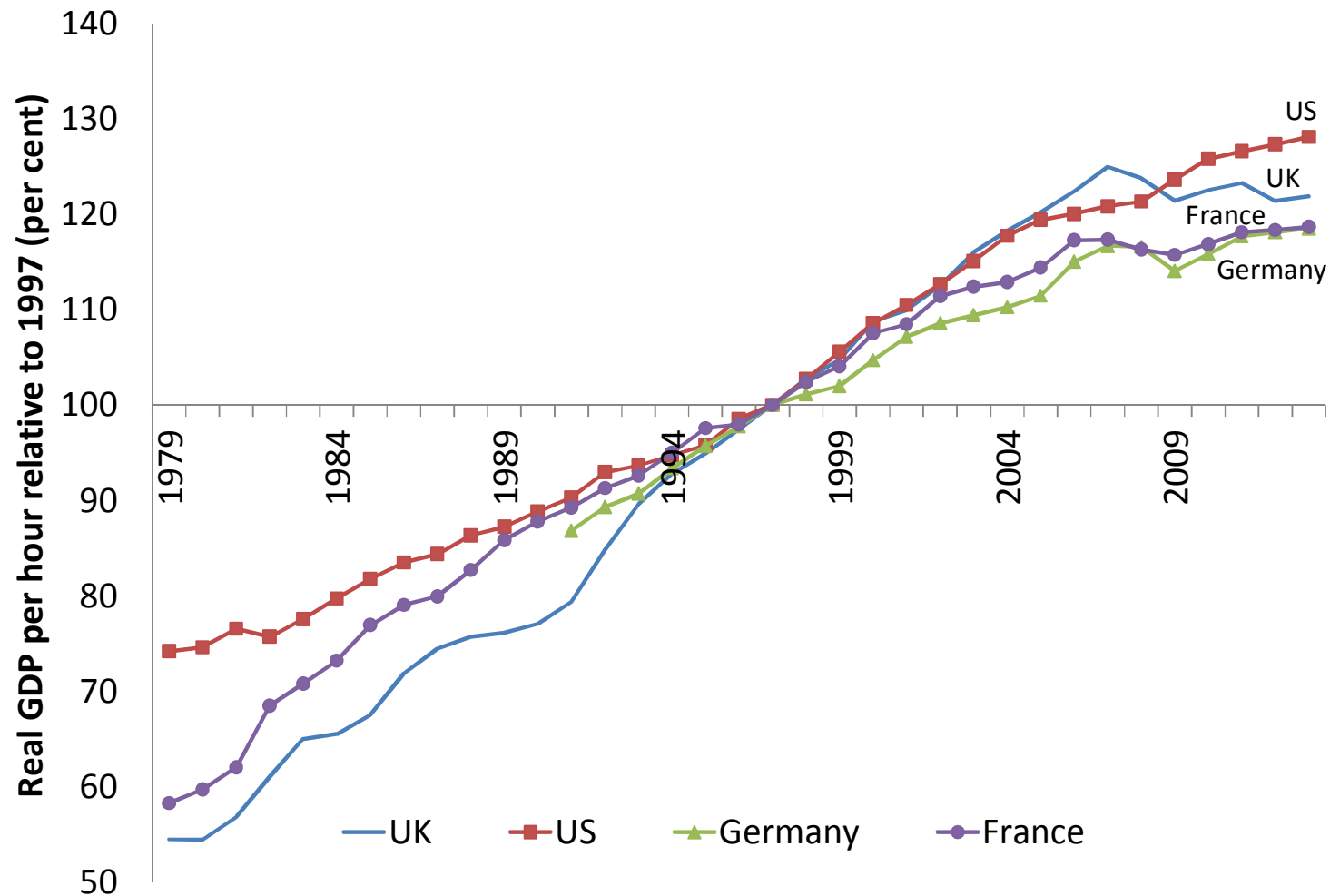
1. Across Countries

**2. Over time (e.g. Solow 1957)**

- Output Growth = TFP growth + growth of inputs
- TFP is dominant factor

3. Across firms

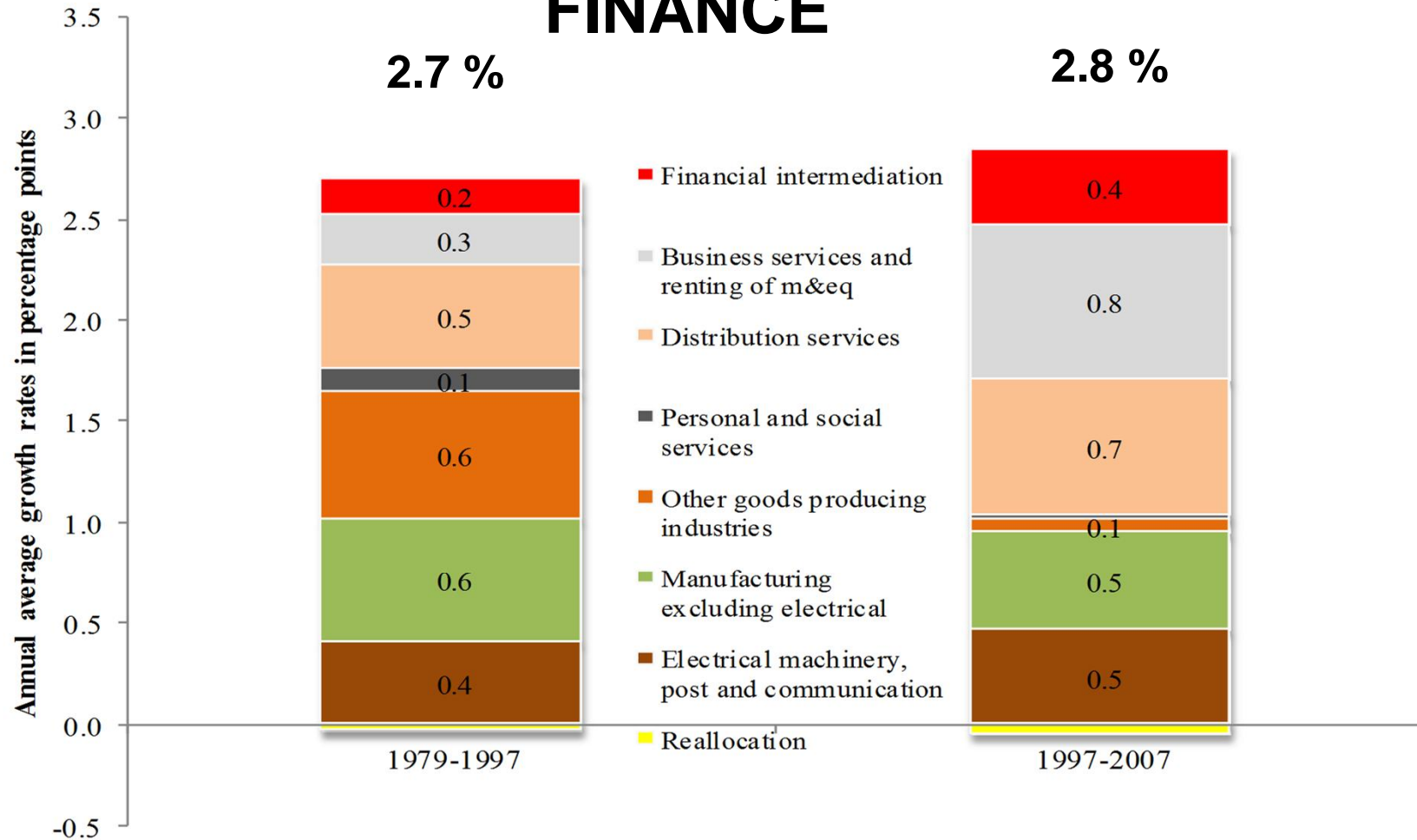
## UK PRODUCTIVITY GROWTH WAS STRONG PRE-CRISIS (1997=100)



Source: Conference Board data, extracted 8 Feb 2015

Notes: GDP is in US\$, constant prices, constant purchasing power parity. Base year 1997. Data for unified Germany is from 1991.

# UK PRODUCTIVITY GROWTH (MARKET OUTPUT PER HOUR) : IT WASN'T ALL FINANCE



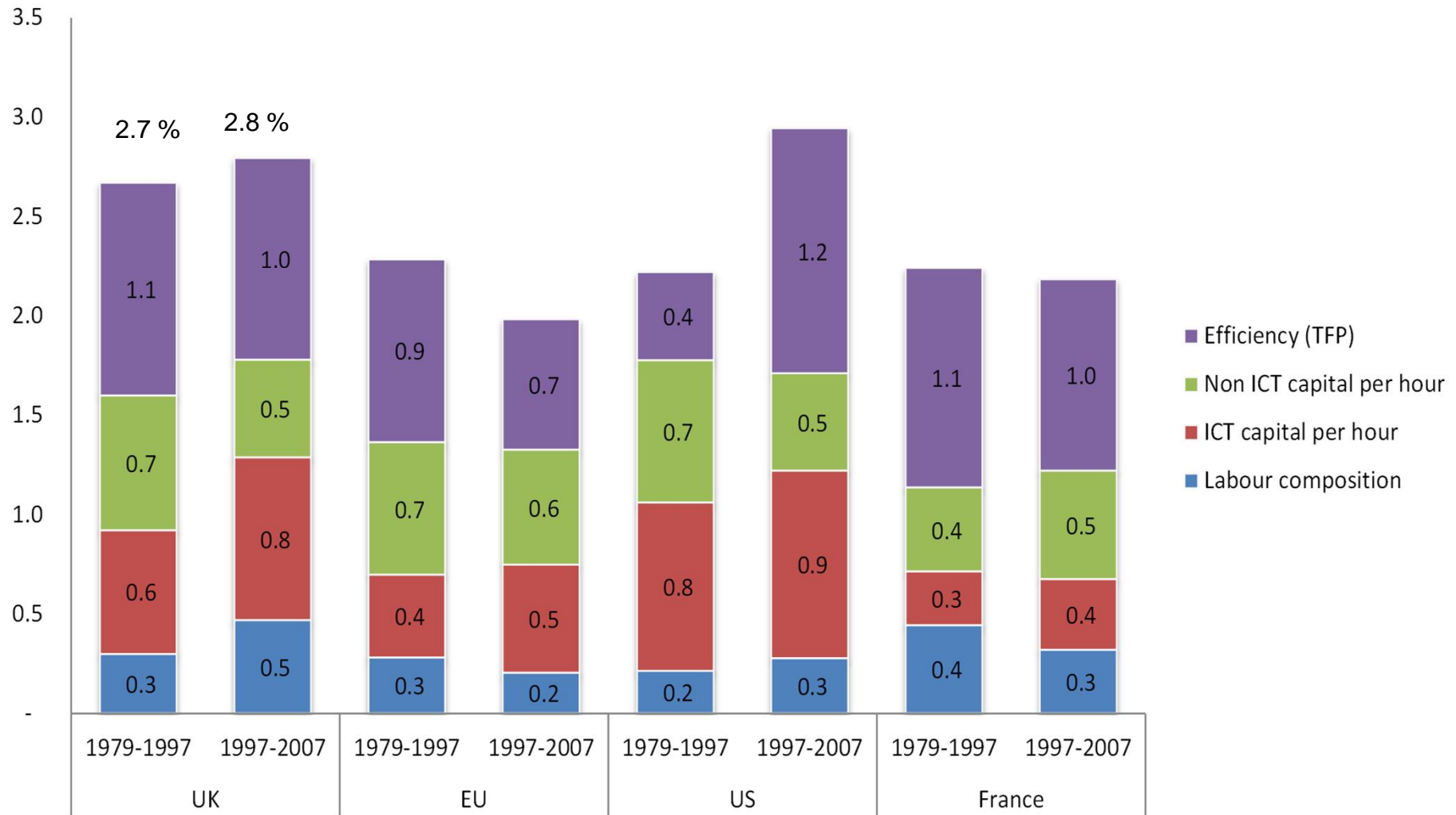
Source: LSE Growth Commission

# Sources of productivity growth: 1979-2007



Notes: Analysis based on EU KLEMS data. EU represents all EU-15 countries for which growth accounting could be performed, i.e. AUT, BEL, DNK, ESP, FIN, FRA, GER, ITA, NLD & UK. Data for France and EU are available from 1981 onwards.

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# PRODUCTIVITY COMPARISONS

1. Across Countries
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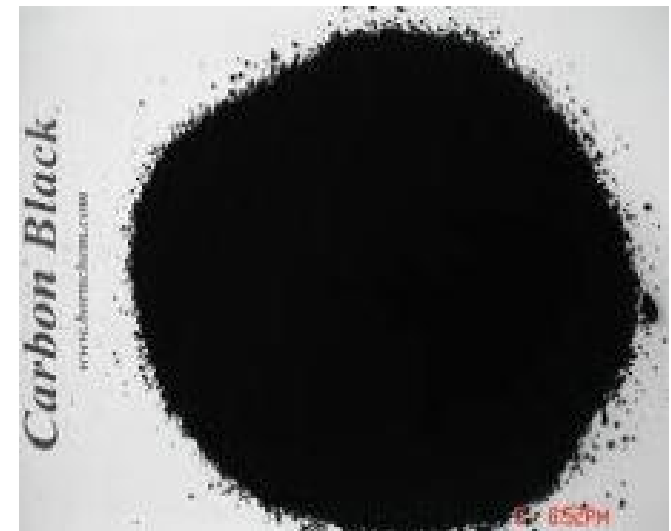
# BIG VARIATION OF PRODUCTIVITY ACROSS FIRMS

- Typical productivity gap between top 10% and bottom 10% within same US four digit industry (Syverson, 2004)
  - Output per worker 4:1 ratio
  - TFP 2:1 ratio
- These ratios are *larger* in other countries (spread of output per worker in UK 5:1 ratio)
- These gaps are very persistent:
  - 2/3 of plants in top TFP quintile were also there 5 years later (Bailey et al, 1993)

# WHAT COULD CAUSE SUCH BIG VARIATIONS IN FIRM PRODUCTIVITY?

One possibility is measurement error, but:

- Productivity is strongly linked with exit and long-run growth
- Conventional TFP mixes up firm-specific price-cost margins
  - When looking at narrow industries where we measure plant output & input prices (e.g. boxes, bread, block ice, carbon black etc.) still see this spread (Foster et al, 2008)



# PRODUCTIVITY CAN INCREASE THROUGH TWO CHANNELS

- **Within Firms (Traditional view)**
  - The same firms become more productive (e.g. new technology spreads quickly to all firms, like Internet)
- **Between Firms (“Schumpeterian” view)**
  - Low productivity firms shrink & exit and resources are reallocated to high productivity firms

# These two effects are well known to cricket fans

Within batsman (each batsman improves)

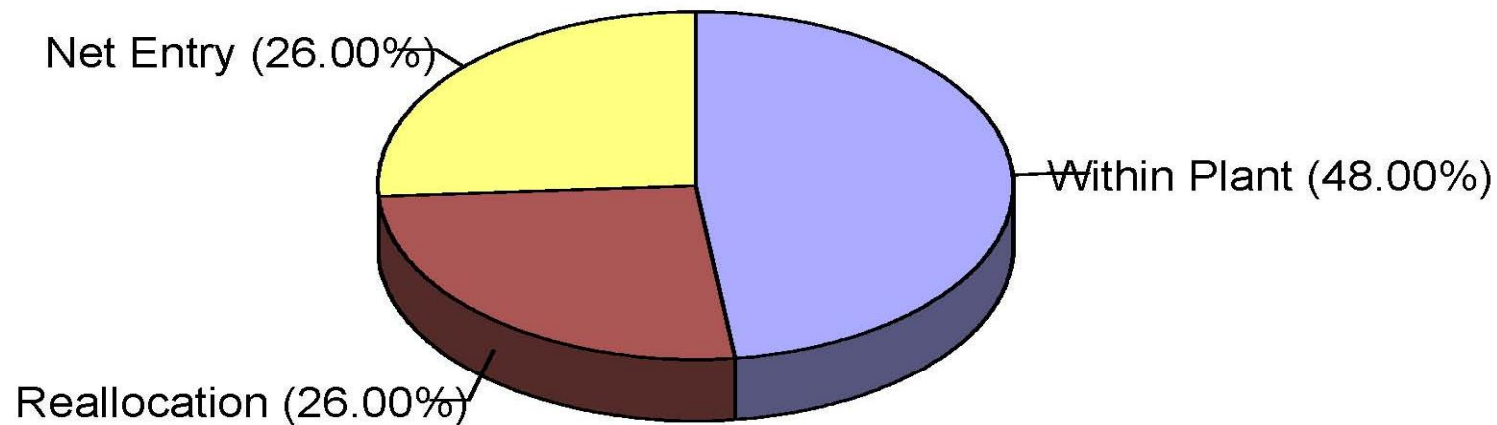


Between batsman (more time for your best batsman)



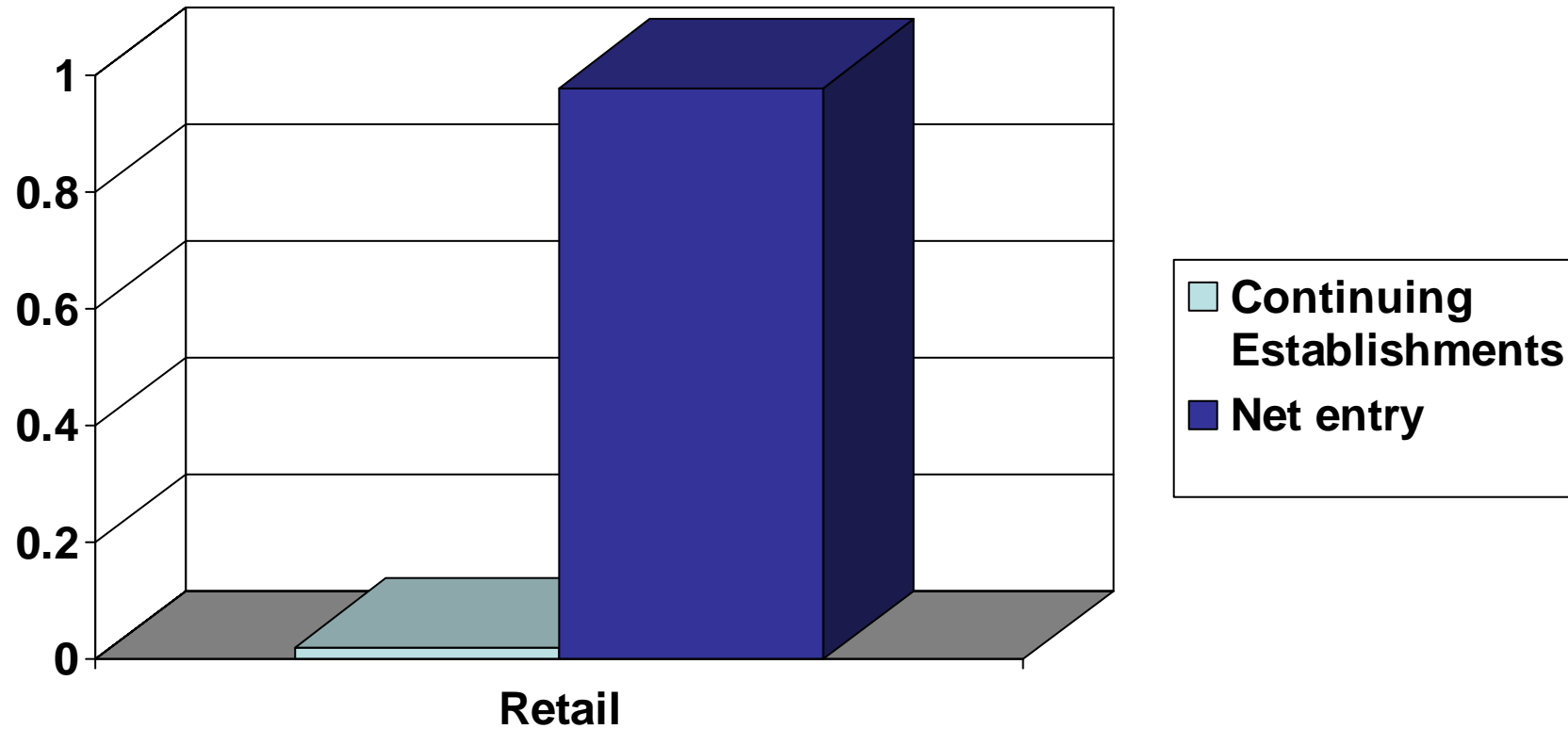
# Total reallocation (between, entry and exit) accounts for about 1/2 of manufacturing TFP growth

## Decomposition of TFP in U.S. Mfg 1977-1987



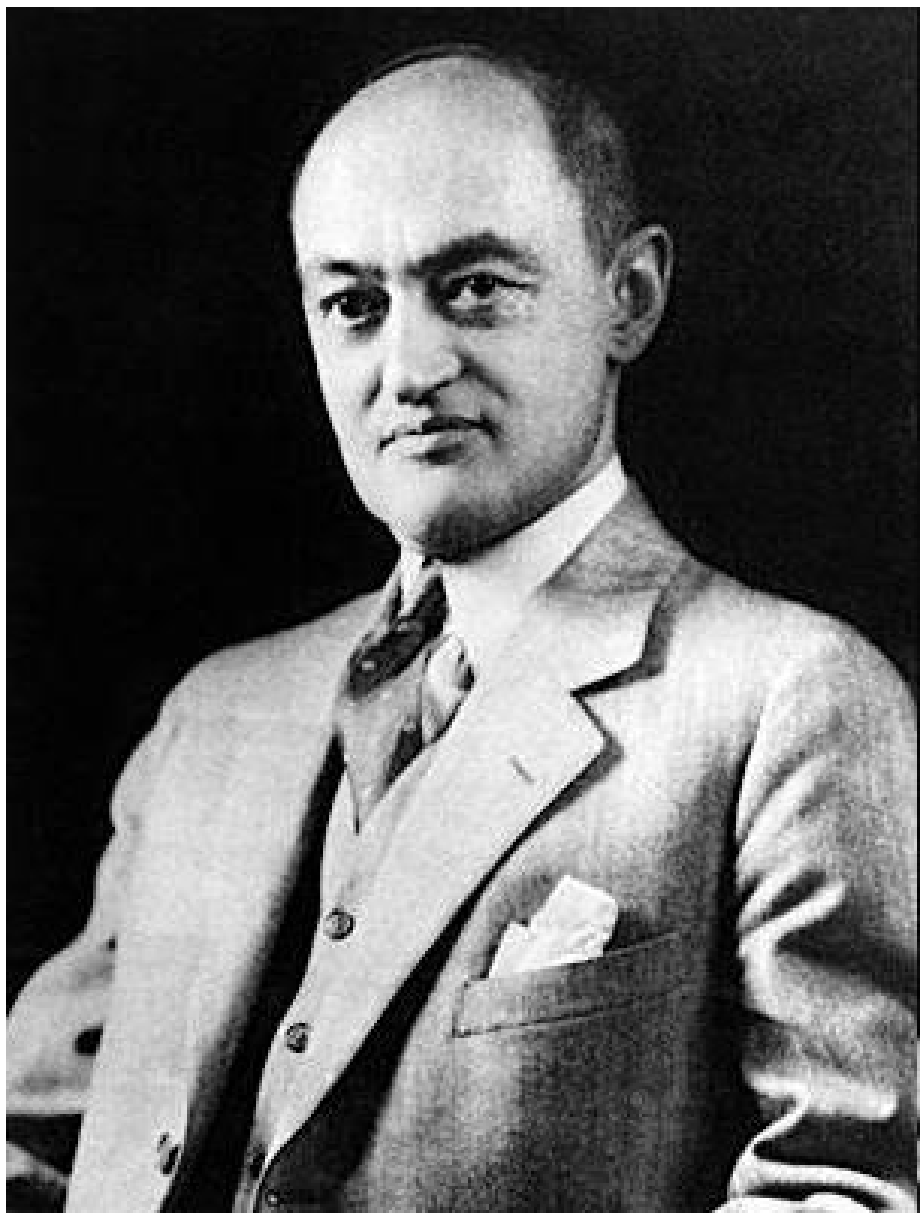
Source: John Haltiwanger

# Reallocation (including entry) accounts for almost all Retail TFP growth



Source: Foster, Haltiwanger & Krizan (2000 and 2006)

**This is very much in the spirit of Joseph Schumpeter**



# This is very much in the spirit of Joseph Schumpeter

*“The fundamental impulse that keeps the capital engine in motion comes from the new consumers’ goods, the new methods of production and transportation, the new markets... [The process] incessantly revolutionizes from within, incessantly destroying the old one, incessantly creating a new one. This process of **Creative Destruction** is the essential fact of capitalism.”*

Schumpeter (p. 83, 1942)

**Although probably his most famous quote was:**

*“Early in life I had three ambitions. I wanted to be the greatest economist in the world, the greatest horseman in Austria, and the best lover in Vienna. Well, I never became the greatest horseman in Austria“*

Measuring Productivity

Productivity Comparisons

**Drivers of Productivity**

Business & Public Policy

# DRIVERS OF PRODUCTIVITY

- **Technological Innovation**
  - Traditional economists explanation & foundation of Growth Theory (e.g. Aghion & Howitt)
  - R&D, patents, diffusion of Information and communication technologies, robots, etc.
- Large body of quality empirical work establishes importance of technology for productivity

# UK SECOND ONLY TO US IN ELITE SCIENCE



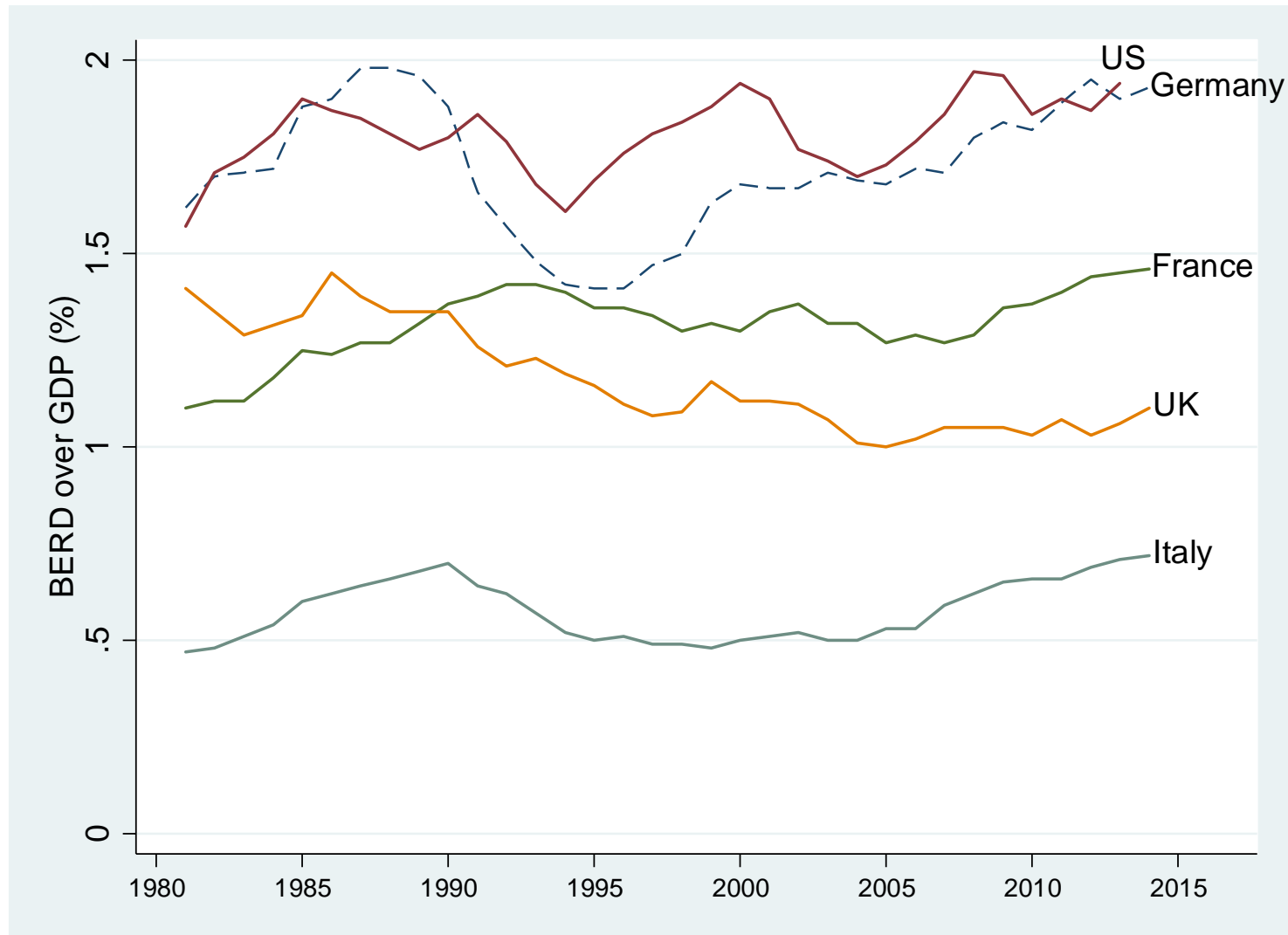
	Share of top scientific papers	Rank
US	58.6	1
UK	14.4	2
GERMANY	11.1	3
FRANCE	7.0	4
CANADA	6.2	5
JAPAN	6.1	6
ITALY	4.8	7
NETHERLANDS	4.3	8
CHINA	4.2	9

**Notes:** Shares of the most cited scientific papers 1999-2008 (top 1%)

**Source:** BIS/Thompson-Reuters (2009) “International comparative performance of the UK research base”, Table 1.12, p.60

[http://www.bis.gov.uk/assets/biscore/corporate/migratedd/publications/i/icpruk09v1\\_4.pdf](http://www.bis.gov.uk/assets/biscore/corporate/migratedd/publications/i/icpruk09v1_4.pdf)

# BUSINESS R&D AS A SHARE OF GDP



**SOURCE:** OECD MSTI (2016), downloaded Feb. 24<sup>th</sup> 2016

# DRIVERS OF PRODUCTIVITY

- **Technological innovation matters a lot, but:**
  - After controlling for technology, still large proportion of productivity differences unexplained
  - Productivity effects of technology depend on firm management/organization (e.g. Bloom, Sadun & Van Reenen, 2012, on Information Technology)
- **So are management practices also important?**
  - Business case studies
  - History of economic thought

# But there is still a wide debate – many people claim management is just “hot air”

*“No potential driving factor of productivity has seen a higher ratio of speculation to empirical study”*

- Chad Syversson (2011, *Journal of Economic Literature*)



# **BLOOM - VAN REENEN (2007) SURVEY METHODOLOGY**

## **1) Developing management questions**

- Scorecard for 18 monitoring (e.g. lean), targets & people (e.g. pay, promotions, retention and hiring). ≈45 minute phone interview of manufacturing plant managers

## **2) Obtaining unbiased comparable responses (“Double-blind”)**

- Interviewers do not know the company’s performance
- Managers are not informed (in advance) they are scored
- Run from LSE, with same training and country rotation

## **3) Getting firms to participate in the interview**

- Introduced as “Lean-manufacturing” interview, no financials
- Official Endorsement: Bundesbank, Bank of England, RBI, etc.
- Run by 200 MBA types (loud, assertive & business experience)

## MONITORING – e.g. “HOW IS PERFORMANCE TRACKED?”

---

<b>Score</b>	<b>(1): Measures tracked do not indicate directly if overall business objectives are being met. Certain processes aren't tracked at all</b>	<b>(3): Most key performance indicators are tracked formally. Tracking is overseen by senior management</b>	<b>(5): Performance is continuously tracked and communicated, both formally and informally, to all staff using a range of visual management tools</b>
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**Note:** All 18 questions and over 50 examples in Bloom & Van Reenen (2007)

<http://worldmanagementsurvey.org/>



# World Management Survey (~12,000 firms, ~20k managers in 4 major waves: 2004, 2006, 2009, 2014; 34 countries)



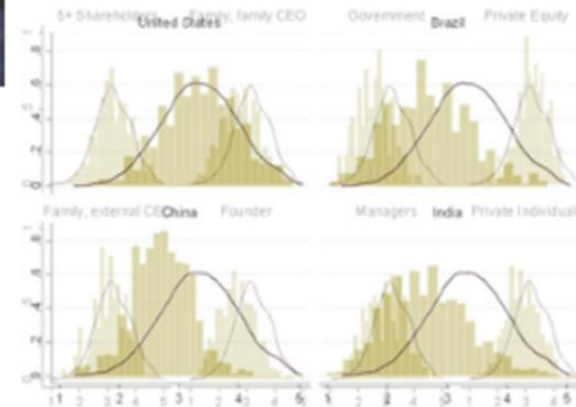
Home	Policy & Business Reports	Academic Research	Teaching Material	Survey Data	Media	Network
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Benchmark your manufacturing firm, hospital, school, or retail outlet against others in your country, industry or size class.

**Benchmark your organization**

Management scores across firms  
WMS team analyses the distribution of management practices within countries by type.

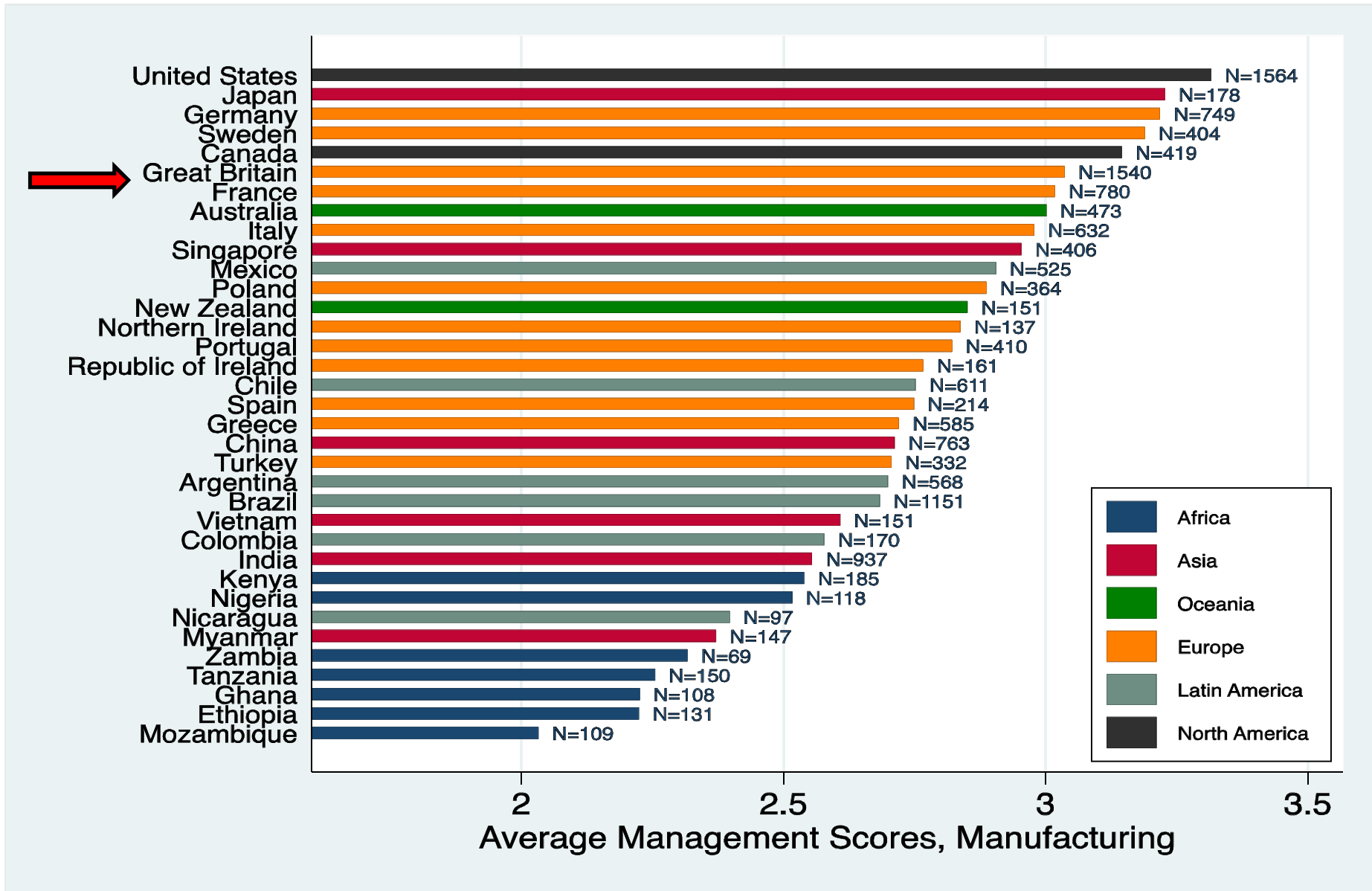


### Featured publications

- » [Why do management practices differ across firms and countries?](#)
- » [Management Practice and Productivity: Why They Matter](#)
- » [Management in Healthcare: Why good practice really matters](#)

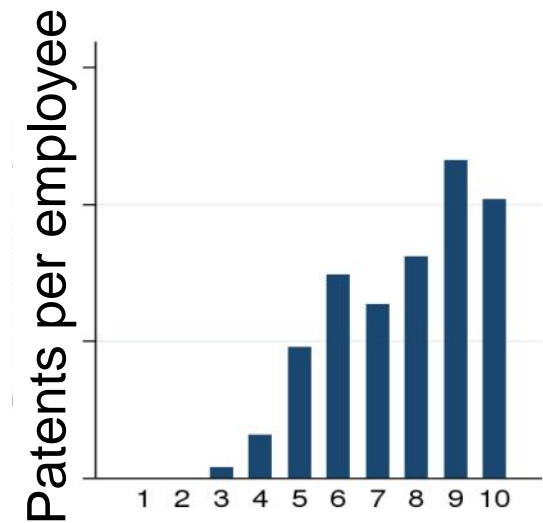
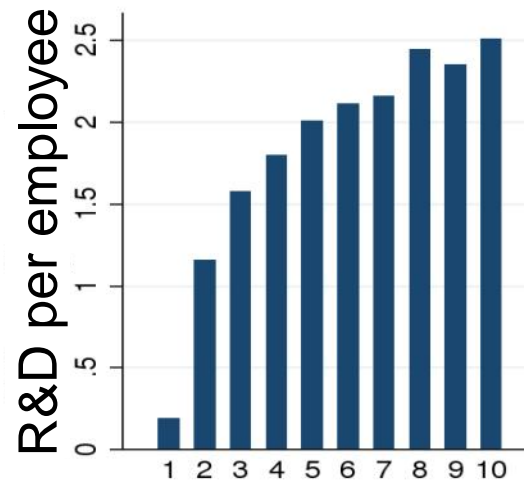
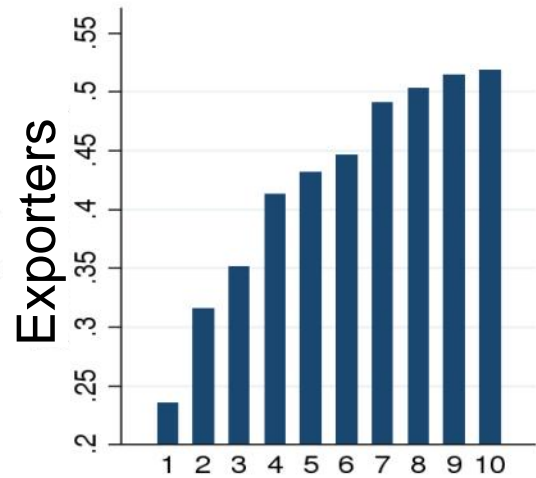
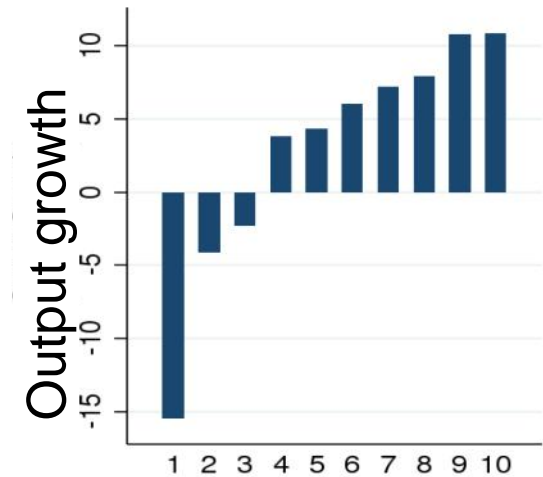
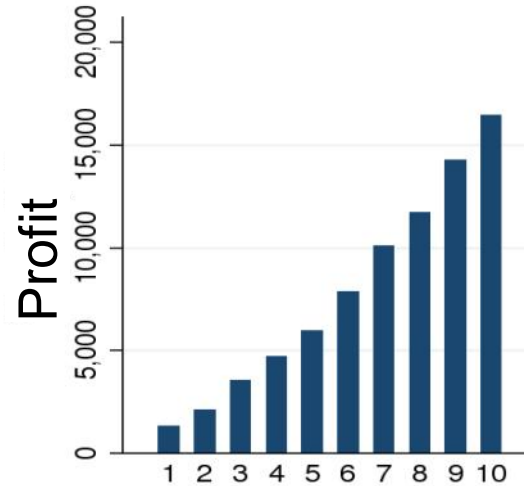
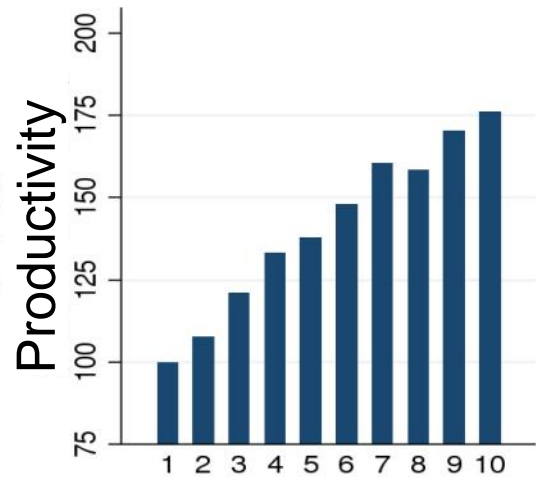
Medium sized manufacturing firms(50-5,000 workers, median≈250)  
Now extended to Hospitals, Retail, Schools, etc.

# Average Management Scores by Country



**Note:** Unweighted average management scores (raw data) with number of observations. All waves pooled (2004-2014), 15,105 interviews

# These management scores positively correlated with many other measures of firm performance



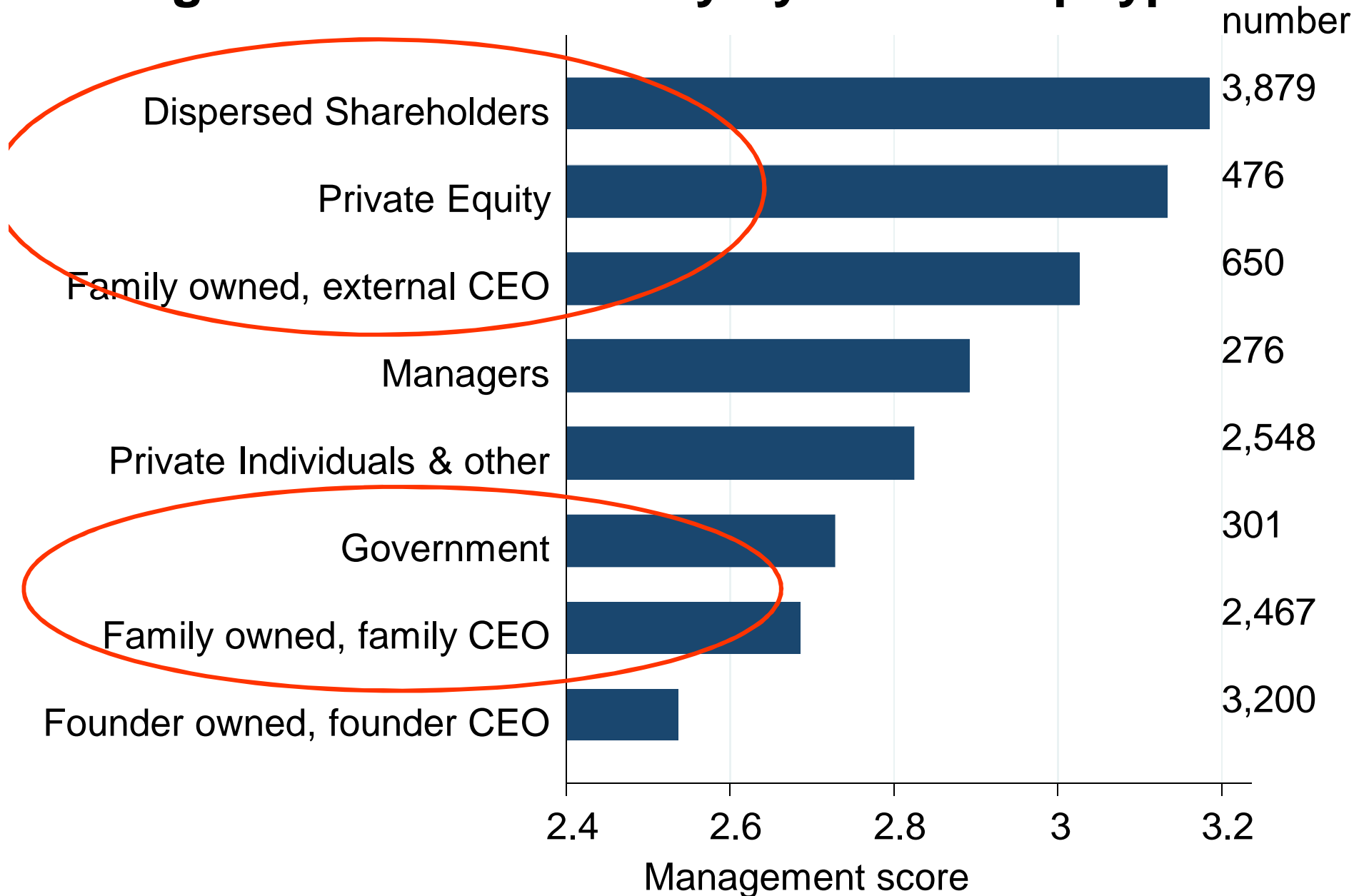
Management score decile

# Foreign Multinationals appear to transplant management overseas



**Notes:** These are the simple unweighted means of management scores by companies belonging to foreign multinationals vs. domestic firms. Domestic multinationals not shown (but available on request) lie between the two bars. 12,189 interviews.

# Management varies heavily by ownership type



**Notes:** Data from 14,686 firm interviews. Created May 2015. Source: [www.worldmanagementsurvey.com](http://www.worldmanagementsurvey.com)

## **Performance: results from randomized control trials also supportive of MAT (Bloom et al, 2013)**

- Experimented on plants in Indian textile firms outside Mumbai
- Randomized treatment plants got heavy management consulting (as in the practices discussed here), control plants got very light consulting
- Collected weekly data & found:
  - Management score improved by 2sd & TFP up by 20%
  - **Implies: 1 SD increase in management index caused 10% increase in TFP**

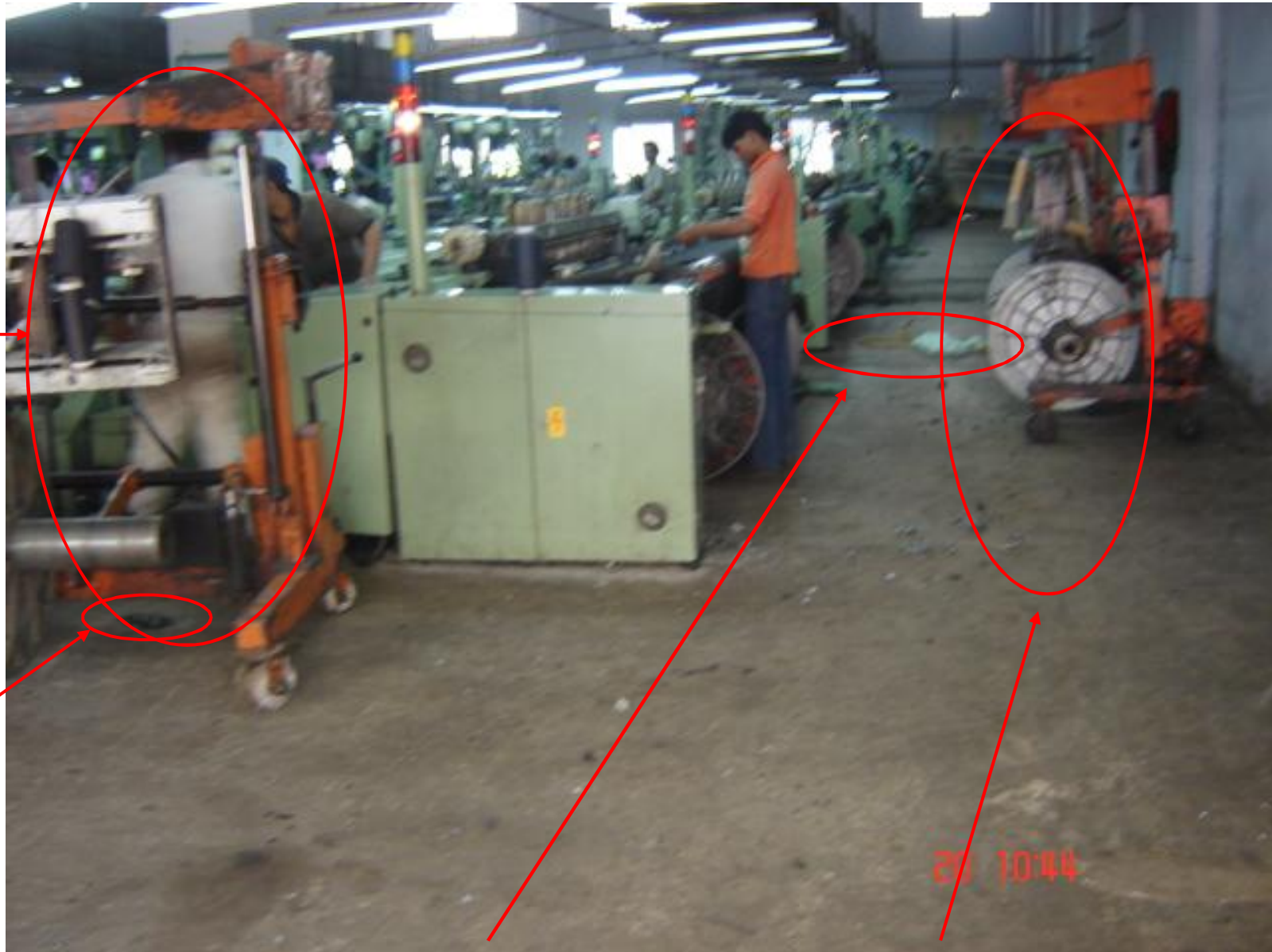
# MANY PARTS OF THE FACTORIES ARE DIRTY AND UNSAFE



# THE FACTORIES ARE ALSO DISORGANIZED

Instrument not removed after use, blocking hallway.

Oil leaking from the machine



Cotton lying on the floor

Instrument blocking the hallway

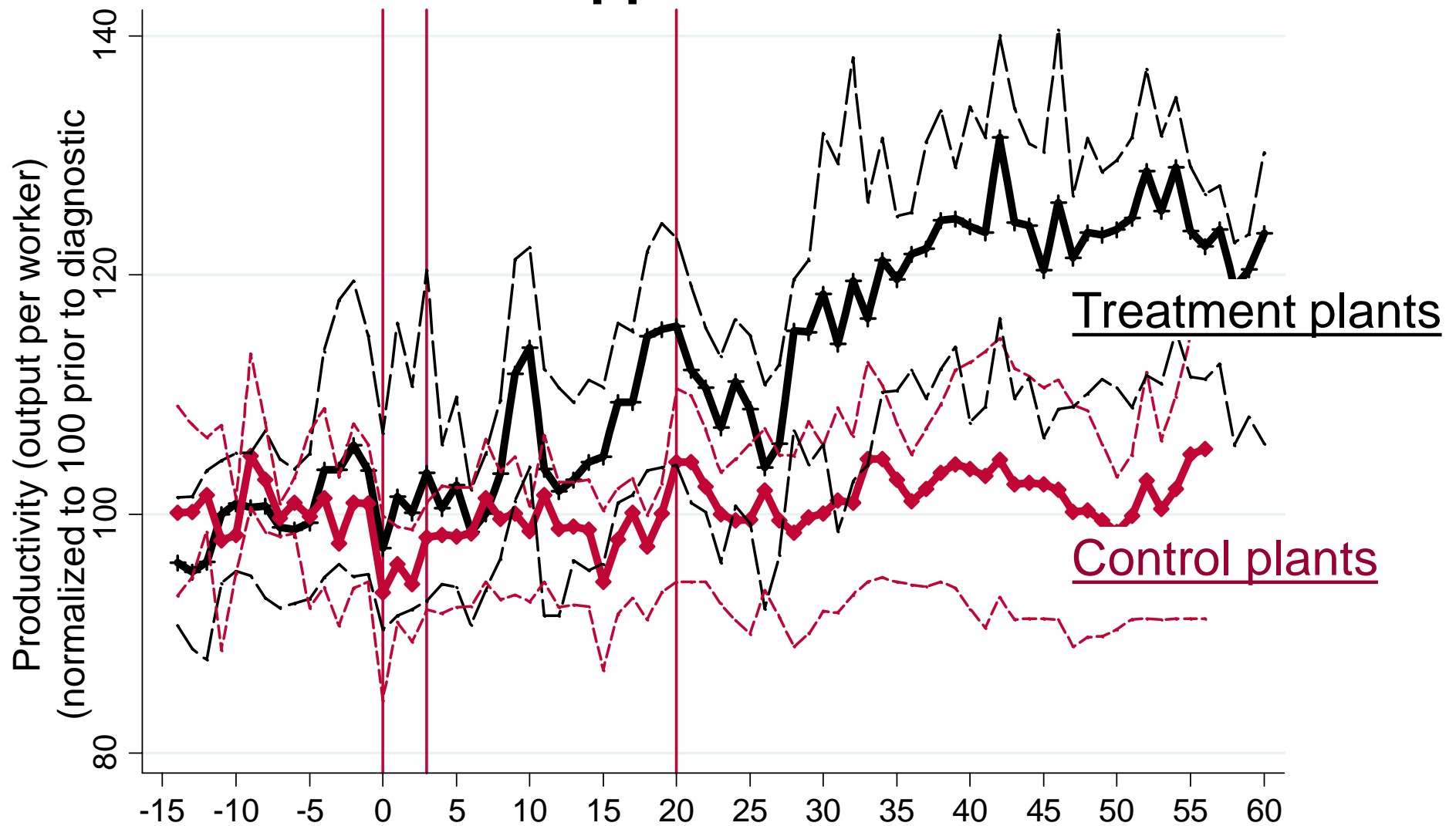
# THE TREATED FIRMS INTRODUCED BASIC INITIATIVES

Worker involved in “5S” initiative on the shop floor, marking out the area around the model machine



Snag tagging to identify the abnormalities on & around the machines, such as redundant materials, broken equipment, or accident areas. The operator and the maintenance team is responsible for removing these abnormalities.

# Performance: causal results from randomized control trials also supportive of MAT



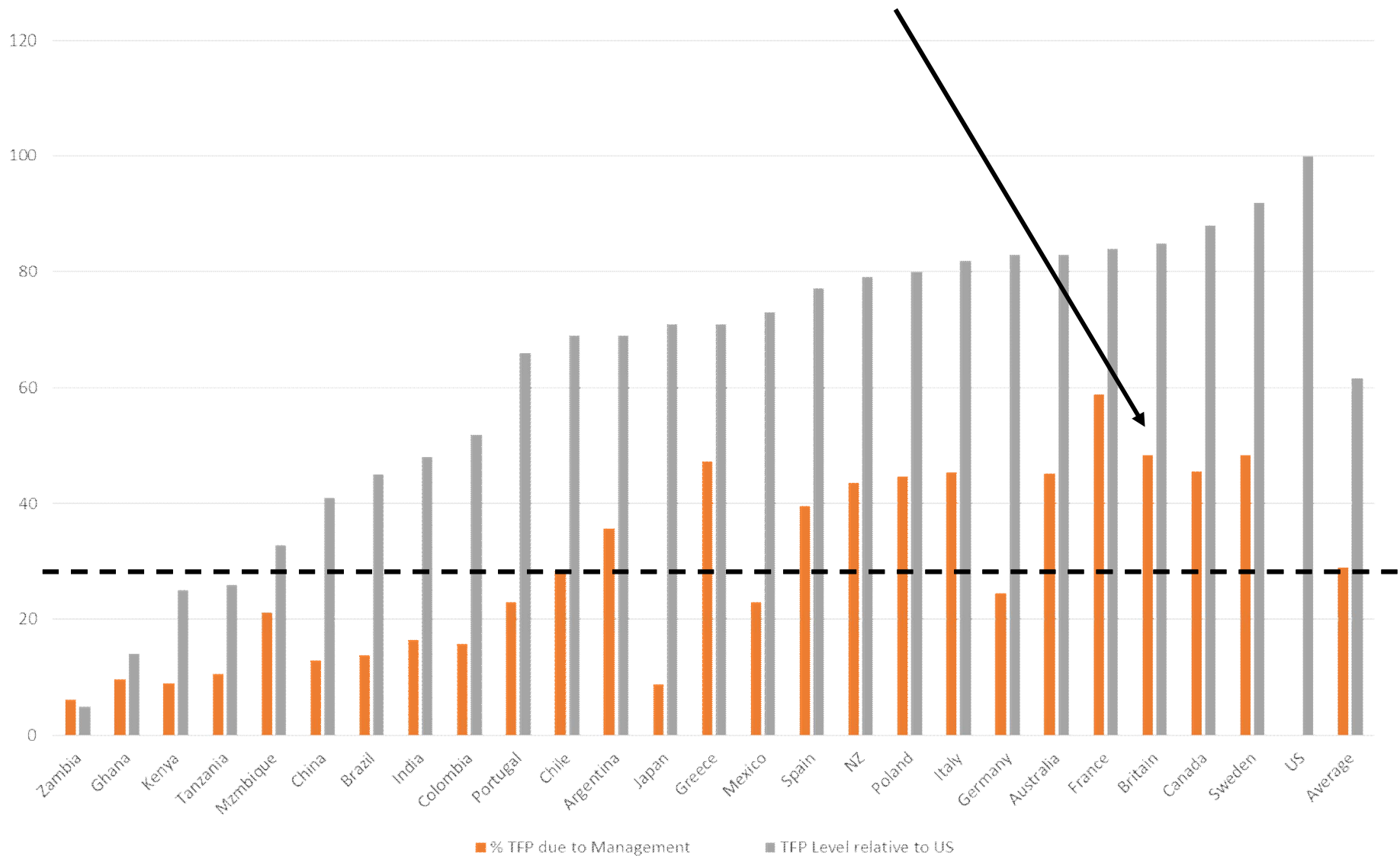
Weeks after the start of the management experiment

**1 SD in management caused 10% increase in productivity**

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# Management accounts for ~50% of UK TFP Gap with US



**Source:** Bloom, Sadun & Van Reenen (2015)

**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

Measuring Productivity

Productivity Comparisons

Drivers of Productivity

**Business & Public Policy**

# IMPLICATIONS – FOR BUSINESS

- Positive message: many ways to improve as big spread of performance & management
- FDI shows that even in tough circumstances some firms can thrive
- Succession planning for family firms

# IMPLICATIONS – FOR POLICY-MAKERS

- Again, big prize for improvement in terms of income





# Competition

- **Powerful evidence** that increases in product market competition boost productivity
  - Between firm & within firms
- Openness to trade (e.g. China, EU Single Market)
- Strong Competition authorities



# Education Policy



- UK does well for elite but badly in bottom & middle
- **Educational reform**
  - City Academies (Eyles & Machin, 2015)
- Apprenticeships, FE, etc.

# Infrastructure

- UK under-performs on transport, energy & housing
- Political uncertainty & reversals; short-termism
- Better strategic control via new Infrastructure Commission (Lord Adonis)
  - Issue of finance remains (Investment Bank?)



# Innovation Policy



- **Empirical evidence** shows that:
  - R&D boosts productivity growth
  - Tax incentives increase R&D (Bloom et al, 2002)
- Science budget (Haskel et al, 2010) & universities (Valero & Van Reenen, 2016)

# Conclusions

- Productivity matters!
- Many puzzles, especially over UK
- Much evidence on what matters
  - Capital & skills
  - Technology & Management
- Many lessons on how to improve
  - Open markets, Human capital, Infrastructure, innovation

# MY FAVOURITE QUOTES:

## The difficulties of defining ownership in Europe

*Production Manager:* “We’re owned by the Mafia”

*Interviewer:* “I think that’s the “*Other*” category.....although I guess I could put you down as an “*Italian multinational*” ?”

## Americans on geography

*Interviewer:* “How many production sites do you have abroad?”

*Manager in Indiana, US:* “Well...we have one in Texas...”

## MY FAVOURITE QUOTES:

### Don't get sick in Britian

*Interviewer* : “Do staff sometimes end up doing the wrong sort of work for their skills?”

*NHS Manager*: “You mean like doctors doing nurses jobs, and nurses doing porter jobs? Yeah, all the time. Last week, we had to get the healthier patients to push around the beds for the sicker patients”

### Don't do Business in Indian hospitals

*Interviewer*: “Is this hospital for profit or not for profit”

*Hospital Manager*: “Oh no, this hospital is only for loss making”

# MY FAVOURITE QUOTES:

## The traditional British Chat-Up

[Male manager speaking to an Australian female interviewer]

*Production Manager:* “Your accent is really cute and I love the way you talk. Do you fancy meeting up near the factory?”

*Interviewer* “Sorry, but I’m washing my hair every night for the next month....”

# MY FAVOURITE QUOTES:

## The traditional Indian Chat-Up

*Production Manager:* “Are you a Brahmin?”

*Interviewer* “Yes, why do you ask?”

*Production manager* “And are you married?”

*Interviewer* “No?”

*Production manager* “Excellent, excellent, my son is looking for a bride and I think you could be perfect. I must contact your parents to discuss this”

## MY FAVOURITE QUOTES:

### Don't get sick in India

*Interviewer* : “Do you offer acute care?”

*Switchboard*: “Yes ma'am we do”

*Interviewer* : “Do you have an orthopeadic department?”

*Switchboard*: “Yes ma'am we do”

*Interviewer* : “What about a cardiology department?”

*Switchboard*: “Yes ma'am”

*Interviewer* : “Great – can you connect me to the ortho department”

*Switchboard?*: “Sorry ma'am – I'm a patient here”

## MY FAVOURITE QUOTES:

### The bizarre

*Interviewer:* “[long silence].....hello, hello....are you still there....hello”

*Production Manager:* “.....I’m sorry, I just got distracted by a submarine surfacing in front of my window”

### The unbelievable

[Male manager speaking to a female interviewer]

*Production Manager:* “I would like you to call me “Daddy” when we talk”

[End of interview...]

# Further reading for business

HBR.ORG

# Harvard Business Review

NOVEMBER 2012  
REPRINT R1211D

**SPOTLIGHT ON HBR AT 90**

## Does Management Really Work?

How three essential practices can address even the most complex global problems  
by Nicholas Bloom, Raffaella Sadun, and John Van Reenen

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"Yes, I finally landed a corner office and, no, I'd rather not discuss it."

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the word to the thousands of other underperforming companies, schools, and hospitals worldwide is urgent. Awareness is very low: 79% of the organizations in our study claimed to have above-average manage-

ate their own practices and compare themselves with others'. Managers can quickly benchmark themselves by country and industry on our management scoring grid at [worldmanagementsurvey.org](http://worldmanagementsurvey.org).

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