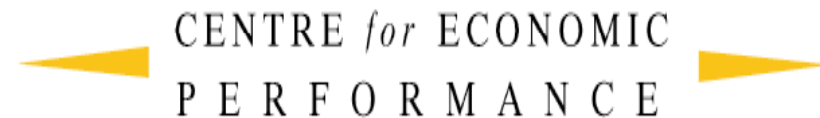


PRODUCTIVITY, INNOVATION AND ECONOMIC POLICY

John Van Reenen

Department of Economics, LSE;
Director, Centre for Economic Performance

Copenhagen, May 2010



OUTLINE

1. What is productivity & why should we care?

2. International Comparisons: How is Europe doing?

3. Why is there a European productivity gap?

- The role of management

4. Why has the EU-US gap got worse in last 15 years?

5. What can we do to improve things?

WHAT IS PRODUCTIVITY AND WHY SHOULD WE CARE?

- *“Productivity isn’t everything, but in the long run it is almost everything” (Nobel Laureate Paul Krugman)*
- **Productivity growth**
 - Drives growth of real wages
 - Can facilitate redistribution
 - Helps finance government expenditure
- Particularly important during current era of fiscal retrenchment
 - Lisbon Agenda (2000), Sapir Report (2003), Europe 2020,

DOWNSIDERS TO PRODUCTIVITY GROWTH?

- **Poverty?**

- absolute poverty tends to fall with growth
- No evidence that faster productivity growth means more inequality

- **Happiness?**

- Growth doesn't guarantee happiness
- Wellbeing not all about consumption
- But falls in consumption create misery

WHAT IS LABOUR PRODUCTIVITY?

Basic “welfare” measure

$$\frac{GDP}{Population} = \frac{GDP}{hours} \times \frac{hours}{workers} \times \frac{workers}{population}$$

Choice?

Labour productivity

Voluntary and involuntary.
Unemployment and inactivity

The diagram illustrates the decomposition of the basic welfare measure (GDP per population) into three components. The equation is: $\frac{GDP}{Population} = \frac{GDP}{hours} \times \frac{hours}{workers} \times \frac{workers}{population}$. An arrow points from the text 'Basic "welfare" measure' to the first fraction. Another arrow points from 'Choice?' to the second fraction. A third arrow points from 'Voluntary and involuntary. Unemployment and inactivity' to the third fraction. A fourth arrow points from 'Labour productivity' to the first fraction.

*US has higher GDP/pop than EU, but more similar GDP/hour
This has changed a lot over time via catch up

MEASURING PRODUCTIVITY

- Output per hour depends on:
 - Inputs per hour (physical and human capital, materials, energy, etc.)
 - “Total Factor Productivity” (technology, management, etc.) Also known as the “Solow residual”. Accounts for most of long-term growth

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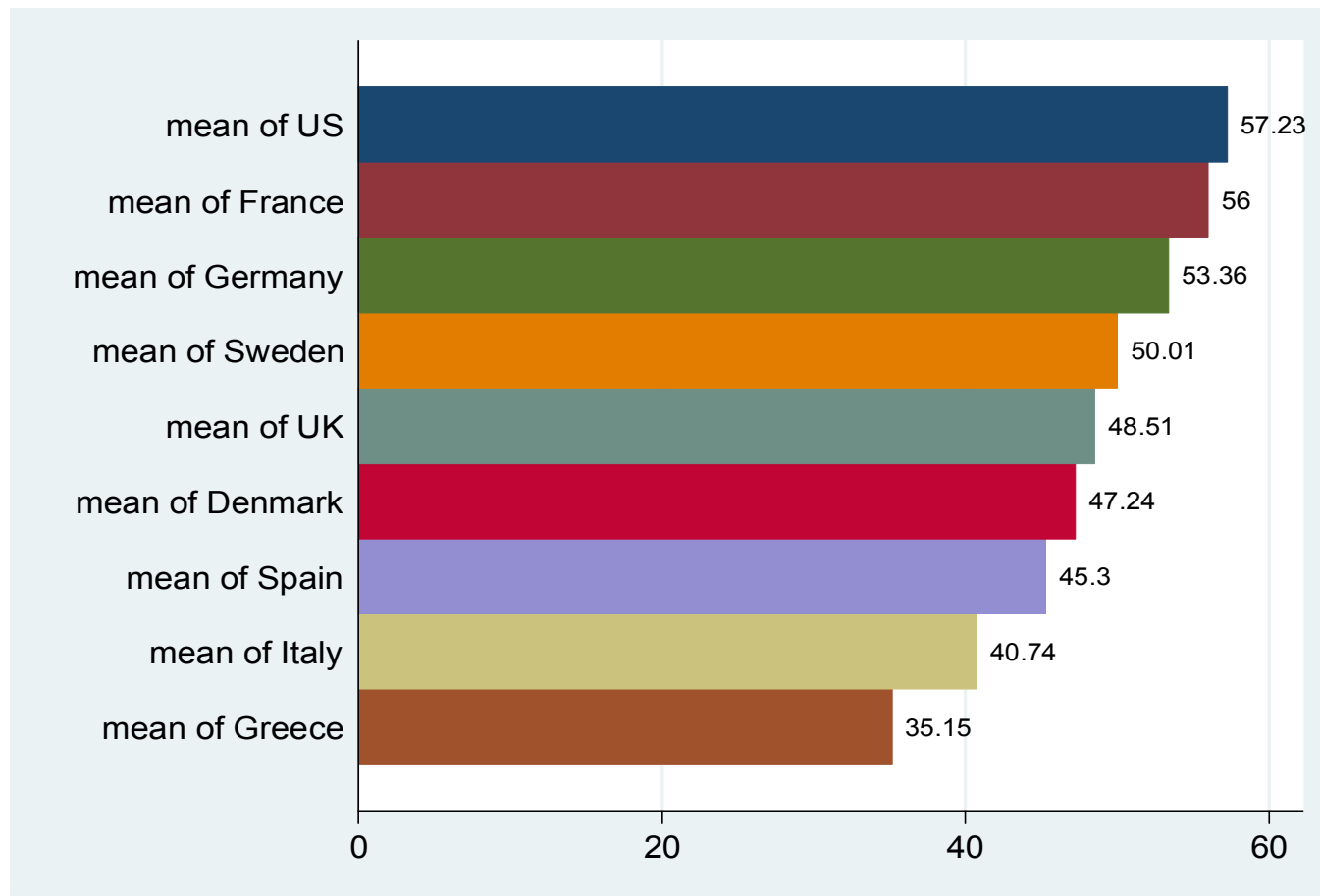
3. Why is there a European productivity gap?

- The role of management

4. Why has the situation got worse?

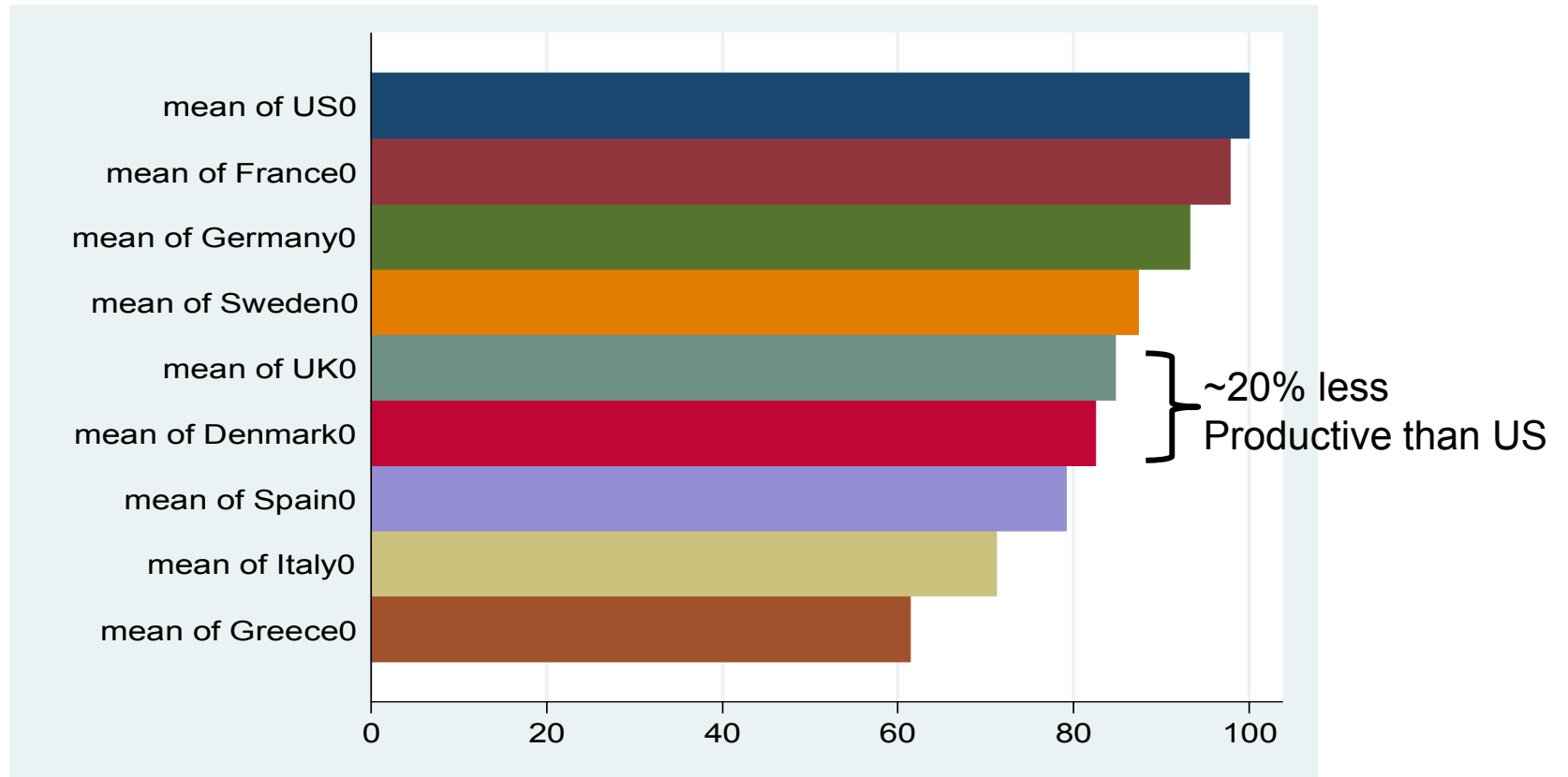
5. What can we do to improve things?

LABOUR PRODUCTIVITY (GDP PER HOUR) IN 2009, US\$1,000 PPP



Source: Conference Board (2010)

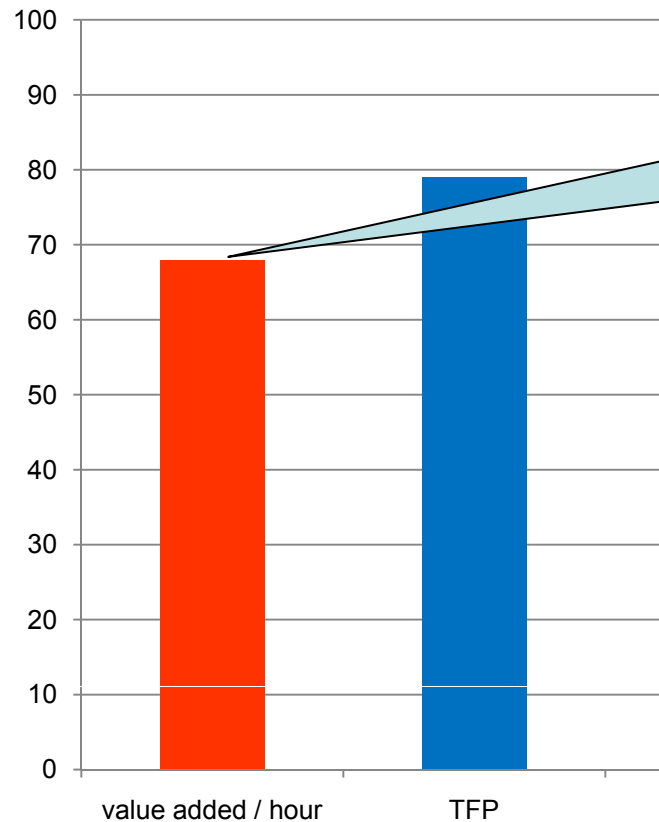
RELATIVE LABOUR PRODUCTIVITY (GDP PER HOUR) IN 2009, US=100



Source: Conference Board (2010)

THE US-EU GAP IS MAINLY TO DO WITH TFP (~2/3 TFP AND 1/3 OTHER INPUTS)

EU-15, MARKET ECONOMY, 2005, US=100



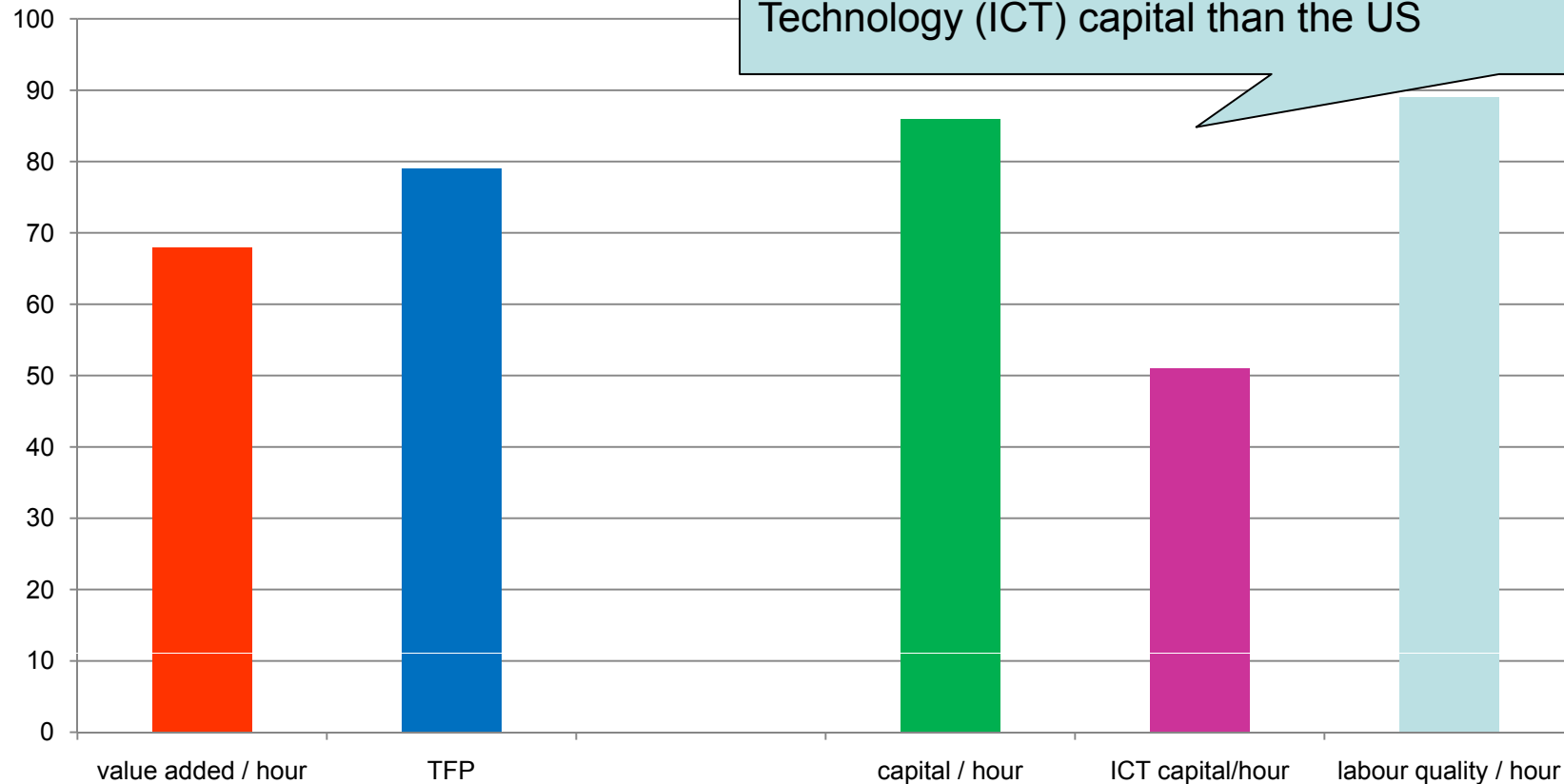
EU's 32% productivity gap with US falls to 21% when we take lower inputs of capital and skills into account

Source: Inklaar and Timmer (2008)

THE US-EU GAP IS MAINLY TO DO WITH TFP (1/3 OTHER INPUTS – EU ICT INPUTS VERY LOW)

EU-15, MARKET ECONOMY, 2005, US=100

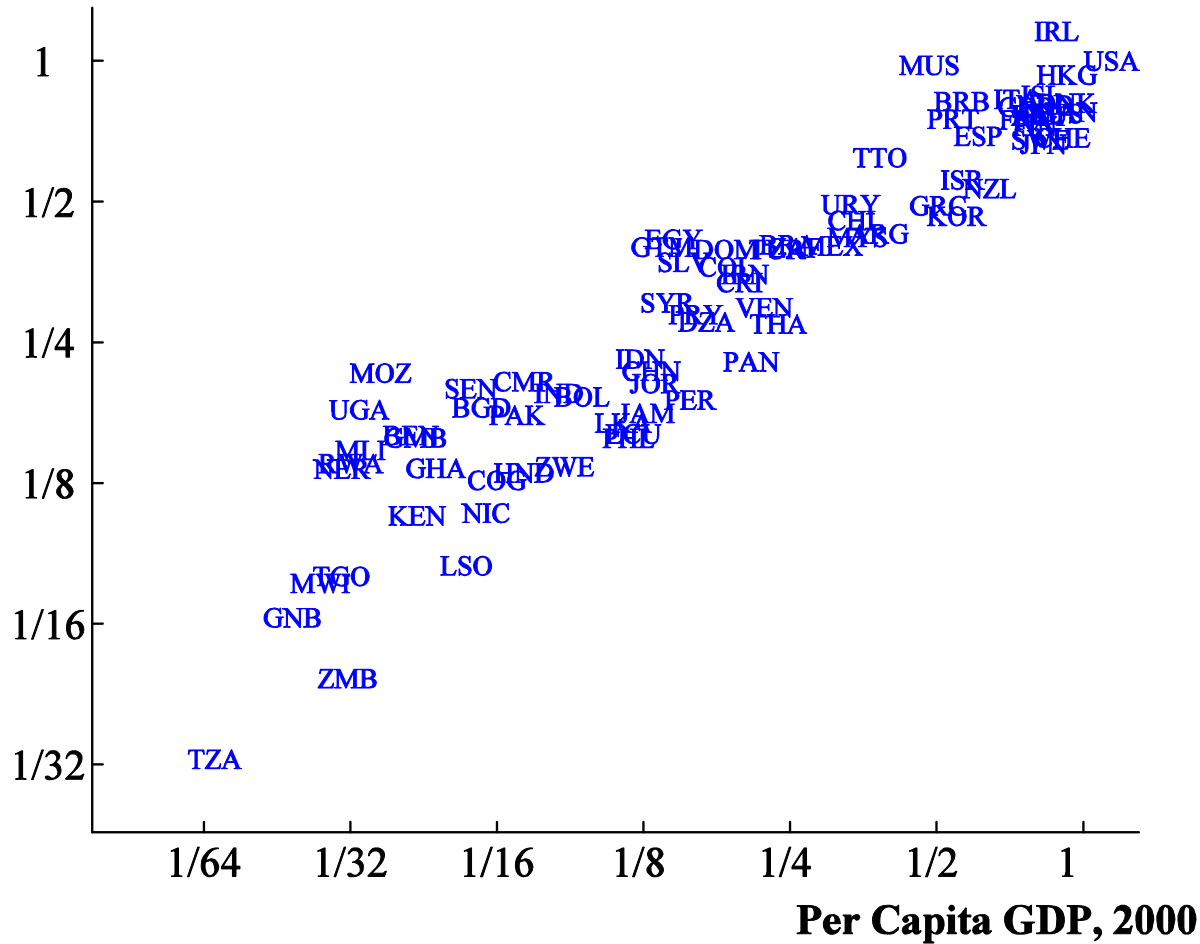
EU has 15% less total capital, 10% less skills but 50% less Information & Communication Technology (ICT) capital than the US



Source: Inklaar and Timmer (2008)

LARGE INCOME & TFP DIFFERENCES BETWEEN COUNTRIES

Total Factor Productivity, 2000



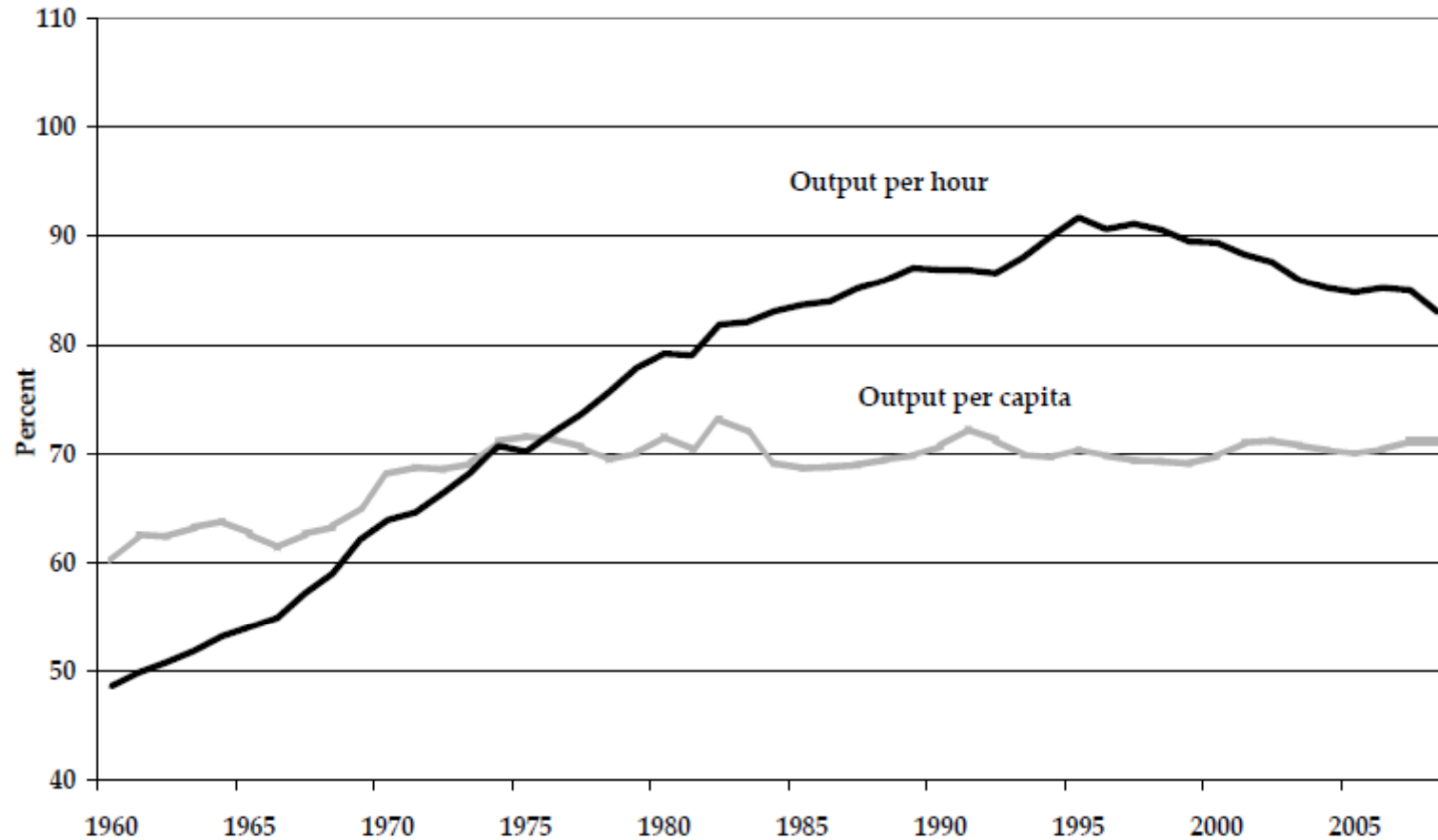
Source: Jones and Romer (2009). US=1

RECENT TRENDS: THE US “PRODUCTIVITY MIRACLE”

- Post-war rapid productivity growth
- After 1970s Oil Shocks a Productivity slowdown
- From mid-1990s, US productivity “miracle”
- **GDP per hour annual % growth (Inklaar et al, 2008)**

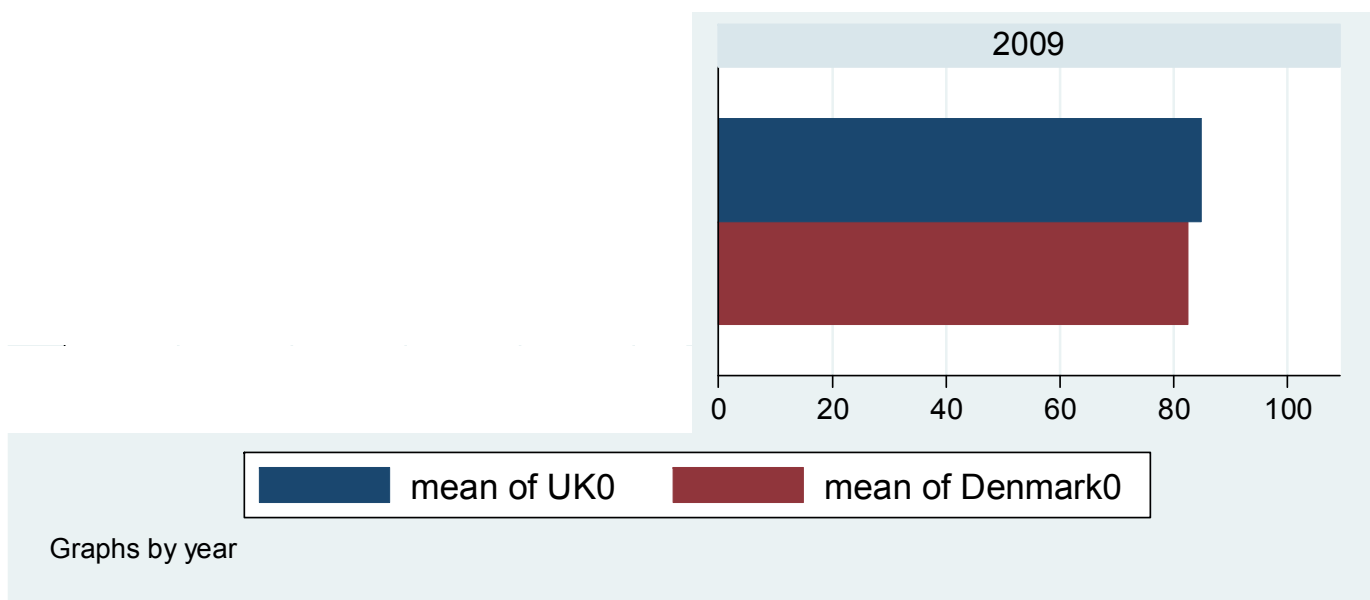
	US	EU-15	Difference
1980-1995	1.3%	2.3%	
<u>1995-2006</u>	<u>2.2%</u>	<u>1.4%</u>	
Change	+0.9%	-0.9%	1.8%

THE US PRODUCTIVITY MIRACLE HASN'T BEEN SEEN IN EU: GDP/HOUR EU-15 RELATIVE TO THE US, 1960-2008

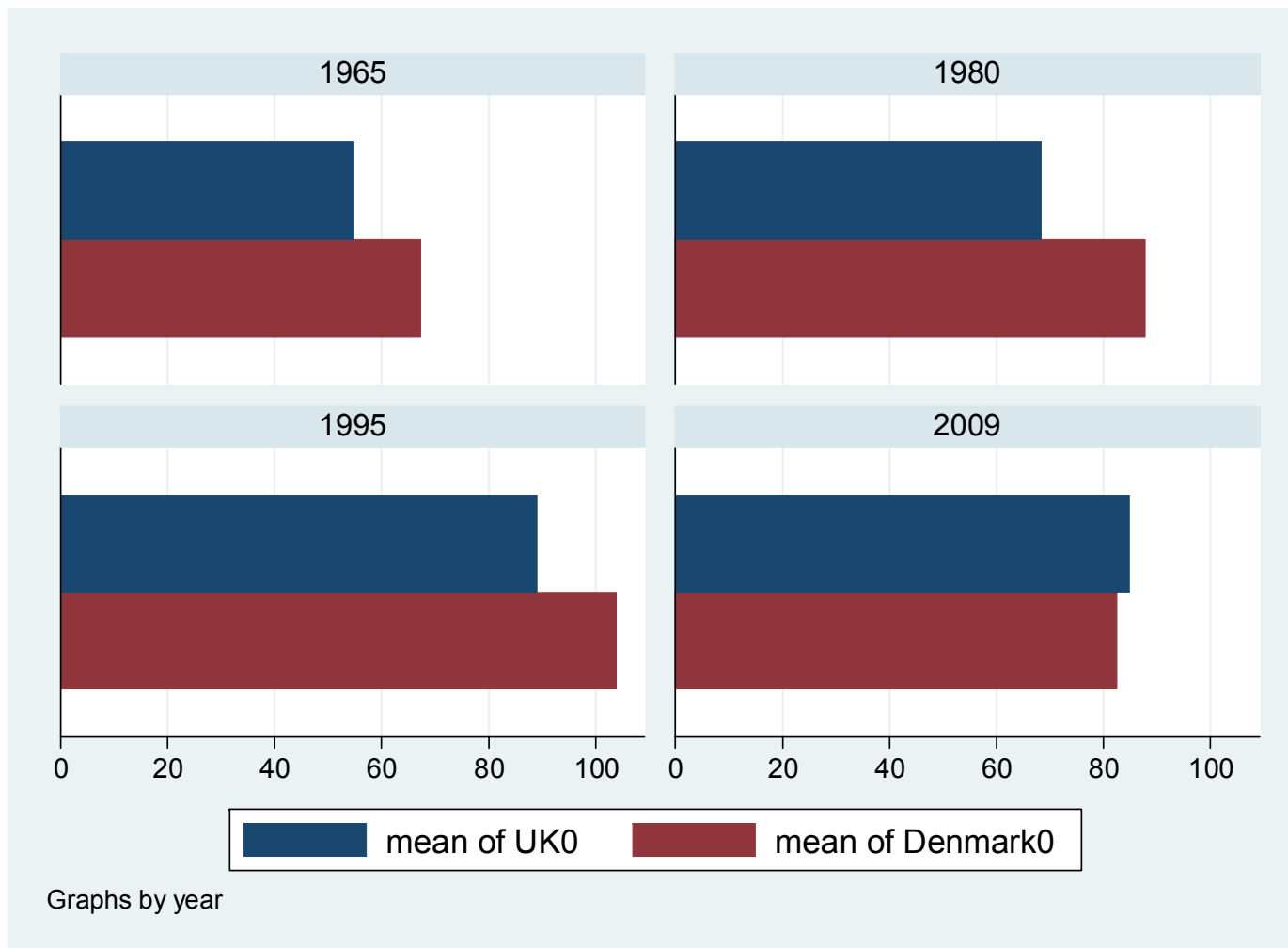


Source: Gordon (2010) based on EU-KLEMS

RELATIVE PRODUCTIVITY OF DENMARK AND UK (US=100), 1965-2009



RELATIVE PRODUCTIVITY OF DENMARK AND UK (US=100), 1965-2009



EMPLOYMENT RATE (% EMPLOYED OF WORKING AGE POPULATION)

	US	UK	Denmark	France	Italy	Germany	Japan
1984	68.1	65.9	72.2	59.9	52	61.1	67.2
1997	70.6	70.6	75.4	58.9	51.6	63.8	70
2008	70.9	72.7	78.4	64.6	58.7	70.2	70.7

French productivity over-estimated because of low employment rates?

Source: OECD (2010)

EMPLOYMENT RATE (% EMPLOYED OF WORKING AGE POPULATION)

	US	UK	Denmark	France	Italy	Germany	Japan
1984	68.1	65.9	72.2	59.9	52	61.1	67.2
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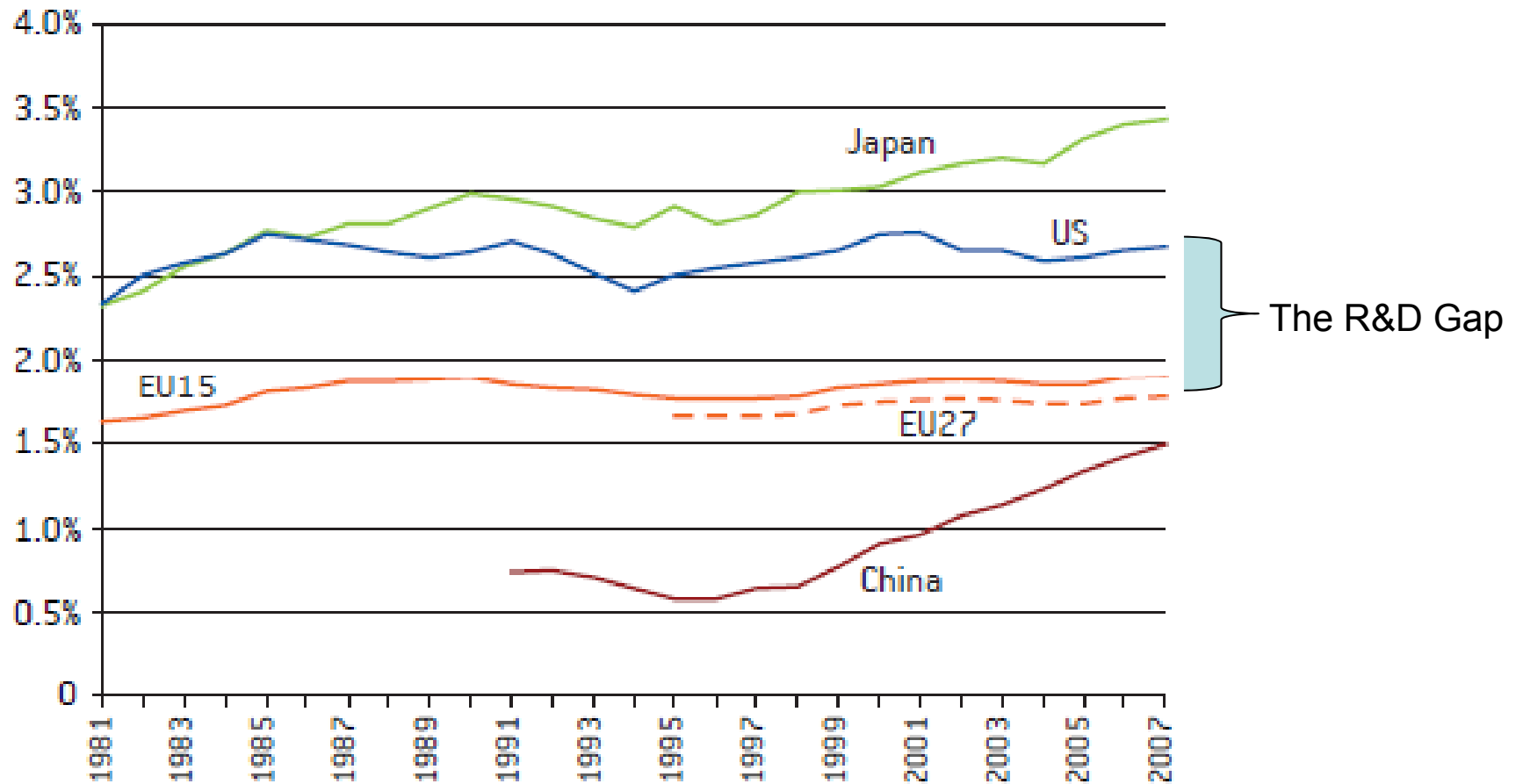
Danes 3/36 highest in OECD (only Swiss and Iceland work more!)

Source: OECD (2010)

INNOVATION A CAUSE OF EU-US PRODUCTIVITY GAP?

- **Sapir Report (2003):** EU “caught up” with US technology “frontier” by mid 1990s & needs to innovate. Existing set of institutions designed for adoption & imitation rather than innovation
- **Partially correct.** Europe has innovation deficit:
 - Universities/basic science
 - Research & Development (R&D), Patenting, etc.

EU LAGS BEHIND US IN R&D/GDP (GERD)



Source: OECD, MSTI

INNOVATION A CAUSE OF EU-US PRODUCTIVITY GAP?

- **Sapir Report:** EU caught up with US technology “frontier” by mid 1990s & needs to innovate. Existing set of institutions designed for adoption rather than innovation
- **Partially correct.** Europe has innovation deficit:
 - Universities/basic science
 - R&D & Patenting (see over)
- **Problem is not just “hard” technologies. Also problems with the way firms are managed.**
 - **European firms slower in responding to changes in technology and globalization than US**

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WHY FOCUS ON MANAGEMENT?

- Technologies available globally - why do some countries/firms not use?
- Large variation in productivity between firms as well as countries
- But how to measure, quantify and compare across firms and countries?
- My Research Program with Nick Bloom (Stanford) & CEP/LSE team over last 7 years
 - Measuring Management across firms & countries
 - Describing Management
 - Explaining Management

THE SURVEY METHODOLOGY

1) Developing management questions

- Scorecard for 18 monitoring, targets and people
- ≈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, PBC, RBI, etc.
- Run by 55 MBA types (loud, assertive & business experience)

MONITORING – e.g. *HOW IS PERFORMANCE TRACKED?*”

Score	(1): Measures tracked do not indicate directly if overall business objectives are being met. Certain processes aren't tracked at all	(3): Most key performance indicators are tracked formally. Tracking is overseen by senior management	(5): Performance is continuously tracked and communicated, both formally and informally, to all staff using a range of visual management tools
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INCENTIVES - e.g. “HOW DOES THE PROMOTION SYSTEM WORK?”

Score	(1) People are promoted primarily upon the basis of tenure	(3) People are promoted upon the basis of performance	(5) We actively identify, develop and promote our top performers
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Note: All 18 dimensions and over 50 examples in Bloom & VanReenen (2006).

TARGETS - e.g. "HOW TOUGH ARE TARGETS?"

Score	(1) Goals are either too easy or impossible to achieve; managers low-ball estimates to ensure easy goals	(3) In most areas, top management pushes for aggressive goals based on solid economic rationale. There are a few "sacred cows" not held to the same rigorous standard	(5) Goals are genuinely demanding for all divisions. They are grounded in solid, solid economic rational
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Note: All 18 dimensions and over 50 examples in Bloom & VanReenen (2006).

MANAGEMENT SURVEY SAMPLE

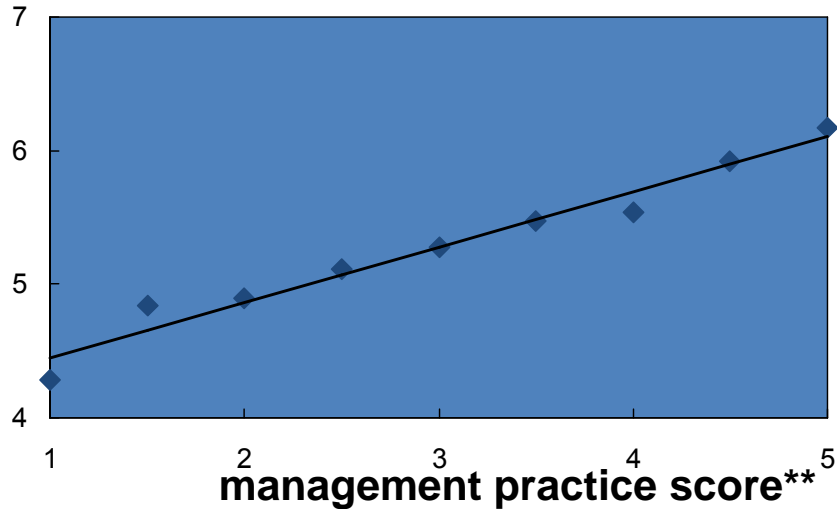
- Interviewed over 6,000 firms across Americas, Asia & Europe
- Obtained 45% response rate from sampling frame (with responses uncorrelated with performance measures)

Medium sized manufacturing firms:

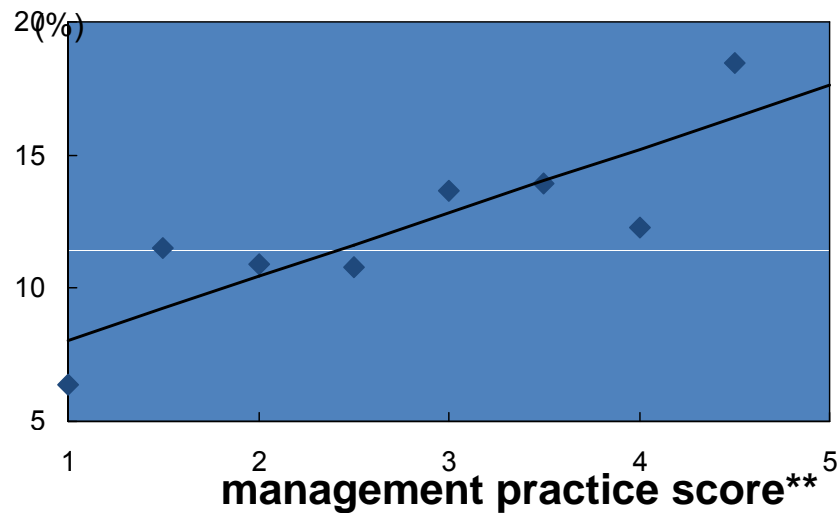
- Medium sized (100 - 5,000 employees, median \approx 250) because firm practices more homogeneous
- Manufacturing as easier to measure productivity (currently piloting in Schools, Hospitals, Retail and Law Firms)

EXTERNAL VALIDATION: MANAGEMENT SCORE CORRELATES WELL WITH PERFORMANCE INDICATORS

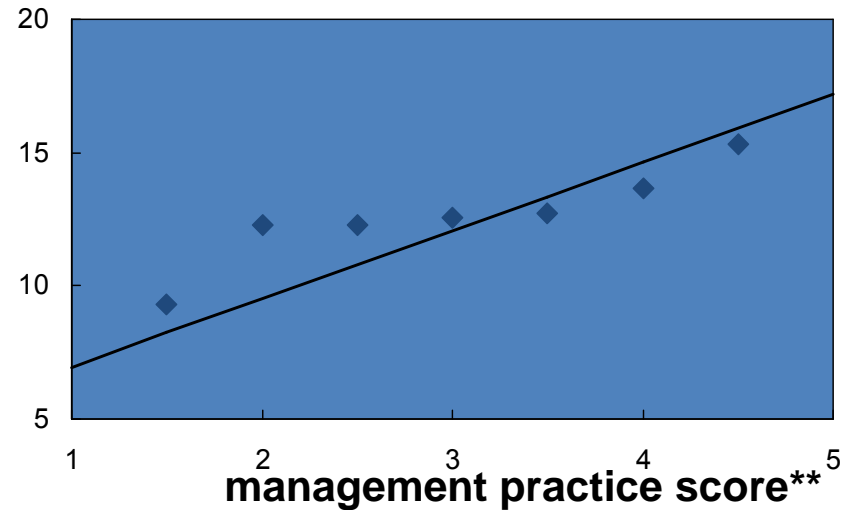
Labour productivity*



Return On Capital Employed, ROCE



Sales growth (%)

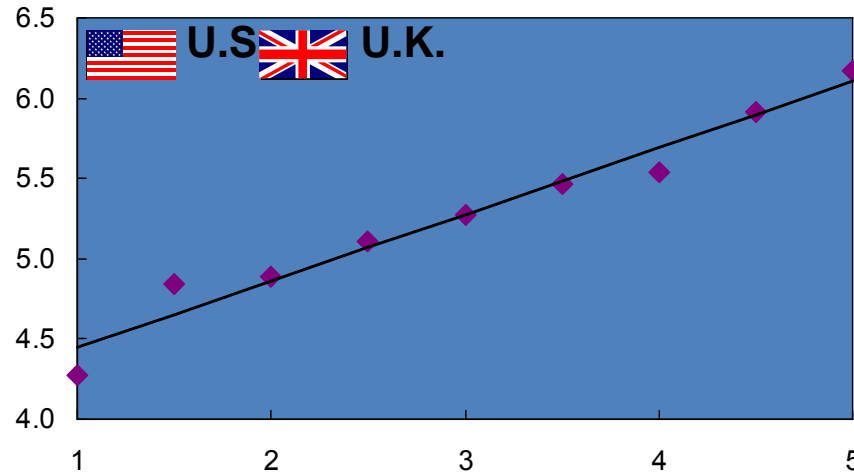


* Log scale

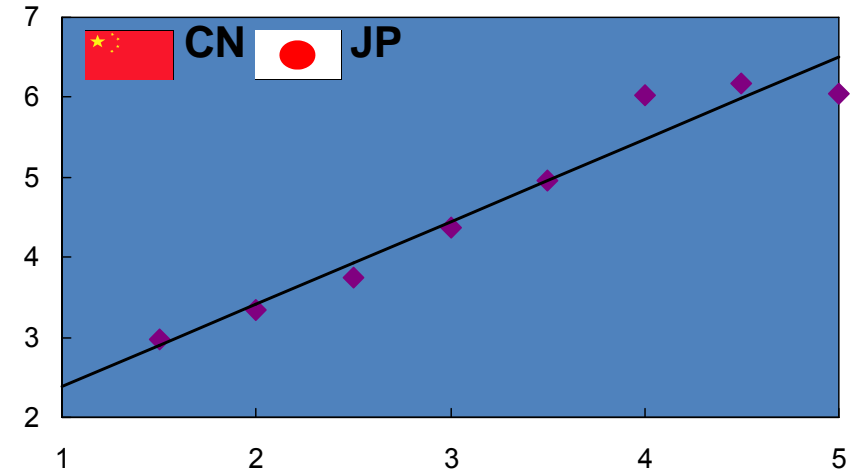
** Firms are grouped in 0.5 increments of assessed management score

THE LINK BETWEEN PRODUCTIVITY AND MANAGEMENT HOLDS TRUE ACROSS DIFFERENT COUNTRIES

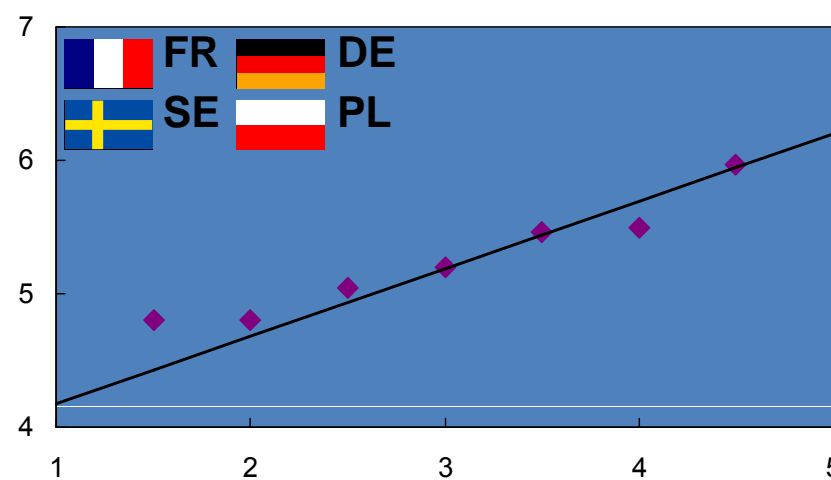
Labour productivity*



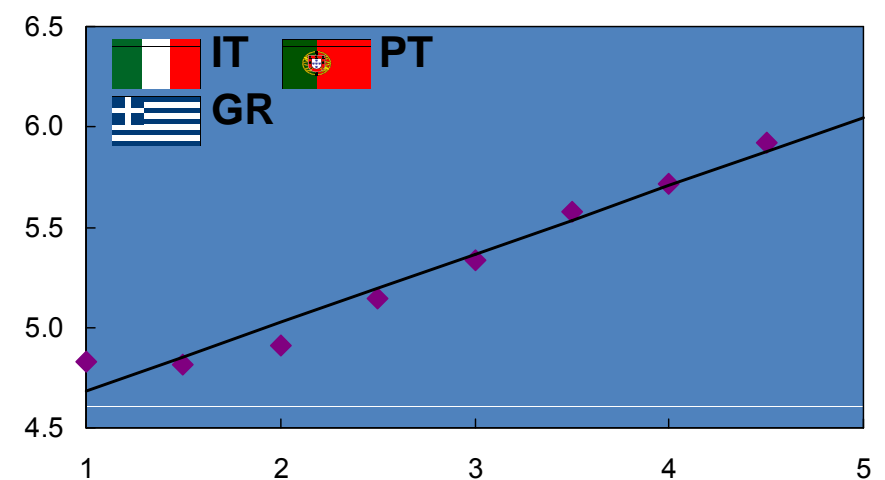
Labour productivity*



Labour productivity*



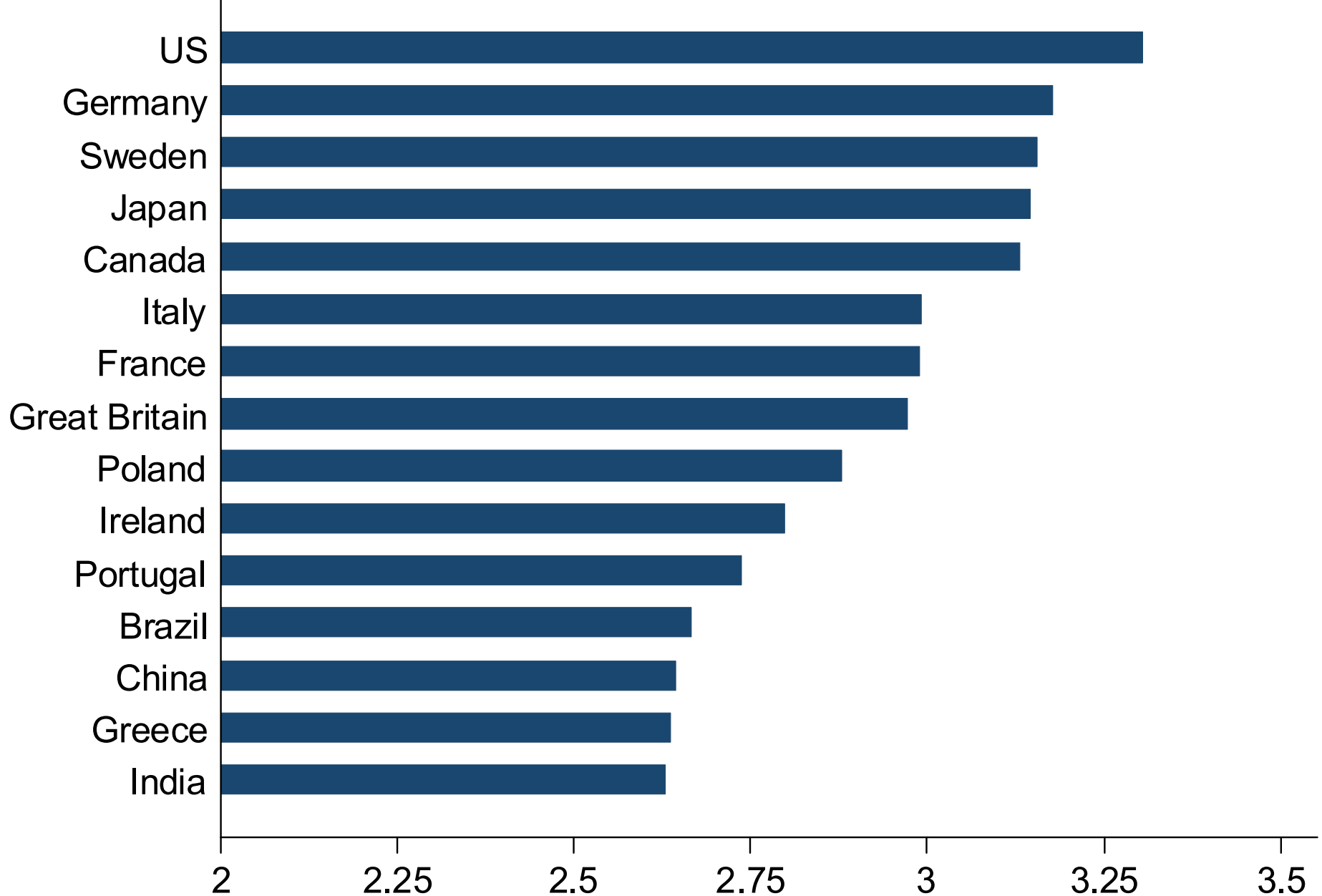
Labour productivity*



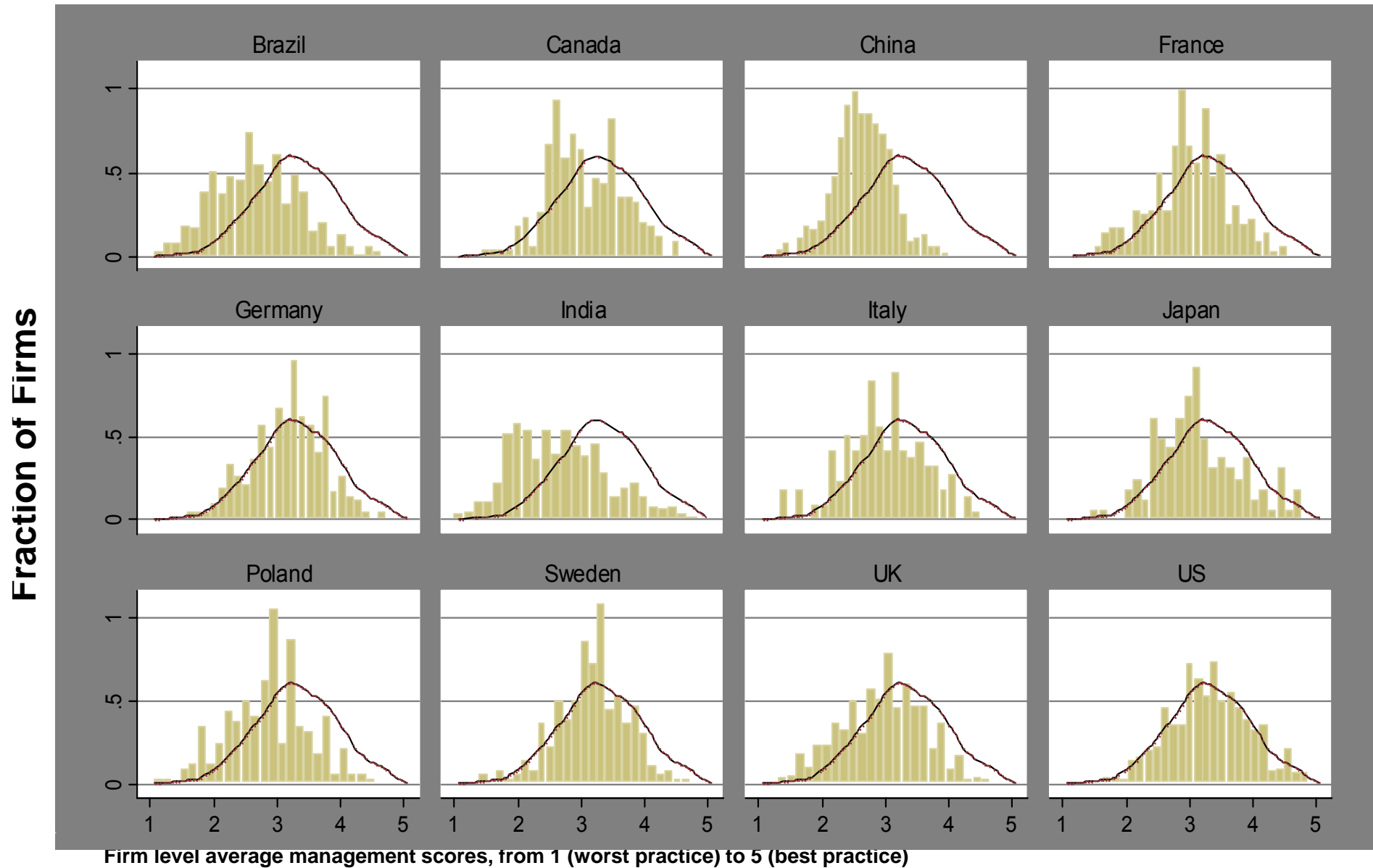
* Log scale (sales per worker)

** Firms are grouped in 0.5 increments of assessed management score

MANAGEMENT PRACTICE SCORES ACROSS COUNTRIES



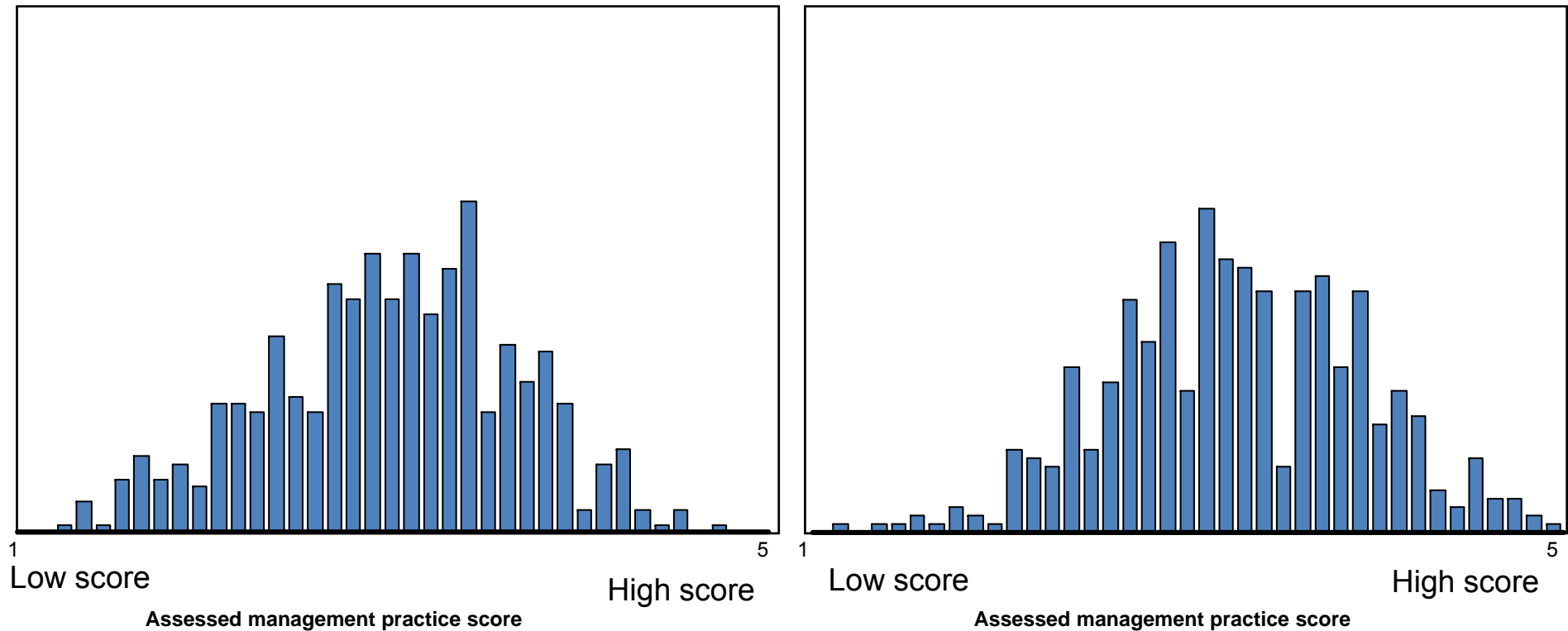
MANAGEMENT PRACTICE SCORES ACROSS FIRMS



Note: The bars are the histogram of the actual density. The line is the kernel of the US density for comparison. Portugal, Ireland and Greece omitted for presentational reasons, <http://www.nber.org/reporter/2008number4/bloom.html>

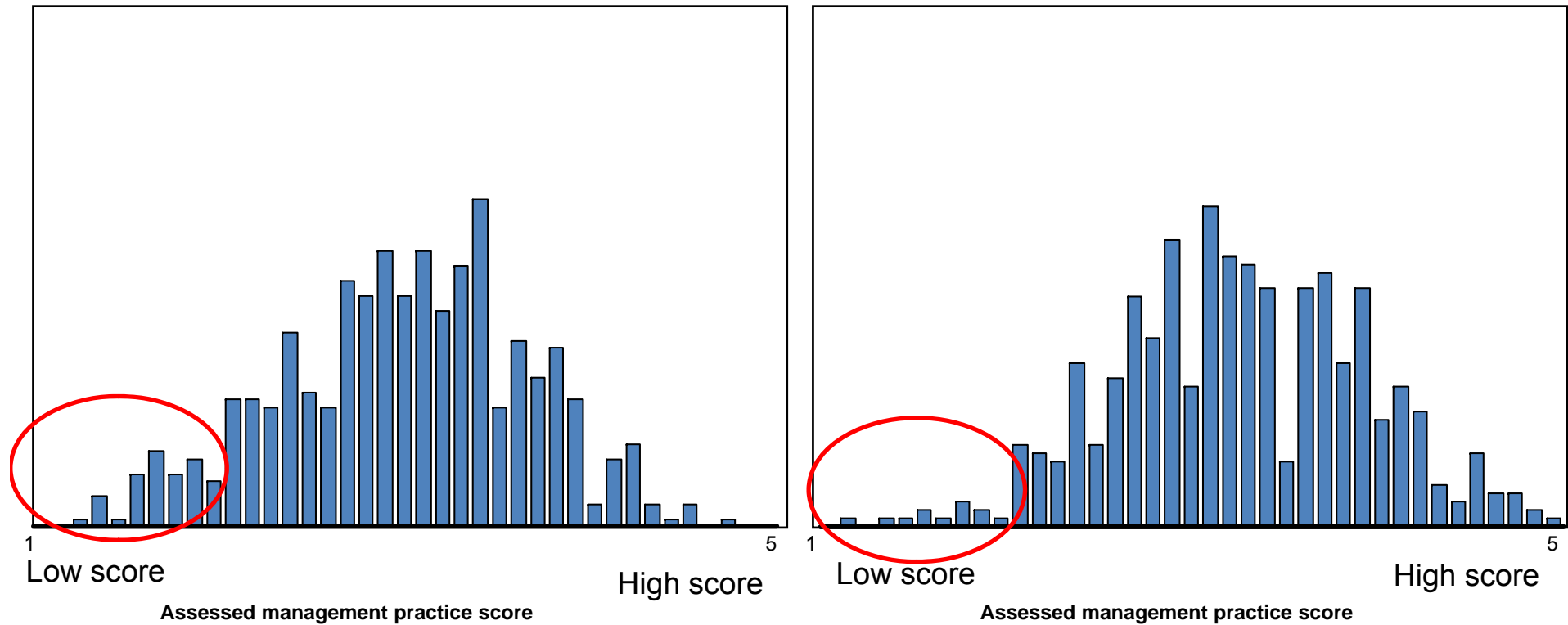
MUCH OF THE CROSS-COUNTRY DIFFERENCES DUE TO THE “LOWER TAIL”

Distribution of firm level management practice scores



MUCH OF THE CROSS-COUNTRY DIFFERENCES DUE TO THE “LOWER TAIL”

Distribution of firm level management practice scores



COMPETITION & MODELS OF MANAGEMENT

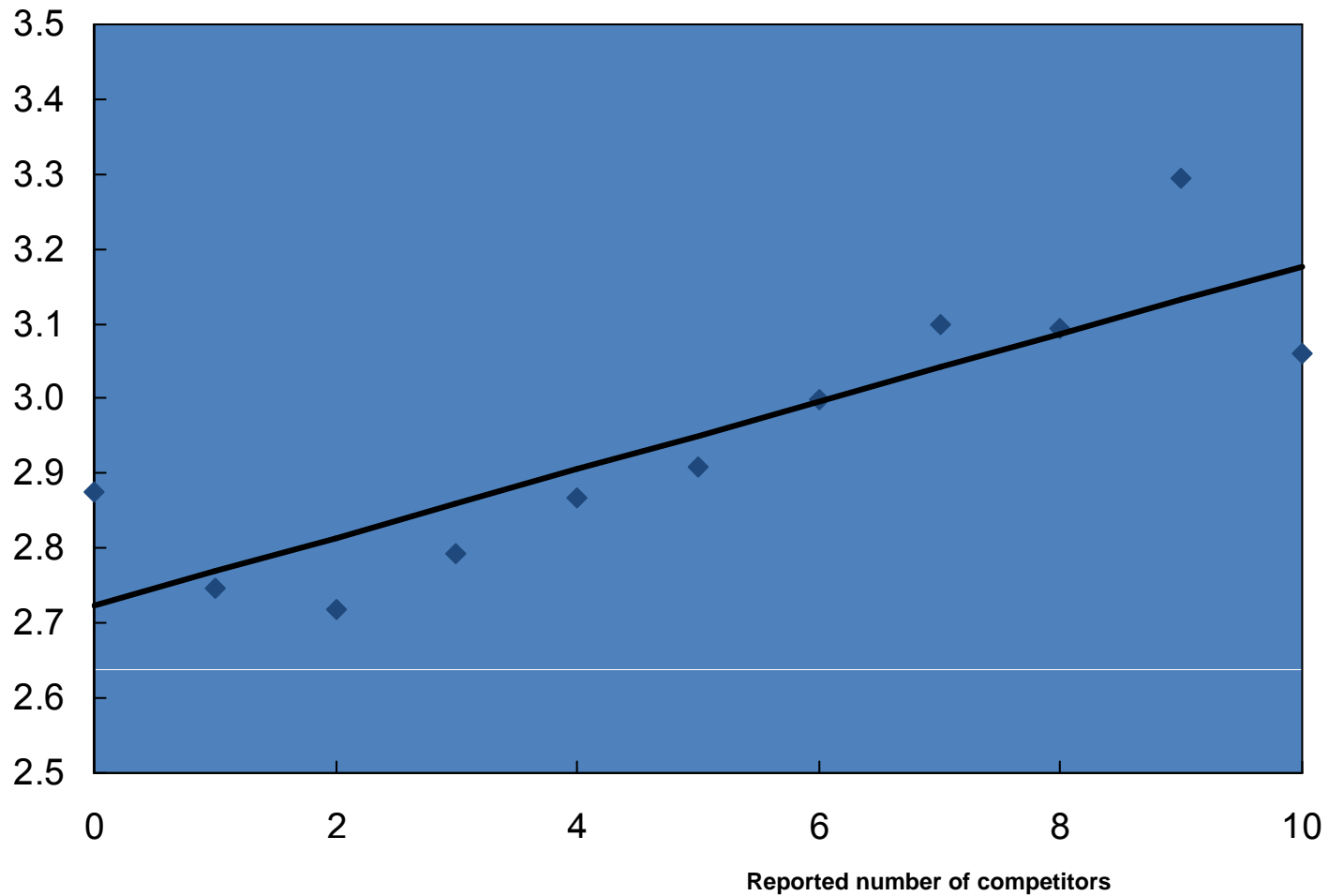
Various ways that competition may influence management

- Selection – badly run firms more likely to exit
- Effort – forces badly run firms to try harder to survive

We find competition is strongly linked with better management through a mixture of selection & effort

COMPETITION IS ASSOCIATED WITH BETTER MANAGEMENT PRACTICES

Assessed management practice score

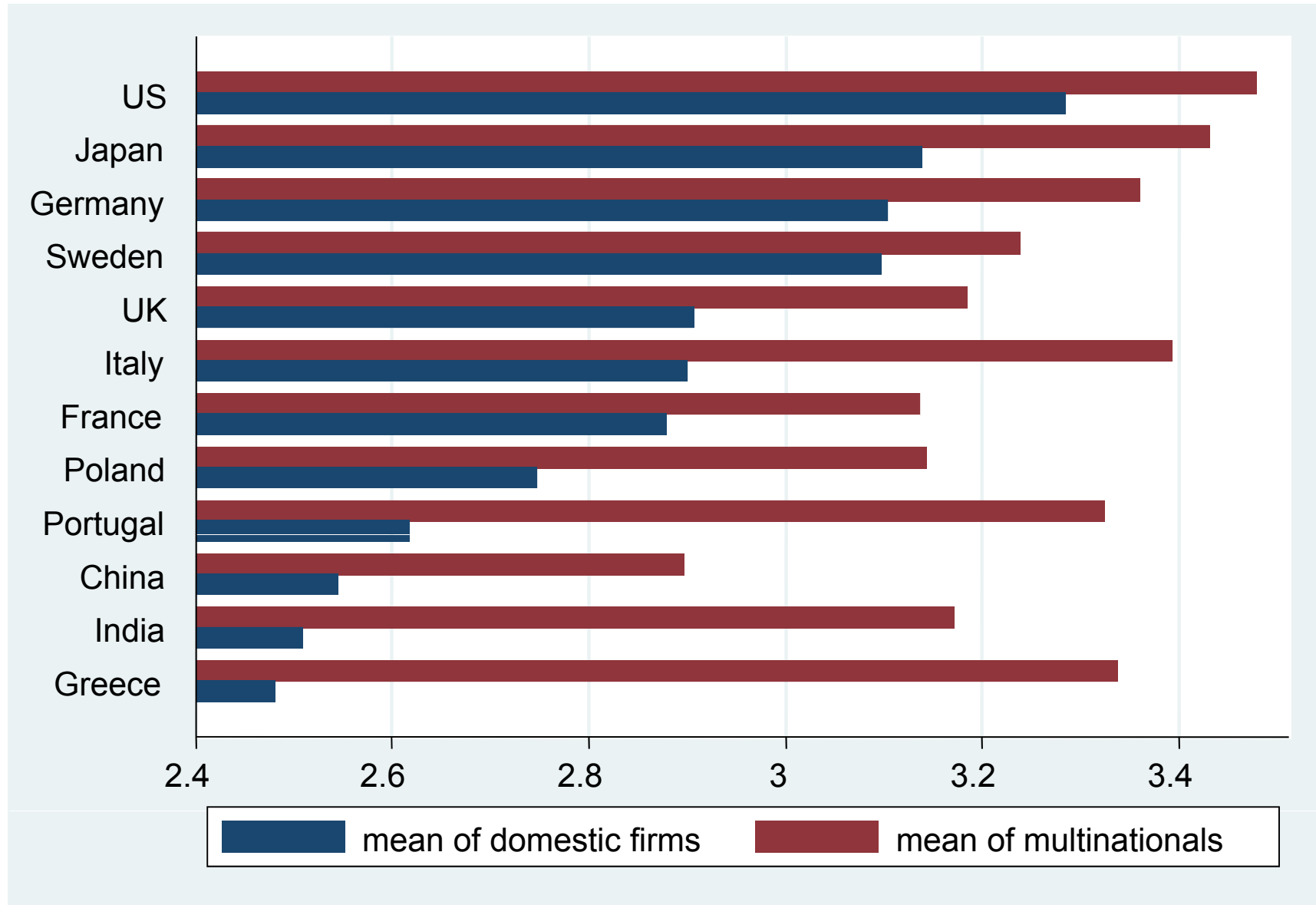


FAMILY FIRMS (OWNED WITH ELDEST SON AS CEO) AND GOVERNMENT FIRMS HAVE WORST MANAGEMENT

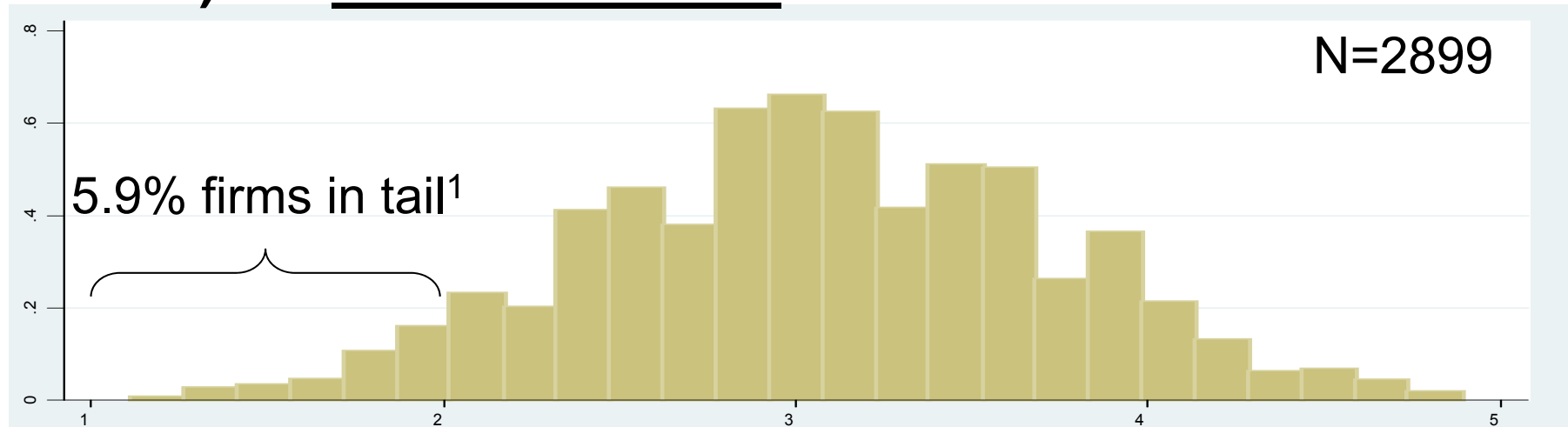


Note: Sample of 4,221 medium-sized manufacturing firms. The bottom bar-chart only covers the 3696 firms which have been in the same ownership for the last 3 years. The "Other" category includes venture capital, joint-ventures, charitable foundations and unknown ownership.

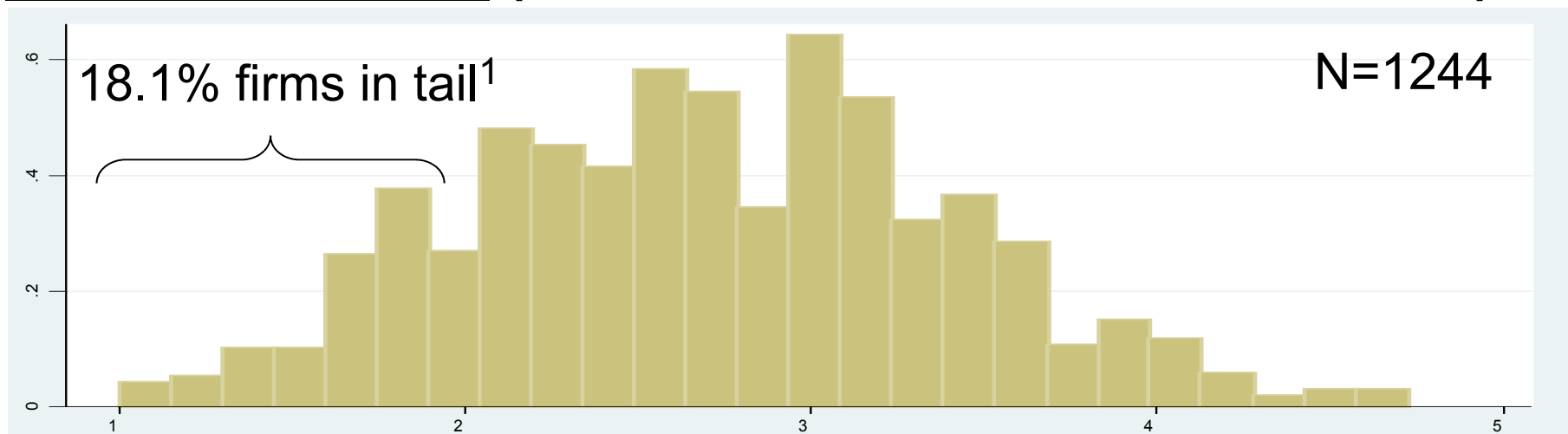
MULTINATIONALS APPEAR TO BE WELL MANAGED IN ALL COUNTRIES



“GOOD DOMESTIC” (MANY COMPETITORS, NOT PG FAMILY) OR MULTINATIONAL



“BAD DOMESTIC” (FEW COMPETITORS OR PG FAMILY)



¹ Tail defined as a score ≤ 2 . In the whole sample 9.6% of firms are in the tail.

SUMMARY OF FACTORS DRIVING MANAGEMENT QUALITY

- Product market competition
- Multinationals, especially from high performing countries like US
- Meritocratic CEO selection
 - These three things account for about 50% of the variation across firms and across countries

**** BUT HOW CAN WE EXPLAIN WHY THINGS GOT WORSE AFTER 1995?**

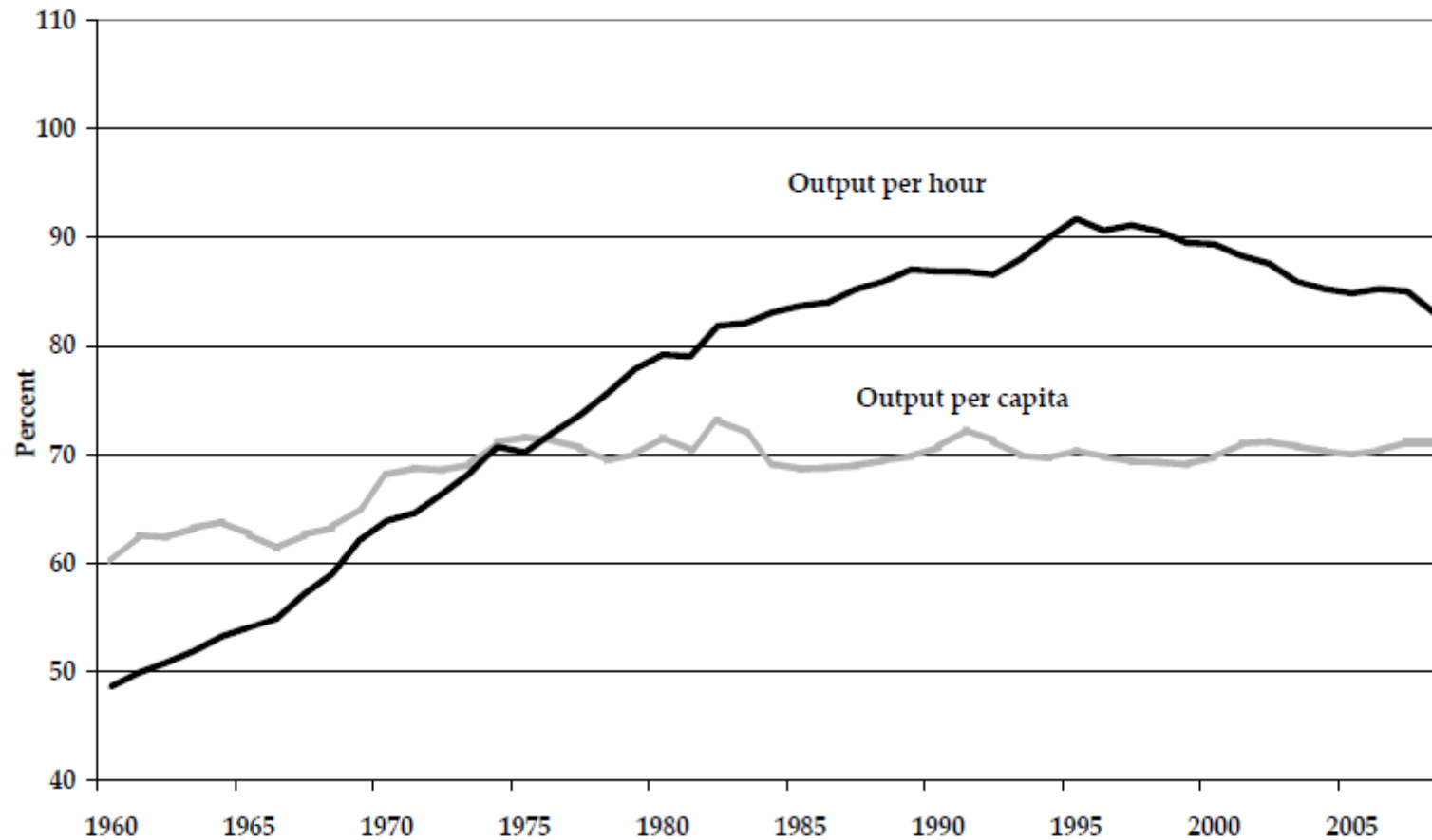
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THE US PRODUCTIVITY MIRACLE HASN'T BEEN SEEN IN EU: GDP/HOUR EU-15 RELATIVE TO THE US, 1960-2008



Source: Gordon (2010) based on EU-KLEMS

RECENT TRENDS: THE US “PRODUCTIVITY MIRACLE”

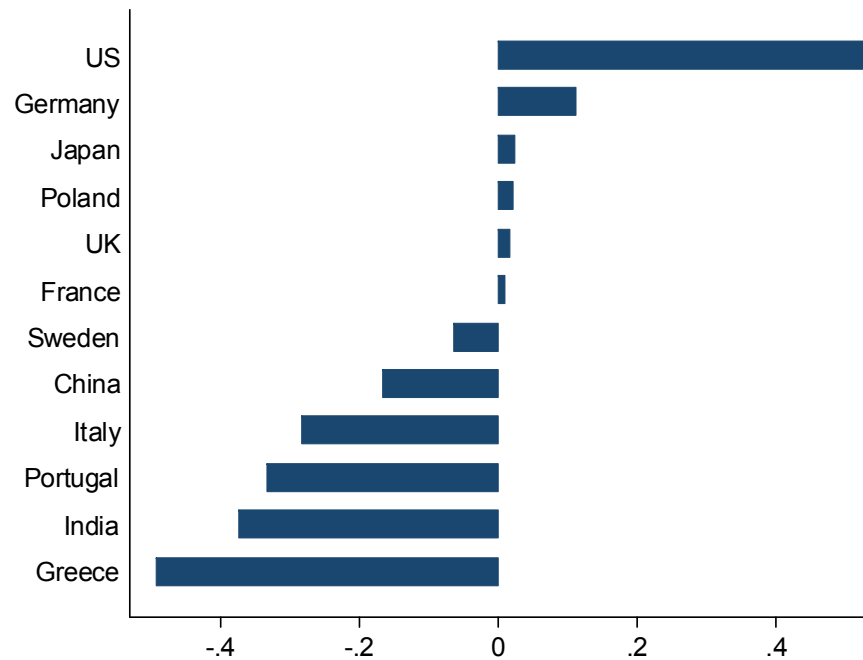
- From mid-1990s, US productivity “miracle”
 - Huge fall in quality adjusted ICT prices (~30% p.a. After 1995 compared to ~15% before)
 - Strong productivity growth in sectors that produced and used ICT intensively (e.g. Retail & wholesale) in US
 - EU ICT-using sectors did not experience this productivity growth despite ubiquity of ICT

ADOPTION OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT)

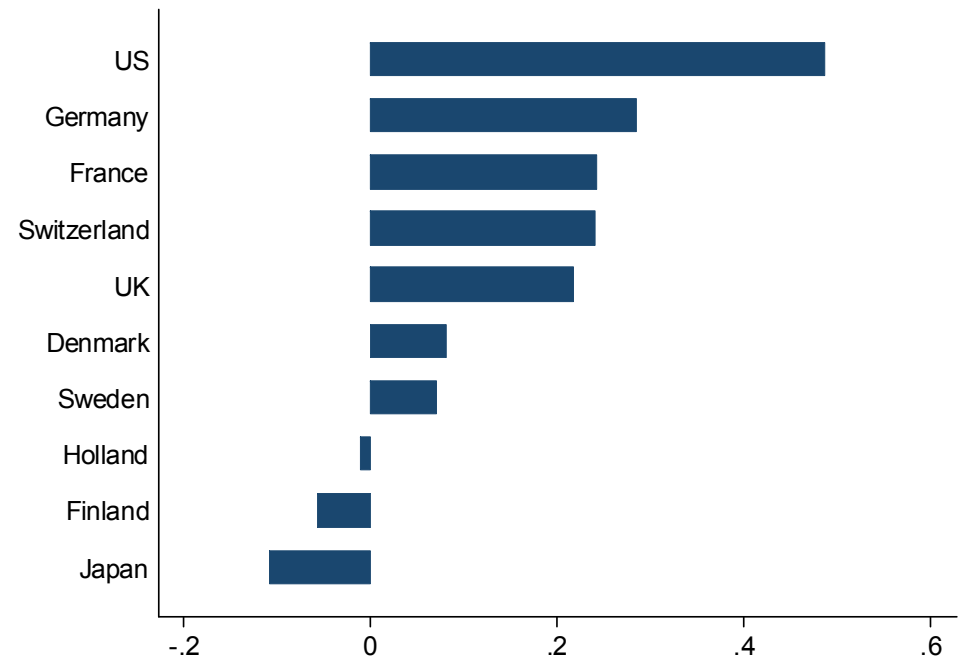
- **Bloom, Sadun and Van Reenen (2007)**
 - In Europe, US multinationals have higher productivity than European multinationals
 - US firms spend more on IT, but main reason is they get more productivity from every Euro spent. Suggests that management/organization important.
 - Results driven by same sectors driving the US productivity miracle (heavy IT users like retail & wholesale)
 - Even true for takeovers of plants

US MULTINATIONALS TRANSPLANT THEIR PRACTICES TO THEIR SUBSIDIARIES IN EUROPE

A. People management z-scores, all firms by country of location



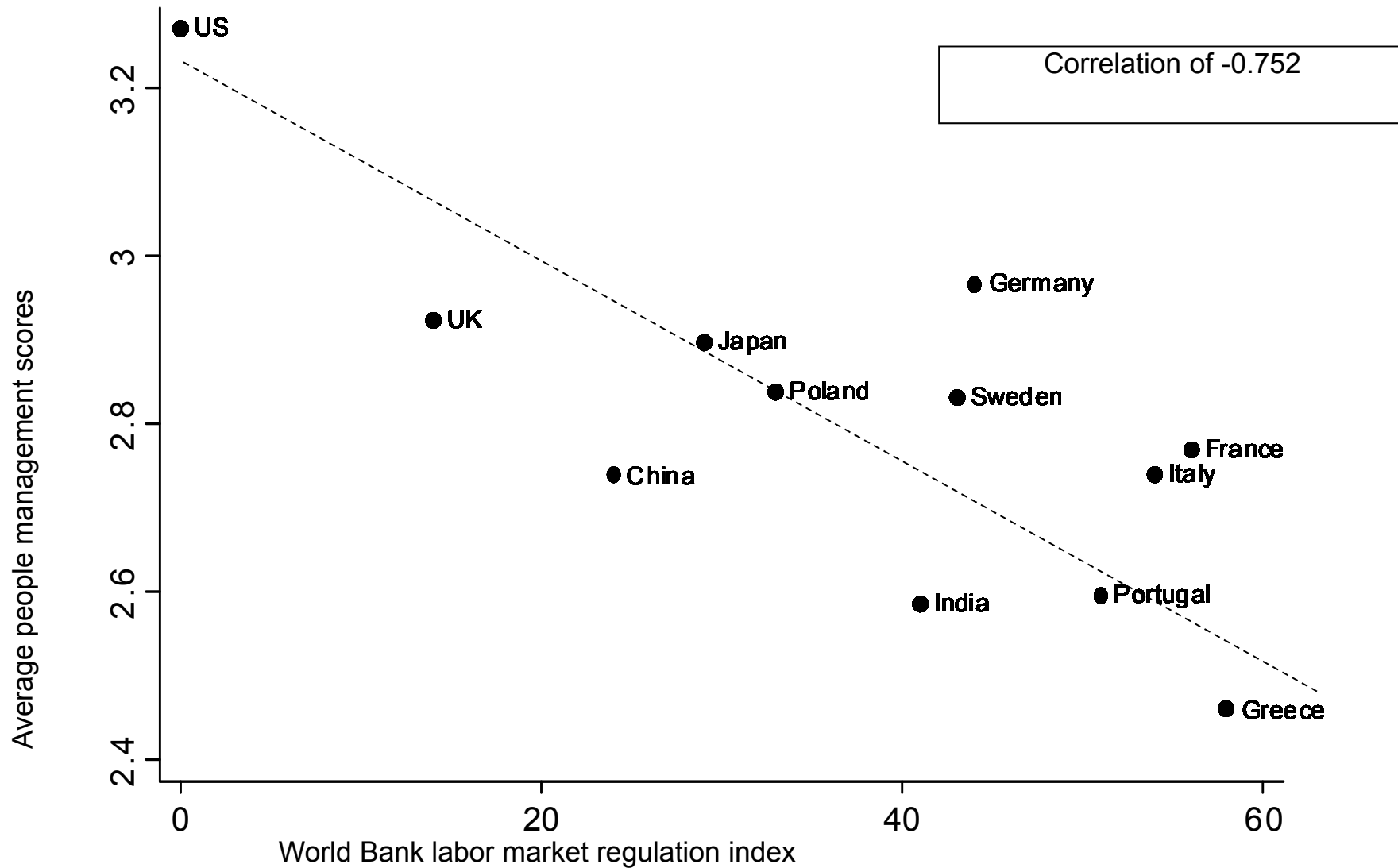
B. People management z-scores, multinational subsidiaries



Source: Bloom, Sadun and Van Reenen (2007)

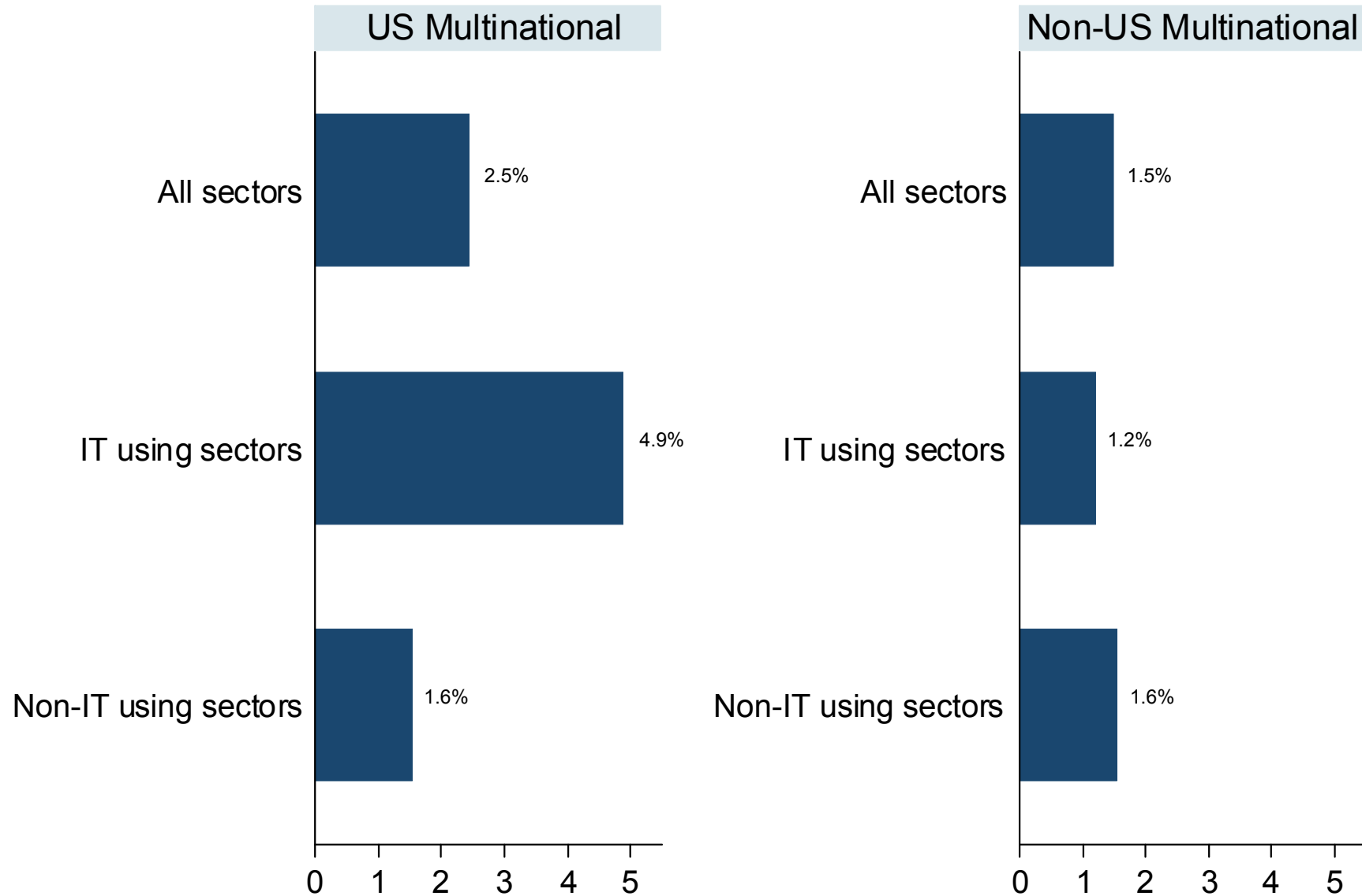
Note: “People management” is average z-score for 4 management practices covering “Managing human capital”, “Rewarding high performance”, “Removing poor performers” and “Promoting high performers”. 4,003 firms sorted according to country of location. Figure B is 631 multinational subsidiaries located in the EU

LABOUR MARKET REGULATION ARE NEGATIVELY CORRELATED WITH PEOPLE MANAGEMENT...



US MULTINATIONALS IN EUROPE ALSO HAD AN IT PRODUCTIVITY MIRACLE

% increase in output from a doubling of IT capital (data from 1995 to 2003)



Notes: Estimated on a sample of 21,746 observation on 7,121 establishments in the UK across manufacturing and services.

IMPLICATIONS OF THIS ANALYSIS

- Across 7 EU countries we can show that all of US multinational IT advantage is due to tougher people management
- About half of the EU-US gap in productivity growth since 1995 is related to IT & management
- So the same policies which help to improve management will also enable EU to start catching up process again

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POLICY IMPLICATIONS I – PRODUCT MARKET COMPETITION

- Structural problems in markets (e.g. less competition) has been a particular handicap over last decade because of US advantage in times of big changes
- There have been some reforms in the right direction....
 - Enlargement creates more competition
 - Competition policy (e.g. blocking state aid distortions)
- But **threats**
 - Services Directive stalled “what has competition ever done for Europe?” Answer: A LOT!
 - Fears of globalisation as an excuse for protectionism
 - Stalling of trade liberalisation (fear of China)

POLICY IMPLICATIONS II

- Policies to improve productivity/management:
- Openness to foreign investment
 - Directive on Alternative Investment Funds discourages
- Meritocratic CEO appointment not eldest sons
 - e.g. Estate tax zero for family firms in UK, creates distortion to promote inefficient family-run firms
- Labour market flexibility
- Innovation policies
 - Community Patent
 - Universities

HOW DOES CREATIVE DESTRUCTION DIFFER IN EU COMPARED TO US?

- Entry rates not so different.....EU problem is post-entry growth
- More efficient EU firms grow more slowly than their US counterparts
- Some Reasons:
 - Product market competition weaker (e.g. barriers to trade across Member States in services, national regulations, etc)
 - Protection of inefficient firms through subsidies, bail-outs, etc.
 - Labour market and other regulations that kick in when a firm grows beyond a certain size threshold
 - Resistance to cross-border takeovers that are a key way of rationalising production

CONCLUSIONS

- Recession focuses need to raise productivity in order to grow
- Great potential for EU growth given large EU-US productivity gap
 - Product markets
 - Labour markets
 - Governance
 - Trade & FDI
- Related to innovation in conventional technology but also to management practices
- China and emerging economies an opportunity more than a threat

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:

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:

India is such an interesting place...

Plant Manager: “Modern manufacturing? Yes, I have heard about it, but it doesn’t make any sense at all, does it?”

Interviewer: “How do you identify your star performers?”

Manager: “This is India, everyone thinks he is a star performer!”

Interviewer: “How do you keep your top performers?”

Manager: “I am a star performer and I want to leave!”

MY FAVOURITE QUOTES:

Staff rewards the American way

Production Manager: “For example, if an employee suggests a company slogan, and his name is used, he gets a TV.
If he is employee of the month, he gets a parking space”

Staff retention the UK way

Interviewer: “How would you persuade your top performers to stay?”
UK Chairman: “Sex is a great thing! If the employee finds a new girlfriend somewhere else, I can’t do anything!”

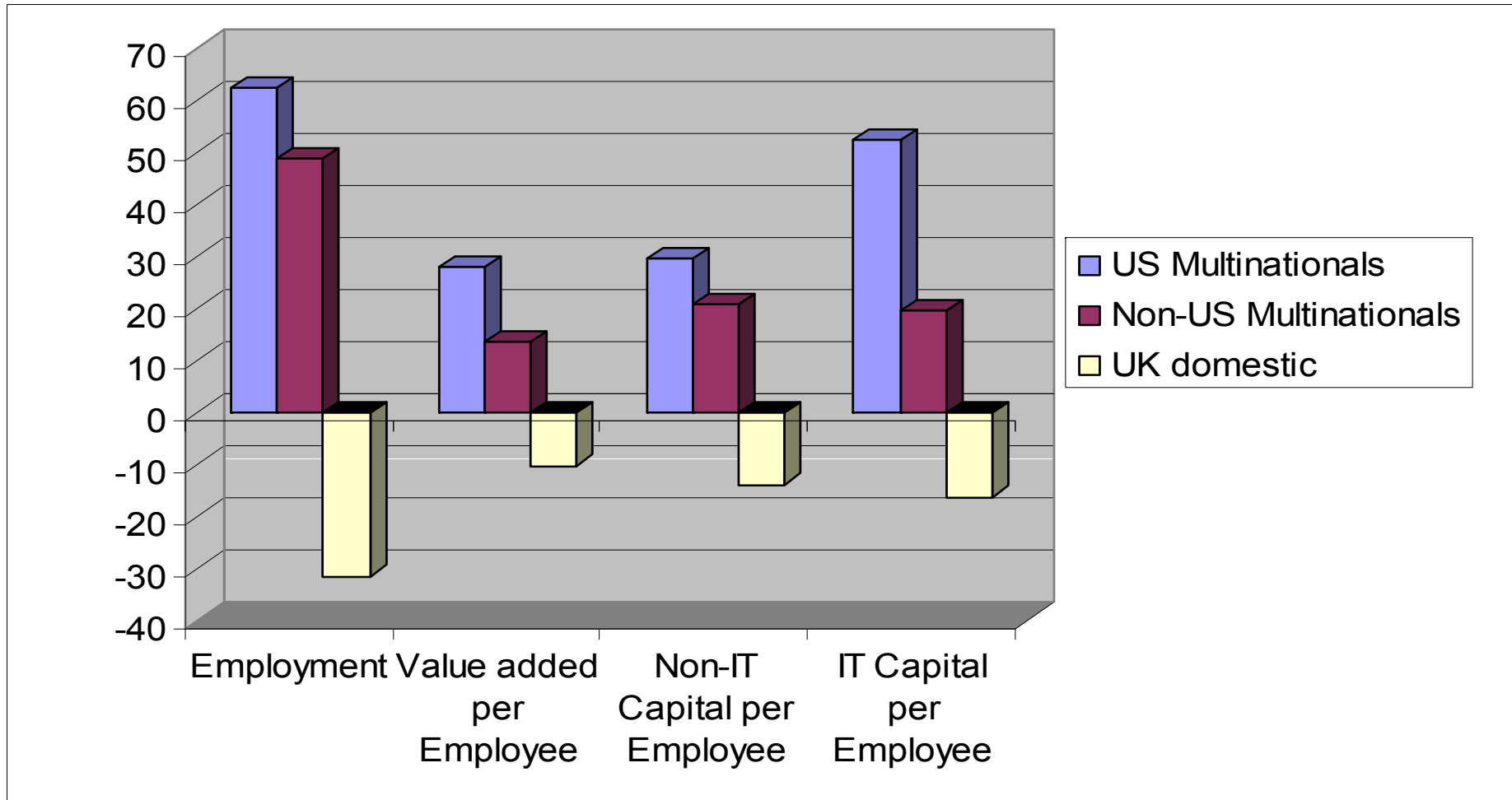
Further Reading

1. Bloom and Van Reenen (2007) "Measuring and Explaining Management practices across firms and nations" Forthcoming, *Quarterly Journal of Economics*, Centre for Economic Performance Discussion Paper No. 716 <http://cep.lse.ac.uk/pubs/download/dp0716.pdf>
2. Bloom, Sadun and Van Reenen (2007) "Americans do IT better" Centre for Economic Performance Discussion Paper No. 788 <http://cep.lse.ac.uk/pubs/download/dp0788.pdf>
3. Lisbon agenda http://cep.lse.ac.uk/briefings/pa_lisbon_agenda.pdf
4. UK productivity improvements : http://cep.lse.ac.uk/briefings/pa_uk_productivity.pdf

BACK-UP

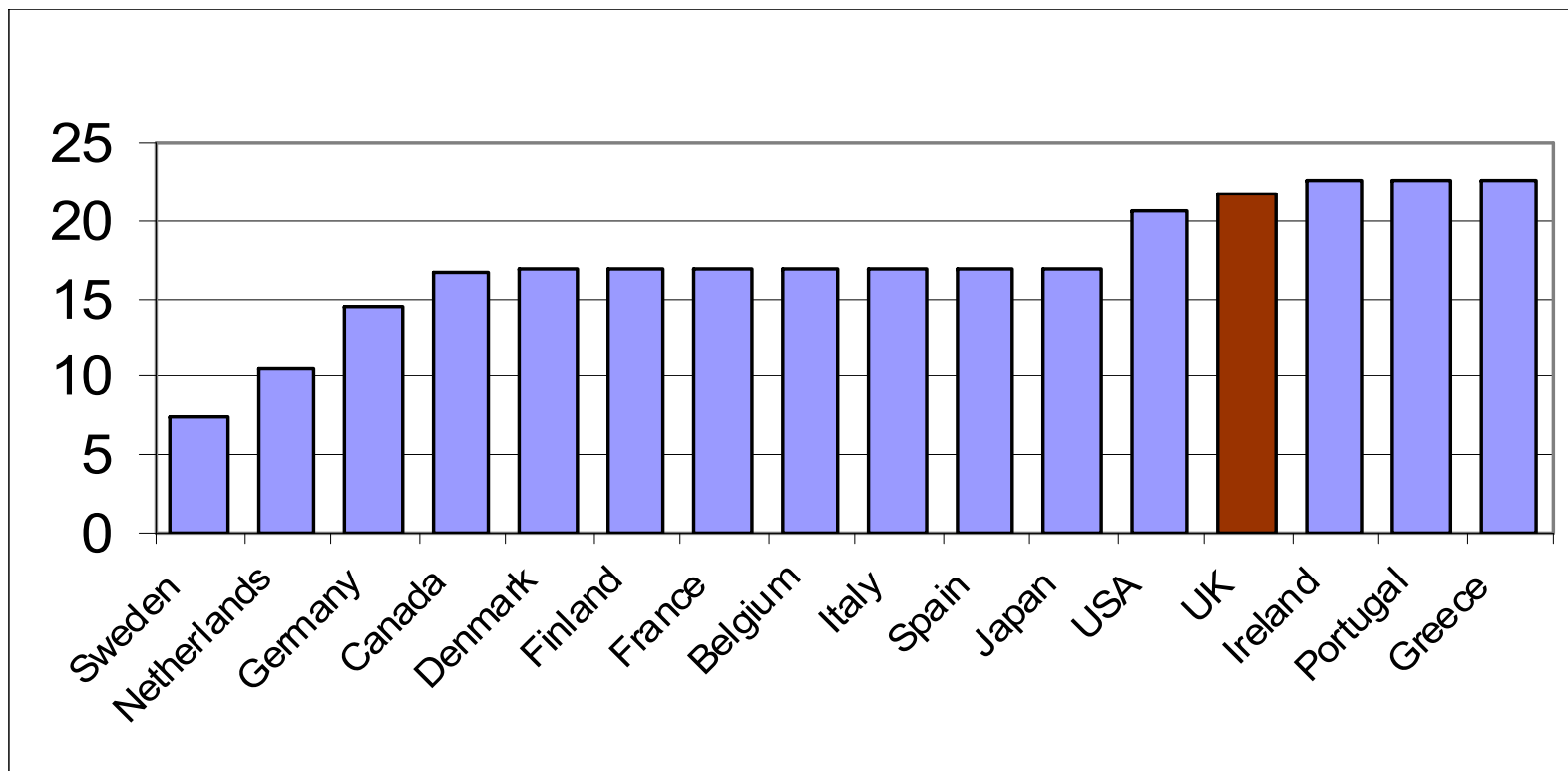
Raw data shows US multinationals are particularly different in terms of IT use

% difference from 3 digit industry mean in 2001



Observations: 576 US; 2228 other MNE; 4770 Domestic UK, Bloom, Sadun and Van Reenen (2007)

Functionally illiterate (% aged 16-65, 1995)



source HDR 1998

HOWEVER, MANAGEMENT PRACTICES VARY

MUCH MORE WITHIN THAN ACROSS COUNTRIES

Distribution of firm level management practice scores – by country

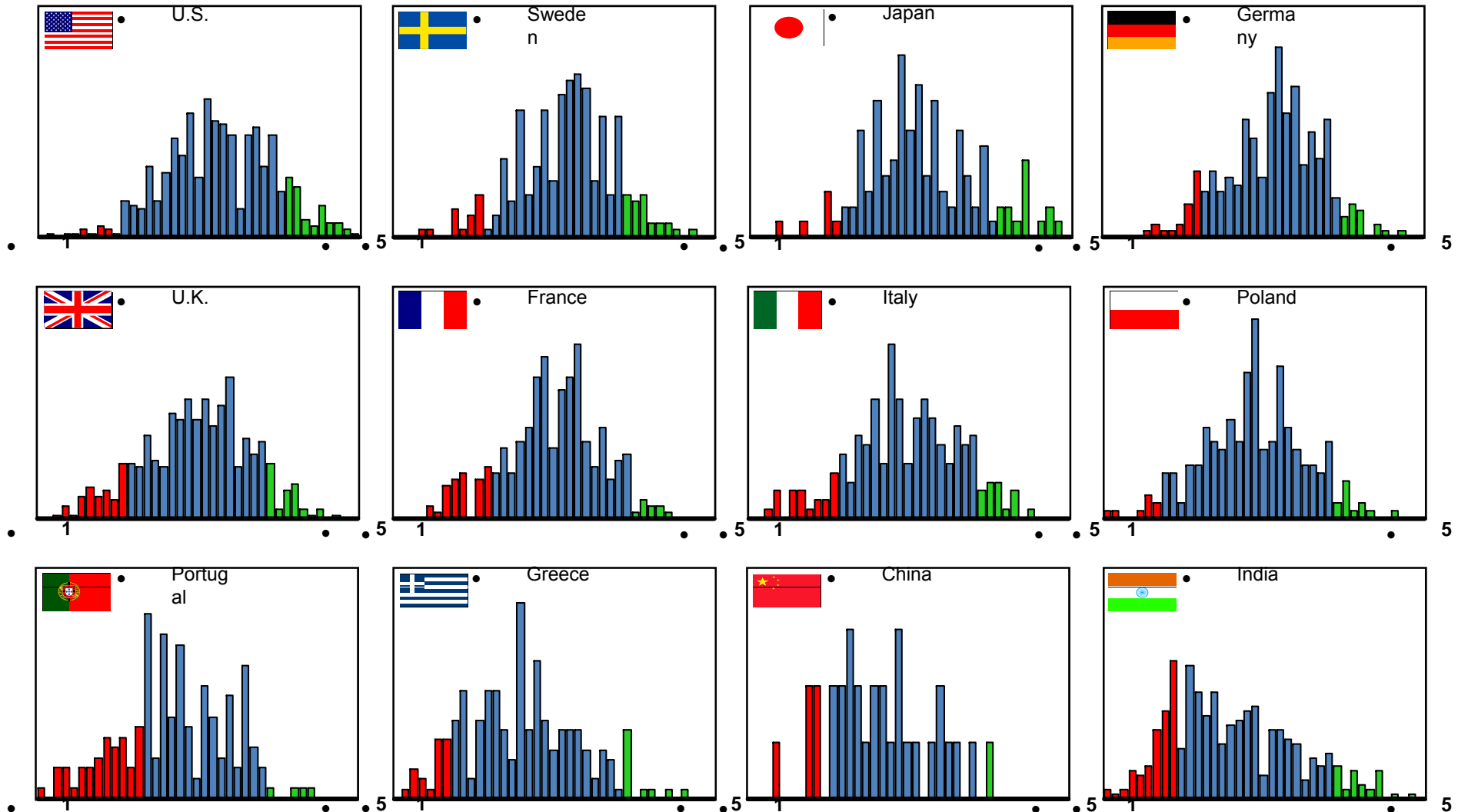
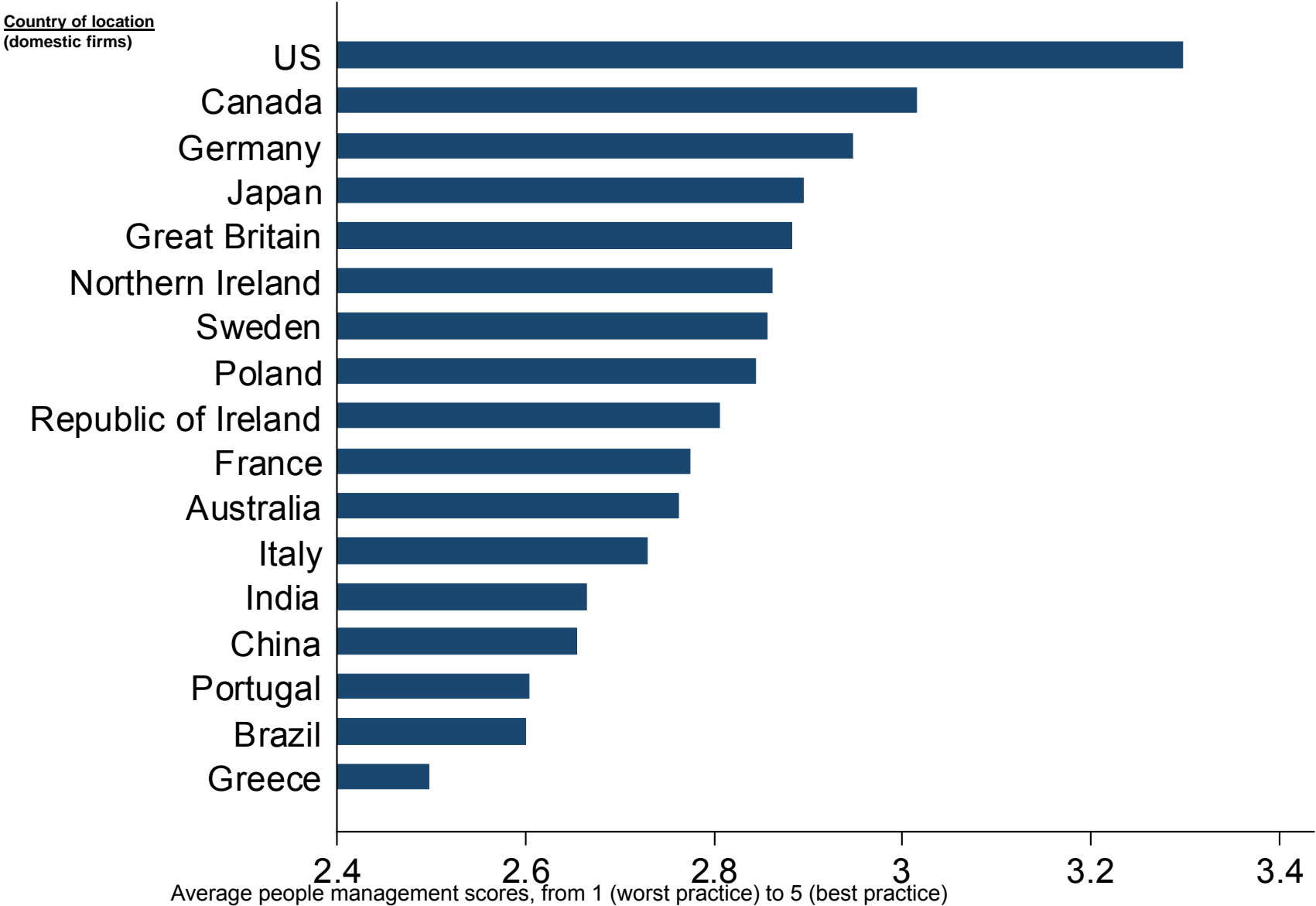


Figure 3: US firms seem to have particularly tough people management

Average people management score in 5850 medium sized (100 to 5000 employee) manufacturing firms. People management scored on hiring, firing, pay and promotions.

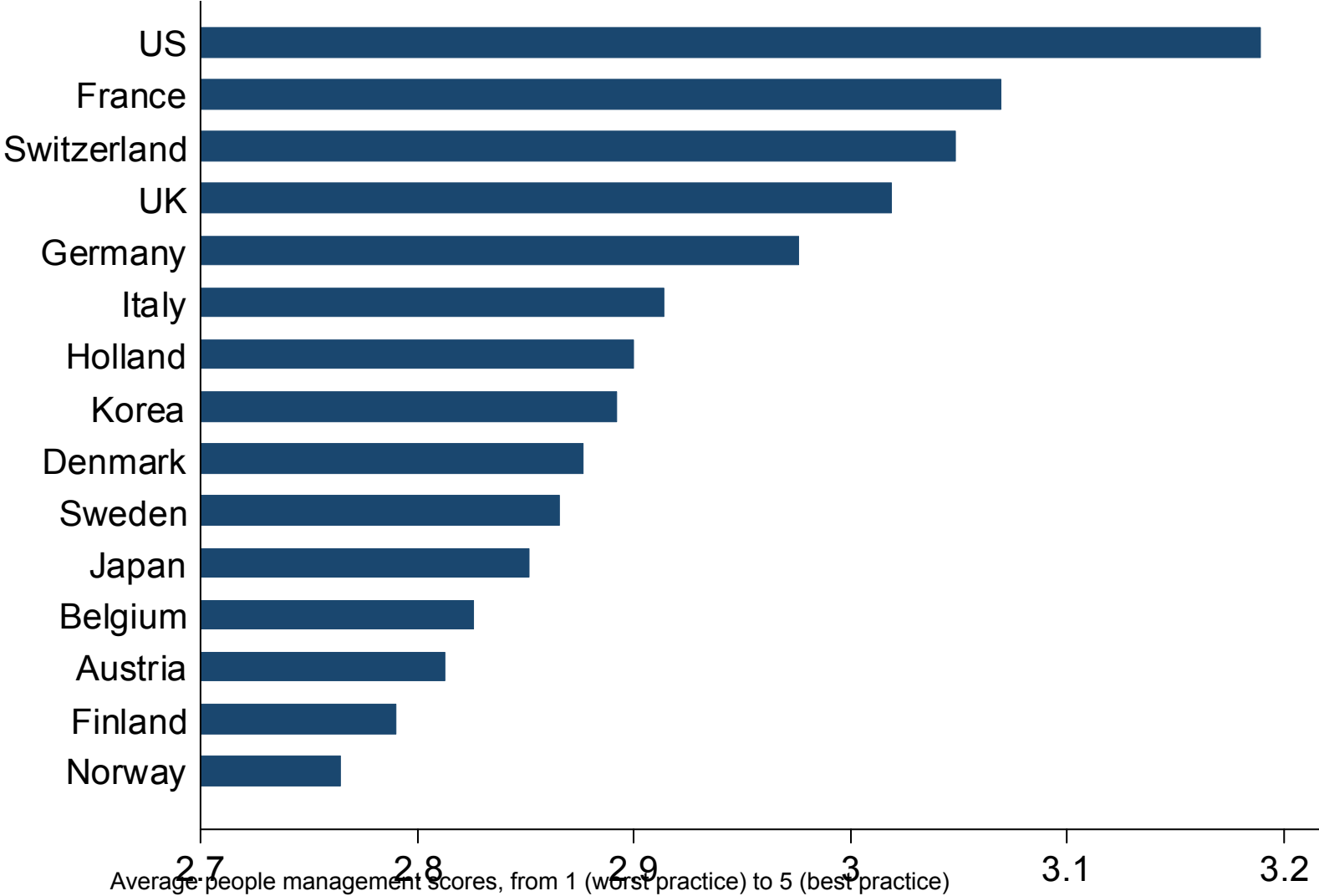


Notes: Data collected using double-blind management surveys. High scores indicate strong performance incentives.

Figure 4: US multinationals take their management practices abroad

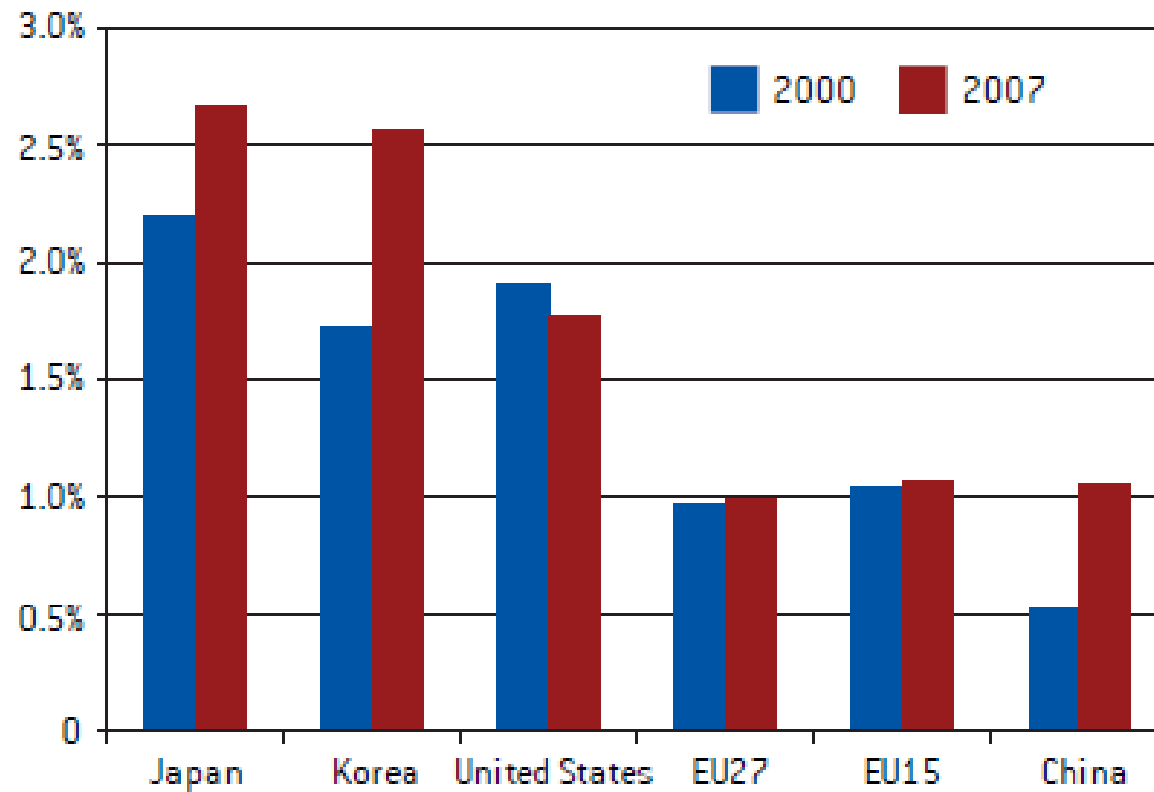
Average people management scores in 1,059 medium sized (100 to 5000 employee) manufacturing foreign multinationals located in Europe by country of ownership.

Country of ownership
(multinationals)



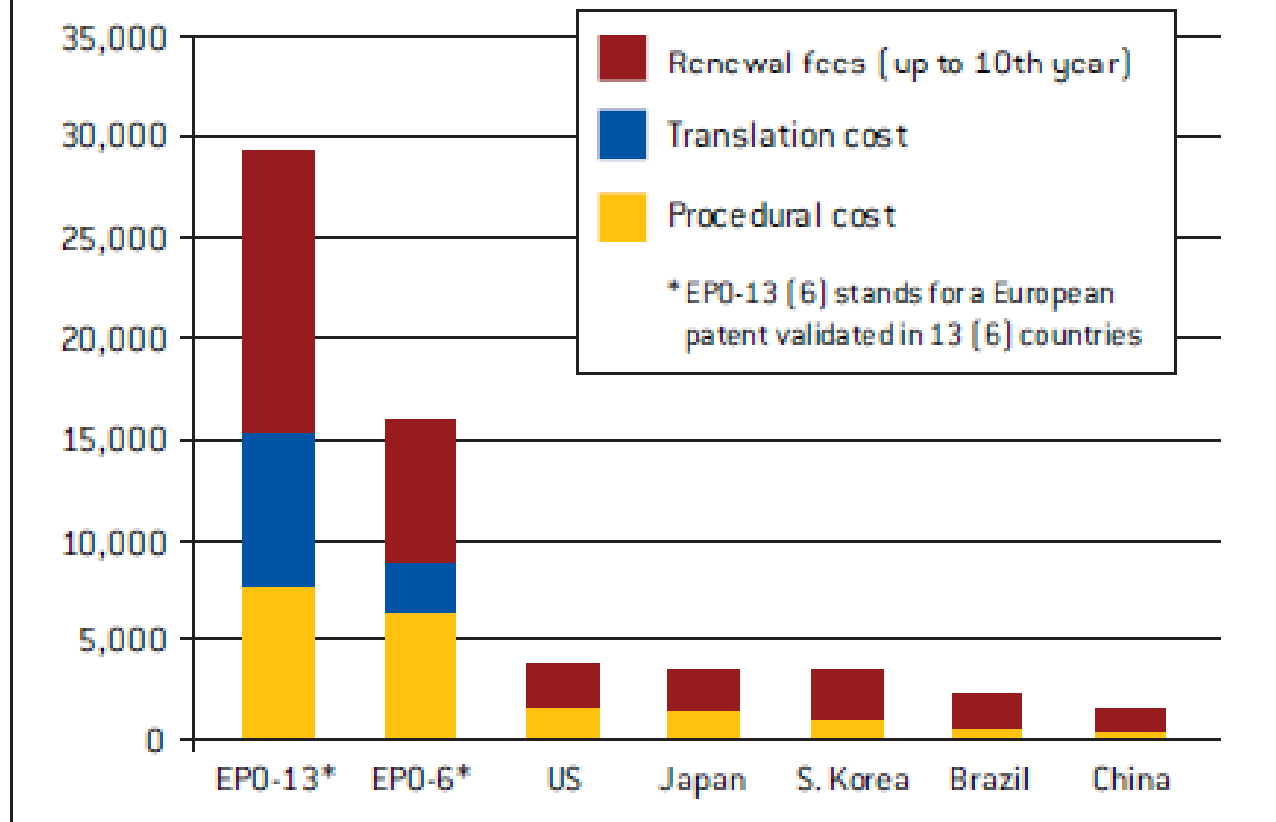
Notes: Data collected using double-blind management surveys. High scores indicate strong performance incentives. Only multinationals reported here.

BUSINESS R&D (GERD) AS A % OF GDP



Source: OECD, MSTI

Cost of patenting in major economies, €s



Source: Bruegel based on van Pottelsberghe and Mejer (2008) and van Pottelsberghe and François (2009). Figures refer to 2008.

ADDITIONAL CONTROLS FOR BIAS & NOISE

8 INTERVIEWEE CONTROLS

- Gender, seniority, tenure in post, tenure in firm, countries worked in, foreign, worked in US, plant location, reliability score

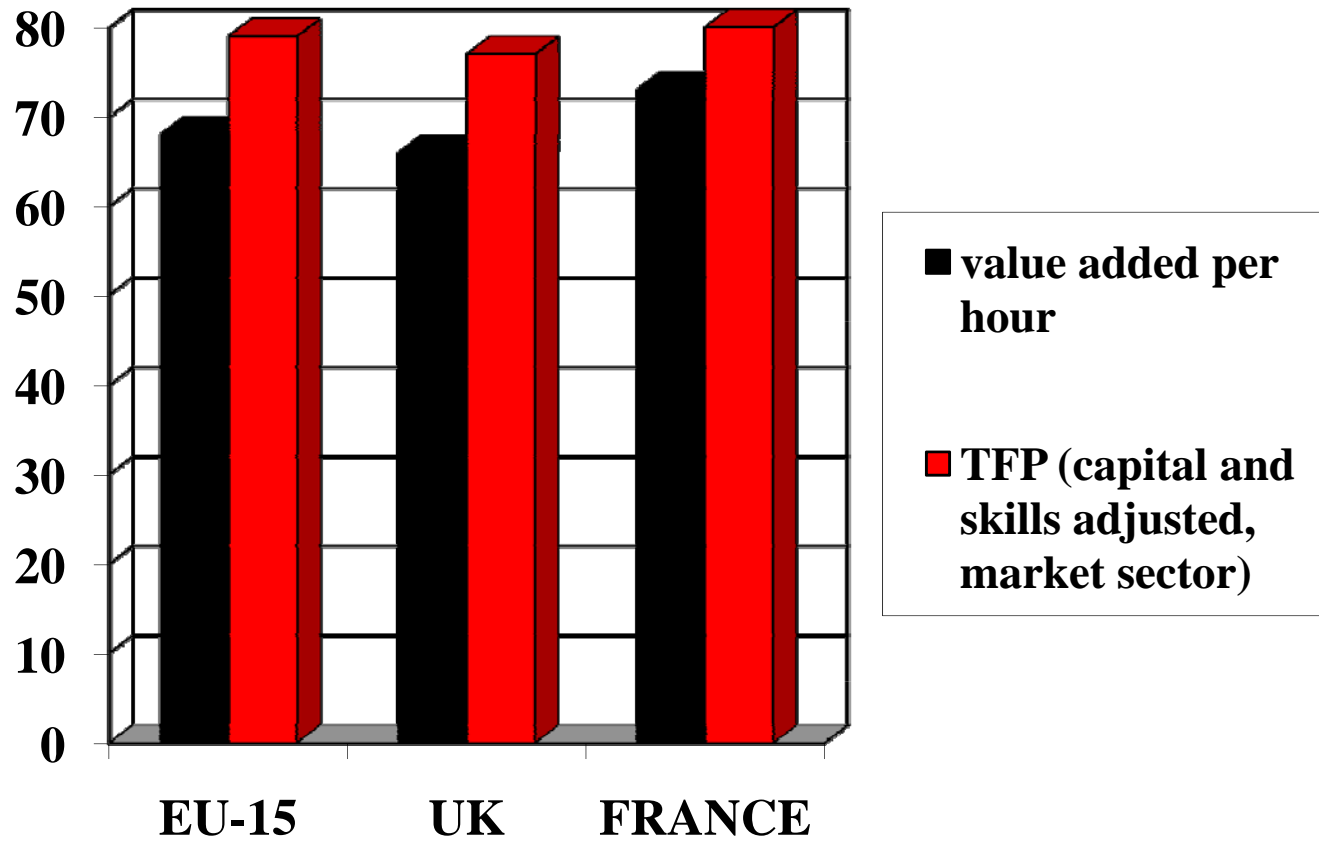
3 INTERVIEWER CONTROLS

- Set of analyst dummies, cumulative interviews run, prior firm contacts

5 TIME CONTROLS

- Day of the week, time of day (interviewer), time of the day (interviewee), duration of interview, days from project start

EXAMPLE: PRODUCTIVITY GAP (UK=100), 2005

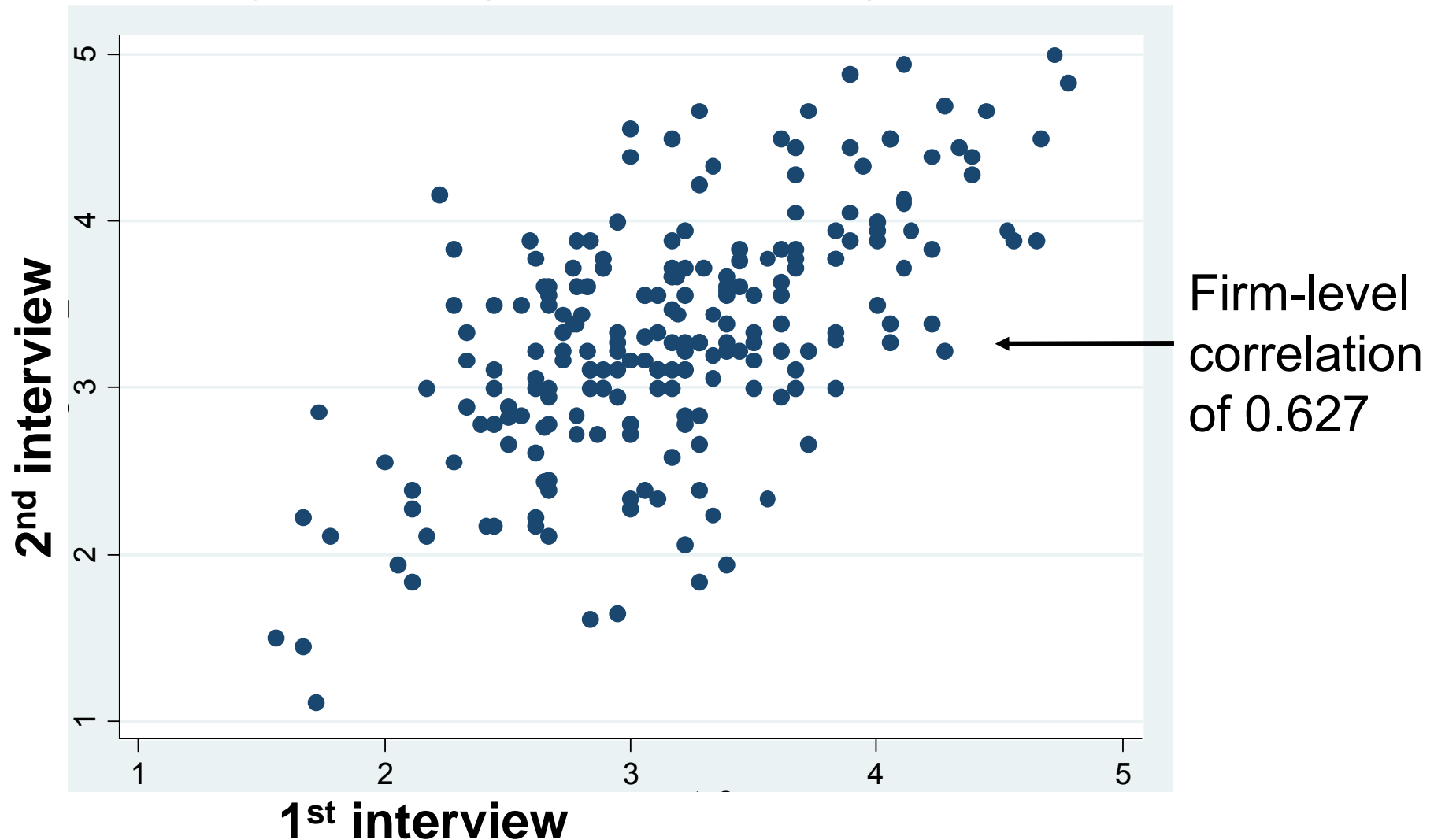


Source: Inklaar and Timmer (2008)

INTERVAL VALIDATION OF THE SCORING

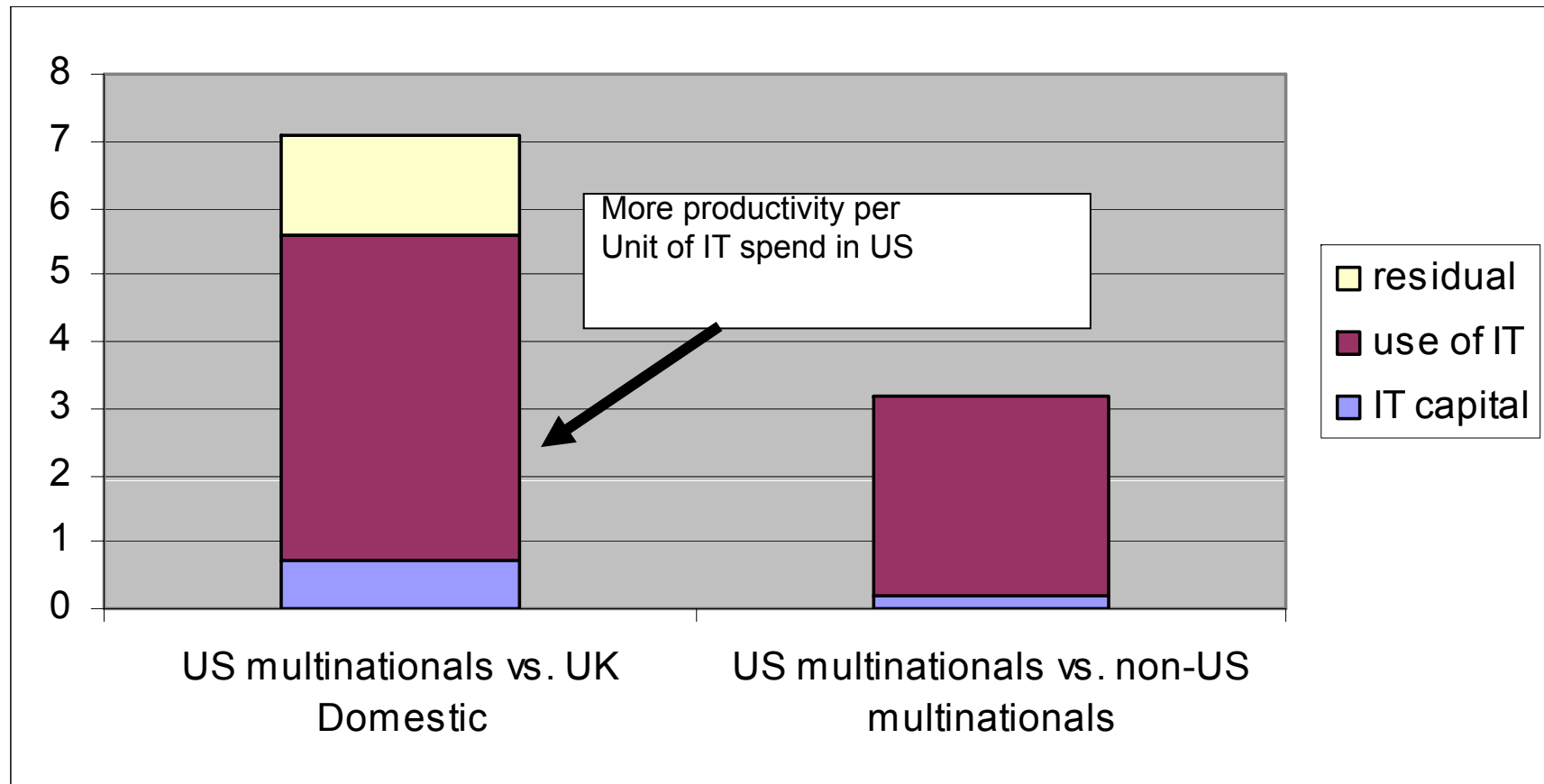
Re-interviewed 222 firms with different interviewers & managers

Firm average scores (over 18 question)



Productivity gap between US multinationals and EU multinationals mainly due to better use of ICT. Not simply greater U.S. spend on IT.

----Better management and organization in US firms?



Notes: Estimated percentage difference in labour productivity after controlling for materials, non-IT Capital, age, industry, multi-plant firm, region.

Source: Derived from Bloom, Sadun and Van Reenen (2007), Table 3, ONS Census ABI data

PEOPLE – e.g. *DEALING WITH POOR PERFORMERS*

Score	(1): Poor performers are rarely removed from their positions	(3) Suspected poor performers stay in a position for a few years before action is taken	(5): We move poor performers out of the hospital/department or to less critical roles as soon as a weakness is identified
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If you had an employee who could not do his job, what would you do? Could you give me a recent example? How long would underperformance be tolerated? Do some individuals always just manage to avoid being fixed/fired?

DIFFERENCE IN PRODUCTIVITY LEVELS AND COMPONENTS BETWEEN US AND EU: MARKET SECTOR, 2005

	US	EU-15	UK	Denmark	France	Germany
Value added/hour	100	68	66	78	73	79
Capital services/hour	100	86	80	123	81	102
ICT cap services/hour	100	51	78	102	44	62
Labour services/hour	100	89	90	82	98	91
MFP	100	79	77	84	80	85

Source: Inklaar and Timmer (2008) "GGDC Productivity Level Database: International Comparisons of Outputs, Inputs and Productivity at the Industry level" Working Paper N. 40

CREATIVE DESTRUCTION: ENTRY AND GROWTH

- Effect of IT revolution: researchers have large datasets following millions of firms over time
- **Key Findings:**
 - Huge and persistent variation in the productivity of firms even after controlling for many factors like capital and skills
 - *Creative Destruction* is a key to aggregate productivity growth: efficient firms grow, inefficient firms shrink and exit
 - Examples
 - trade liberalisation
 - Privatization
 - Competition policy
 - Lowering barriers to entry