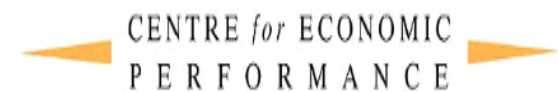


Management, Organization and Productivity

John Van Reenen, LSE & CEP
Nicholas Bloom, Stanford & CEP

Shanghai, August 2010



INTRODUCTION

- Explosion of empirical work on firms & plant performance in last 1-2 decades (IT and opening of National Statistical Agencies).
- Heterogeneity of productivity a first order economic fact
- Related to management and organization of firms
 - Requires new data collection
 - Link to economics of organization
- Management is, in part, a “technology”
 - Determinants of management practices
 - Effects on productivity
- Many implications for economic theory and policy

Facts on productivity & management

Theories

Measuring Management

Explaining Management

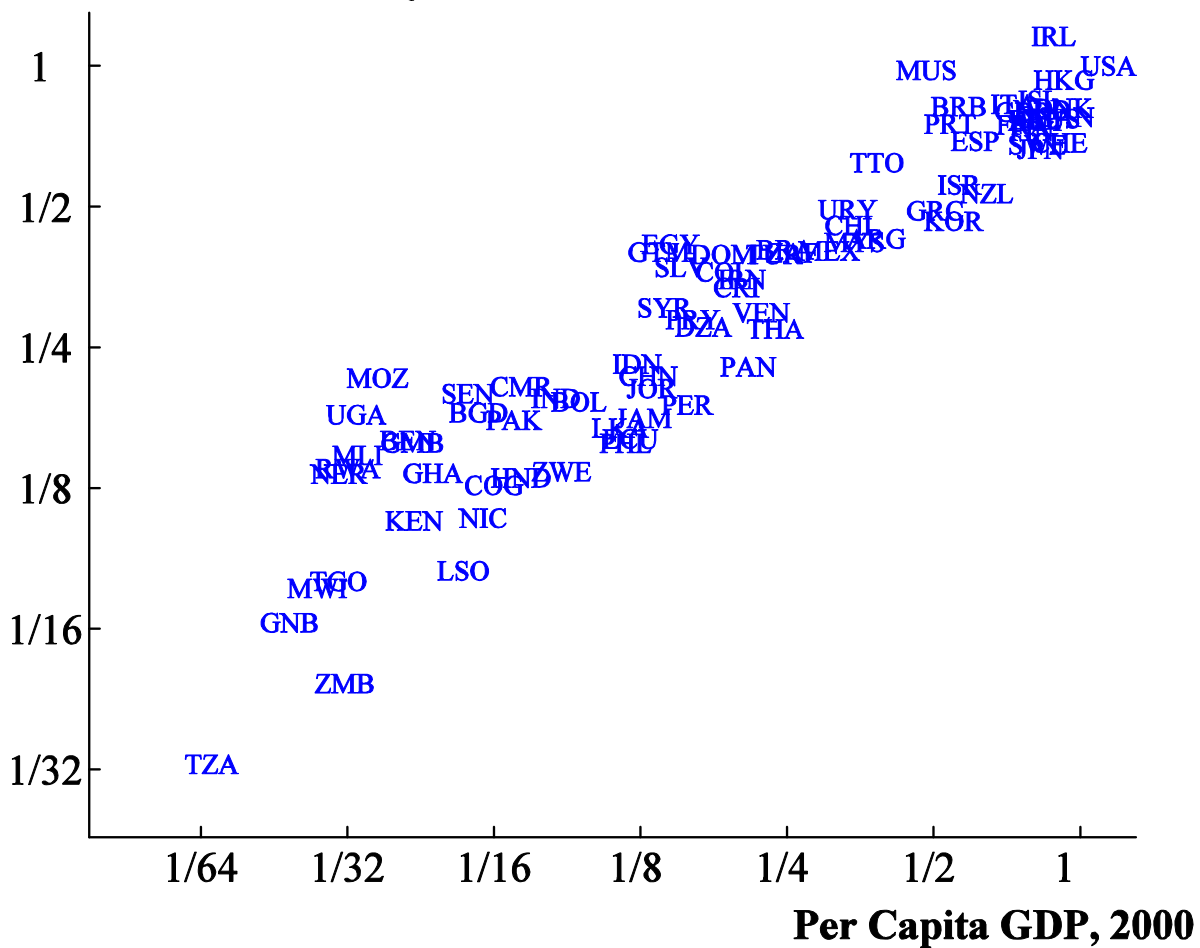
Effects of Management on productivity

SOME FACTS ON AGGREGATE PRODUCTIVITY

- Aggregate growth a Total Factor Productivity (TFP) story (Solow)
- About $\frac{1}{2}$ of country variation in GDP per capita TFP related (Jones and Romer, 2009)

LARGE INCOME & TFP DIFFERENCES BETWEEN COUNTRIES

Total Factor Productivity, 2000

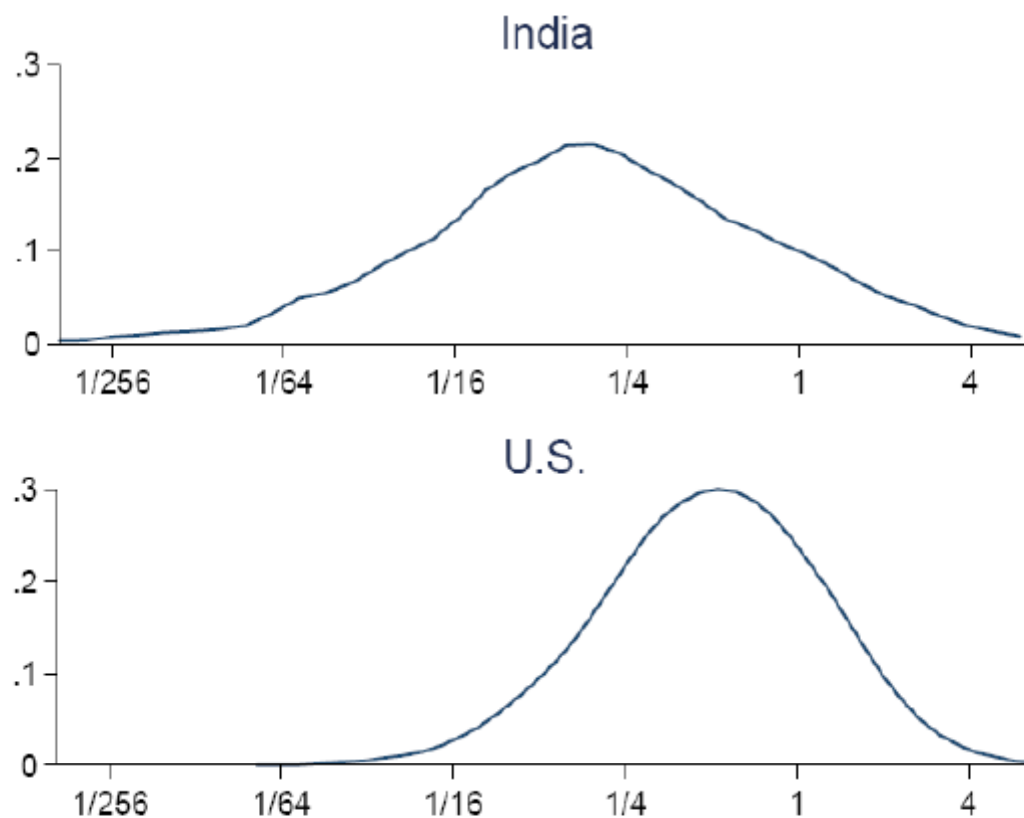


Source: Jones and Romer (2009). US=1

SOME FACTS ON PRODUCTIVITY

- Aggregate growth a Total Factor Productivity (TFP) story (Solow, 1956)
- About $\frac{1}{2}$ of country variation in GDP per capita TFP related (Jones and Romer, 2009)
- **Reallocation** of output from low TFP to high TFP plants
 - Aggregate growth within countries (Bailey et al, 1992)
 - Productivity across countries (Hsieh & Klenow, 2009)

DISTRIBUTION OF PLANT TFP DIFFERENCES IN US VS. INDIA HIGHER US TFP DUE TO REALLOCATION - THINNER “TAIL” OF LESS PRODUCTIVE PLANTS



Source: Hsieh and Klenow (2009); US mean=1

PRODUCTIVITY DISPERSION WITHIN COUNTRIES

- **Large cross sectional dispersion *within* countries**
 - Within average US 4 digit sector, labor productivity for plant at 90th percentile four times 10th. TFP 2x (Syverson, 2004). Other countries similar/larger
 - These plant productivity differences are persistent
- **Is it all measurement problems? NO**
 - cf. debate on aggregate TFP (Griliches, 1997)
 - Robust to different methods of production function estimation (Olley-Pakes, 1996; Blundell-Bond, 2000; Akerberg et al, 2007, Solow residual)
 - Plant-specific prices (Foster et al, 2009)
 - Other measures of firm performance (e.g. profitability, size, management quality, etc.) show wide variation

FIRM HETEROGENEITY HAS LONG BEEN RECOGNIZED

“...we have the phenomenon in every community and in every trade, in whatever state of the market, of some employers realizing no profits at all, while others are making fair profits; others, again, large profits; others, still, colossal profits.”

Francis Walker (*Quarterly Journal of Economics*, '87)

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EFFECT OF FINDINGS OF FIRM HETEROGENEITY ON ECONOMICS

- **Gradually absorbed into fields**
 - Macro; IO; Organizational Economics
 - Labor (matched emphasis on worker heterogeneity)
 - Trade (huge influence)
- **Causes of firm heterogeneity**
 - Proximate (management, R&D, etc.)
 - Fundamental (market structures, laws, etc.)

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REASONS FOR PERFORMANCE HETEROGENEITY

- **TFP Heterogeneity due to “hard technologies”**
 - R&D, patents, diffusion of ICT (information and communication technologies), etc.
- **These hard technologies matter a lot, but:**
 - After controlling for technology, still a big TFP residual
 - Productivity effects of ICT depend on firm organization (e.g. Bloom, Sadun & Van Reenen, 2007; BBH, 2002)
- **Heterogeneity of management practices & organization?**
 - Econometric tradition that fixed effects in production function = managerial ability (Mundlak, 1961)
 - Case studies & recent advances in measurement
 - Management strongly correlated with performance

THEORETICAL PERSPECTIVES ON MANAGEMENT

- **Fads and fashions? MBA example**
- **“Design Approach” of Organizational Economics**
 - Example: Personnel Economics (Lazear & Oyer, 2009) application of economics to Human Resources
 - More generally: Decentralization, Span of control, vertical integration, etc.
- **“Management as a technology”**
 - Incorporates firm heterogeneity in productivity
 - *Non transferable* management capabilities (IO models & talent models)
 - *Transferable* capabilities “diffusion” models
 - Tackles question of “How do badly managed firms survive?”

MANAGEMENT AS A *NON-TRANSFERABLE* TECHNOLOGY

- **Imperfect Competition**
 - Low productivity firms can survive because they have a degree of market power (e.g. imperfect consumer substitutability as in monop. comp & entry barriers)
 - Examples: Melitz (2003), Foster et al (2009)
- **Talent & human capital (e.g. Lucas, 1978)**
 - Managerial talent is heterogeneous in population
 - Talent can be leveraged through greater Span
 - Will show up as TFP as managers/entrepreneurs earn rents to scarce talent
 - Overload (e.g. communication costs) limits size of firm
- Some implications similar (e.g. Hsieh and Klenow, 2009)
 - Reallocation of output to better managed firms

NOTIONS OF MANAGERIAL “BEST PRACTICE”

- Management styles that have always been better
 - e.g. promotion on ability/effort (rather than family)
- **Complementarity:** Practices that have become desirable because the environment has changed
 - Technological advances makes monitoring output better (e.g. SAP) and enables more performance related pay (Lemieux et al, 2009)
- **Innovation:** Discoveries of how to manage better
 - E.g. Toyota system of Lean Manufacturing
 - **Transferable:** dynamic diffusion

EXAMPLES OF MANAGEMENT AS A NEW TECHNOLOGY?

Waves of management technologies have arisen over time:

- American System of Manufacturing (1850s)
- Taylor's Scientific management (1900s)
- Mass production (1920s)
- Alfred Sloan's M-form firm (1930s)
- Demming's quality movements (1950s)
- Toyota production system of "lean manufacturing" (1970s)

MANAGEMENT AS A *TRANSFERABLE* TECHNOLOGY

- **Technological Diffusion is not immediate**
 - Hybrid corn (Griliches, 1958)
 - Beta blockers (Skinner and Staiger, 2008)
 - Computers & other forms of ICT
- **Causes of slow diffusion**
 - Competition (as in IO models)
 - Human Capital (as in Lucas model)
 - Information (standard model)
 - Adjustment costs (“frictions”)
 - Incentives (agency issues, ownership & governance)
 - Institutions (e.g. labor market regulations)

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BLOOM - VAN REENEN (2007) SURVEY METHODOLOGY

1) Developing management questions

- Scorecard for 18 monitoring, targets and people (e.g. 7 HR practices around 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 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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Note: All 18 dimensions and over 50 examples in Bloom & Van Reenen (2006)

PEOPLE – e.g. “HOW IS PROMOTION DETERMINED?”

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

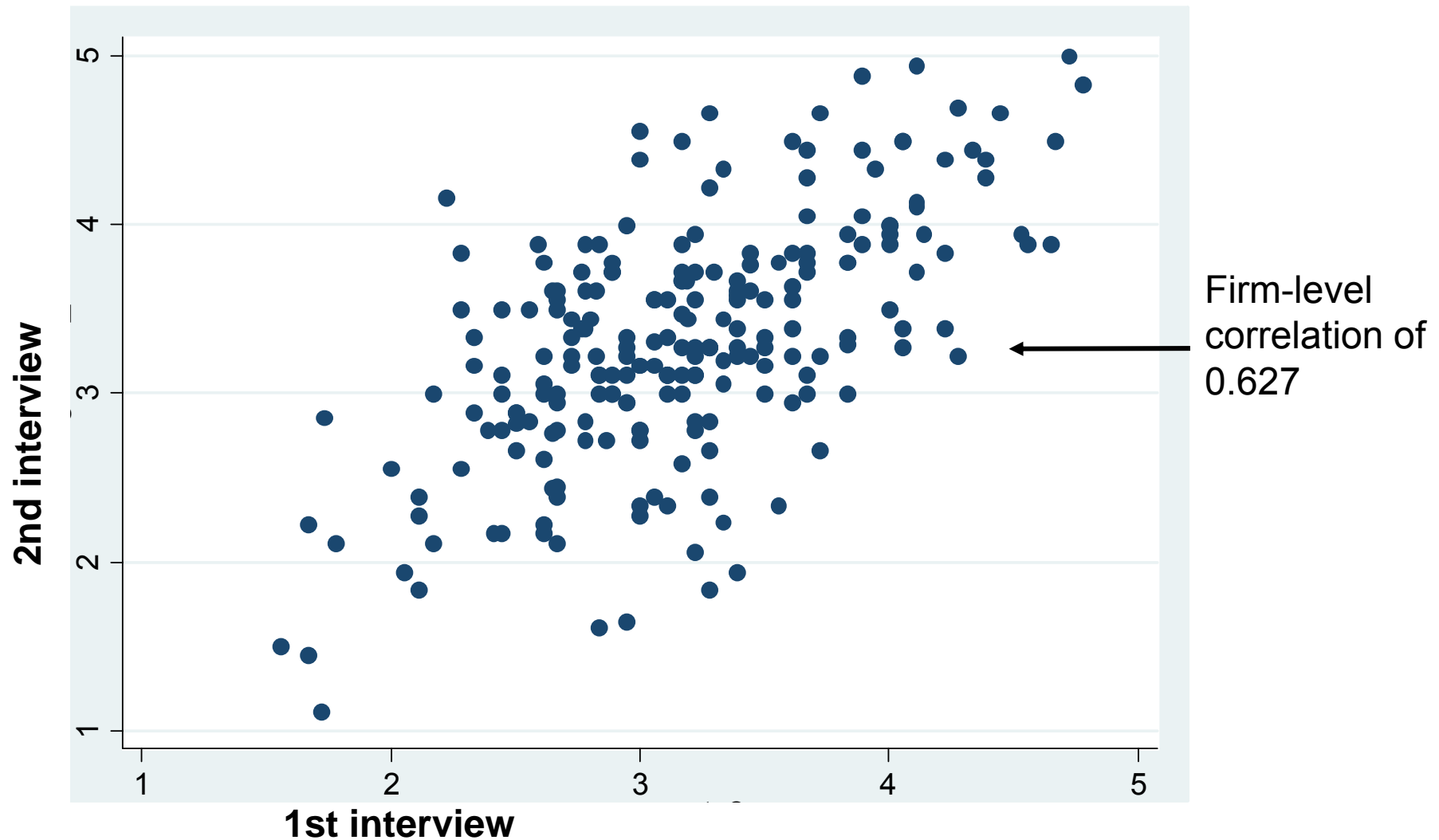
Medium sized manufacturing firms:

- Medium sized (100 - 5,000 employees, median \approx 250) because firm practices more homogeneous
- Have run 3 waves (2004, 2006, 2009)
- Manufacturing as easier to measure productivity
 - Now extended to Hospitals, Retail, Schools, Charities, Nursing homes, Law Firms, Government agencies, etc.

INTERVAL VALIDATION OF THE SCORING

Re-interviewed 222 firms with different interviewers & managers

Firm average scores (over 18 question)



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

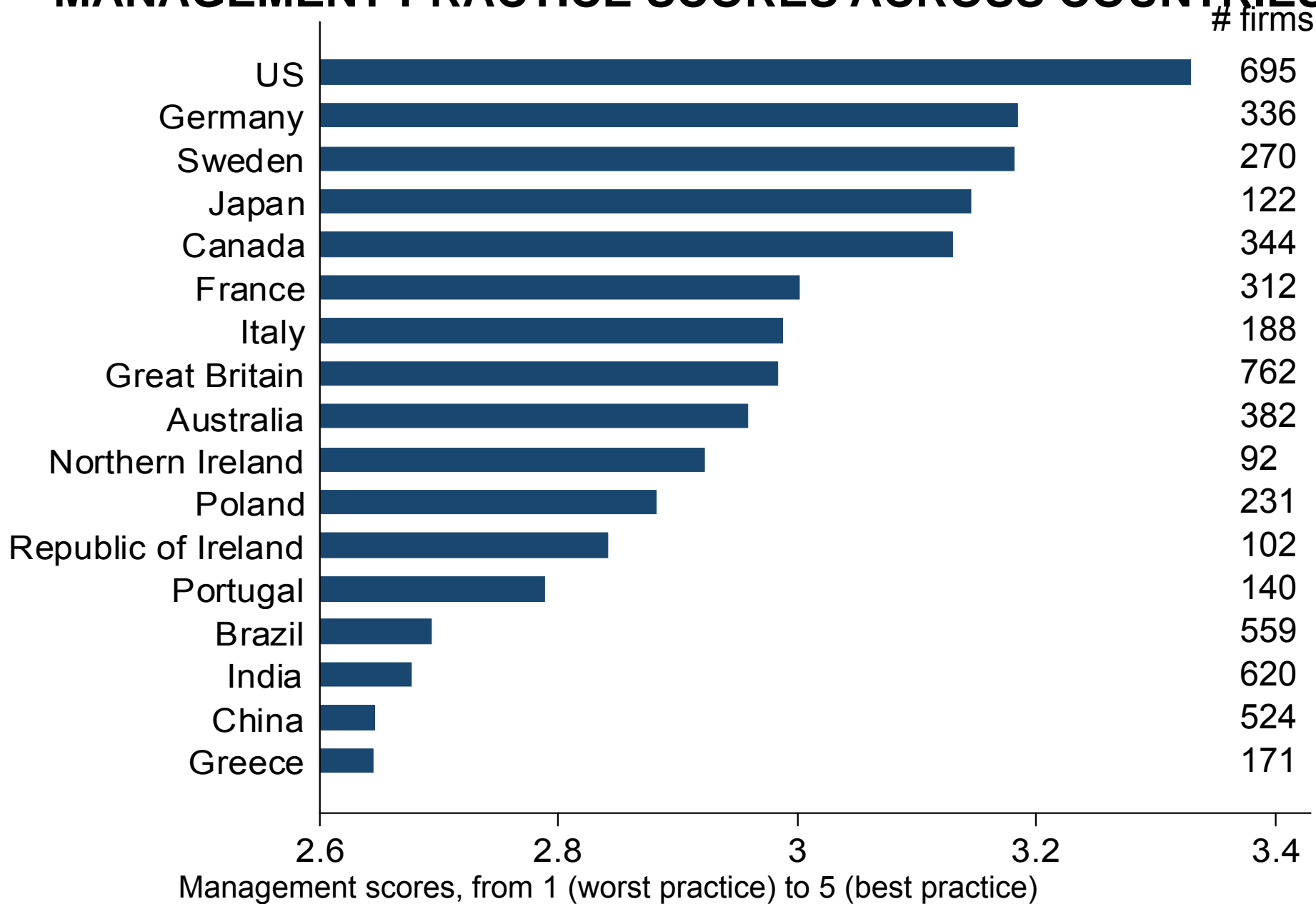
3 INTERVIEWER CONTROLS

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

5 TIME CONTROLS

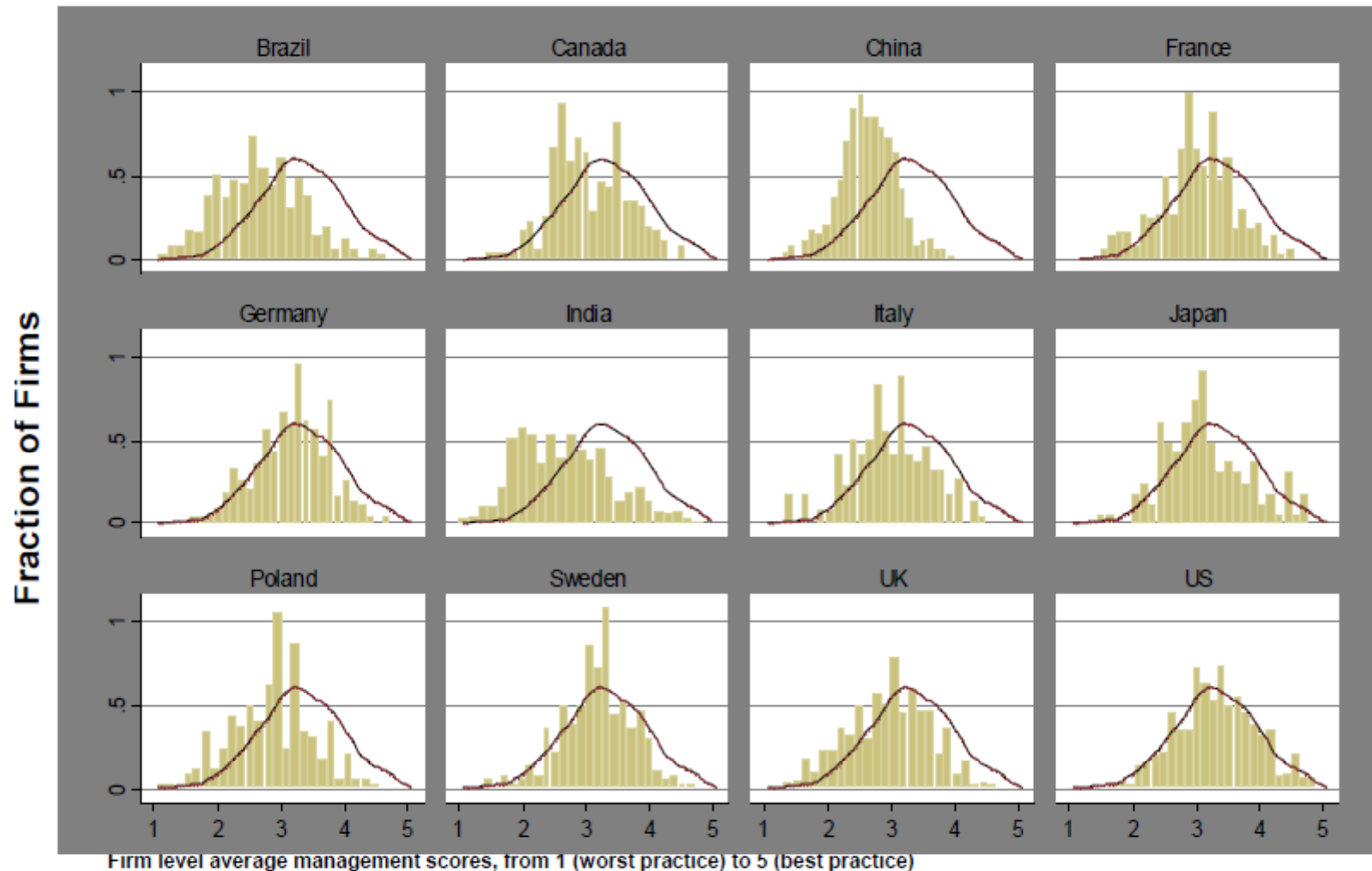
- Day of the week, time of day (interviewer), time of the day (interviewee), duration of interview, days from project start

MANAGEMENT PRACTICE SCORES ACROSS COUNTRIES



Note: Averages taken across all firms within each country. 5,850 observations in total. Firms per country in the right column
 Source: Bloom, Genakos, Sadun and Van Reenen (2009)

MANAGEMENT PRACTICE SCORES ACROSS FIRMS

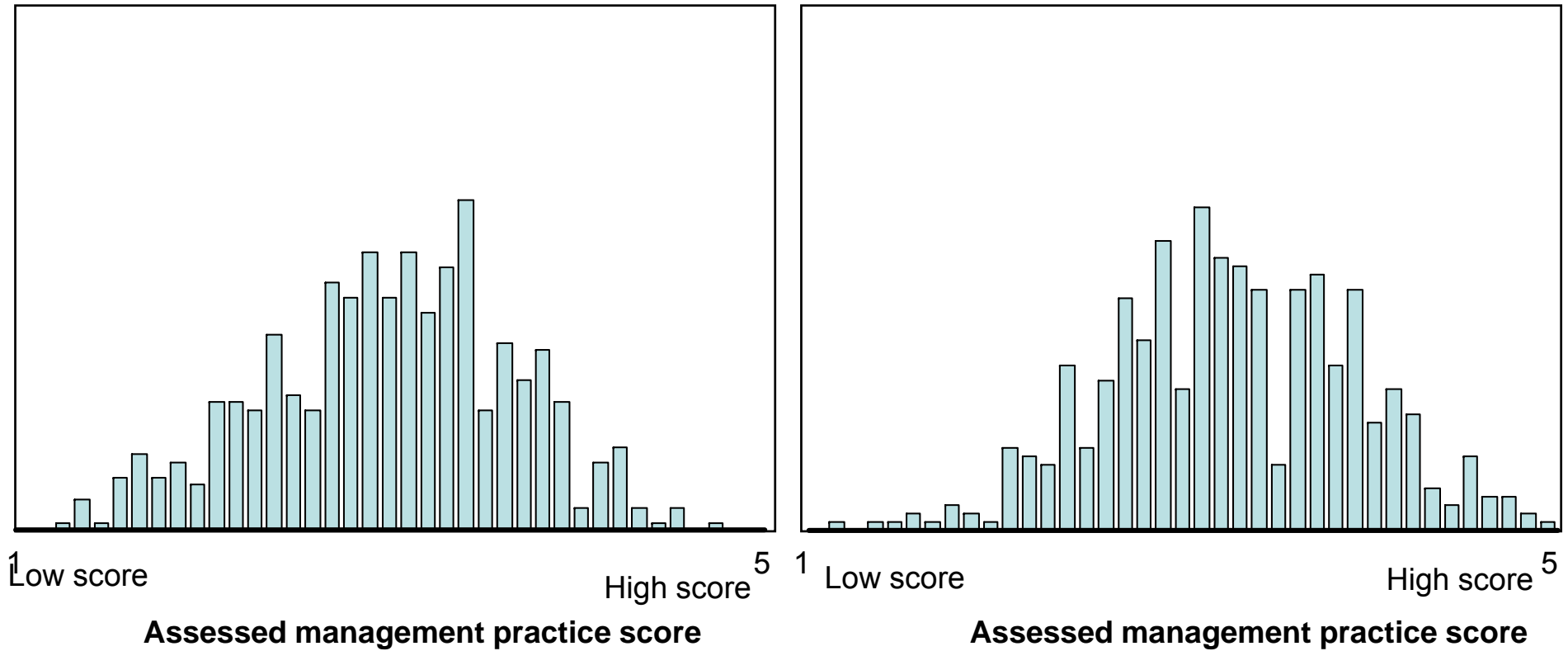


Note: The bars are the histogram of the actual density. The line is the kernel of the US density for comparison. Portugal, Ireland and Greece omitted for presentational reasons, <http://www.nber.org/reporter/2008number4/bloom.html>

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

Distribution of firm level management practice scores

 U.S.

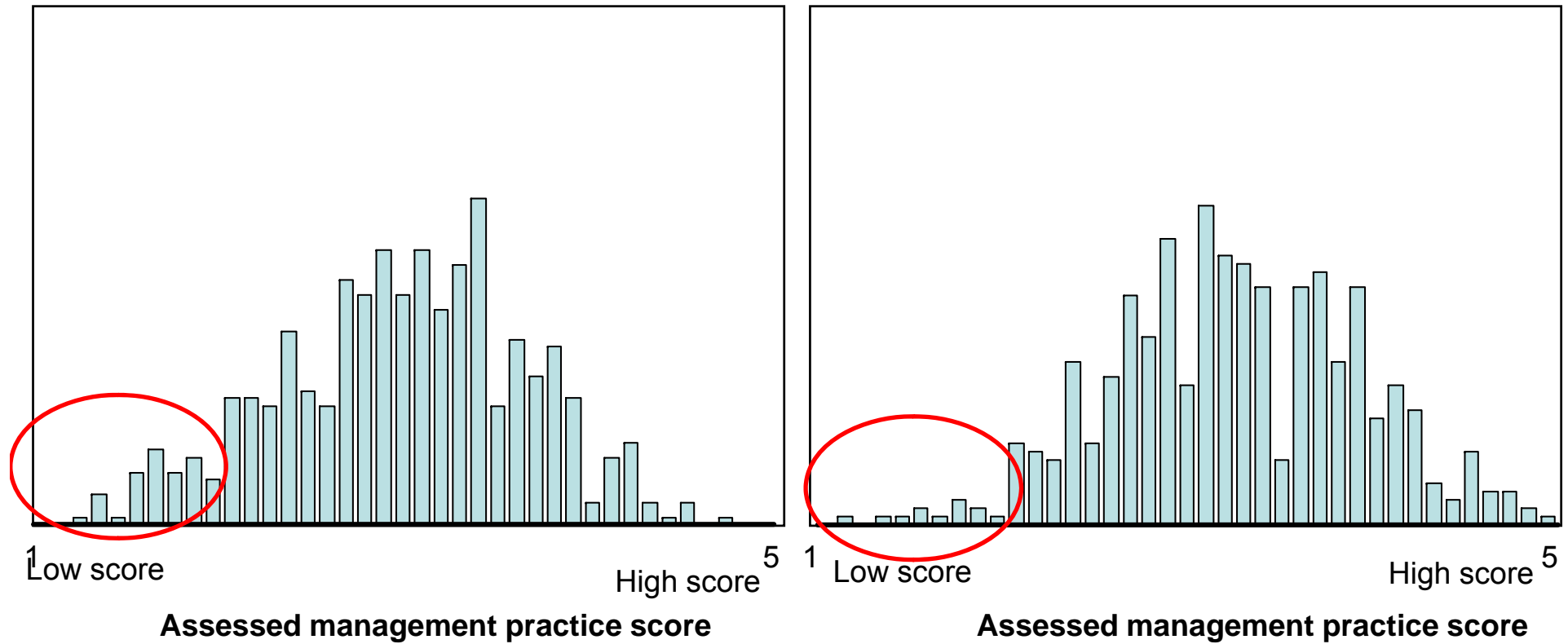


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Distribution of firm level management practice scores

 U.K.

 U.S.



RELATIONSHIP BETWEEN MANAGEMENT & SIZE IS MUCH WEAKER IN COUNTRIES WITH LESS COMPETITION

- “Selection” effect – market reallocates jobs to more efficient firms
- An additional sd of management score associated with of employment increase (Bloom, Genakos, Sadun & Van Reenen, 2010):
 - US ~720 more workers
 - UK ~550 more workers
 - India ~260 more workers
 - Italy ~250 more workers
- Competitive forces of reallocation weaker in India/Italy compared to US

Facts on productivity & management

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- Competition

- Ownership & Governance

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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

Using panel we can find a role for both mechanisms

COMPETITION AND MANAGEMENT PRACTICES

3 competition proxies from Nickell (1996) & Aghion et al. (2005)

Competition proxies	Dependent variable: Management		
Import penetration (lagged industry-country level)	0.066** (0.033)		
1- Lerner Index¹ (lagged industry-country level)		1.964*** (0.721)	
# of competitors (Firm level)			0.158*** (0.023)
Observations	2,499	2,980	3,589
Full controls^{2,3}	Yes	Yes	Yes

¹ Rents = 1- (operating profit – capital costs)/sales

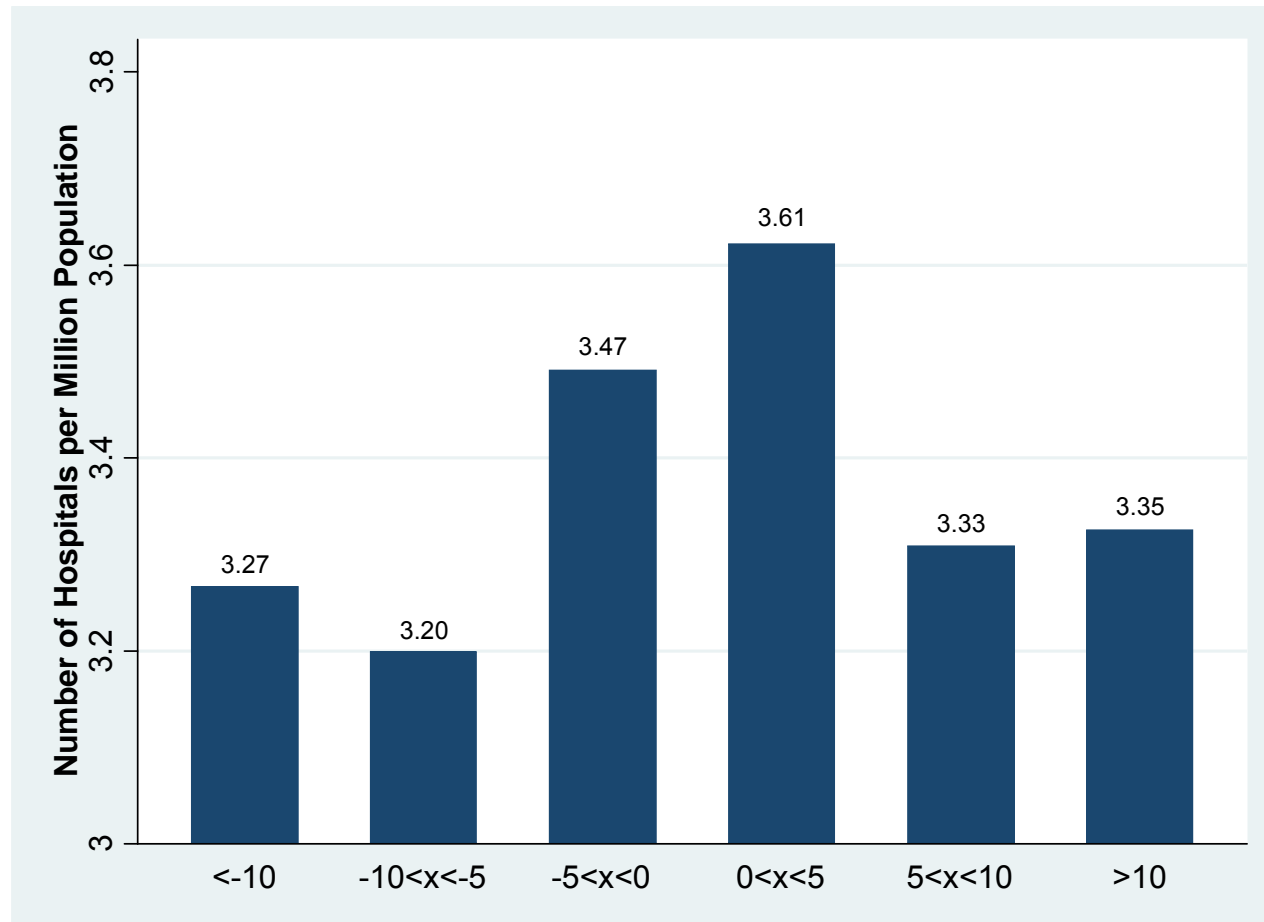
² Includes 108 SIC-3 industry, country, firm-size, public and interview noise (analyst, time, date, and manager characteristic) controls

³ S.E.s in () below, robust to heteroskedasticity, clustered by country-industry

IS THE EFFECT OF COMPETITION ON MANAGEMENT CAUSAL?

- Classical IO question. Problem is identifying exogenous shocks to product market competition
- Bloom, Propper, Seiler & Van Reenen (2010) examine management in public hospitals. Competition driven by geographical proximity of rival hospitals
- In UK, exit controlled by government. Closing hospitals very politically unpopular, so we use exogenous variation in degrees of political contestability to construct IV's
 - Hospital in “marginal” political districts much less likely to be closed

NUMBER OF HOSPITALS IN A POLITICAL CONSTITUENCY IS GREATER WHEN POLITICAL DISTRICT IS MARGINAL



Labour party's winning % margin (1997)

Notes: Mean number of hospitals per 1 million people within a 30km radius of centre of a political constituency; “winning margin” (x) is % of votes ahead of second party

CAUSAL EFFECT OF COMPETITION ON MANAGEMENT & PATIENT OUTCOMES (DEATH RATES) IN HOSPITALS

Type of Regression	OLS	IV: 1 st Stage	IV: 2 nd Stage	IV: 2 nd Stage
Dependent variable	Management	# Competing Hospitals	Management	Emergency AMI death rate
# Competing Public Hospitals	0.121** (0.058)		0.361* (0.215)	-1.827* (1.037)
Marginal Constituencies		5.850*** (1.553)		
F-statistic of excluded instrument		14.18		
Observations	161	161	161	140

Source: Bloom, Propper Seiler & Van Reenen (2010)

Notes: Constituency marginal if won by <5%. S.Es clustered by hospital. Controls include casemix (age/gender of admissions), population density, age profile (11 categories), Foundation Trust & interviewer dummies (4); % Labour votes, #political constituencies & mortality in catchment area; respondent tenure & whether she was a manager or clinician, regional dummies, # hospital sites, # admissions, % managers with a clinical degree and a dummy for joint decision making at the hospital level.

FAMILY FIRMS AND GOVERNMENT FIRMS HAVE WORST MANAGEMENT

Average score on 18 management practice questions



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.

FAMILY FIRMS (PARTICULARLY A *PRIMO GENITURE* SELECTED CEO) HAVE LOW MANAGEMENT SCORES

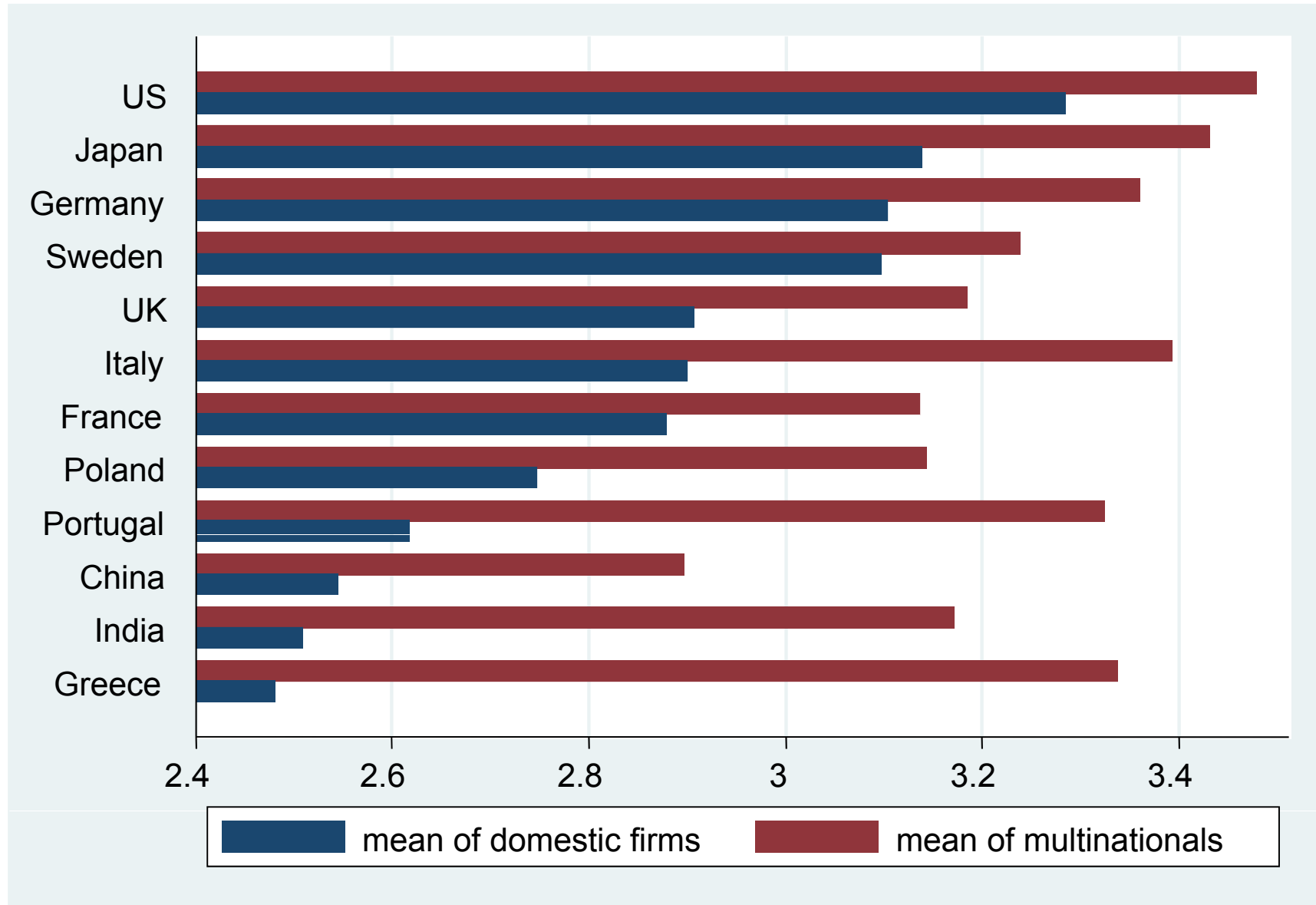
%	Dependent variable: Management			
Family ¹ largest shareholder	-0.137** (0.023)			-0.008 (0.043)
Family ¹ largest shareholder & family CEO		-0.169** (0.025)		-0.073 (0.049)
Family ¹ largest shareholder, family CEO & <i>primo geniture</i> ²			-0.254** (0.043)	-0.223** (0.046)
Observations	4,141	4,141	4,141	4,141

1 Family defined as 2nd generation or later

2 Based on question: “*How was management of the firm passed down: was it to the eldest son or by some other way?*”.

Note includes SIC-3 digit, country, skills, firm size and public controls

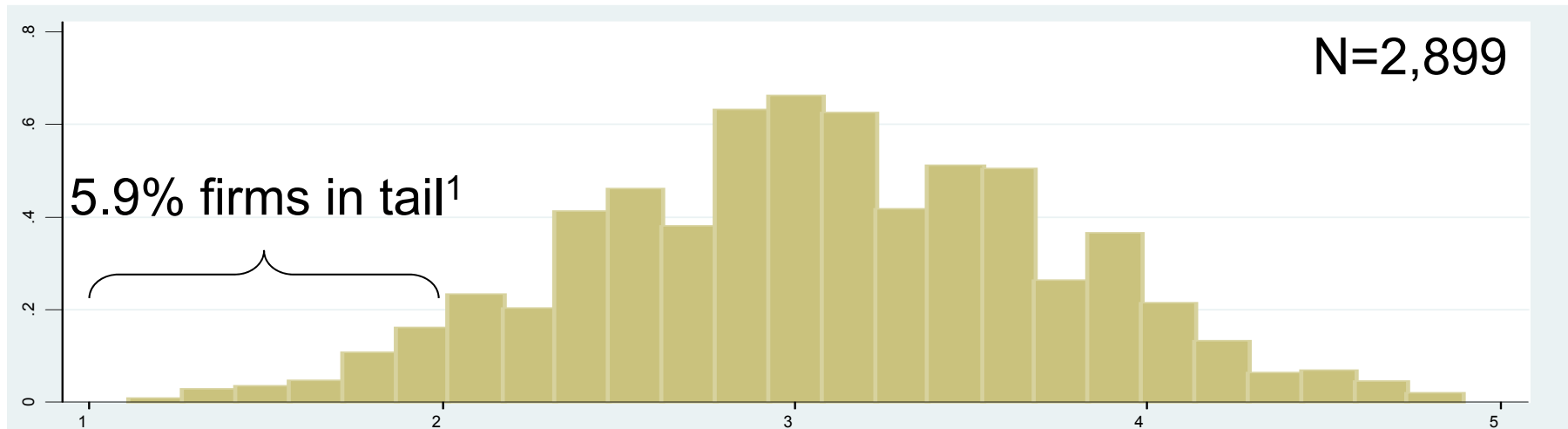
MULTINATIONALS APPEAR TO BE WELL MANAGED IN ALL COUNTRIES



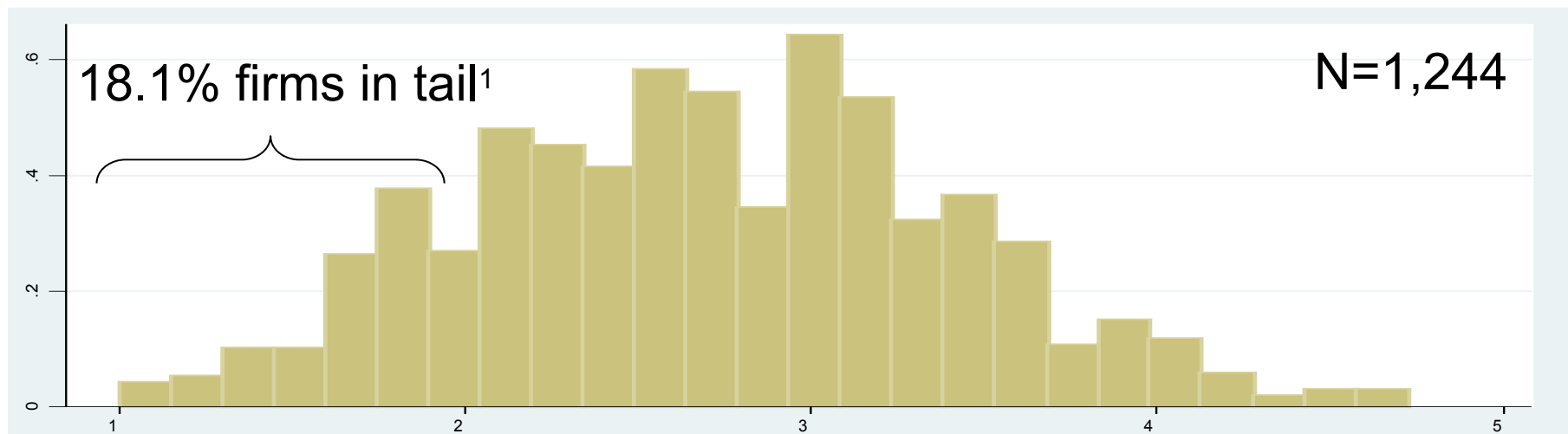
QUANTIFYING EFFECTS OF COMPETITION, FAMILY FIRMS & MULTINATIONALS:

- **ACROSS FIRMS ~ 1/2 VARIATION**
- **ACROSS COUNTRIES ~ 1/2 VARIATION**

“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.

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MANAGEMENT AND PRODUCTIVITY: WHAT IS THE QUESTION?

- **If firms are optimizing why should there be any effect of management on productivity?**
 - Productivity not the same as profits
 - “Management as a technology”: inefficient firms, diffusion, etc.
- **Also interested in:**
 - Magnitude of the effects (cf. production function)
 - Mechanisms (e.g. selection vs. same individuals)
 - Heterogeneity of the management effect
 - Complementarity between practices, e.g. decentralization and IT (Caroli & Van Reenen, '01)

IDENTIFICATION

Productivity measure

$$y_{it} = \beta_i m_{it} + \alpha x_{it} + \eta_i + u_{it}$$

management practices

- Cross section
- Fixed effects
- Quasi-experiment before & after a firm's policy change
- Randomized control trials

BETTER PERFORMANCE IS CORRELATED WITH BETTER MANAGEMENT “EXTERNAL VALIDATION”:

Dependent variable	Productivity (% increase)	Profits (ROCE)	5yr Sales growth	Share Price (Tobin Q)	Exit
Estimation	OLS	OLS	OLS	OLS	Probit
Firm sample	All	All	All	Quoted	All
Management	28.7***	2.02***	4.70***	25.0***	-26.2**
Firms	3,469	1,994	1,883	374	3,161

Notes: One sd change in management. Regressions includes controls for country, with results robust to controls for industry, year, firm-size, firm-age, skills etc.

Source: Bloom and Van Reenen (2010)

- Relationship persists after controls for fixed effects
- Not causal – we treat as “external validation” of management score

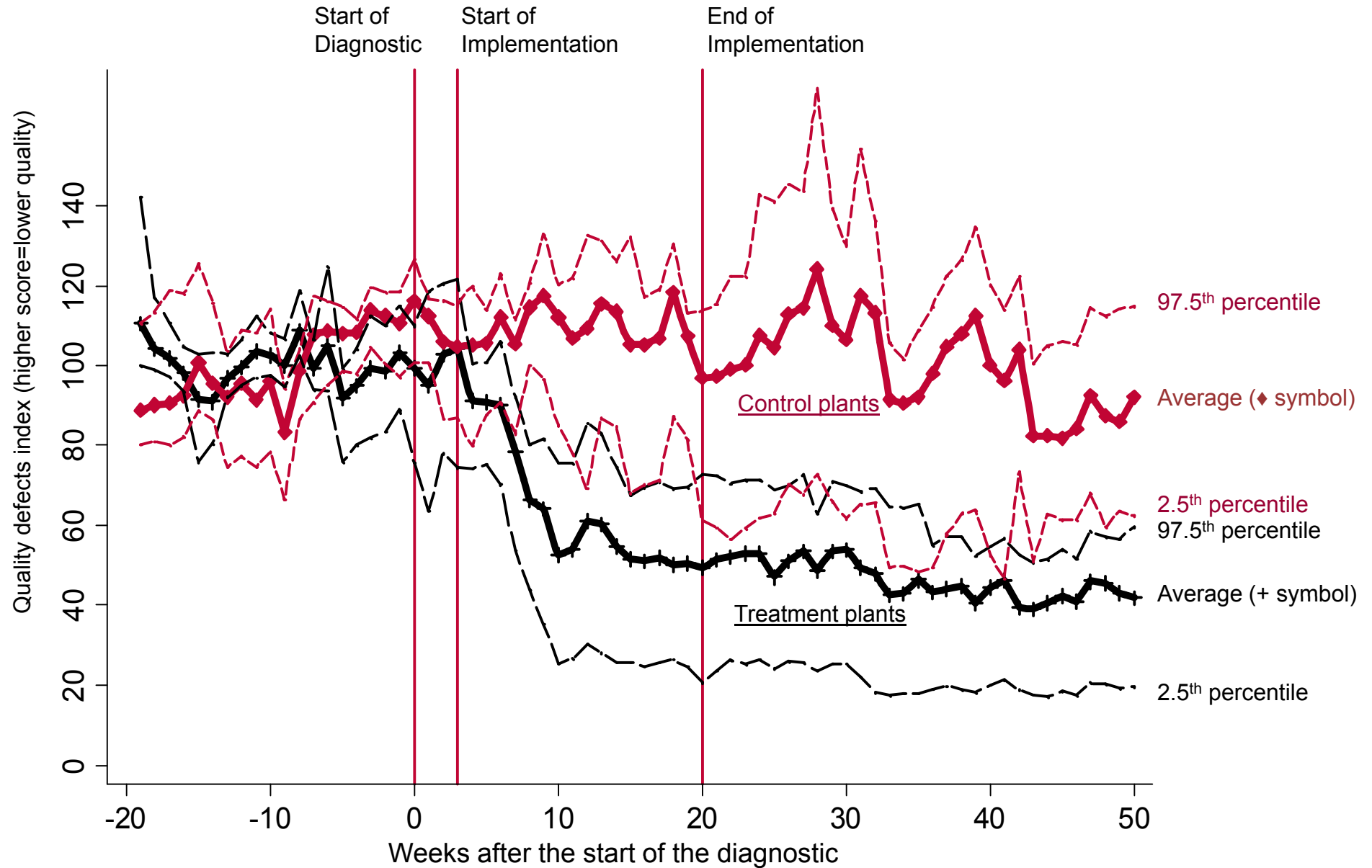
HUMAN RESOURCE MANAGEMENT & PRODUCTIVITY

- **Individual incentive pay (increase in productivity)**
 - Lazear (2000). *Safelite*. 44%
 - Bandeira et al (2007, 2009). *Fruit farm*. 21%
 - Freeman and Kleiner (2005). *Shoes* (6%)
 - Shearer (2004). *Tree Planters* (22%)
 - Lavy (2002, 2008). *Teachers*.
- **Group incentive pay**
 - Blasi et al (2009) *Meta study* mean effects (+4.5%)
 - Hamilton et al (2003). *Garment factory* (18%)
 - Knez and Simester (2001). *Continental Airlines*
 - Ichinowski et al (1997). *Steel finishing lines*.
- **Note: Generally all find positive effects**

RANDOMIZED CONTROL TRIALS: BLOOM, EIFERT, MCKENZIE, MAHAJAN & ROBERTS (2010)

- Experiment on plants in Indian textile firms outside Mumbai
- Randomized treatment plants get heavy management consulting, control plants get very light consulting (just enough to get data)
- Collect weekly performance data on all plants from 2008 to 2010
 - Improved management practices led to large and significant improvements in productivity and profitability
 - Appears informational constraints were a major reason for lack of prior adoption, but often other constraints also present

QUALITY DEFECTS INDEX: TREATMENT & CONTROL PLANTS



Notes: Displays the average weekly quality defects index, which is a weighted index of quality defects, so a higher score means lower quality. This is plotted for the 14 on-site treatment plants (+ symbols) and the 6 on-site control plants (♦ symbols). Values normalized so both series have an average of 100 prior to the start of the intervention. To obtain confidence intervals we bootstrapped the firms with replacement 250 times.

CONCLUSIONS

- Heterogeneity in firm productivity a first order fact
- Linked to management and organization of firms.
- Management a “technology”, partially transferrable (diffusion) terms as well as static non-transferable way (Lucas and Melitz)
- Evidence from new survey methods suggests
 - Importance of competition
 - Importance of ownership and governance
 - Management important for productivity
- Policies
 - Competition (private & public sectors)
 - Trade
 - Family firms (e.g. Estate tax)

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”