Productivity, management & public policy I: Measurement & Impact

John Van Reenen (LSE, Centre for Economic Performance & LEAP Visitor)

Much based on work with Nick Bloom (Stanford) & Raffaella Sadun (HBS) Harvard Public Finance Lecture 1 (November 2013)
Three lectures on management & innovation

1. Monday 4th Nov: Productivity and management
Overview on productivity facts; what are management practices, how to measure & what effect on performance

2. Wednesday 6th Nov: Determinants of management
What causes the wide variation in management & what can policy do? Focus on competition, skills, governance

Importance of technological innovation for growth. Market failures & policy response. Focus on tax incentives for R&D: rationale & evidence. Other innovation policies
Lecture 1: Overview

1. Productivity across organizations & countries

2. Managers

3. Management practices
   a) Measurement
   b) Variation
   c) Impact on performance
Inefficiency & poor management of public sector a daily refrain. Example, govt. online health services
Inefficiency & poor management of public sector a daily refrain. Example, govt. online health services


Solutions: “Flying to Canada to buy cheaper prescription drugs” “How to Restart Computer”
But also much apparent inefficiency in private sector organizations

- Empirical work over last ~10 years has found similar problems in private sector organizations: Huge variance of private sector productivity across firms

- In average US 4 digit industry plant at 90th percentile has ~4x higher labor productivity than plant at the 10th percentile (Syverson, 2004, 2011)
  - Controlling for other inputs, TFP difference is about 2:1
  - Gap is larger in other countries, e.g. in India this gap is about 5:1 (Hsieh and Klenow, 2009 QJE)
Is productivity dispersion all just measurement problems?

- cf. debate on aggregate TFP (Griliches, 1997)
- Robust to different methods of estimating TFP:
  - Solow residual approaches
  - Econometrics of production functions (e.g. Olley-Pakes, 1996; Blundell-Bond, 2000; de Loecker, 2011)
- Not just mis-measured prices: in detailed industries with plant level prices like white pan bread, block ice, concrete, etc. productivity differences still ~2:1 (Foster et al, 2008 AER)
- Other measures of firm performance (e.g. profitability, size, etc.) also show wide variation
- Productivity differences matter for macro-economy (over)
Large GDP/capita & TFP differences across countries

Total Factor Productivity, 2000

Per Capita GDP, 2000

Average US worker produces more in a day than Tanzanian in a month with same inputs.

Source: Jones and Romer (2010). US=1
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
What are reasons for private sector inefficiencies?

- Imperfect Competition (e.g. Syverson on concrete, 2004)
  - Selection
  - Incentives
- Principal-agent problems (e.g. CEO compensation literature)
- Institutional frictions (e.g. in labor market: firing costs, minimum wages, etc.)
- Owners not seeking to maximize profits (e.g. family firms)
  - Public/private a difference in degree rather than kind?

- Managerial solutions in private sector?
  - Contract structure: e.g. performance pay, tournaments (promotions), monitoring
  - But why don’t these work so well in public sector?
Why don’t managerial solutions work so well in public sector?

- **Multi-tasking** (Holmstrom & Milgrom, 1991). When tying rewards to objectively measured outcomes, agents reduce effort on non-targeted outcomes (difficulty of objectively measuring all complex outcomes). Examples:
  - Teaching to test
  - Quantity instead of quality

- **Influence activities** if use subjective performance measurement (Milgrom & Roberts, 1988)

- Public employees more **risk averse** so harder to use high powered incentives (Prendergast, 1999)

- Public employees **motivated agents?** Performance pay adversely selects/de-motivates (Besley & Ghatak, 2005)

- **Multiple principals** - Goals unclear (no profit maximization), e.g. Baker (2002)
Performance heterogeneity in the public sector

• **Healthcare** (NB mainly public outside of US)
  
  – Heart attack (AMI) death rates 27% in top decile of UK public hospitals vs. 17% in bottom decile
  
  – Chandra et al (2013) AMI survival rates “TFP” (controlling for inputs: procedures which are DRG Medicare reimbursement cost weighted)
  
Large spread in death rates from AMI between English Hospitals: 27% at 90\textsuperscript{th} & 17% at 10\textsuperscript{th} in 1995

\textbf{Source:} Propper and Van Reenen (2010, JPE)

\textbf{Notes:} Improvements over time (cf. TECH Investigators); Drop in 2002 related to HD National Service Framework
TFP Spread in hospitals (AMI) and concrete plants

Productivity Distribution Across Hospitals and Across Manufacturers

Figure shows estimated productivity dispersion across hospitals for heart attack treatments and across concrete plants for the production of ready-mixed concrete. We show the average within-year fitted normal density for each. Hospital productivity estimates (which reflect the hospital’s ability to produce patient survival given a fixed set of inputs), are from our baseline specification (Table 2, column 1); concrete productivity estimates are from Table A7. See text for more details on the construction of these estimates.

Source: Chandra, Finkelstein, Sacarny & Syverson (2013)
Performance heterogeneity in the public sector

- **Healthcare**
- **Schools**
  - SD of mean test score 0.42 in major US city (Chetty, 2013)
- **Police**
  - Crime Clear-up rates (Garicano & Heaton, 2010)
- **Civil Service**
  - Tax collection, Project completion rates, (Rasul & Rogger, 2013)

- All could be because of measurement error or failure to control for relevant factors
  - But could be related to management
Dispersion of management quality in US hospitals, schools & manufacturing (To be explained later!)

Source: Bloom, Sadun & Van Reenen (2013b)
EXPLAINING TFP HETEROGENEITY

• Proximate causes
  – “Hard” Technologies (Lecture 3)
    • R&D, patents, diffusion (e.g. ICT, Cloud)
  – Management Practices

• Deeper structural causes
  – What causes the variation in management?
  – Why, for any given distribution of productivity, do some organizations obtain higher market shares than others (reallocation issue)
  – Market structure (product, financial, labor); information; governance
Heterogeneity of firm performance & link with management

“It is on account of the wide range [of ability] among the employers of labor that we have the phenomenon in every community and in every trade some employers realizing no profits at all, while others are making fair profits; others, again, large profits; others, still, colossal profits.”

Francis Walker (QJE, April ‘87)
Heterogeneity of firm performance & link with management

“It is on account of the wide range [of ability] among the employers of labor that we have the phenomenon in every community and in every trade some employers realizing no profits at all, while others are making fair profits; others, again, large profits; others, still, colossal profits.”

Francis Walker (QJE, April 1887)

Walker ran the 1870 US Census, and was the founding president of the AEA and president of MIT

Marshall made response in next issue of QJE
Lecture 1: Overview

1. Productivity across firms and countries

2. Managers

3. Management practices
   a) Measurement
   b) Variation
   c) Impact on performance
One explanation for variation in performance is differences in top managers

There is a large literature looking at CEOs (managers) – for example Jack Welch, Steve Jobs or Alex Ferguson

Potentially distinct from management practices

- Goes beyond CEO
- How individual bundles of managerial human capital combined

Some key empirical papers on impact of managers:

- Bertrand and Schoar (2003, QJE). CEOs
- Perez-Gonzalez (2006, AER – Lecture 2). Founders
- Lazear, Shaw & Stanton (2012). Supervisors
Summary of Bertrand and Schoar (2003, QJE)

- Build panel dataset tracking managers across S&P500 publicly traded US firms, allowing for firm and top manager fixed effects


- Average size of firms about 10,000 employees – so impact of strategy by the top managers.
Bertrand and Schoar (2003)

Outcome for CEO $i$ in firm $j$ at time $t$:

$$y_{ijt} = \eta_i + \phi_j + \alpha' x_{it} + \beta z_{jt} + \gamma' w_{ijt} + \tau_t + u_{ijt}$$

- Like Abowd, Karmarz, Margolis (1999) method using near population of French workers
- Issues of job match-specific effects & and endogenous sorting
- Card, Heining & Kline (2013) find that these job match effects are small
Bertrand and Schoar (2003)

Findings:

1. Manager fixed effect large, particularly for M&A, dividend policy, debt ratios and cost-cutting

2. Managers have styles. Examples:
   - Early cohorts less aggressive on leverage
   - MBAs increase investment-Q relationship

3. Managers also absolutely “better”/“worse” – performance fixed effects exist, linked to compensation & governance (e.g. concentrated ownership increases both CEO performance FE & pay)
Lecture 1: Overview

1. Productivity across firms and countries

2. Managers

3. Management practices
   a) Measurement
   b) Variation
   c) Impact on performance
Measuring management practices

Also a literature on management practices, which I will focus on more as these are more about firms than individuals.

Historically been strongly case study based—e.g. Ford, GM, Toyota, GE, Mayo Clinic, Dabbawala etc.

Case studies helpful for intuition and illustration, but potentially misleading because very selected sample—e.g. Enron.

More recently work has focused on trying to systematically measure management practices in large samples of firms:

- First generation, single country studies & direct questions
- Second generation, international studies & indirect questions
Challenges to measuring management practices

Despite sounding easy, “measuring management” is fraught with difficulties, which has held back research.

1) How to quantify management practices

2) How to obtain data from firms – participation

3) How to get the truth – will badly managed firms lie

4) Building a representative population – e.g. not just targeting Compustat firms – especially important for cross-country work
First generation surveys: single-country focus with direct survey techniques

Black and Lynch (2001, 2004) is a good example of single country management survey. Surveyed ~3,000 establishments

1. **Quantify**: Asked a series of questions on employee recruitment, work organization, meetings and modern production practices

2. **Get data**: Administered by the US Census Bureau

3. **Truth**: Told respondents their answers were confidential

4. **Population**: Stratified from the Census establishment database

**Findings**

- Large variations in management & strong correlation of management practices & performance in cross section
- Panel: relationship between management & productivity disappears. Why?
  - Really no relationship
  - Measurement error & attenuation
  - Endogeneity
Second wave surveys: try to address biases with indirect surveys

Problems with direct surveys: unfortunately people typically do not tell the complete truth in open surveys:

- Schwartz (1999, American Psychologist)
- Opinion poll-evidence

Bloom and Van Reenen (2007, QJE) example of a second wave of management survey
The Bloom and Van Reenen (2007) approach

1) Quantifying: use scoring grid from a consulting firm
   • Scores 18 monitoring, targets and incentives practices
   • ≈ 45 minute phone interview of manufacturing plant managers

2) Truth: use “Double-blind”
   • Interviewers do not know the company’s performance
   • Managers are not informed (in advance) they are scored
   • All interviews run from a single location with rotation by country

3) Getting data: a variety of tricks
   • Introduced as “Lean-manufacturing” interview, no financials
   • Official Endorsement: Bundesbank, PBC, CII & RBI, etc.
   • Run by 150+ MBAs types (loud, assertive & business experience)

4) Population: sample randomly medium and large firms (50-5000 employees) from population databases across countries
| Score | (1): Measures tracked do not indicate directly if overall business objectives are being met. | (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 |

**Note:** All questions plus many more examples in paper & on website http://cep.lse.ac.uk/pubs/download/dp0716.pdf
Q15 INCENTIVES - Removing poor performers

- If you had an employee who could not do her job adequately, what would be done? Could you give me a recent example?
- How long would underperformance be tolerated?
- Do some individuals always just manage to avoid being re-trained/fired?

<table>
<thead>
<tr>
<th>Score</th>
<th>(1): Poor performers are rarely removed from their positions</th>
<th>(3) Suspected poor performers stay in a position for a few years before action is taken</th>
<th>(5): We move poor performers out of the hospital/department or to less critical roles as soon as a weakness is identified</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Obtaining representative cross country samples

• So far interviewed about 15,000 organizations (~10k manufacturing) across 30 countries

• In manufacturing, obtain ~45% coverage rate from sampling frame (with response rates uncorrelated with performance measures)

• Extended to Hospitals, Schools, Law Firms, Nursing homes, Not for Profits, Retail, Civil Service, Universities, etc.
  – So basic concept can be used in different industries
## LEAN OPERATIONS – layout of patient flow

- Can you briefly describe the patient journey for a typical episode?
- How closely located are the wards, theatres and consumables?
- Has the patient flow and the layout of the hospital changed in recent years

| Score | (1): Layout of hospital and organisation of workplace is not conducive to patient flow, e.g., ward is on different level from theatre, or consumables are often not available in the right place at the right time | (3): Layout of hospital has been thought through and optimised as far as possible; but workplace organisation is not regularly challenged (and changed) | (5): Hospital layout has been configured to optimize patient flow; workplace organisation is challenged regularly and changed when needed |

TYPICAL PROCESS IMPROVEMENT (BEFORE)
TYPICAL PROCESS IMPROVEMENT (AFTER)

Visual Control for Safety

5S Anesthesia Shadow Board - After
Q5 MONITORING – Performance review

How do you review your department’s performance? Tell me about a recent meeting. Who is involved in these meetings? Who gets to see the results. What is the follow-up plan? Can you tell me about the recent follow-up plan?

| Score | (1): Performance is reviewed infrequently or in an unmeaningful way e.g. only success or failure is noted | (3): Performance is reviewed periodically with both successes and failures identified. Results are communicated to senior staff. No clear follow up plan is adopted. | (5): Performance is continually reviewed, based on the indicators tracked. All aspects are followed up to ensure continuous improvement. Results are communicated to all staff. |
REGULAR PERFORMANCE MONITORING

Tuesday “Stand Up”
ADDITIONAL CONTROLS FOR “NOISE”

INTERVIEWEE CONTROLS
• Gender, seniority, tenure in post, tenure in firm, countries worked in, foreign, worked in US, plant location, reliability score

INTERVIEWER CONTROLS
• Set of interviewer dummies, cumulative interviews run, prior firm contacts

TIME CONTROLS
• Day of the week, time of day (interviewer), time of the day (interviewee), duration of interview, days from project start
Internal survey validation – useful exercise suggesting double-blind methodology may work

Re-interviewed 222 firms with different interviewers & managers

Firm average scores (over 18 question)

Firm-level correlation of 0.627
Interviewer: “Would you mind if I asked how much your bonus is as a manager?”
Manager: “I don't even tell my wife how much my bonus is!”
Interviewer: “Frankly, that’s probably the right decision…”

Staff retention the American way
Manager: “I spend most of my time walking around cuddling and encouraging people - my staff tell me that I give great hugs”

The trusted Secretary
French secretary: “You want to talk to the plant manager? There are legal proceedings against him, so hurry up!!”
Lecture 1: Overview

1. Productivity across firms and countries

2. Managers

3. Management practices
   a) Measurement
   b) Variation
   c) Impact on performance
Plant locations from World Management Survey (~8,000 firms, 3 major waves: 2004, 2006, 2009; 20 countries)

Medium sized manufacturing firms (50-5,000 workers, median≈250) [http://worldmanagement调研.org/](http://worldmanagement调研.org/)

Extension to nearer population surveys (e.g. US MOPs)
Management and Organizational Practices survey (MOPS)

It was delivered to 47,534 manufacturing plants in 2011 (ASM)

This was quick and easy to fill out - and mandatory - so ~80% of plants responded, covering 5.6m employees
Wide variation in management: US and Japan leading, developing nations trailing (includes 2013 wave)

Note: Firms between 50 and 5000 employees, Raw data
Average management scores across countries are strongly correlated with GDP per capita.

Data includes 2013 survey wave as of 9/20/2013. Africa data not yet included in the paper.
HUGE VARIATION IN MANAGEMENT SCORES ACROSS FIRMS WITHIN COUNTRIES

Note: Bars are the histogram of the actual density. Scores from 9,995 management interviews across 20 countries.
HOSPITAL MANAGEMENT SURVEY SAMPLE

- In 2006 pilot survey in England & Wales
- 161 respondents in 100 public acute care (short-term general) hospitals ("trusts")
  - 61% response rate from the population of 164 acute (short-term general) hospitals & response rates balanced on observables
- In 2009 repeated survey & extended to ~2,000 hospitals in 9 countries (Brazil, Canada, France, Germany, India, Italy, Sweden, UK, US)
MANAGEMENT IN HOSPITALS ACROSS COUNTRIES

<table>
<thead>
<tr>
<th>Country</th>
<th>Average Management Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>3.0</td>
</tr>
<tr>
<td>UK</td>
<td>2.8</td>
</tr>
<tr>
<td>Sweden</td>
<td>2.7</td>
</tr>
<tr>
<td>Germany</td>
<td>2.6</td>
</tr>
<tr>
<td>Canada</td>
<td>2.5</td>
</tr>
<tr>
<td>Italy</td>
<td>2.5</td>
</tr>
<tr>
<td>France</td>
<td>2.4</td>
</tr>
<tr>
<td>Brazil</td>
<td>2.2</td>
</tr>
<tr>
<td>India</td>
<td>1.9</td>
</tr>
</tbody>
</table>

SOURCE: Bloom, Sadun & Van Reenen (2013b)
There is also substantial variation across hospitals in management within countries.

Source: Bloom, Sadun & Van Reenen (2013b)
Lecture 1: Overview

1. Productivity across firms and countries

2. Managers

3. Management practices
   a) Measurement
   b) Variation
   c) Impact on performance
External survey validation

Performance measure (e.g. output of firm $i$ in country $c$)

$$y^c_i = \beta MNG^c_i + \alpha_l l^c_i + \alpha_k k^c_i + \gamma' x^c_i + u^c_i$$

- Controls include dummies for country, 3 digit industry, time; skills, average hours “noise” (e.g. interviewer dummies),
- Note – **not a causal relationship**, only an association (external validity)
### Manufacturing: Firm Performance in general is robustly correlated with management

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Ln(sales)</th>
<th>TFP</th>
<th>Ln(sales)</th>
<th>Ln(employment)</th>
<th>Profit rate</th>
<th>5yr Sales growth</th>
<th>Exit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OLS</td>
<td>(Olley-Pakes) Fixed Effects</td>
<td>OLS</td>
<td>OLS</td>
<td>OLS</td>
<td>OLS</td>
<td>OLS</td>
</tr>
<tr>
<td>Firm sample</td>
<td>All</td>
<td>2+ surveys</td>
<td>2+ surveys</td>
<td>All</td>
<td>All</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>Management(SD=1)</td>
<td>0.150***</td>
<td>0.134***</td>
<td>0.033**</td>
<td>0.338***</td>
<td>1.202***</td>
<td>0.039***</td>
<td>-0.006***</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.020)</td>
<td>(0.013)</td>
<td>(0.015)</td>
<td>(0.264)</td>
<td>(0.013)</td>
<td>(0.002)</td>
</tr>
<tr>
<td>Ln(emp)</td>
<td>0.645***</td>
<td>0.374***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.024)</td>
<td>(0.096)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ln(capital)</td>
<td>0.307***</td>
<td>0.237***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.019)</td>
<td>(0.096)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obs</td>
<td>8,314</td>
<td>6,364</td>
<td>6,364</td>
<td>15,608</td>
<td>9,163</td>
<td>8,365</td>
<td>7,532</td>
</tr>
</tbody>
</table>

**Notes:** M, Management Index is z-score of average 18 questions z-scored (sd=1). Other controls include % employees with college, av hours, firm age, 3-digit industry, country & time dummies & noise controls (e.g. interviewer dummies). Standard errors clustered by firm.

**Source:** Bloom, Sadun & Van Reenen (2013a)
**Hospitals: Patient Outcomes better when Management scores higher (US, UK, Canada & Sweden)**

<table>
<thead>
<tr>
<th>Countries</th>
<th>All</th>
<th>US</th>
<th>UK</th>
<th>Canada</th>
<th>Sweden</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management (z-score)</td>
<td>-0.162***</td>
<td>-0.246***</td>
<td>-0.211**</td>
<td>-0.416*</td>
<td>-0.717**</td>
</tr>
<tr>
<td>(0.056)</td>
<td>(0.075)</td>
<td>(0.100)</td>
<td>(0.224)</td>
<td>(0.316)</td>
<td>(0.193)</td>
</tr>
<tr>
<td>Observations</td>
<td>324</td>
<td>324</td>
<td>178</td>
<td>74</td>
<td>24</td>
</tr>
<tr>
<td>Country dummies</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
</tr>
<tr>
<td>Hospital controls</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
</tr>
<tr>
<td>Region &amp; noise controls</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
</tr>
</tbody>
</table>

Notes. OLS; SE clustered by hospital. Hospital controls: size, age, specialty, % managers with a clinical degree. “Noise controls”: 13 interviewer dummies, seniority & tenure of manager; interview duration, reliability indicator, interviewee type (nurse, doctor or manager).

Source: Bloom, Sadun & Van Reenen (2013b)
Schools: Pupil outcomes correlated with higher management scores

Notes: Graph based on 354 observations with available school performance information (Canada=77; UK=85; US=120; Sweden=72). Performance data are zscored within country (US 2009 math exam pass rate from High School Exit Exams/End-of-Course exams, UK 2009 average uncapped GCSE score, CA 2009 Fraser Institute calculated ratings from school reports, and SW 2009 9th grade GPA). Source: Bloom, Genakos, Sadun & Van Reenen (2012)
# Pupil Achievement & management practices

<table>
<thead>
<tr>
<th>Country</th>
<th>(1) All</th>
<th>(2) Canada</th>
<th>(3) India</th>
<th>(4) Sweden</th>
<th>(5) UK</th>
<th>(6) US</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cross-country pooled measure of student achievement</td>
<td>Rating (zscored)</td>
<td>X Standards Average (%) Math Score (zscored)</td>
<td>9th grade GPA (zscored)</td>
<td>Average uncapped GCSE score (zscored)</td>
<td>HSEE Math Pass Rate (zscored)</td>
</tr>
<tr>
<td>Management (z-score)</td>
<td>0.328*** (0.074)</td>
<td>0.352*** (0.086)</td>
<td>0.606** (0.287)</td>
<td>0.472** (0.216)</td>
<td>0.327* (0.196)</td>
<td>0.505** (0.241)</td>
</tr>
<tr>
<td>Log(pupils)</td>
<td>0.088 (0.061)</td>
<td>0.348* (0.187)</td>
<td>0.050 (0.132)</td>
<td>0.383 (0.283)</td>
<td>-0.297 (0.453)</td>
<td>0.096 (0.080)</td>
</tr>
<tr>
<td>Observations</td>
<td>515</td>
<td>77</td>
<td>150</td>
<td>78</td>
<td>85</td>
<td>125</td>
</tr>
<tr>
<td>Country dummies</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
</tr>
<tr>
<td>Regional dummies</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
</tr>
<tr>
<td>School controls</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
</tr>
<tr>
<td>Noise controls</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
</tr>
<tr>
<td>Student controls</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
</tr>
</tbody>
</table>

**Notes:** US: Math exam pass rate from HSEEs (only available for public schools), UK: average GCSE score, Canada: school-level rating (Fraser Institute), Sweden: 9th grade GPA, India: Standards Average Math Score. “School controls”: #pupils, pupil/teacher ratio, governance (public regular, public autonomous, private); whether curriculum academic or vocational; noise controls (19 interviewer dummies, tenure & seniority of manager, day of the week; time of day the interview; interview duration, reliability indicator).

**Source:** Updated from Bloom, Genakos, Sadun & Van Reenen (2012)
School results consistent with Fryer RCTs

- RCTs of “high performance” US Charter Schools find better pupil outcomes (Angrist et al. 2010 Boston & KIPP charters; Dobbie & Fryer, 2011, on Harlem Promise Academies)
- Fryer (2012) RCT on introducing Charter teaching & management practices in Houston public schools. Big overlap with BVR questions
  - Use of data to guide instruction
  - Frequent teacher feedback
  - High dosage tutoring
  - Increased instructional time
  - Culture of high expectations
- Increased math score by 0.28 SD & reading by 0.08 SD
- Fryer running NYC intervention to determine which work best
Some Macro evidence

- Chong, La Porta, Lopez-de-Silanes & Shleifer (2012)
- Novel measure of efficiency of postal services across country
  - Sent letters to fake addresses in 159 countries & observed whether they came back to return address in US
  - Only 60% of letters returned & took on average 6 months!
  - Corruption plays no role (can’t ask for bribe)
- Many factors influenced efficiency positively:
  - Management quality (Bloom-Van Reenen scores)
  - “Weberian” bureaucracy, esp. Meritocratic recruitment
  - Technology
  - NOT average public-private wages
A counter-example? Nigerian Civil Service

- Rasul & Rogger (2013) implemented BVR survey 2010. 4,721 projects across 63 organizations (e.g. bore hole; dam)
- Findings
  - Increases in management score reduced performance (successful project completion)
  - Increases in autonomy increased performance
- Explanations
  - Multi-tasking (negative effect of management worse when complexity high, IT low, project “atypical”)
  - Intrinsic motivation (effect worse when agents motivated – conducted separate survey of why joined civil service)
  - No interaction with corruption
- Different from private sector where autonomy has ambiguous effect on performance (e.g. Aghion et al, 2007; Bloom et al, 2012)
Identification of effects of management on performance


• Before/after studies in small group of firms (e.g. Ichniowski, Shaw, Prennushi, 1997)

• Before/after for a single firm (e.g. Lazear, 2000; Bandiera et al, 2005, 2007, 2009, 2010)

• RCTs (Mostly experiments in developing countries)
The effect of management practices on performance

• Before/after in small groups of firms
• Before/after for a single firm
• Randomized Control Trials
Insider Econometrics: Ichniowski, Shaw and Prennushi (1997, AER)

• Collect detailed monthly performance and management data on 36 steel lines owned by 17 firms.
• Plant visits, detailed survey data

• Results:
  – Introducing “high-performance” management linked to improved performance (robust to various controls)
  – Clustering of high performance practices suggesting complementarity of practices (Milgrom & Roberts, 1988)
    • But clustering could arise from omitted factors
    • Productivity could have latent variable interpretation

• Influential paper, but obvious concerns over endogeneity
Complementarities following Ichinowski et al

• Much work on how the impact of management/organization depends on other factors
• Focus on ICT (information & communication technology). Impact of ICT on productivity very heterogeneous
  – Depends on organizational characteristics of firm (Bresnahan et al, 2002; Caroli & Van Reenen, 2001)
  – Can help explain differential productivity trends since mid 1990s between US and EU (Bloom, Sadun & VR, 2012)
• Example of police clear up rates (Garicano & Heaton, 2010)
• Impact of new technologies depended on adopting complementary organizational practices (COMPSTAT)
The effect of management practices on performance

- Before/after in small groups of firms
- **Single firms**
- Randomized Control Trials
Lazear (2000, AER) study on Safelite glass

Classic paper which studies the introduction of one type of management practice—piece-rate pay—on performance. The setting is Safelite Glass, who replaced car windscreens, who rolled out a switch from flat to piece-rate across regions.

Examines performance data for 19 months before and after the switch from hourly rates to piece-rate and finds:

• Increase in productivity of 44%
• About ½ selection and ½ effort effects
Bandiera, Barankay and Rasul (2007)

- Run experiments on incentives for workers and managers, team selection, tournament & task division on a fruit picking farm

- Introduce managerial changes part-way through season to look at change in performance, use last season output as controls

- Find large effects of varying management practices:
  
  - Worker incentive pay increases their performance, especially absolute (rather than relative) incentives
  
  - Manager incentive pay improves team selection (less favoritism) and the effort they put into monitoring workers: 21% increase in productivity, 10% is selection
The effect of management practices on performance

- Before/after in small groups of firms
- Single firms
- Randomized Control Trials
Evidence from micro-enterprises in developing countries

- A few projects are in progress—Karlan and Valdivia (2010) in Peru; Bruhn, Karlan and Schoar in Mexico; Karlan and Udry in Ghana; McKenzie and Woodruff in Sri Lanka.

- Survey in Karlan, Knight & Udry (2012).

- These provide a limited amount (≈50 hours) of basic trainings to small firms—e.g. accounting, marketing, pricing, strategy, etc.

- This training is provided randomly and performance measured before and after the intervention.
Evidence from micro-enterprises in developing countries

• Papers preliminary

• Some studies find evidence of impact of management training on performance, others do not (so far)

• Maybe management does not matter in these small firms, or the intervention is very poor quality?
A management experiment on larger firms

Bloom, Eifert, Mahajan, McKenzie and Roberts (2013, QJE).

Randomize management practices delivered by Accenture to 20 plants in large (300 person) textile firms in Mumbai, India

Control firms get one month of diagnostic. Treatment firms get one month of diagnostic, four months of intervention.

Collect weekly data for all plants from 2008 to 2010

Findings:
• 2 SD increase in management score & 20% higher TFP
• Increased profits by $325k per annum (cost of consultancy on open market $200k)
Inventory Control: Before
Inventory Control: After
Factory operations: **Before**
Factory operations: **After**
Factory information: **Before**

<table>
<thead>
<tr>
<th>Design No.</th>
<th>Beam Length</th>
<th>Getting Date</th>
<th>Beam Weight</th>
<th>Warp Weight</th>
<th>Weft Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>5A 160 09 10</td>
<td>12000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beam No.</td>
<td>No. of Pieces</td>
<td>Total Ends</td>
<td>Total Quality Weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5A 160</td>
<td>108</td>
<td>580</td>
<td>108 580 108</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WARP PATTERN</th>
<th>DRAWING PATTERN</th>
<th>PEG PLAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-A</td>
<td>1-4-4-4-4-4</td>
<td>1-2-3-9-7</td>
</tr>
<tr>
<td>1-B</td>
<td>6-1-4-4-4</td>
<td>1-2-3-4-4</td>
</tr>
<tr>
<td>1-A</td>
<td>1-2-2-1-1-5</td>
<td>1-6-4-5-8</td>
</tr>
<tr>
<td>1-E</td>
<td>4-1-2-1-1-5</td>
<td>4-3-4-5-8</td>
</tr>
<tr>
<td>21-A</td>
<td>4-1-2-1-1-5</td>
<td>4-3-4-5-8</td>
</tr>
<tr>
<td>1-A</td>
<td>2-1-1-1-1</td>
<td>5-FK</td>
</tr>
<tr>
<td>1-C</td>
<td>12.4cm 68cm</td>
<td></td>
</tr>
</tbody>
</table>

**Selvage**

| SC 160 4x230 4x230 | 12 dest = 76 950 40 905 40 905 |
| SC 160 4x230 4x230 | 8 dest = 76 952 41 198 41 198 |
| SC 160 4x230 4x230 | 25 dest = 10 85 60 60 60 60 60 60 |

**Other Text**

- FABRICS PVT. LTD.
- LOAM 15-51-49-08-7
Factory information: After
These simple management improvements increased productivity by 20% within 1 year alone.

Source: Bloom, Eifert, Mahajan, McKenzie & Roberts (2013)
Summary of lecture 1

• Large heterogeneity of productivity in private as well as public organizations
  — Suggestive of some fundamental factors

• Measurement of management a major challenge

• Evidence of a positive effect of management practices on private & public sector performance
  — Appears to be causal

• Issue of why profit increasing management practices are not adopted?
Some outstanding research questions

1. What are the key factors causing difference in management & Why do management practices take so long to change?

2. What are the correct set of public policies towards improving management

3. Are different management practices complementary, or are their impacts more or less additive?

4. What broad types of management practices are universally good and what types of contingent on firm’s environment

5. Are there are fundamental differences between public & private sector management & performance?
Interviewer “What kind of Key Performance Indicators do you use for performance tracking?”

Manager: “Performance tracking? That is the first I hear of this. Why should we spend money to hire someone to track our performance? It is a waste of money!”

Interviewer “How do you identify production problems?”

Production Manager: “With my own eyes”
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…”]
Estimating effect of management on performance

• Is there really “bad” management, or are management variations just optimal responses to different environments?

• Management discipline is big on “contingent” management (Woodward, 1958), while the Chicago school would claim bad managed firms would be swiftly driven out of the market.
Other RCTs on management

• Shearer (2004, REStud) RCT on tree planters;

• Lavy (2008, AER) on teachers prp

• Burgess et al – group prp for tax collection agencies. Effects declined with size of group

• Check BVR
Conclusions and summary

• Managers and management practices vary widely across firms and countries, much like productivity.

• Factors associated with good management are competition, meritocratic selection of CEO (not families or Government), human capital & some degree of labor flexibility.

• There is “good” and “bad” management, in that monitoring, targets and incentives appear to causally improve performance.

• Change appears slow with many badly run firms. Informational barriers to adoption appear one reason why.
Different measures of productivity

Labor Productivity:

\[ LP_{i,t} = va_{i,t} - l_{i,t} \]

“Three factor” TFP:

\[ TFP_{i,t}^3 = y_{i,t} - \alpha_l l_{i,t} - \alpha_k k_{i,t} - \alpha_m m_{i,t} \]

Can expand factors – e.g. can split capital \((k)\) into ICT and non-ICT

Note: \(y=\log(\text{output})\), \(va=\log(\text{value added})\), \(l=\log(\text{labor})\), \(k=\log(\text{capital})\), \(m=\log(\text{intermediate inputs})\)
Ownership differences are another factor behind cross-country variations in management practices.

Ownership differences are another factor behind cross-country variations in management practices. Ownership differences are another factor behind cross-country variations in management practices. Ownership differences are another factor behind cross-country variations in management practices. Ownership differences are another factor behind cross-country variations in management practices. Ownership differences are another factor behind cross-country variations in management practices. Ownership differences are another factor behind cross-country variations in management practices. Ownership differences are another factor behind cross-country variations in management practices.
Multinational presence also linked to cross-country differences in average management practices

- The chart shows the share of multinational companies in various countries, with bars indicating foreign multinationals (blue) and domestic multinationals (green).
- Countries with a higher share of foreign multinationals include Sweden, France, Germany, and Great Britain.
- Countries with a higher share of domestic multinationals include Brazil, China, India, and the Republic of Ireland.

Multinational presence is linked to cross-country differences in average management practices.
Figure 3: Hospital, School & Retail Management Practices Also Vary Across Countries, With the US Top Except in Schools

Note: Averages taken across all organizations within each country. 1,183 hospitals, 780 schools and 661 retail sites.
Like TFP management also varies within countries

Data includes 2013 survey wave as of 9/20/2013. Africa data not yet included in the paper.
CORRELATION BETWEEN FIRST AND SECOND INTERVIEWEE IN SAME HOSPITAL (SINGLE SITES)

Correlation = 0.68

Notes: standardized management score (16 questions) for hospitals where there were 2+ interviews. 20 hospital trusts.
Same in other countries
In India not all firms are bad – many are world class. The problem is the large tail of bad firms.

Source: [www.worldmanagement survey.com](http://www.worldmanagementsurvey.com)
Management also correlated with measures of Hospital “TFP”

Source: Chandra et al (2013)
Lazear, Shaw & Stanton (2012)

- June, 2006 to May, 2010. 23,878 workers & 1,940 bosses. 5.7 million worker-day observations

- Output measure is computer coded, like grading a multiple choice test

- Average daily team size is 9

- Large supervisor effects: replacing a boss from 90th percentile with one from 10th percentile same as adding one worker to a nine worker team)
Also increased firm size – better management allowed the family to manage more plants

### TABLE III

**LONG-RUN IMPACT OF THE EXPERIMENT ON FIRM SIZE AND DECENTRALIZATION**

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Firm size</th>
<th>Delegation to plant management</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1) No. of plants</td>
<td>(2) No. of plants</td>
</tr>
<tr>
<td>Sample</td>
<td>Industry</td>
<td>Experiment</td>
</tr>
<tr>
<td>Management$_{i,t}$</td>
<td>1.040*</td>
<td>(0.563)</td>
</tr>
<tr>
<td>Male family members$_{i,t}$</td>
<td>0.210***</td>
<td>(0.065)</td>
</tr>
<tr>
<td>Posttreatment$_{i,t}$</td>
<td>0.217*</td>
<td>(0.122)</td>
</tr>
<tr>
<td>Plant manager related$_{i,t}$</td>
<td>0.423***</td>
<td>(0.150)</td>
</tr>
<tr>
<td>Plant manager tenure$_{i,t}$</td>
<td>n/a</td>
<td>3</td>
</tr>
<tr>
<td>Small sample robustness</td>
<td>n/a</td>
<td>0.21</td>
</tr>
<tr>
<td>Permutation tests (p-value)</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Time FEs</td>
<td>n/a</td>
<td>3</td>
</tr>
<tr>
<td>Plant/Firm FEs</td>
<td>n/a</td>
<td>17</td>
</tr>
<tr>
<td>Observations</td>
<td>107</td>
<td>68</td>
</tr>
</tbody>
</table>

**Notes.** The size dependent variable in columns (1)–(3) is the number of plants in the firm. The decentralization dependent variable in columns (4)–(6) is the z-score index of plant decentralization, which is the sum of the four z-scored (normalized to a mean of 0 and standard deviation of 1) individual responses over plant manager autonomy over weaver hiring, junior manager hiring, spare parts purchasing authority, and days the director does not visit the factory (see Online Appendix A1 for details). Columns (1)–(3) are run at the firm level (because firm-size is a firm-level variable) and columns (4)–(6) are run at the plant level (because decentralization is a plant-level variable). Management is the adoption share of the 16 management practices starred in Appendix Table A1 and discussed in Online Appendix A1, averaged across all plants within the same firm in columns (1)–(3). Male family members is the number of adult sons and brothers of the interviewed director, which includes all male family members currently working (even working in another firm) but excludes those in school of university. This is designed to measure the supply of male family members that could work in the firm. Post treatment takes the value 1 for a treatment firm/plant after the implementation phase and 0 otherwise. Plant manager related reports if the plant manager is related to the director, including cousins, uncles, and other indirect family members. Plant manager tenure measures the number of years the plant manager has been working at the firm. Time FEs report the number of calendar week fixed effects. Firm/Plant FEs reports the number of firm-level fixed effects (columns (1)–(3)) or plant-level fixed effects (columns (4)–(6)). Standard errors clustered at the firm level in all columns. Permutation test reports the p-values for testing the null hypothesis that the treatment has no effect for the ITT parameter by constructing a permutation distribution of the ITT estimate using the 12,376 possible permutations of treatment assignment. *** denotes 1%, ** denotes 5%, * denotes 10%, † denotes 15% significance.
Spare parts: Before
Stores: After
Stores: After