Productivity, Management & Reallocation

John Van Reenen

Bank of England/IFS Conference
September 23rd 2015

Draws on joint work with Nick Bloom (Stanford), Raffaella Sadun (Harvard), Tim Besley (LSE), Isabelle Roland (LSE)
OR... BOSS-ONOMICS
MOTIVATION

- UK has ~20% lower GDP per hour than G7 average
- UK GDP per hour ~14% below 1979-07 pre-crisis trend
- More generally, what are the reasons for productivity dispersion across & within countries?
  - Role of management practices
  - Role of misallocation: better firms “too small”
SUMMARY

• Management important in accounting for cross-country (and cross firm) productivity patterns
  – Most of UK-US TFP accounted for by management deficit (cf ½ across US-EU & 31% in world)
  – About a 1/3 of differences in cross country management gaps due to misallocation: well managed firms cannot grow to scale in many nations
• Low UK productivity growth since recession not well explained by misallocation
  – Reallocation to better managed firms fell 2008-2009, but has since recovered
  – Misallocation of credit only a small drag
  – More “macro” effects operating across most firms: credit access; low wages; low demand; high uncertainty, etc.
Measuring Management

Management Models

Management and cross-country TFP

Misallocation over UK Recession & Recovery
1) Developing management questions
   • Scorecard for 18 monitoring (e.g. lean), targets & people (e.g. pay, promotions, retention and hiring). ≈45 minute phone interview of manufacturing plant managers

2) Obtaining unbiased comparable responses (“Double-blind”)
   • Interviewers do not know the company’s performance
   • Managers are not informed (in advance) they are scored
   • Run from LSE, with same training and country rotation

3) Getting firms to participate in the interview
   • Introduced as “Lean-manufacturing” interview, no financials
   • Official Endorsement: Bundesbank, Bank of England, RBI, etc.
   • Run by 200 MBA types (loud, assertive & business experience)
| 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 |

**Note:** All 18 questions and over 50 examples in Bloom & Van Reenen (2007)

[http://worldmanagementsurvey.org/](http://worldmanagementsurvey.org/)
Examples of performance metrics – Car Plant
World Management Survey (~20,000 interviews, 4 major waves: 2004, 2006, 2009, 2014; 34 countries)

Medium sized manufacturing firms (50-5,000 workers, median ≈ 250)
Now extended to Hospitals, Retail, Schools, etc.  http://worldmanagementsurvey.org/
Average Management Scores by Country

Note: Unweighted average management scores (raw data) with number of observations. All waves pooled (2004-2014)
Large variation of firm management within countries

Firms with 50 to 5000 employees randomly surveyed from country population. Mar 2014.
Measuring Management

**Management Models**

Management and cross-country TFP

Misallocation over UK Recession & Recovery
We define a *stylized* Management As a Technology (MAT) model (Bloom, Sadun & Van Reenen, 2015)

Production Function: \( Y = AK^\alpha L^\beta M^\gamma \) where \( M \) = management

Firms invest in \( M \) (like intangible capital) which depreciates like \( K \), but (unlike \( K \)) firms draw an endowment at entry & it cannot be sold (Melitz, 2003)

Other assumptions:
- \( A \) also drawn randomly at entry (\( K_0 = 0 \)) from known distribution. Hit by ongoing \( A \) shocks
- Changing \( M \) & \( K \) involves adjustment costs (\( L \) flexible)
- Monopolistic competition (Iso-elastic demand, \( e \))
- Sunk entry cost (\( \kappa \)) & fixed per period operating cost (\( F \))
Management As a Technology (MAT) empirics

• Structurally estimate some key unknown parameters of model using the panel data (e.g. adjustment costs for M) by SMM

• Simulations: look at some (non-targeted) moments
  – Performance increases with Management
  – Management rises with human capital
  – Higher competition increases aggregate management
    • Unweighted management higher (e.g. badly managed firms exit)
    • Allocation improves (better managed firms obtain higher market shares)
  – All these are strongly supported by data
Data: TFP is increasing in management

Management is an average of all 18 questions (set to sd=1). TFP residuals of sales on capital, labor, skills controls plus a full set of SIC-3 industry, country and year dummies controls. N=8314
Performance: results from randomized control trials also supportive of MAT (Bloom et al, 2013)

• Experimented on plants in Indian textile firms outside Mumbai

• Randomized treatment plants got heavy management consulting (as in the practices discussed here), control plants got very light consulting

• Collected weekly data & found:
  – Management score improved by 2sd & TFP up by 20%
  – **Implies: 1 SD increase in management index caused 10% increase in TFP**
Notes: Management is an average of all 18 questions (set to sd=1) on the y-axis. Lerner is median firm profits over sales ratio in industry-country pair. Management & competition are expressed in relation in deviations from the country and global industry average. Competition measure (1-Lerner) is binned into quintiles. 5,982 observations.
Find the US (where markets generally most competitive) has the most reallocation.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Employees</th>
<th>Employees</th>
<th>Sales growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management (US=base)</td>
<td>201.7*** (19.9)</td>
<td>371.9*** (64.3)</td>
<td>0.069** (0.033)</td>
</tr>
<tr>
<td>MNG*Africa</td>
<td>-237.0*** (75.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MNG*Americas</td>
<td>-192.1*** (66.7)</td>
<td>-0.068** (0.034)</td>
<td></td>
</tr>
<tr>
<td>MNG* (“Northern” EU)</td>
<td>-164.2* (93.7)</td>
<td>-0.024 (0.037)</td>
<td></td>
</tr>
<tr>
<td>MNG* (“Southern” EU)</td>
<td>-292.0*** (66.9)</td>
<td>-0.047 (0.035)</td>
<td></td>
</tr>
<tr>
<td>MNG*Asia</td>
<td>-131.2* (77.1)</td>
<td>-0.064* (0.037)</td>
<td></td>
</tr>
</tbody>
</table>

Observations: 8,895 8,895 2,627

Notes: US is the omitted country in columns 2 and 3. Includes year, country, 3-digit SIC dummies, firm and noise controls.

Reallocation towards better managed firms significantly worse in other countries than in US.
Measuring Management

Management Models

Management and cross-country TFP

Misallocation over UK Recession & Recovery
Decomposition of the size weighted management ($M$) in each country we surveyed

$$M \equiv \sum_i S_i M_i$$

Employment Share of firm $i$  \hspace{1cm} Management score of firm $i$
Decomposition of the size weighted management ($M$) in each country we surveyed

$$M = \sum_i S_i M_i$$

$$= \sum_i \left[ (S_i - \bar{S})(M_i - \bar{M}) \right] + \bar{M}$$

$$= OP + \bar{M}$$

“Between Firm” Covariance (Olley-Pakes, 1996, reallocation term)

“Within Firm” Unweighted mean of management score
Calculate the **size** weighted management gap with the US in terms of these “between” (reallocation) and “within” terms.

Notes: These are the share-weighted management score differences relative to the US (sd=1). Length of bar shows total deficit which is composed of (i) the unweighted average management scores (“rel_zman”, light red bar) and reallocation effect (“rel_OP” blue bar). Domestic firms only with management scores corrected for sampling selection bias.
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Step 2: What fraction of country k’s TFP gap (with the US) can this management gap (with the US) explain?

\[
\text{% TFP gap accounted for by management} = \frac{\gamma \times (\bar{M}^k / \bar{M}^{US})}{\ln(TFP^k / TFP^{US})}
\]

where \( \gamma = \text{impact of M on TFP} \)
<table>
<thead>
<tr>
<th>Country</th>
<th>Weighted Mng. Gap with US</th>
<th>TFP Relative to US</th>
<th>% TFP due to Management</th>
</tr>
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<tbody>
<tr>
<td>US</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Japan</td>
<td>-.3</td>
<td>.71</td>
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### Management accounts for ~30% of TFP Gap with US

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**Average** | **31.4**
Measuring Management

Management Models

Management and cross-country TFP

Misallocation over UK Recession & Recovery
Covariance of Firm Size with Management in UK
Increased misallocation in 2008-9 recession, but subsequent recovery

Note: Height of bar is covariance of firm employment and management practice z-score. Pre-Recession is 2004 & 2006 waves (N=305); Recession is 2008/9 (N=76); Post Recession is 2010 & 2014 waves (N=222). Domestic firms only between 50 & 5000 workers.
“Credit Market Frictions & UK Labour Productivity” (with Tim Besley & Isabelle Roland)

• Explicit model of credit frictions & contracting to analyze effect on aggregate labour productivity
• Structural estimation to decompose UK GDP per hour change
  – **Misallocation**: credit not flowing sufficiently to more efficient firms
  – **Macro** credit tightening (e.g. raising effective cost of capital through decline in bank competition)
• Calculate expected default rates exploiting the (historical) credit rating software used by banks (S&P PD model)
  – Run this model through ~1m firms per year 2004-2013
  – Match firm-level default probabilities to ABS panel
• **Misallocation** a function of covariance between firm TFP & (expected) default probability
• **Macro** via average default probability conditional on observables
Findings (preliminary)

- Credit channels can account for ~10%-20% of change in GDP per hour 2008-2013

- But misallocation only a very small amount (macro component 10x misallocation component)

- Consistent with general finding that misallocation matters, but not quantitatively large
  - Hoppenhayn (2014): Need rank reversals of firm productivity & outcome (survival, size etc.) to get first order macro welfare effects
CONCLUSIONS

• Productivity differences across countries (& firms) related to management (e.g. $\sim\frac{3}{4}$ of UK-US TFP difference)

• $\sim\frac{1}{3}$ management differences across countries is misallocation (relates to various frictions)

• However, misallocation does not appear to be major source of ongoing UK productivity puzzle
  – Factors working across all firms (factor prices, etc.) more important?
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….”
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”
Does Management Really Work?

How three essential practices can address even the most complex global problems
by Nicholas Bloom, Rebecca Henderson, and John Van Reenen
Further reading for researchers

THE NEW EMPIRICAL ECONOMICS OF MANAGEMENT
Nicholas Bloom
Renata Lemos
Raffaella Sadun
Daniela Scur
John Van Reenen
Working Paper 20102
http://www.nber.org/papers/w20102
NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
May 2014

MANAGEMENT AS A TECHNOLOGY?
Nicholas Bloom, Raffaella Sadun and John Van Reenen
November 1st 2013

Abstract
Are some management practices akin to a technology that can explain company and national performance, or do they simply alter alternative styles? We collect cross sectional and panel data on management practices we believe are related to productivity across 8,000 firms in 20 countries in the Americas, Europe and Asia. We find the US has the highest weighted average management score, with around a quarter of this advantage due to more powerful reallocation effects

IT and Management in America
Nicholas Bloom1, Erik Brynjolfsson2, Lucia Foster3, Ron Jarmin4,
Megha Patnaik5, Hay Saporta-Eksten6 and John Van Reenen7
February 2014

The Census Bureau recently conducted a survey of management practices in over 5,000 establishments across the US, the first large-scale survey of management in America. Analyzing the data reveals several striking results. First, more structured management practices are tightly correlated with higher levels of IT intensity in terms of a higher expenditure on IT and more on-line services. Second, more structured management is strongly linked with superior performance: establishments adopting more structured practices for performance monitoring, target setting and management by exception enjoy greater productivity and profitability, higher rates of innovation and faster growth. Second, there is a substantial dispersion of management practices across the US. We find that 18% of establishments have adopted at least 75% of these more structured practices, while 77% of establishments adopted less than 50% of these.

Management, Product Quality and Trade: Evidence from China
Nick Bloom, Stanford University and NBER
Kalina Manova, Stanford University and NBER
John Van Reenen, London School of Economics and CEP
Zhihong Yu, Nottingham University


US had an even larger cyclical change in reallocation (but productivity changes less than in UK)
Average management scores across countries are strongly correlated with GDP per capita

Note:
Unweighted average management scores (raw data) with number of observations. All waves pooled (2004-2014)
LARGE PRODUCTIVITY DIFFERENCES BETWEEN COUNTRIES

Source: Jones and Romer (2010). US=1
Performance: causal results from randomized control trials also supportive of MAT

Weeks after the start of the management experiment

1 SD in management caused 10% increase in productivity
Measuring Data

Management Models

Examining the Model’s Predictions
- Performance
- Competition
- Skills
- Age

Management and cross-country TFP
Education (for managers and non-managers) in the raw data is correlated with better management.

Source: www.worldmanagementsurvey.com
Preliminary estimates of contribution of management to within-country TFP spread ~1/3

<table>
<thead>
<tr>
<th>Country</th>
<th>90-10 gap in:</th>
<th>% accounted for by management</th>
<th>TFP spread source:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TFP</td>
<td>Management</td>
<td></td>
</tr>
<tr>
<td>US</td>
<td>90%</td>
<td>2.7 SDs</td>
<td>30%</td>
</tr>
<tr>
<td>UK</td>
<td>110%</td>
<td>3.0 SDs</td>
<td>38%</td>
</tr>
</tbody>
</table>

Note: Management share imputed assuming that ↑1 SD management ≈ ↑ 10% TFP
Using US MOPs on entire firm size distribution US figure is 21%
Figure 4: Constant price GDP per hour worked, actuals and projections

Source: Office for National Statistics