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Constraints on Developing UK Management Practices

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Executive summary

In the Autumn/Winter of 2009/10 CEP conducted a management practices survey that involved contacting over 600 medium sized British manufacturing plants and interviewing the plant manager. We set out to interview the same sample of British firms as in the 2006 and 2004 surveys so we could observe how their practices may have changed over this time period.

We implemented the “double blind” Bloom and Van Reenen (2007) methodology to score firms on 18 dimensions of management quality covering lean operations, performance monitoring, target and people/talent management. The questions were identical to those asked in previous years so a longitudinal panel could be constructed.

We also asked a new set of questions relating to (i) the constraints firms perceived on improving management practices and (ii) the effects of the credit crunch.

We have been successful in obtaining reliable data from 265 firms representing a sample response rate of 46% - higher than in 2006. There did not appear to be significant bias in the surviving firms. In addition, we interviewed 2,046 firms from 13 other countries, out of which 1,465 had also been interviewed in 2006, in order to provide some comparison group for our British firms.

Changes in Management Practices

- Management practices appear reasonably persistent over time – the well-managed firms in 2006 tend to also be the well-managed firms in 2009.

- Management quality appears to have improved in our firms as a group, suggesting some learning behaviour. Although all four main dimensions of management we surveyed (operations, monitoring, target and people management) show improvement, the increase in performance is particularly strong for lean operations.

- The improvement in management practices in the UK was weaker than the improvement in China but stronger than the growth in the US. This suggests some cross-country convergence in management quality over this period.

- The improvement in management practices was greatest when (i) the firm faced increased product market competition; (ii) the firm upgraded its skills. It was also greater when a new plant manager on site was interviewed. This suggests that managerial turnover may be a driver of better management practices.

Constraints on improving management

- The greatest constraint for improving management is an inadequate supply of managerial human capital. The next most important constraint is inadequate worker skills, and the third most important is informational barriers – not knowing what changes to make. Consultancy costs, labour regulation and unions appear much less important.

- The constraints on improving management faced by UK firms are similar to those of the three other main OECD nations we look at (France, Germany and the US); they are particularly similar to those in the US. This suggests that while a scarcity of managerial human capital may be a major constraint on improving management practices in the UK, the problem is no more severe for us than for our major comparators.

- British managers attribute more importance to a lack of worker skills and informational barriers than their US counterparts; however, these differences are not huge.

- The scarcity of managerial skills and informational constraints are much more pronounced in developing countries (especially India) compared to OECD countries. Within the OECD, German and French firms report more severe problems with labour regulations.

Impact of the credit crunch/recession

- We asked firms how they had responded to the recession, for example by cutting costs, prices and/or reducing the number of different products they offered. Prices (and product mixes) appeared relatively “sticky” and adjusted very little in all the countries in our sample.

- India and China have made relatively few cuts in capital, labour or other costs as a result of the global recession, from which they were relatively sheltered.

- Amongst OECD countries, the largest cutback has been in investment, which, in comparison to labour and other input costs, fell the most across all countries in our sample. Surprisingly, the cuts in UK investment were less than in the other countries.

- US firms have been the most aggressive in cutting jobs; British firms came second. Employment in France and Germany fell by a lot less, which is consistent with higher firing costs in Continental European countries.

- In general, US firms have been the most aggressive cost cutters. However, German firms have also been tough in this regard – more so than French or British firms.

Policy Implications

There remain large gaps between the best and the worst performers within countries. As the UK is mid-way in the management league tables, our relative position and overall productivity could significantly increase by raising the management quality of British firms especially in the lower tail of the distribution.

From the analysis of the large **cross sectional** dataset, ways to improve management quality include:

- Reducing the role of family firms. This could be done, for example, by no longer exempting business assets from inheritance taxes when they are passed down within the family
- Do not erect further barriers limiting foreign takeovers of UK firms.

An analysis of the **panel data** suggests the following ways to improve management quality:

- Increase product market competition. In the traded sectors, this could be implemented by advancing a new Doha Round, and in the non-traded sectors by passing the Services Directive.
- Increase the supply of human capital by allowing university expansion and increasing the availability of travel/work visas for experienced managers from other well-managed countries such as the US.

From the **management constraints survey,** the following are ways through which policy can help improve management quality:

- Smaller firms have particular problems in getting access to skills and information and there are many activities to spread best practice. As such, target these activities at firms with between 100 and 300 employees.
- Examine the types of industry-specific market failures that could lead to the under-supply of managerial skills to smaller firms.
- Facilitate the creation of management education courses and facilities as a measure for increasing the supply of capable managers for small firms.

From the analysis of the **reaction to the recession/credit crunch**, the following are suggestions to improve firm performance during crises:

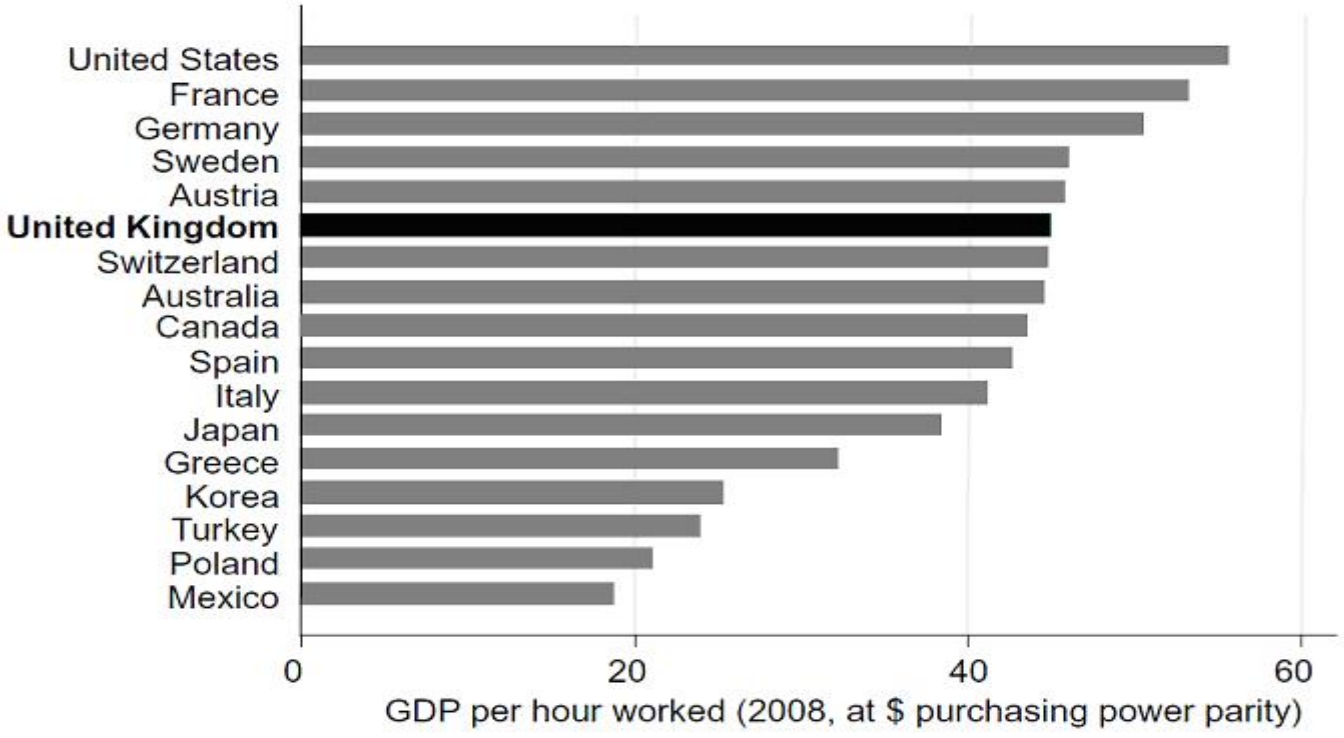
- Improvements in management quality will not just make firms more productive but will also make them more "resilient" to recessions. Better quality management acts to decrease output volatility of UK firms over the business cycle. This dynamic effect should be considered when determining the relative costs and benefits of policy interventions.

- It is difficult to predict firms' responses to an economic downturn so close targeting of firms to help *ex ante* is unlikely to be fruitful.

Introduction

UK productivity levels are distinctly mid-table by international standards for developed countries. Figure 1 plots the output per hour worked in 2008 at purchasing power parities. This is the Organization of Economic Cooperation and Development's (OECD) preferred internationally comparable measure of productivity. The table shows that UK productivity is similar to that of other countries in Northern Europe like Austria and Sweden but is behind France and Germany and, most notably, the United States. The large productivity gap with some of the UK's major competitors, in some cases up to 20% in 2008, is clearly worrying. In addition, recent firm level evidence has increasingly highlighted the differences in productivity across firms within very narrowly defined industries.[1] One possible explanation of these differences in productivity across firms and countries is the variation in management practices. While the popular press, business schools and industry experts have long stressed the importance of good management in driving these differences, academic economists have traditionally paid little attention to this. Having newly generated quality firm level data, recent research has begun to investigate the importance of management practices for performance.[2]

Figure 1: The UK's GDP per hour worked - a basic measure of productivity - is mid-table for major OECD countries



Source: OECD STAN productivity statistics (see http://www.oecd.org/statistics/productivity for details) Notes: Reported for all OECD countries with 2008 GDP of $30bn or greater. Purchasing power parities benchmarked at 1 for US dollars.

[1] For example, Baily, Hulten and Campbell (1992), Foster, Haltiwanger and Syverson (2008).

[2] For example, Ichinowski, Shaw, and Prennushi (1997), Sutton, (2007) and Bloom and Van Reenen (2007).

The findings of this study are based on the survey findings from 265 UK firms. In addition, using funding from other sources such as the ESRC and European Union, we collected equivalent data from 2,311 firms in 13 other countries. With this data we perform a unique international benchmarking exercise, comparing the UK to 3 major G7 countries (France, Germany and the US) and the main two emerging economies (India and China).

The structure of this report is as follows. Section II describes some managerial theories, section III our methodology, section IV the data, and section V contains the results. The final section offers some concluding comments.

Theories of management practices

In economics there is a large number of theories and many notions of “management practices”. It is useful to analytically distinguish between three approaches which we can embed in a simple production function framework where output, Q, is produced as follows in equation (1):

$$Q = G(A,M,X) \qquad (1)$$

where A is an efficiency term (often called productivity), X are conventional factors of production like labour, capital and skills, and M is management quality.

Management as a factor of production

The simplest view is that management is another factor or production, like labour or capital. In this view there is a market price for the management input, and this price will determine the optimal level. For example, firms in regions with low wage rates for workers with engineering or MBA qualifications may optimally hire more of these types of workers, leading to better measured management practices. As a result, while differences in management practices will be correlated with differences in productivity (if we correctly measure these managerial inputs) they should not be systematically correlated with differences in profitability.

Our results show some evidence for this type of approach. First, we find a strong correlation in our results between better management practices and measures of manager and worker education. While this does not causally indicate that variations in management are driven by the supply of skills, it is suggestive of this. Second, we find that firms across every country interviewed highlight the lack of manager and worker skills as a constraint on their management practices, and presumably these types of skills are available at market rates.

Under this theoretical construct, one obvious policy to improve management practices is to increase the supply of (and thereby reduce the cost of) highly trained managers and workers. We will return to this policy recommendation later in the report.

Management as a Technology

Another perspective is based on a second class of theories that explains firm heterogeneity as differences in management technology. This is the notion that management (M), like efficiency (A), is free to firms so that better management should strictly increase firm-level profitability.

The idea here is that management is a type of process innovation that can be utilized by many firms. For example, the major management innovations of the last two centuries such as the American System of Production, Scientific Management, Mass Production, the M-Form Organization, Total Quality Management and Lean Manufacturing are process innovations which have spread across firms in the US, Europe and Asia. These process innovations are similar to product innovations, which are non-rivaled but diffuse slowly because of the informational complexity around their introduction. For example, it took the American automotive industry several decades to replicate the Japanese system of Lean Manufacturing despites the system's increasingly obvious superiority from the 1980s onwards.

Formal economics models such as Jovanovic (1982), Hoppenhayn (1992) and Melitz (2003) describe an industry structure whereby entering firms take a permanent draw from a productivity distribution (which we can think of as managerial quality). Firms with higher draws are larger and also make greater absolute levels of profit. One way to think of this is firms sample the latest process technologies, drawing nearer or further from the production frontier. There are fixed costs of production so firms with poor management will exit whereas firms with a very high draw will tend to be large and export.

All of these models take (firm-level) management quality as fixed over time. Treating management as a technology, we could consider it to change over time as new managerial techniques arise and firms choose whether to adopt these or not. In this sense Japan's Lean Manufacturing techniques or Wal-Mart's supply chain management are genuine economy-wide productivity breakthroughs. From this perspective management could be considered like other models of firm adoption and innovation with all the attendant modeling issues of information, fixed costs, spillovers and so on. Alternatively we could take an evoluationary economics approach following Nelson and Winters (1982), in which firms follow a set of management routines. Well managed firms prosper, grow and generate new firms from spin-offs, while badly managed firms shrink and exit.

Empirically we also find some evidence for this theoretical approach, in that well-managed firms do make higher profits on average, suggesting good management is more than just a paid for factor. The case study literature and world of management guru books is also replete with examples of management best-practices which can be copied to improve firms' performance. This more anecdotal literature also suggests that management is a type of technology that firms can adopt. The policy response to this type of view of management is to try and encourage the spread of management best practices through free product markets, management interactions and government supported management education programs. For example, providing regional clinics on Lean Manufacturing to disseminate the latest management thinking.

Management as Design (Contingent management)

The third class of management models we label the design approach (also known as contingency theory in management science). The production function can be written as equation (1), but for some firms and practices $G'(M) < 0$. Even if M is free and could be costlessly introduced, output would fall. For example, team based incentives will work well in industries

with joint production while in industries with individual production individual incentives may be more appropriate. In other words all practices are contingent on the industry and environment faced by the firm. This approach has a long history in management science, going back at least to Woodward (1958), and in fact is now the dominant paradigm in fields like organizational behavior and human resource management. Within economics, Organizational and Personnel economics has also focused here, analyzing the circumstances under which different designs of firms could raise productivity (e.g. decentralization, incentive pay, outsourcing, etc.).

There will always be some element of the design approach at play when firms choose management practices. In our research we focused on collecting information on management practices that we believe on average should raise productivity (e.g. using data systematically to make operational decisions and taking an worker performance into account when making promotion decisions). That is we tried to avoid measuring management practices whose impact was contingent because these are hard to label “good” and “bad”. Such contingent practices would be around things like advertising, strategy, research and development rates for which there is no one best practice.

But despite our focus on “best practice” management, these will still not be universally equally important. For example, aspects of the environment such as labour regulations and the level of human capital will make some styles of management more attractive for some countries and firms than others. In these circumstances firms will optimally specialize in some forms of managerial practices rather than others. Our view is, however, that the 18 practices we focus on are likely to be performance enhancing for most British firms. This is based both on our own empirical results in this report and also on field experiments showing a large causal impact of better management (Bloom, Eifert, McKenzie, Mahajan and Roberts ,2010).

Methodology

Basic Survey Method and Management Practices Questions

To measure management practices we developed an innovative survey methodology in Bloom and Van Reenen (2006, 2007), henceforth BVR. We describe the methodology underlying this type of survey technique in more detail in Bloom and Van Reenen (2010). This uses an interview-based evaluation tool that defines and scores from one ("worst practice") to five ("best practice") across 18 basic management practices on a scoring grid. This evaluation tool, developed by an international consulting firm, scores these practices in four broad areas[3]:

- *Operations:* To what extent have modern lean manufacturing techniques been introduced and was there a good business rationale?

- *Performance monitoring*: How well do companies track what goes on inside their firms and use this for continuous improvement?

- *Target setting*: Do companies set the right targets, track the right outcomes, and take appropriate action if the two are inconsistent?

- *Talent/people management*[4]: Are companies promoting and rewarding employees based on performance and systematically trying to hire and keep their best employees?

To obtain accurate responses from firms we interview production plant managers using a 'double-blind' technique. One part of this double-blind technique is that managers are not told in advance they are being scored or shown the scoring grid. They are only told they are being "interviewed about management practices for a piece of work".

To run this blind scoring we used open questions. For example, on the first monitoring question we start by asking the open question "tell me how you monitor your production process", rather than closed questions such as "do you monitor your production daily [yes/no]". We continue with open questions focusing on actual practices and examples until the interviewer can make an accurate assessment of the firm's practices. For example, the second question on that performance tracking dimension is "what kinds of measures would you use to track performance?" and the third is "If I walked round your factory could I tell how each person was performing?". The scoring grid for this performance tracking dimension is shown in Table 1 for an example set of questions. The full list of questions for the grid are in Annex Table A1 and given in more detail in Bloom and Van Reenen (2006).

[3] Bertrand and Schoar (2003) focus on another important managerial angle - CEO and CFO management style - which captures differences in management strategy (say over mergers and acquisitions) rather than practices *per se*.
[4] These practices are similar to those emphasized in earlier work on management practices, by for example Ichinowski, Prennushi and Shaw (1997) and Black and Lynch (2001).

Table 1: Example questions from scorecard

PERFORMANCE MONITORING - i.e. "*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
TARGET SETTING - i.e. "*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
TALENT MANAGEMENT - i.e. "*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

Notes: All 18 topics and over 50 examples in Bloom and Van Reenen (2006)

The other side of the double-blind technique is that interviewers are not told in advance anything about the firm's performance. They are only provided with the company name and telephone number. Since we randomly sample medium-sized manufacturing firms (employing between 100 to 5,000 workers) which are not usually reported in the business press, the interviewers generally have not heard of these firms before, so should have no preconceptions. By contrast, it would be hard to do this if an interviewer knew they were talking to an employee of Microsoft, General Electric or Boeing. Focusing on firms over a size threshold is important as the formal management practices we consider will not be so important for smaller firms. We did not focus on smaller firms where more formal management practices may not be necessary. Since we only interviewed one or two plant managers in a firm, we would only have an inaccurate picture of very large firms.

The survey was targeted at plant managers, who are senior enough to have an overview of management practices but not so senior as to be detached from day-to-day operations. We also collected a series of "noise controls" on the interview process itself – such as the time of day, day of the week, characteristics of the interviewee and the identity of the interviewer. Including these in our regression analysis typically helps to improve our estimation precision by stripping out some of the measurement error.

To ensure high sample response rates and skilled interviewers we hired MBA and other master's students to run interviews because they generally had some business experience and training. We also obtained endorsements for the surveys in each country covered. Most importantly we positioned it as a "piece of work on Lean manufacturing", never using the word "survey" or "research". We also never ask interviewees for financial data, obtaining this from independent sources on company accounts. Finally, the interviewers were encouraged to be persistent – so they ran about two interviews a day lasting 45 minutes each on average, with the rest of the time spent repeatedly contacting managers to schedule interviews.

Since each question is scored between one and five, we will generally z-score each question (i.e. take away the mean and divide by the standard deviation). With these standardized questions we will often simply average across all the 18 questions to construct a composite measure of management quality or average across a sub-set (e.g. in each of the four dimensions of operations, monitoring, targets and talent).

Internal Validation of Management Practice Questions

Before presenting the results of the management scores it is worth discussing a survey validation step we undertook to validate our management data. In 2006 we re-surveyed 5% of the sample using a second interviewer to independently survey a second plant manager in the same firm. The idea is that two independent management interviews on different plants within the same firms reveal how consistently we are measuring management practices. We found that in the sample of 222 re-interviewed firms the correlation between our independently run first and second interview scores was 0.51 (p-value 0.001). Part of this difference across plants within the same firms is likely to be real internal variations in management practices, with the rest presumably reflecting survey measurement error. The highly significant correlation across the two interviews suggests that while our management score is clearly noisy, it is picking up significant management differences across firms.

External Validation: Management and Productivity

The main data we have is cross sectional; therefore, establishing the causal impact of management on productivity is not possible. Some ongoing work on randomized control trials in Indian textile firms is attempting to establish causality using management consultancy treatments (Bloom, Eifert, Mahajan, McKenzie and Roberts, 2010). There is also a wealth of field experiments suggesting the importance of people management practices for productivity.[5] Nevertheless, examining the correlation between our measures of management and firm performance is important as an external validity check of data quality. If the measures were simply cheap talk, we would expect no relationship with productivity.

We examined the correlation between management practices and firms' performance in terms of productivity, profitability, growth rates, survival rates, and market value (e.g. Bloom and Van Reenen, 2010). To measure firm performance we used company accounts data and found that higher management scores are robustly associated with better performance for our sample of

[5] See Lazear and Oyer (2009) for a survey.

manufacturing firms [6]. Across all these measures we have found that management is highly correlated with these indicators of better firm performance.

We give an example of such regressions using the new (and old) data in Annex Table A2. Column (1) uses a large sample that includes all firms even if we only observe a firm in one year (i.e. we cannot control for fixed effects). Here, a one standard deviation of the management score is associated with about a 40% increase in size as indicated by sales. Column (2) conditions on the sample where we have panel data, so there are at least two observations (usually 2006 and 2009). The cross sectional correlation between management and size is almost identical on this sub-sample. Column (3) includes employment as a control so the coefficient on management can be interpreted as the association with labour productivity. The association is smaller, but remains positive and significant. Column (4) includes capital, so the management coefficient now represents the association with total factor productivity (TFP). The coefficient is also positive and significant indicating that a one standard deviation increase in management is associated with a 14% increase in TFP. In column (5) we include a full set of firm fixed effects – this is only possible now that we have the panel data from this new survey. Unsurprisingly the coefficient is smaller, but remains significant at the 10% level even with this demanding specification.

The last three columns repeat the analysis for the return on capital employed (ROCE). We observe that the correlation of performance with management is significant at the 5% level in the fixed effects specification of column (8)[7].

Annex Table A2 shows that management matters for size, labour productivity, TFP and profitability. None of these correlations should be given a causal interpretation (the biases could be positive or negative). Nevertheless, they indicate that the management score has some informational content, even in the time series dimension. If the measure were just “hot air” – cheap talk by managers – then we would expect no correlation.

[6] Our sampling frame contained 90% private firms and 10% publicly listed firms. In most countries around the world both public and private firms publish basic accounts. In the US, Canada and India, however, private firms do not publish (sufficiently detailed) accounts so no performance data is available. Hence, these performance regressions use data for all firms except privately held ones in the US, Canada and India.

[7] Unlike TFP, including fixed effects actually strengthens the results which may be because there is more permanent measurement error in ROCE and more transient measurement error in TFP.

Data

We first describe the sampling approach in our UK and overseas management surveys and then report some of the main management results.

Survey sample

Our sampling frame in 2009 for the UK consisted of the firms who responded to either the 2004 or 2006 CEP Management Survey. These firms were randomly drawn from the population of companies with between 100 and 5,000 employees whose primary code was in manufacturing. For the UK this firm population data came from Bureau Van Dijk's ORBIS database. This database originates from Companies House, with whom all UK incorporated firms are legally obliged to file an annual report (which for smaller firms is typically very limited in scope). As such, this database spans all UK incorporated firms. Since our original 2004 and 2006 sampling frames were restricted to manufacturing firms with 100 to 5,000 employees, for the UK this included about 7,400 firms.

From this population of 7,400 firms in 2004 and 2006 we randomly selected 1,851, of which we found 33% agreed to take part in the survey, 19.6% refused to take part in the survey, and the remaining 47.4% were still being scheduled when the survey ended.[8] The firms responding to the survey appeared to be essentially random and in particular the response rate was uncorrelated with observed measures of performance such as productivity or profitability.

For the 2009 survey we started with the sample of 679 firms interviewed in either the 2004 or 2006 surveys, so that for every firm we have a prior and a current management score. Column (1) of Table 2 shows that 13.7% of these 679 firms were actually no longer eligible because when the interviewers attempted to contact the firm they discovered that the firm had gone out of business or was no longer in manufacturing. This left us with an effective sample of 586 firms - somewhat lower than we expected. This is likely to be because of the unexpectedly severe nature of the recent recession which led to a fall of GDP greater than any other in the post-war period (around 6.5% peak to trough). Since the recession was global, manufacturing firms (which comprise our sample) were hit harder than other sectors because they are export-oriented.

[8] These are firms which our interviewers were still contacting managers or arranging interviews before the end of our 3 month interview project.

Table 2: Company response rates

	2009/10	2009/10 (eligible)	2006
Interviews completed (%)	39.76	46.08	32.9
Interviews refused (%)	16.79	19.45	19.6
Scheduled (%)	29.75	34.47	47.4
No longer eligible (%)	13.70	-	-
Survey sample, number of firms	679	586	1,851
Interviews completed	270	270	609

Notes: 1) “Interviews completed” reports all the companies contacted for which a management interview was completed. 2) “Scheduling in progress” reports all the companies contacted with no interview run nor any manager refusing to be interviewed. 3) “Interviews refused” reports all companies contacted in which the manager refused to take part in the interview. 4) No longer eligible reports all the companies interviewed which no longer manufacture in the UK, are out-of business or for which no phone number was found. Survey sample is the total number of firms that were randomly selected from the complete sampling frame (for 2009/10, the sampling frame constitutes all the companies previously interviewed in 2004 and 2006)

In terms of interviews completed, we managed to obtain a response rate of 46.1% in 2009 (note when interviewing firms randomly from the population in 2004 and 2006 we obtained a response rate of 32.9%).[9] This high response rate was primarily due to greater persistence in following up non-respondents in order to meet the target numbers of 250 that we were aiming for. Although the number of outright refusals was almost identical in 2009 to 2006 (19.5% vs. 19.6%), the number of “scheduled in progress” was only 34% in 2009 compared to 47% in 2006. These “scheduled in progress” observations are firms who have been contacted by an interviewer and who have not refused to be in the interview (for example they may schedule an interview but

[9] In 2006 we obtained an overall response rate across all 12 countries of 44.9%, but just 32.9% for the UK. There are a number of possible reasons for why the UK response rate was lower, including the proliferation of cold-calling firms in the UK (which makes running telephone surveys harder as switchboards more aggressively screen out calls), and the domestic bias (phoning UK firms from the UK is less impressive than, for example, phoning US firms from the UK). Bloom, Sadun and Van Reenen (2009) has extensive discussion of the 2006 survey wave sampling response rates.

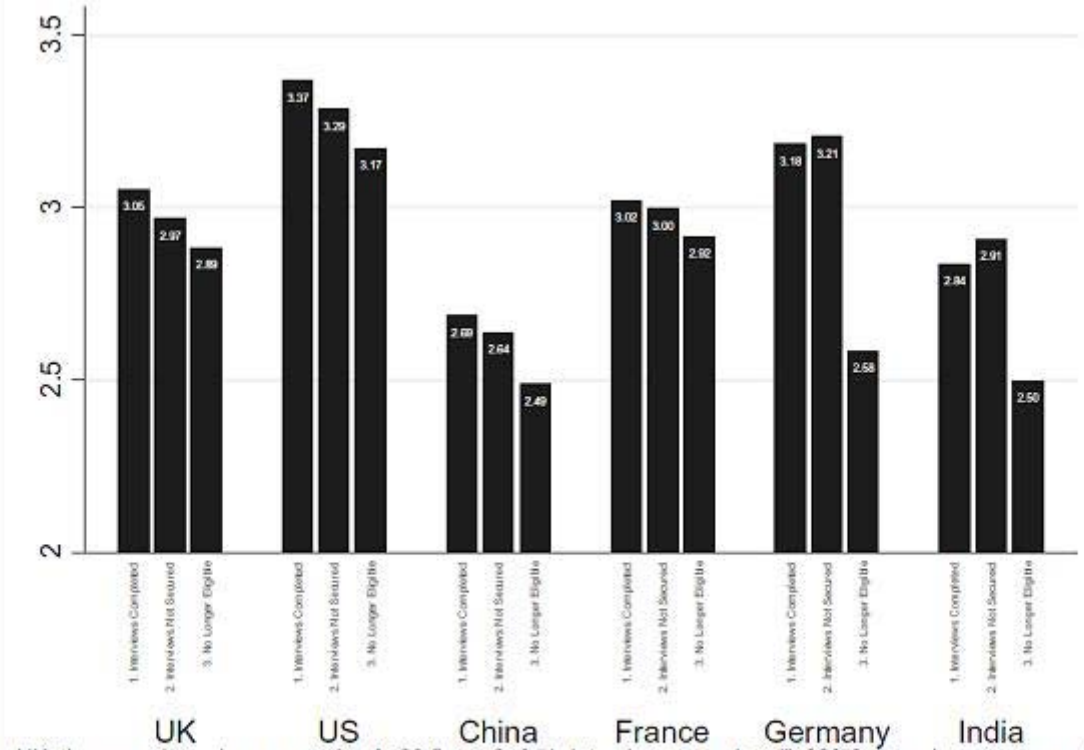
cancel or postpone it). Unfortunately, the survey ended before these firms could be interviewed so, although we have no data on them, they are still “possibles”.

We obtained re-interviews with 270 firms. 5 of these had "low reliability" according to the assessment of the interviewer, so we generally drop them leaving 265; 42 of these 265 were interviewed in 2004, 2006 and 2009 (a three wave panel), 253 of which were interviewed in 2009 and 2006, and 12 of which were interviewed in 2004 and 2009 only. The data in this report focuses on the 253 firms who we have management data for 2006 and 2009.

Did the higher response rate in 2009 lead to some panel survival bias? Since we were only interviewing firms who responded in 2006, the original sample remains representative of the cohort of medium sized manufacturing firms who were alive in 2006.

One potential concern is whether the non-responders in the (survivors) sample are substantially different from the responders? Unlike our previous surveys, because all the firms in the sampling frame have a management score we can explicitly examine whether better (or worse) managed firms are more likely to respond to the survey. Figure 2 examines potential bias on this dimension. We show the UK compared to other countries (the US, France, Germany, India and China).

Figure 2: Responders vs non-responders compared on 2006 management score



Note: In the UK, these are based on a sample of 582 firms, 256 “1. Interviews completed”, 238“2. Interview not secured” and 78 “3. No longer eligible”. 1) Interviews completed reports all the companies contacted for which a management interview was completed in 2009/10. 2) Interviews not secured reports all companies contacted where scheduling an interview was still in progress or the manager had refused to take part on the interviews in 2009-2010. 3) No longer eligible reports all the companies interviewed in 2006 which no longer manufacture in the UK, are out-of business or for which no phone number was found.

Looking at the first two bars, the firms who responded (“interviews completed”) have rather similar scores than the firms who did not respond (“interviews not secured”). In the UK non-

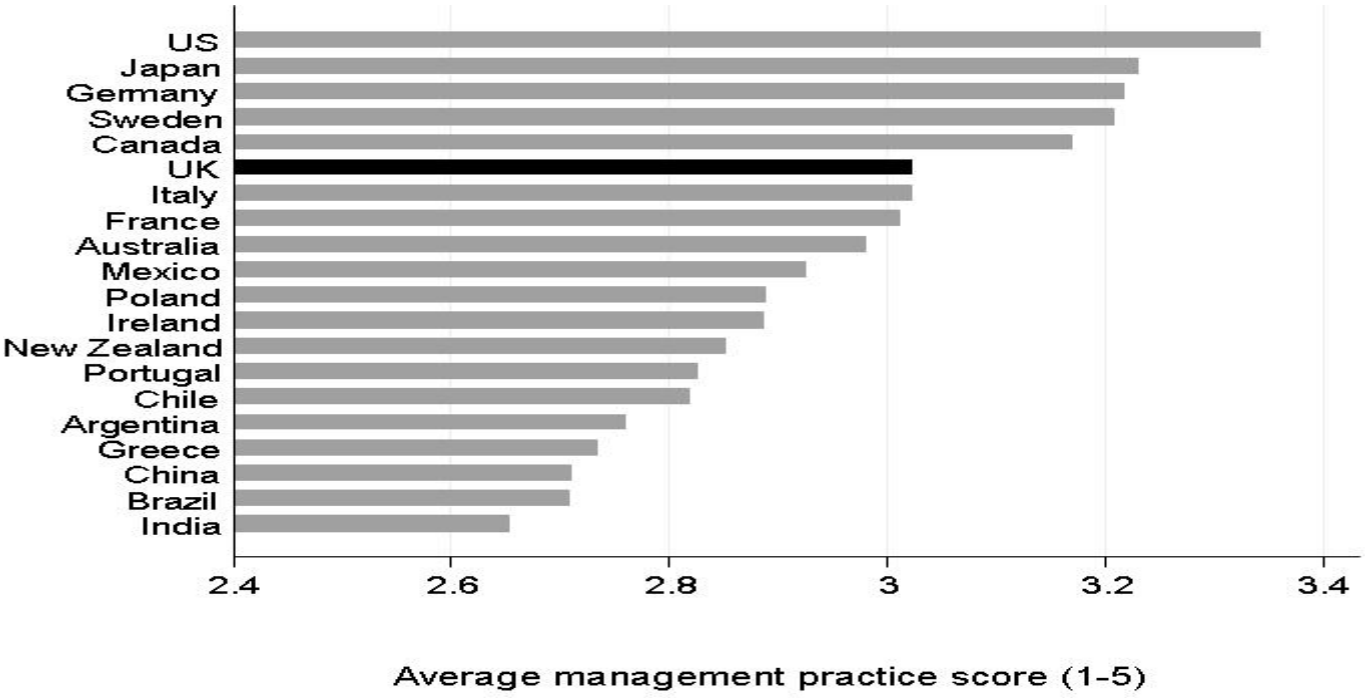
responders had scores which were about 0.08 points lower (like the US) with this difference falling to 0.05 in China and 0.02 in France. In Germany and India, non-responders had slightly higher scores (0.03 and 0.07 respectively)[10]. Similarly, looking at other characteristics (like size); the UK responders seem broadly similar to the non-responders.

The third bar for each country in Figure 2 relates to those firms who were not eligible to be interviewed in 2009 – essentially because they had exited the manufacturing sector. Firms who died between 2006 and 2009 were those with much lower management scores in 2006[11]. This is to be expected – firms with poor management practices are much less likely to survive over time, and this relationship holds true in the UK and all other countries. As with the analysis in Annex Table A2, better management is significantly associated with one key measure of performance – better survival rates.

Management practices across firms and countries

Figure 3 plots the UK management score across the pooled survey waves from 2006 to 2009/10 against data for 19 other countries. We present the cross-country comparisons here using the pooled data to enable us to make comparisons to the widest possible range of countries, surveyed in all survey years. Of course this means these comparisons are not perfect because of changes within countries overtime, but given the large differences across countries (and small changes within countries over time) we think this comparison is still reasonable.

Figure 3: UK management practices are mid-table by international standards



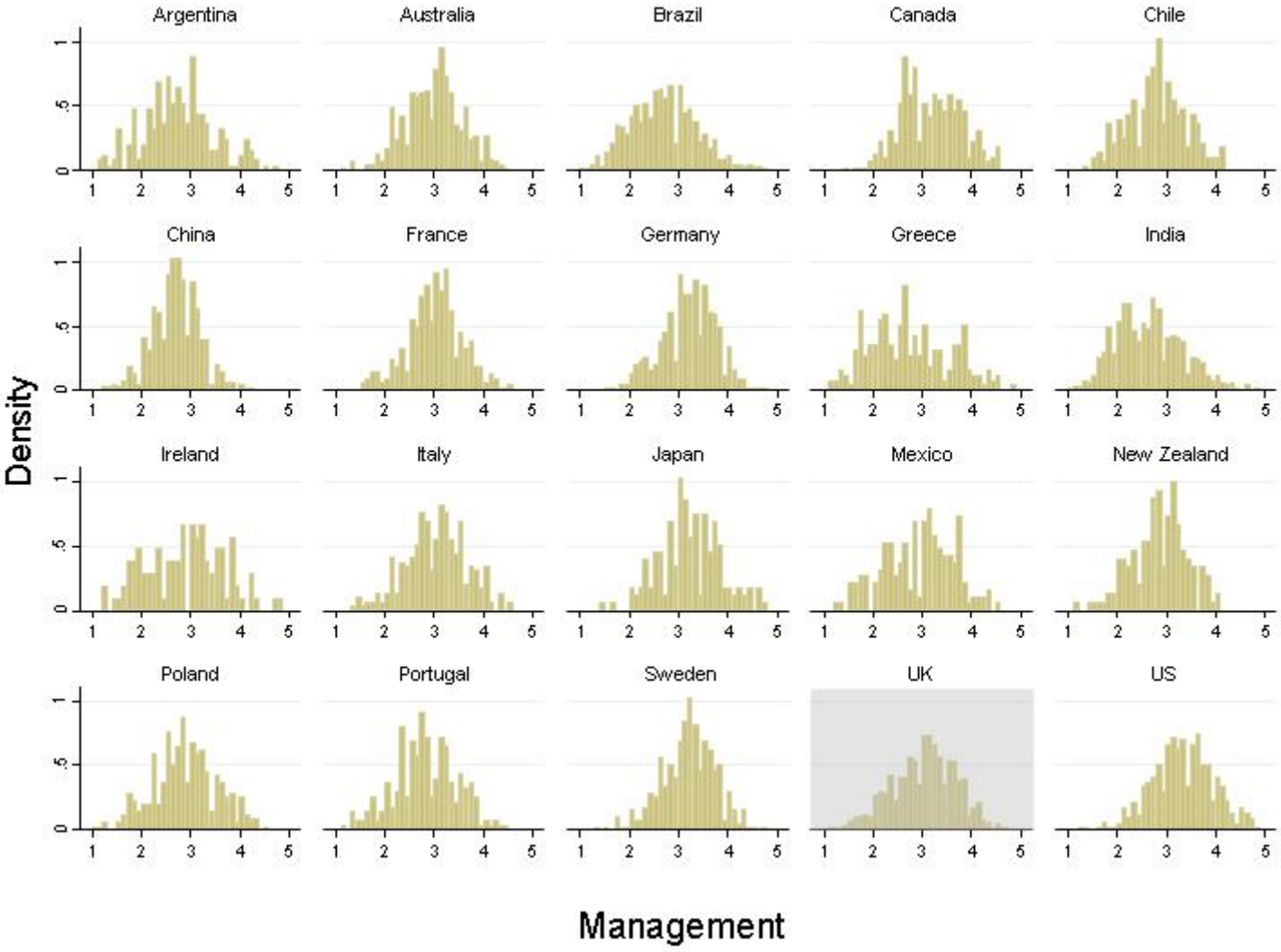
Note: Based on 8,597 management interviews between 2006 and 2010. We pool across multiple survey waves to maximise the extent of cross-country management comparison

[10] The p-value of the test of selection bias is 0.14 for the UK, 0.15 for the US, 0.75 for Germany, 0.75 for France, 0.23 for China and 0.65 for India.
[11] A test of the effect of management on survival is significant at the 10% level or greater in every country except France.

We see that UK management scores are distinctly mid-table by international comparisons in Figure 3, distinctly below the US, Japan, Germany, Sweden and Canada but comparable to most other developed countries. In particular, UK management practices are pretty similar to those in the rest of Northern Europe and Australia and clearly higher than those in Southern Europe and developing countries like China and India.

Figure 4 plots a management histogram on a country-by-country basis, showing the far wider dispersion of management practices across firms compared to across countries. We can see that in the UK, like in other developed countries, there is a wide spread of management practices. In comparison when we look at developing countries like Brazil and India, we see a much fatter tail of badly managed firms.

Figure 4: UK management practices have a similar distribution across firms as other countries



Note: Based on 8,597 management interviews between 2006 and 2010

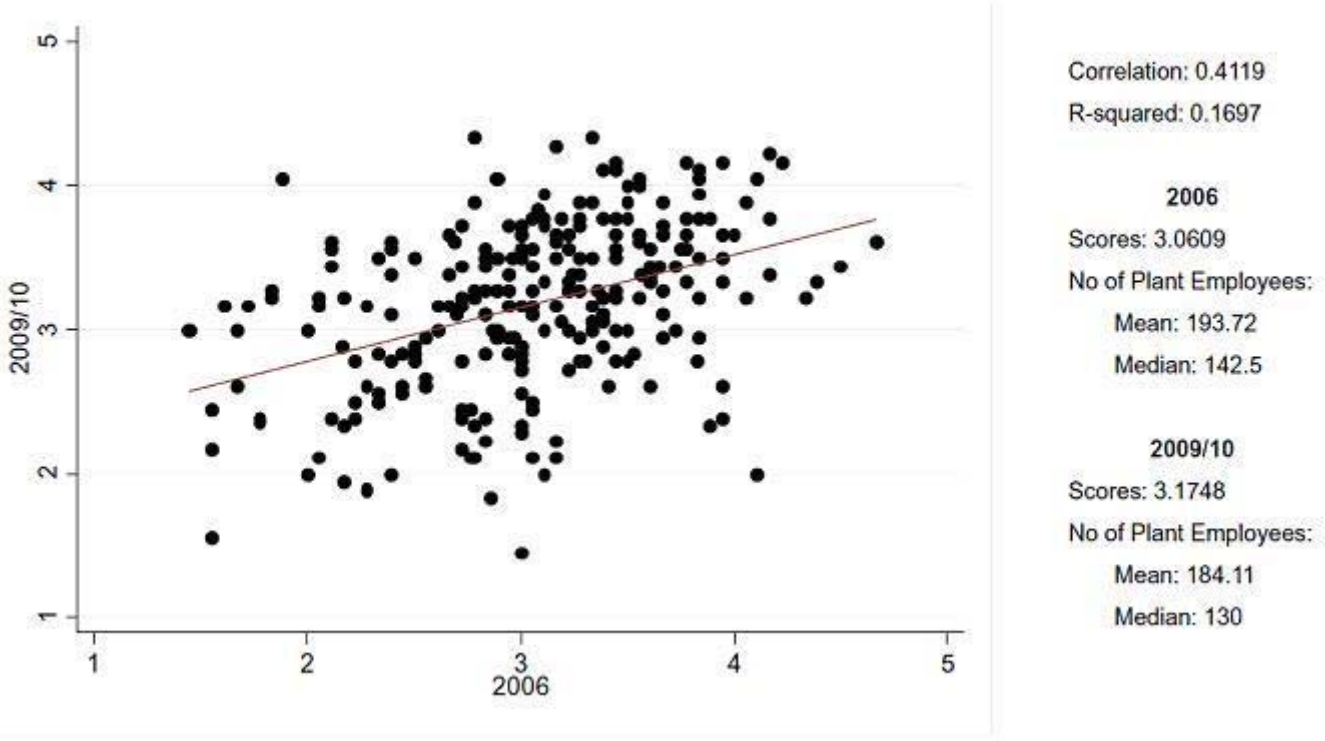
Results

Changes in Management Practices in the late 2000s

Descriptive Analysis

Figure 5 compares the management scores of firms in 2006 to 2009/10. Reassuringly there is a positive correlation of about 0.41 – firms who were well managed in 2006 remain, on average well managed in 2009/10. Since some of the differences are due to measurement error – the correlation at a single point in time between two interviews from 2006 was only 0.5 - this suggests that managerial practices exhibit a fair bit of persistence over time, just as most economic models assume (e.g. Melitz, 2003). The average number of employees in a firm did not change much between 2006 and 2009/10, moving from 194 to 184, respectively. Similarly the median changed from 142 in 2006 to 130 in 2009/10. This suggests little change in plant size between 2006 and 2009/10.

Figure 5: Firm's management practices in 2009/10 are strongly linked to their 2006 practices

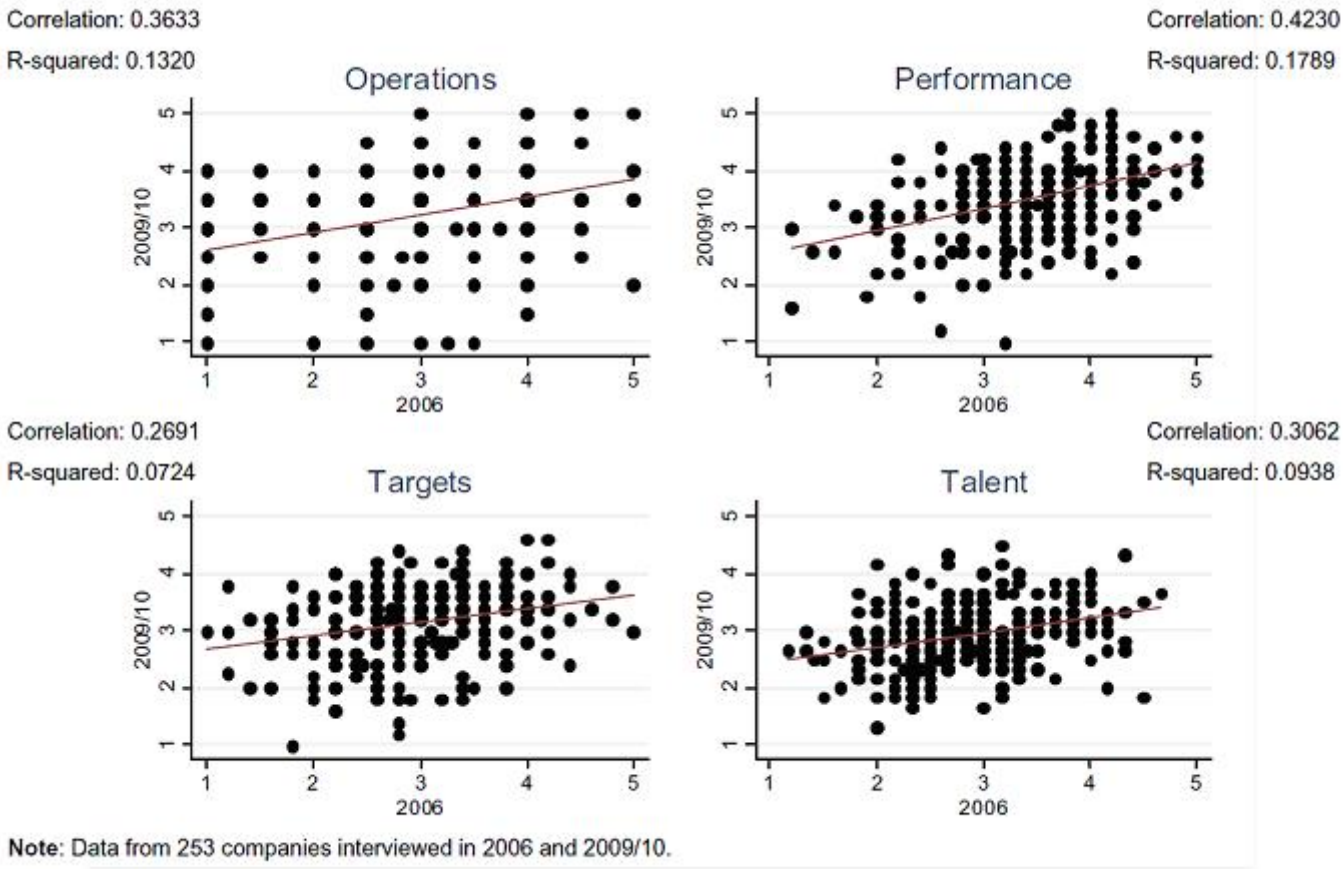


Note: Data from 253 companies interviews in 2006 and 2009/10

Figure 6 breaks down this cross-time correlation of management scores into four dimensions - operations, performance monitoring, targets and talent. The correlation is somewhat lower (as low as 0.27 for targets) as by disaggregating the scores we increase measurement error, but there remains a positive relationship over time across all four groups which is lowest for targets

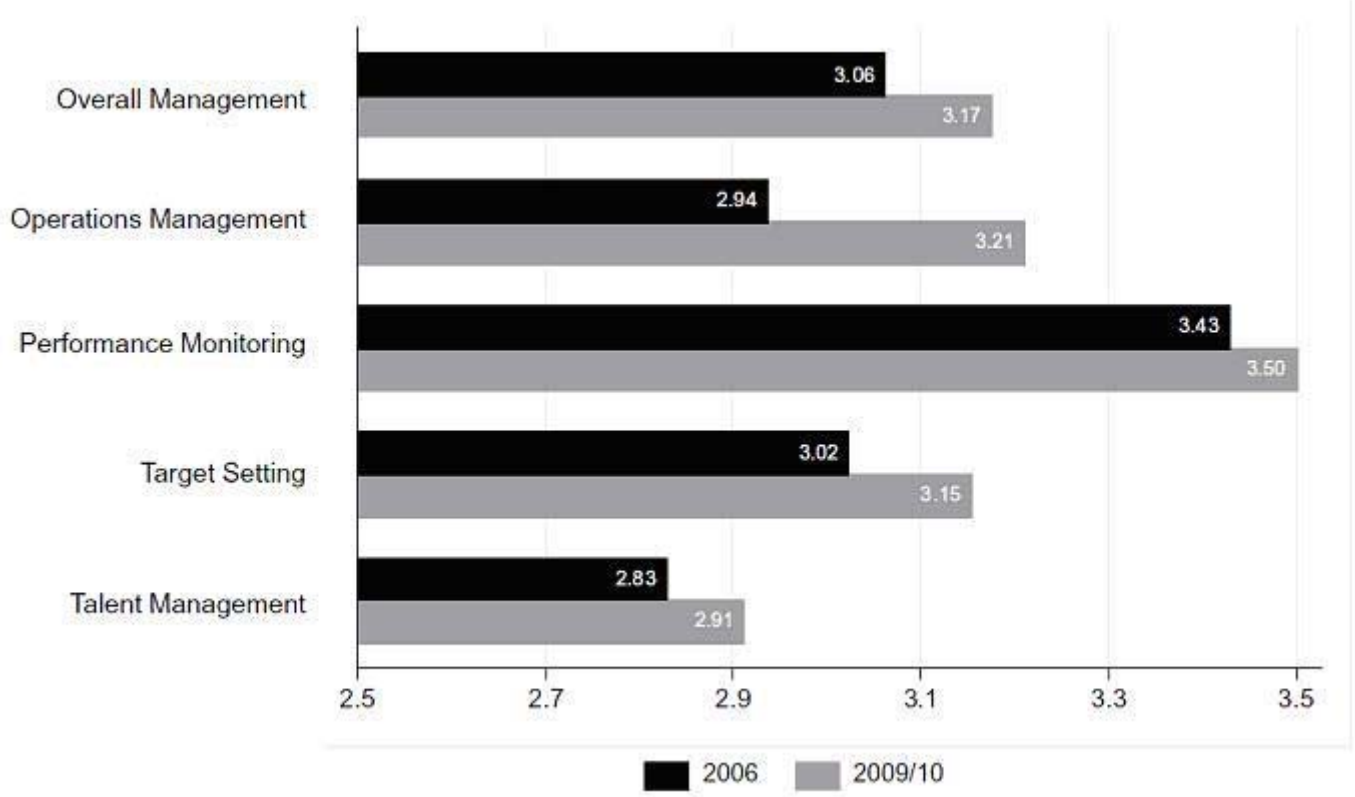
and talent management (suggesting more changes for how firms treat their people) and highest for performance monitoring (0.42) and lean operations (0.36).

Figure 6: All four dimensions of management practices were strongly linked between 2006 and 2009/10



Has management improved in the UK since 2006? Figure 7 suggests that there have been important improvements presumably as best practices diffuse across firms due to competitive pressure, learning and other forces. The average firm in our 2009/10 sample has a management score of 3.17 compared to only 3.06 in 2006. This suggests that the UK has increased its score by about 0.11. This is a substantial fraction as the UK-US management gap is around 0.32 (as displayed Figure 3).

Figure 7: UK management scores changes in the four major dimensions

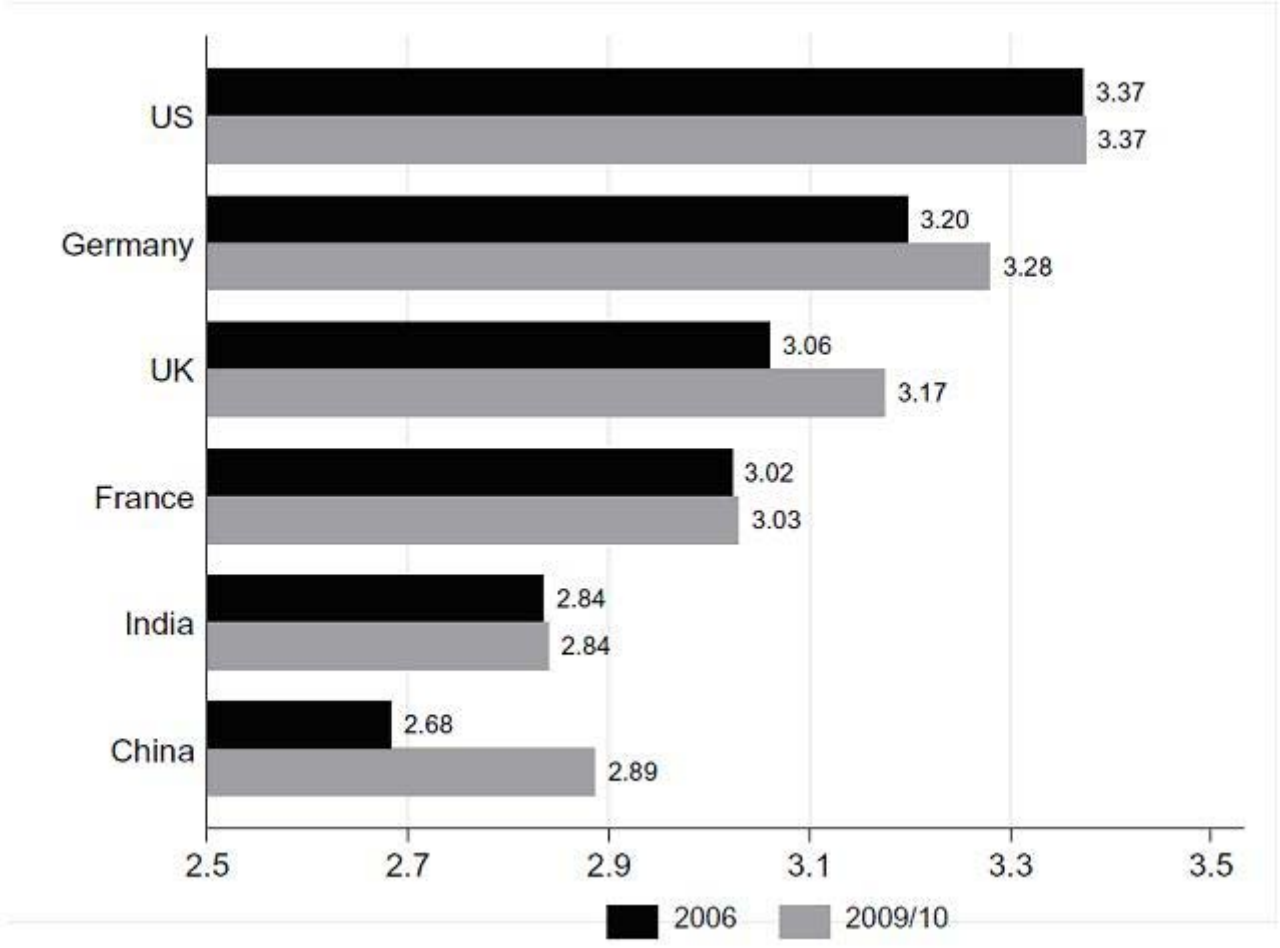


Note: Data from 253 companies interviewed in 2006 and 2009/10

The other bars in Figure 7 break down the management practices for the UK into the four broad groups (operations management, performance monitoring, target setting and talent management). Although there has been broad improvement in all areas, "operations management" shows the greatest upgrading. This is intuitive as the spread of lean manufacturing systems is closest to a technology of all the management indicators.

Looking across countries, some other countries have also improved their scores over time (Figure 8), but the UK's improvement of 0.11 is greater than the improvement in the US (which was broadly stable) so this implies some degree of US-UK convergence. We also find that China has improved its management score substantially - by 0.33 points suggesting rapid catch up with the more advanced economies. The Indian and French scores are also very stable.

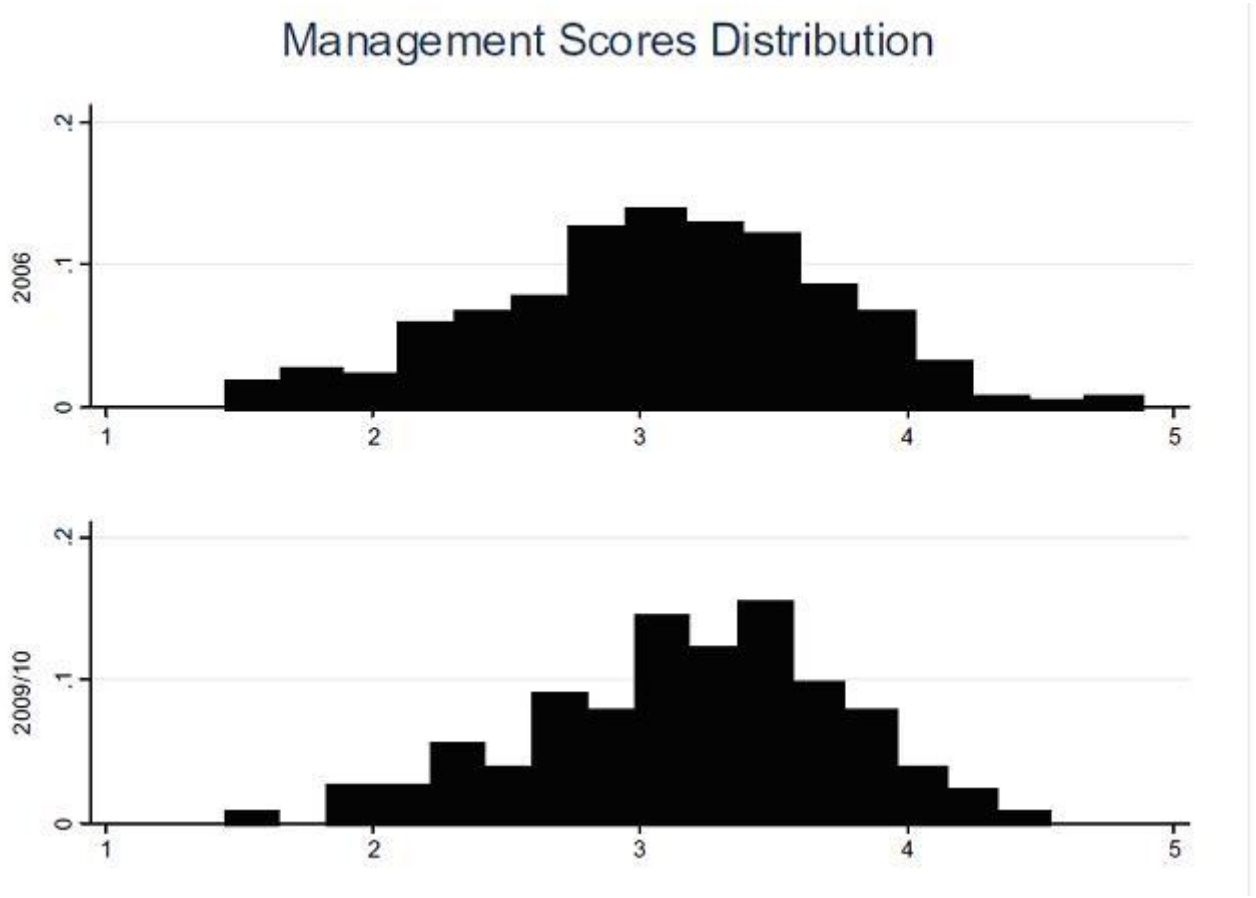
Figure 8: Management score changes in all countries



Note: Data from a total of 1,178 firms interviewed in 2006 and 2009/10 (263 US, 118 German, 253 UK, 157 French, 197 Chinese, 107 Indian)

Figure 9 plots out the whole distribution of management scores across firms in 2006 and 2009/10. Just as in 2006, there is a huge dispersion of management quality with some excellent firms and some very badly managed firms co-existing. The vast majority of this is within industries within the same countries. The aggregate improvement over time does not seem to be driven by a much larger fraction of very well-managed firms with scores below 4 (which is similar in both years), but rather by elimination of badly managed firms (below 2) and a general improvement of average firms.

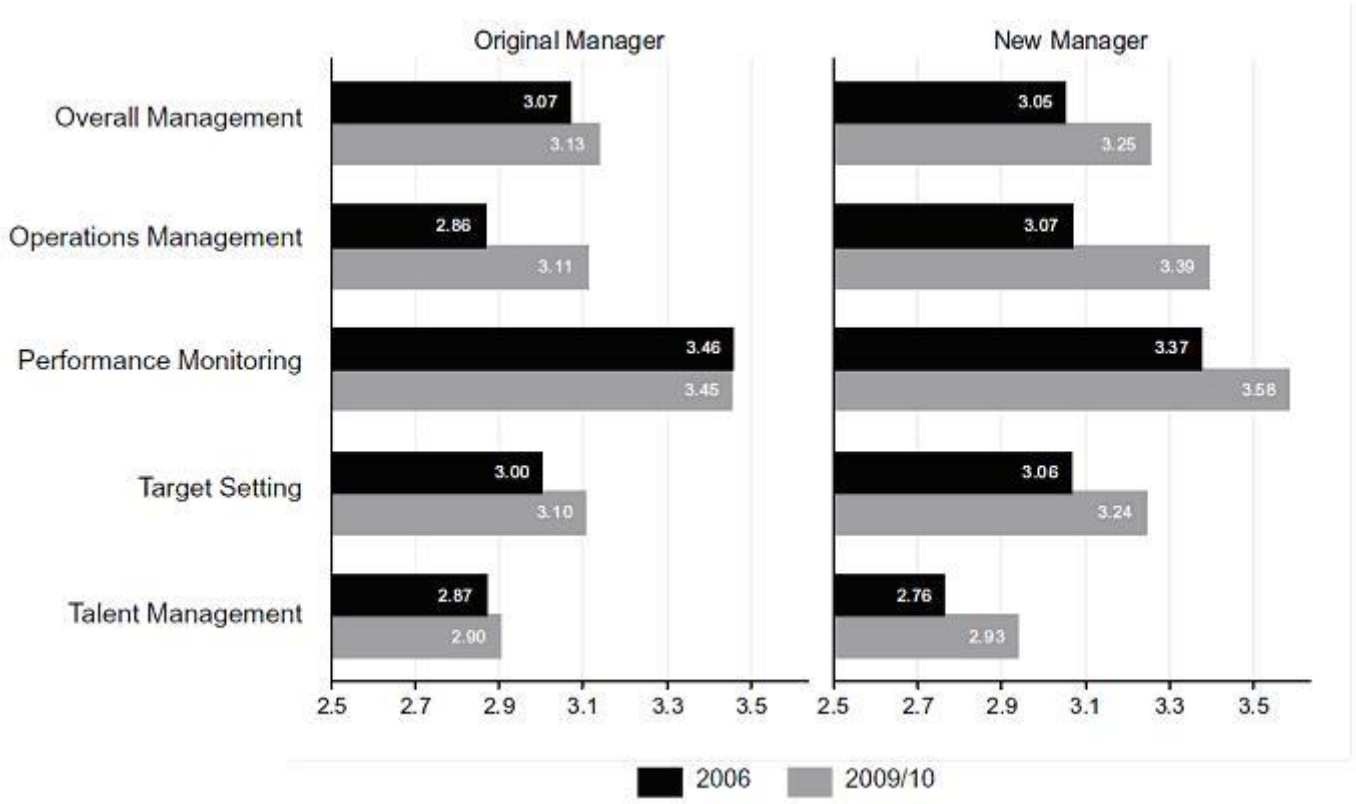
Figure 9: Firm level management scores are slowly improving as the tail of badly run firms shrinks



Note: Data from 253 companies interviewed in 2006 and 2009/10

We kept track of whether the original plant manager we interviewed was still in post in 2009/10. Almost two-thirds (64%) of the managers we interviewed in 2006 were still in place to be interviewed in 2009/10, but over a third had actually moved on to a different position or firm altogether. Figure 10 shows that the improvement in firm management scores was three times as large when there was a new manager (an increase of 0.20) than when the old manager was still in place (an increase of only 0.06). This is very interesting as it suggests that new managers may be much better at creating changes than incumbent managers ("it's hard to teach old dogs new tricks").

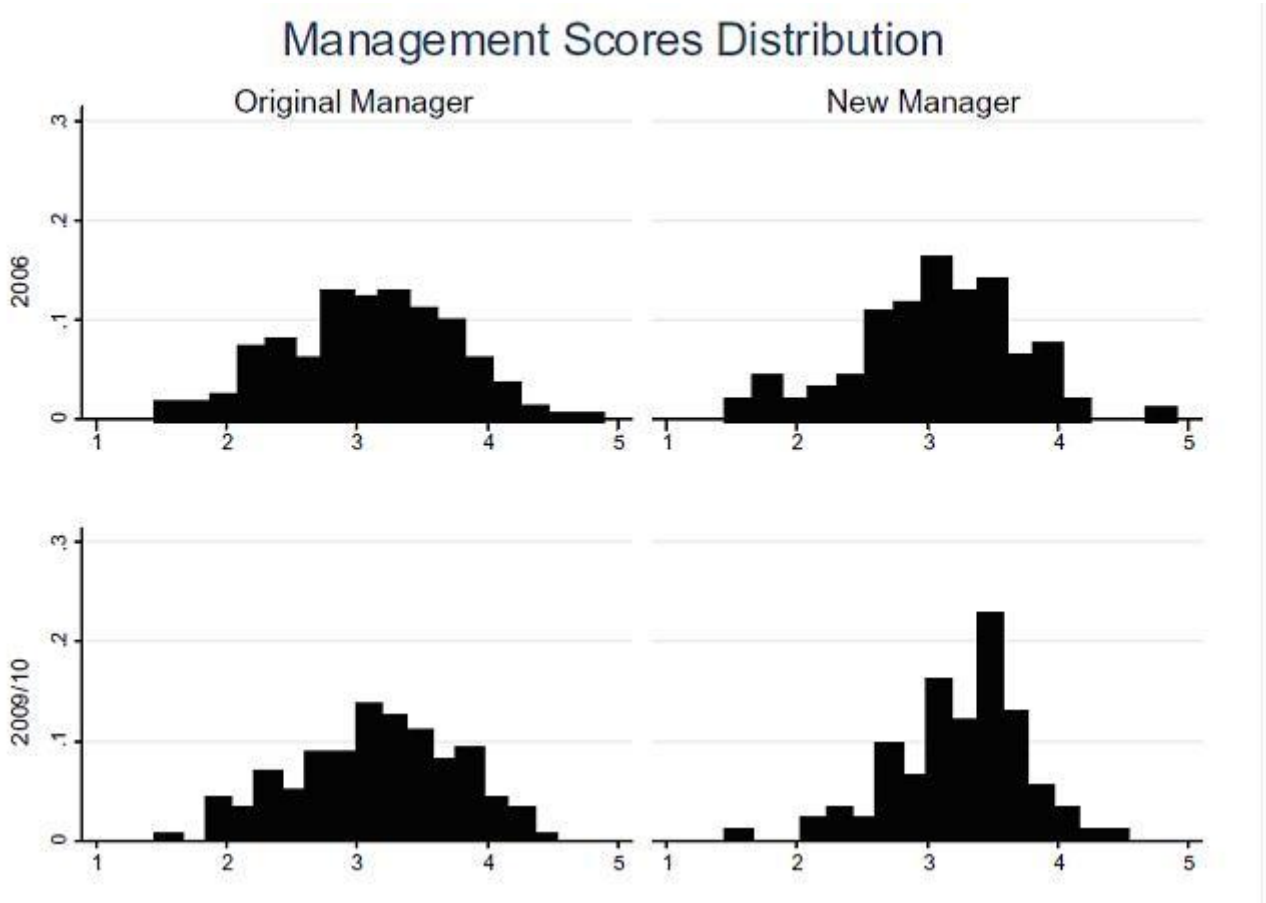
Figure 10: Management scores for firms who still have the 2006 managers in 2009/10 and for firms who have new managers



Note: Data from 253 companies interviewed in 2006 and 2009/10. 64% of the managers spoken to had already been interviewed in 2006 (161 interviews) while 36% were new to the project (92 interviews)

An alternative interpretation is that having a new manager reflects a broader re-organization occurring in the firm. Looking at the different dimensions, the largest relative change between old and new managers appears to be in performance management. Figure 11 plots out the whole distribution of management scores broken down by old and new managers. The main reason for the improvement in firms with new managers seems to be the elimination of below average practices.

Figure 11: Management distributions for firms with the 2006 managers in 2009/10 and for firms who have new managers



Note: Data from 253 companies interviewed in 2006 and 2009/10. 64% of the managers spoken to had already been interviewed in 2006 (161 interviews) while 36% were new to the project (92 interviews)

Although we should be careful of over-interpreting these correlations, these findings suggest that rotating managers in different roles has some advantages for firms, to avoid incumbents getting "stuck in their ways".

Regression Analysis

To probe the results more deeply we ran some simple OLS regressions. The dependent variable is the management score and we examined several variables that are thought to be important factors in "determining" management. As before, the regression results should be interpreted as partial correlations and not as structurally causal since we have no mechanism here by which to claim causality.

Column (1) of Annex Table A3 includes the (perceived) number of rivals that managers face as a key indicator of product market competition. We also control for firm size, "noise" (such as interviewer dummies and characteristics of the responding manager and interview itself), three digit industry dummies, country dummies and time dummies. Note that all the results we report are robust to a much wider range of controls. The coefficient on the competition measure is

positive and significant, indicating that more competitive environments are associated with better management practices.

The next column of Table A3 includes a full set of firm dummies, so we are essentially looking at what happens following a change in perceived competition. We find that the relationship between competition and management remains positive and significant. In fact, the coefficient on competition is much larger in column (2) than in column (1). In some sense this is unsurprising. The endogeneity bias will most likely lead to underestimation of the importance of competition. This is because firms who, for exogenous reasons, are better managed will tend to drive weaker rival firms out of the market (as we saw earlier – better managed firms are much less likely to exit). In this case, competition will appear to be lower in markets where there are many well-managed firms.

The positive relationship between management and competition holds up with other measures, such as industry price-cost margins or indicators of trade openness (see Bloom and Van Reenen, 2007). So the result is robust to the precise measure of competition. Bloom, Propper, Seiler and Van Reenen (2010) suggest that instrumenting for the endogeneity increases the impact of competition (using political economy instruments).

Column (3) of Table A3 includes skills instead of competition as a key “driver”. We use the proportion of the employees of the firm who have a college degree as a standard measure of human capital. This has a large and significant positive coefficient. A doubling of the proportion with a college degree raises the management score by about 0.13. Column (4) includes firm fixed effects and we observe that the coefficient on skills falls by half, but remains significant at conventional levels. This does suggest some upwards bias in simple cross-sectional relationships between skills and management.

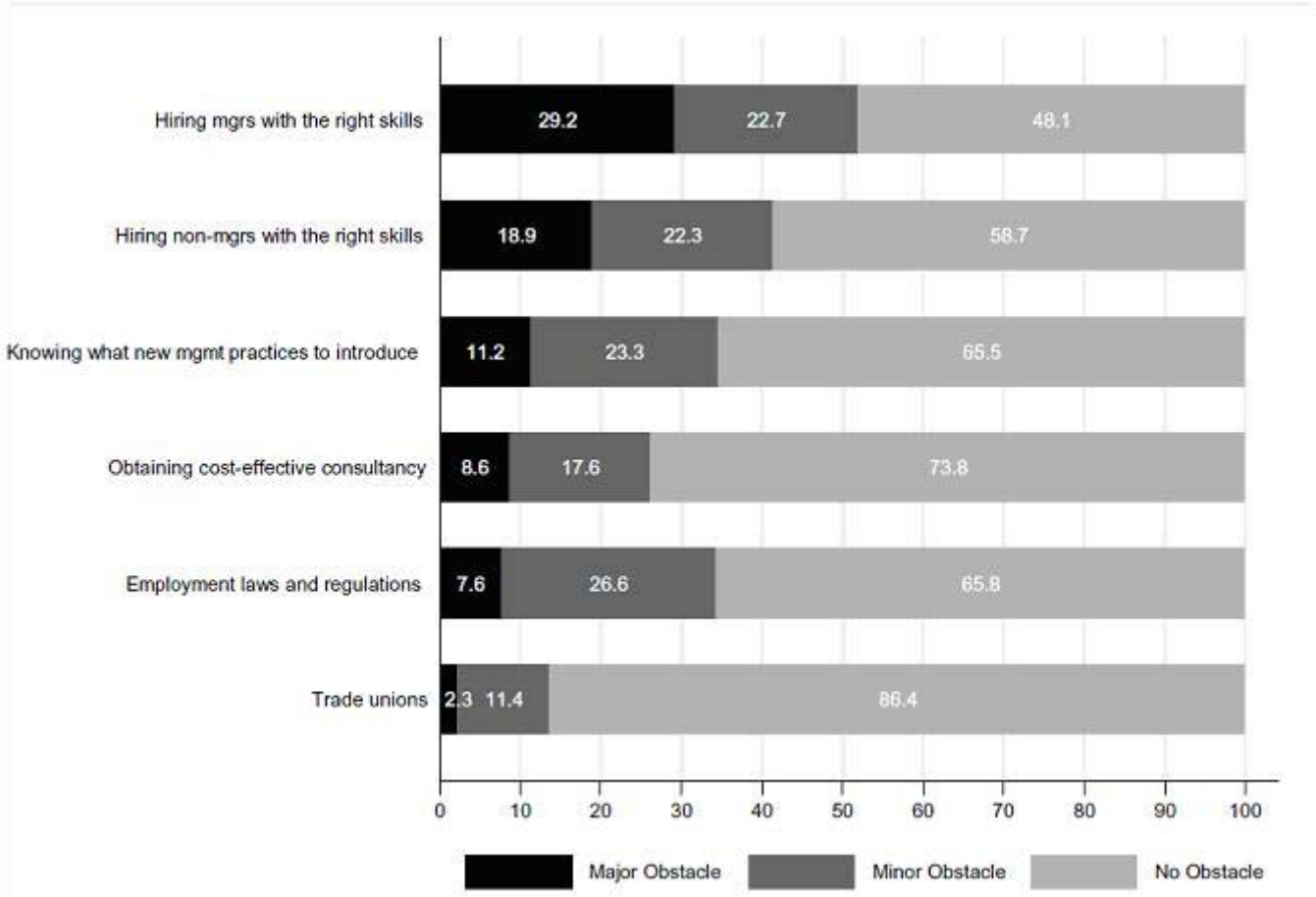
Column (5) includes both skills and competition simultaneously and column (6) repeats the specification but includes firm fixed effects. Even in the most general specification of the final column we can see that the earlier conclusions still hold – both competition and skills appear to have an important and positive effect on management quality.

Constraints on Improving Management

UK evidence

An innovative part of the 2009/10 survey design was a new set of questions where we asked plant managers to reflect upon the constraints they face while trying to improve their firm’s management practices. These questions were asked after we had already evaluated the 18 standard management questions. Figure 12 presents the results from the UK on this part of the survey.

Figure 12: Constraints on improving management in the UK



Note: After discussing different aspects of management we asked plant managers to reflect upon the constraints they may face while trying to improve their management practices such as 1) Hiring managers with the right skills, 2) Hiring non-managers with the right skills, 3) Employment laws and regulations, 4) Trade unions, 5) Knowing what new management practices to introduce, 6) Obtaining cost-effective management consultancy. Data from 265 companies interviewed in 2006 and 2009/10

A scarcity of managers with the right skills turned out to be the most important factor that respondents believed held back managerial improvements. 29% considered that “hiring managers with the right skills” was a major constraint, with a further 23% considering this a minor constraint. Hiring non-managers with the right skills was considered a major constraint by 19% of respondents. These results are consistent with the high correlation of the overall management practices score with skill intensity (as measured by the proportion of employees with degrees or managers with MBAs in Bloom and Van Reenen, 2007).

The next most important factor was a lack of knowledge over what management practices to introduce. 11% of respondents considered that “not knowing what new management practices to introduce” were a major obstacle, and a further 23% considered this a minor obstacle. These informational barriers to business learning would be the factor that a “diffusion” model of

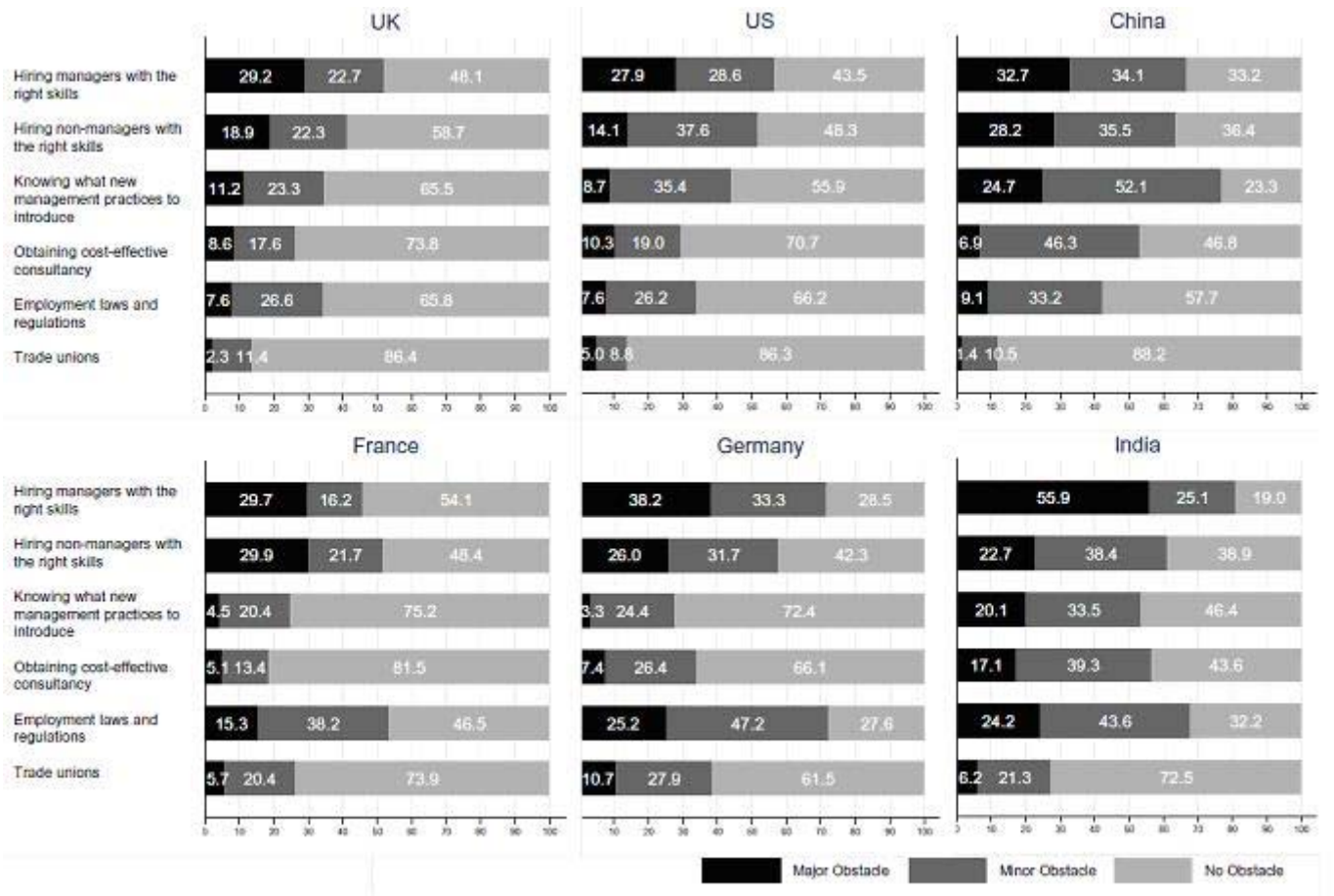
management as a technology would consider most important (see Bloom, Genakos, Sadun and Van Reenen, 2010 and Section II).

By contrast “obtaining cost effective consultancy” was only cited by 9% of respondents as a major obstacle. Employment laws and regulations, often highlighted in the media, were only cited by 8% as a major obstacle . Trade unions were mentioned as an obstacle to management by only 2.3% of respondents. This reflects the historically low levels of union power in the UK since the 1980s.

The UK in international context

For further comparison, it may be useful to compare responses across countries. We do this for three other OECD countries (US, France and Germany) and two emerging economies (China and India) in Figure 13.

Figure 13: Constraints on improving management internationally



Note: Data from 265 UK, 266 US, 123 German, 157 French, 211 Indian and 221 Chinese companies interviewed in 2009/10

Answers given by British managers look broadly similar to those in the other three advanced economies. However, there are some major differences between OECD countries and India and China. To broadly summarize:

- Across all countries the major obstacle to improving management practices is access to managerial human capital ("hiring managers with the right skills").

- On average the management skills constraint seems to bind most strongly for developing countries, especially India: 56% of Indian firms and 33% of Chinese firms cite this as a major barrier whereas only 28% of American firms cited this as a barrier.

- Skills of the non-managerial workforce are also cited by all countries as an important factor ranging as a major obstacle for 14% of the US firms to 30% for French firms.

- Another contrast between developed and emerging economies is in the knowledge about what management practices to introduce. 25% of Chinese firms and 20% of Indian firms cite this as a major barrier as opposed to only 9% in the US, 11% in the UK and fewer than 5% in France and Germany. This idea accords with our intuition that diffusion is slower in developing nations.

- Employment laws and regulations are reported as a major obstacle by very few British and American firms (8%), but by around 15% of French firms and about a quarter of German and Indian firms. This also seems broadly sensible given patterns of labour market regulation (although the rate in France is lower than expected).

- Unions do not seem a major concern in any country except Germany.

- Obtaining cost-effective consultancy does not seem a major concern in any country except India.

In terms of the UK's competitive position, it is difficult to draw clear conclusions as to which constraints are most binding. The profile of the UK looks similar to that of the US. Nevertheless, higher proportions of UK firms cite scarcity of skilled workers and a lack of 'knowledge' as major obstacles. In terms of policy, a focus on upgrading skills and fostering the faster spread of knowledge regarding management practices would have the greatest impact on the proliferation of improved management practices in the UK. Deregulatory labour market policies may not be effective in increasing the competitiveness of UK firms (although raising regulatory burdens to the level of Germany or India would start causing difficulties).

Annex Table A4 regresses responses from the constraints questions on various observables. We present two specifications for each of the six constraints. The first column simply regresses the strength of the constraint against the lagged (2006) managerial score and the second column adds a large number of additional controls such as firm size, plant age, skills, noise controls, industry dummies, and multinational ownership dummies.

Looking across the entire table the most striking result is that firms that had better management in 2006 were much less likely to feel constrained. The coefficient is only positive for one of the six constraints (unions), and even here it is insignificant. In the general model, the coefficient on

management is significant at the 10% level or more for four of the six constraints. This seems a very sensible result: well-managed firms are less likely to be constrained.

A second result is on size. The coefficient on size is negative across all constraints and significantly so for "hiring non-managers with the right skills" and "knowing what practices to introduce". This does suggest that smaller firms are at a particular disadvantage due to difficulties in attracting skilled workers acquiring information on better management practices. Larger firms are more able to pay for the fixed costs of training workers and acquiring information (e.g. through specialist knowledge managers or through consultancy). Note that this is true even after controlling for management quality, so it is not simply that worse managed firms stay small. A policy implication might be to increase focus on skill upgrading and business-to-business knowledge dissemination targeted at SMEs.

Thirdly, older plants do seem to face some disadvantages with unions (presumably because unions are more entrenched and powerful in older plants) and in their ability to obtain cost effective consultancy (perhaps because consultants focus more on new and growing sectors than traditional manufacturing). An increased perception of being constrained in older establishments is unsurprising given the earlier results on incumbent managers; it may be an expression of "you can't teach old dogs new tricks". Importantly, the disadvantage of being old relates to the plant not the people employed. In Bloom and Van Reenen (2007) we showed that the negative correlation between having a firm with older workers and management disappeared when we controlled for the age of the firm.

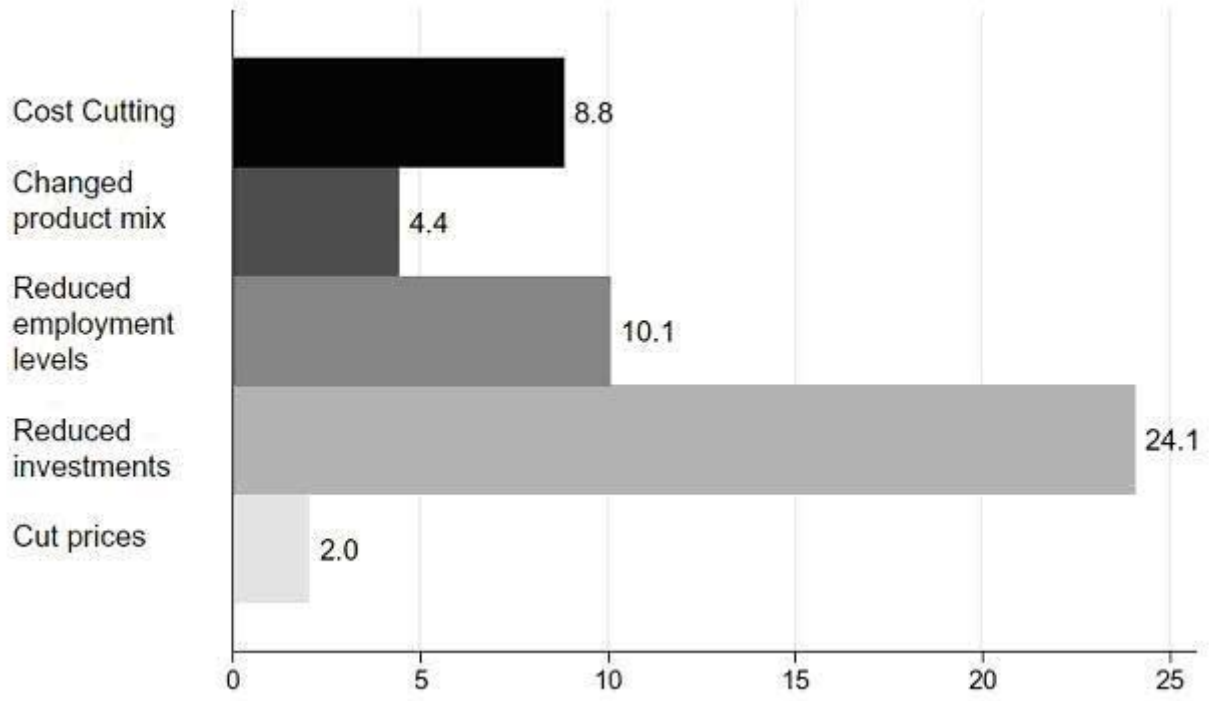
Finally, we note that the vast majority of our variables were insignificant - we found it very difficult to find many observables that were strongly correlated with managerial constraints. This cautions against policies that focus too much on targeting particular firms or sectors. The problems seem to be rather general than focused on obvious clusters of companies. We will return to this point in the next section.

How managers responded to the Credit Crunch/Great Recession

The firms interviewed in 2009/10 were in the midst of the recent crisis, which hit manufacturing especially hard. Understanding how firms respond to recessions is an important area of research (e.g. Geroski and Gregg, 1997). Consequently, we also asked plant managers to reflect upon the impact of the credit crunch/recession on the way they have managed their firms. Focusing on five main areas, we asked “By what percentage did you: 1) cut prices, 2) reduce investments, 3) reduce employment levels, 4) change your product mix, and 5) cut costs?”

The results are contained in Figure 14. A first interesting finding to note is that relatively few firms made big cuts in their prices – a cut of only 2% on average and 78% made no cuts at all. This contrasts to a 24% cut in investment, a 10% cut in employment and 9% general cost cutting. About a third of firms who said they cut employment and investment by over 10% each.

Figure 14: The credit crunch impact in the UK



Note: Data from 265 companies interviewed in 2009/10

One under-studied effect of a recession is how it impacts a firm's optimal product mix. We find that on average 4.4% of products were added or dropped and almost a fifth of firms changed their product mix to some degree during the recession – more than cutting prices. This suggests that altering what you sell is as important as changing the prices of what you produce in a downturn.

Figure 15 again places these results in an international context. Several findings stand out:

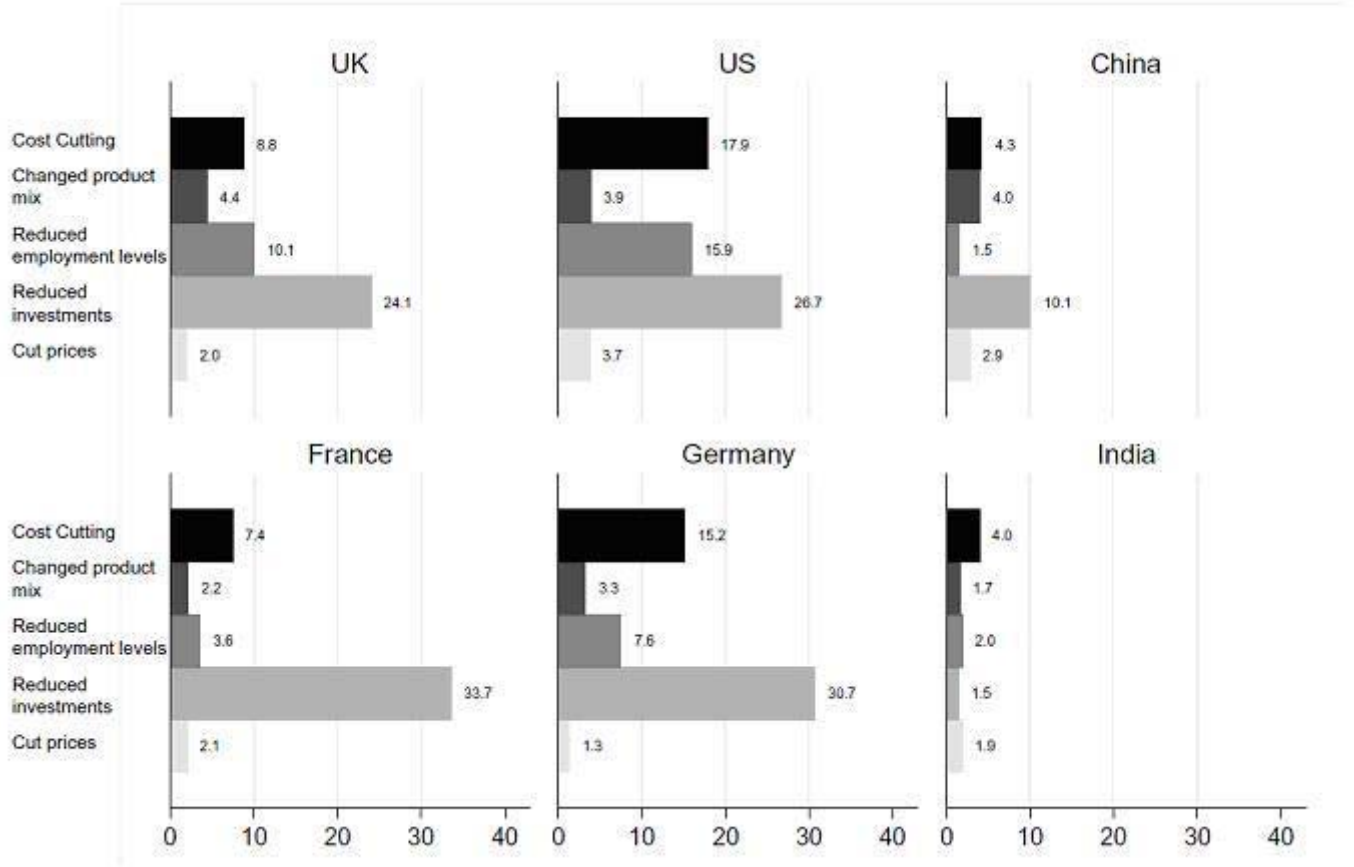
- The overall changes in China and India are much less than those in the OECD countries. This is simply because the severity of the recession was much less in India and China than in the advanced countries. Growth slowed down but stayed positive whereas in France, Germany, the US and UK there was the largest post-war drop in GDP.

- Looking across the OECD, investment saw the largest falls relative to other forms of cost cutting. This is consistent with the notion that investment is more pro-cyclical than other factors of production. Interestingly, the fall of investment in the UK (24%) was stated to be lower than in other countries (27% in the US, 31% in Germany and 34% in France). This is surprising as British manufacturers are often accused of thinking in the short term and of being the first to cut investment (compared to the German Mittelstandt for example). This does not seem to be the case here.

- The fall in employment, by contrast is much more pronounced in the US (16%) than in the other countries. The UK had a fall of 10%, Germany 3% and France 2%. This is broadly consistent with what we know from the macro-economic indicators: even though the US has had a smaller fall in GDP than Germany, for example, its increase in unemployment has been much more dramatic. Tougher firing rules in Continental Europe is surely one factor, but other policies (such as German employment subsidies) also play a role.

- Interestingly, although general cost cutting has been most ferocious in the US (18% reduction), German firms have also been quite ruthless in this regard (15%).

Figure 15: The credit crunch impact internationally



Note: Data from 265 UK, 266 US, 123 German, 157 French, 211 Indian and 221 Chinese companies interviewed in 2009/10

We also ran some multivariate regressions in Annex Table A5. The continuous dependent variable is the amount of change in each of the five dimensions as a result of the recession. Column (1) of the table shows the main result - firms that were better managed (in 2006) were significantly more likely to engage in cost cutting in response to the downturn. This result is robust to adding a very large number of controls in column (2). Better managed firms do seem to respond more across all dimensions as the coefficient on management is positive (but not significant) for product mix, cuts to investment, jobs and prices. We find this interesting and

suggestive evidence. It is not simply that better managed firms are more productive and profitable; they also seem to be more pro-active during times of adversity. Badly managed firms may have a "rabbit in the headlights" effect where they feel unable to react when faced with a bad shock. This finding suggests that promoting managerial capabilities will give the UK manufacturing sector greater resiliency in times of difficulty.

As with Annex Table A4, an important point is that we found it difficult to pin down with any precision the observables which (within country) were driving differences in responses to the recession in Annex Table A5. There is a lot of unexplained heterogeneity. This does suggest that finely targeted "early warning systems" are hard to devise. A general strategy to raise the quality of management is a sounder objective than trying to determine with any degree of accuracy which firms will adjust more or less.

Policy implications

Essential policy lessons from the management work

The additional 265 UK firms from the BIS survey (and the 2,046 firms from the other countries surveyed in 2009/10) have enabled us to expand the number of firm-level management surveys to over 10,000 covering 20 countries in the world. Increasing the sample has enabled us to corroborate many of the key policy lessons drawn from this larger survey.

- The UK has a deficit in management quality relative to the US, Germany, Japan and Sweden. We are comparable to France and Italy, above Portugal, Greece, and well above emerging countries such as Brazil, India and China (see Figure 3).

- This management deficit is likely to be a cause of our productivity gap with countries like the US, Germany, and Japan. If we want to increase our competitiveness vis-à-vis such countries, then we need to consider how to improve management practices in the UK.

- There is a large variation of management quality across firms in all countries and much of what accounts for the cross country differences is the absence (e.g. US) or strong presence (e.g. India, UK) of a long tail of poorly managed firms. If the quality of the poorly managed firms could be lifted even up to the median, this would be a tremendous improvement

Globally, there are several key drivers of management quality that appear in all countries. This is also evident in this data.

CEO Selection

In Bloom and Van Reenen (2007, 2010) and subsequent surveys the UK has significantly more family owned and family run SMEs than Germany or the US. Figure 16 shows that family firms, especially those run by the son or eldest grandson tend to have lower management scores. A large fraction of the UK's management gap with the US is to do with family-based CEO selection.

Figure 16: Average score on 18 management practice questions by ownership

Note: Based on the ownership status reported in 8,597 management interviews between 2006 and 2010. The bottom bar only covers the firms which have been in the same ownership for the last 3 years (7,376 management interviews). The "Other" category includes joint ventures, charitable foundations and unknown ownership

Some of this heterogeneity is undoubtedly due to cultural factors and hard to change. Nevertheless, it would be useful to think of ways of spreading our knowledge of the cost of family-run businesses and encourage families to at least consider getting some alternative expertise in when they reach a certain size (recall our sample in 2006 conditions on having at least 100 workers).

As we have argued elsewhere, the inheritance tax system provides an exemption for business assets passed through the family. Withdrawing this exemption may incentivize family business owners to reconsider their business structure and bring in professional managers, thus improving their business's management quality and overall profitability. Incidentally, it would also increase government revenue and possibly reduce intergenerational inequality (the UK has one of the worst records on low social mobility between generations and this deteriorated between cohorts born in 1958 and 1973).

Multinationals

One of the most striking findings in our work is that multinationals (especially from the US) are major forces for proliferating better management practices around the globe. Foreign multinationals appear to be able to sustain good management practices even when the outside regulatory environment is very hard – such as in India.

The policy implication of this is that a "Wimbledon" approach to FDI and portfolio investment makes a lot of economic sense: it does not matter what the nationality of the player is so long as it creates value in the UK.

In the wake of the Cadbury/Kraft takeover, there has been much policy talk about making foreign takeovers harder and worrying about national identity. Our view is that allowing a strong international market for corporate control and having an environment that encourages FDI (via good skills, infrastructure and stable policies rather than through tax incentives) is the best policy stance.

Policy implications from the management panel

Using the information on changes between 2006 and 2009/10 we found that on average firms had improved their management scores. This is an optimistic message as it suggests that there is some learning behaviour going on. Developing countries like China and India had experienced the fastest improvement, but the UK had also caught up to some degree with the US, which showed only a small improvement.

What factors determine the improvement of management quality? It is worth bearing in mind that there is a lot of stability in management – the best managed firms in 2006 tended to remain the best managed firms in 2009/10. Nevertheless, there are some changes. We found that two important factors were competition and skills. Both of these were strongly related to management quality in the cross section and the panel (i.e. after controlling for firm fixed effects).

Competition

Increasing product market competition is perhaps the most important way to boost management quality. The UK has a relatively good record here with strong competition policy and relatively few barriers to setting up business. The following may be areas for improvement:

- Exerting greater efforts towards a global post-Doha trade deal. The recession is pushing many countries into policies dominated by exchange rate manipulations. The best defence against this may be a strong WTO presence.

- Reducing regulatory barriers to setting up and expanding businesses. The cost of regulation may be adversely affecting the success of future businesses. Moreover the total regulatory impact may be greater than the sum of the effects from individual regulations.

- The passing of the Services Directive would most likely be an important step toward increasing the competitiveness of UK businesses.

Policy implications from the management constraints survey

Skills

Skills are highly correlated with better management, both those of workers and of managers. It is hard to manage well an organization where large numbers of workers lack the relevant skills. The UK has a relatively poor record here when compared to the US and Germany, so one straightforward implication is to focus on education and job training.

Our constraints survey did not investigate more precisely which type of skills were needed – MBAs, apprenticeships, specialist IT skills, etc. Nevertheless, our sense is that responses to these would be firm/industry specific and may not contribute much to the analysis.

In terms of policy we would suggest:

- Focusing on creating the right skills environment with strong support for expanding higher education in the most flexible way possible. This includes allowing universities to compete for students, abolishing the fees cap while enforcing needs blind generous bursaries from poorer students, and/or facilitating entry, exit and expansion in the university/HE sector.

- Deepening the “pupil premium” which should enable pupils from lower income groups to realize their potential and increase the quality of secondary schools (which are the main barrier to reaching university).

- Continuing and extending previous government policies to strengthen apprenticeships.

- Learning more about industry specific market failures. For example, where industry-specific skills are important and there are externalities to human capital, smaller firms will not invest in training their workers. In such sectors there is a major role for government to encourage co-operation among employers or intervene directly to support the creation of industry-specific skills through training, especially in smaller firms.

Firm Size

Looking more closely we found that the firms most likely to face such problems, particularly of skills and access to information on best practice, were smaller firms (recall that our firms are all in the 100 to 5,000 employee range with a median of around 250). This suggests that the smaller companies (where management is worse on average) are struggling to recruit and retain the talent they need and get the advice they want.

Although there are drawbacks to keeping small firms on an “artificial life support system”, it is worth considering how to target existing policies (e.g. over business advice and skill support) to

firms with 100-250 employees. These are not the very smallest firms but are a substantial group whose growth is crucial to prosperity.

Policy implications from managers' reactions to the recession

Firms responded to the recession in many ways, but cutting investment seems to have been a very strong component. Interestingly, however, UK firms appear to have done this relatively less than other OECD countries (at least in our survey). So contrary to the “short-termist” image of British manufacturing, things may be less bad than usually painted.

Interestingly, those firms we judged as well-managed in 2006 were much more likely to respond pro-actively to the recession by trying to manage their costs. This implies that a “multiplier” effect of policies that build up managerial capability may produce more resilient firms that are more likely to survive in conditions of adversity.

A major message from the multivariate analysis of reactions to the recession, however, is that it is very difficult to predict how firms will respond. In some sense, policy makers would like to be able to have an early warning system enabling them to identify which firms would need help and set up mechanisms to provide this. Our management scores are one device, but very few other variables were able to predict who would respond proactively and who would not.

Conclusions and future research

In this report, we have given a description of our findings from the survey of 265 medium sized British manufacturing firms that we surveyed in the Autumn/Winter of 2009, and placed this in the context of a sample of about 2,000 firms from other countries we surveyed at the same time, and a broader sample of 6,000 firms surveyed in previous years. The Executive Summary gives an overview of what we have found and some tentative policy implications, which we will not repeat here. Rather we suggest some lines of future policy relevant research.

Causal effects of management on performance

Although the correlations we have produced between management and performance are suggestive, we cannot interpret them as causal because the change in management practices may be correlated with other events in the firm's environment. This bias could go in either direction. If, for example, bad shocks force managerial innovations then the managerial coefficient will underestimate the "true" effect of improving management on performance. If, on the other hand, improvements of management are implemented when the firm is doing well (e.g. because it can afford to spend more on consultants) we will overestimate the effect of management on performance.

The only way to really overcome this problem is to run some randomized control trials where some improvements in management are introduced and the changes in performance are tracked over time. This is perfectly feasible to do. A simple protocol is to market a managerial improvements program (e.g. free of heavily subsidized high quality consultancy) and collect applicants. Eligibility can be restricted to certain firms based on size, industry or geographical area prior to the marketing. Eligible applicants are randomized in or out of the program as in a clinical trial and then treatment and control are followed up. Bloom et al (2010) have done this for Indian textile firms showing remarkably large effects. We question how well results in Bloom et al (2010) translate to a developed economy like the UK's.

If a causal effect can be established, we could look at (a) what types of intervention are most effective; (b) which groups of firms are most affected? and (c) whether the effects are short term or long-lasting?

Evaluation of policies to raise management quality

We have given many suggestions of policies that could foster improvement in management (and productivity) and existing policies are already in place. Which of these are/have been more effective? What will happen if spending cuts necessitate the abolition or scaling down of such programs?

To really build up a good knowledge base we need to develop robust evaluations of business policies to calculate the effects.

There is a wide range of quantitative evaluation techniques, most convincing of which are randomized control trials. We discussed these above in relation to the effects on productivity, but they are equally applicable to the effects of a policy on managerial practices. Alternative identification strategies are also possible even in the absence of true randomization. These include:

- Using regression discontinuity designs. For example, keeping information on all the applicants for a program with a score of their eligibility for funding. We can then compare those just above to those just below the cut-off for receiving the program. Those who "just failed" are very good controls for those who "just succeeded"

- Using some aspects of the rules for who is eligible for a program. These can be designed to construct instrumental variables

- Matching similar areas/groups that received and did not receive the program. This is usually the weakest quantitative evaluation method because we rarely observe enough about the firm to be sure we have controlled for all confounding influences

Ironically, the public expenditure cuts offer an opportunity to work out whether or not past policies have had an impact or not. If a policy is going to be partially abolished, allow some (preferably randomized at the individual level but still possible at the area or industry level) to maintain access to the program. Then we can observe whether the group that ceases to be eligible changes in any systematic way from the group that maintains eligibility.

The factors determining the changes in management

We have scratched the surface of looking at the factors that determine improvements in management over time. There are some factors that we had seen were important in the cross section that remained important when we controlled for fixed effects such as competition and skills.

But some new factors also appeared to matter substantially such as whether or not there was a new manager. This seemed to suggest that improvements in the overall management practices in firms often required a new set of managers in place: the "you can't teach an old dog new trick" hypothesis. This is certainly something that needs to be explored in greater depth.

What skills constrain managerial improvement?

Skills seem to be very important for management from a range of analyses conducted here. Formal skills (such as degrees) appear important, but it would be desirable to have a more nuanced understanding of what types of skills and training are in greatest shortage.

If a management survey was re-run, it would be desirable to have more detailed questions on the types of skills needed.

Management outside manufacturing

The manufacturing sector is in relative decline, so it would be good to have similar surveys in other parts of the economy. The retail sector is another large sector dominated by private firms that would be an interesting area to study further. We have pilot studies focusing on this sector that have been successful in three countries (the UK, US and Canada) which could be expanded into a larger number of countries to address similar questions to manufacturing.

An ongoing Panel?

Having panel data has allowed a much richer analysis than the previous cross sectional. It would be good to re-sample the same firms again in few years to see how well they have performed over a longer period. For example, surveying them again in 2014 would provide management

and performance data on the same firms for over a decade. If this was done it should also be accompanied by a refreshment sample so new entrants could be studied.

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Annex

Annex Table A1: The Management Scoring Grid

Any score from 1 to 5 can be given, but the scoring guide and examples are only provided for scores of 1, 3 and 5. The survey also includes a set of questions that are asked to score each dimension, which are included in Bloom and Van Reenen (2006).

(1) Modern manufacturing, introduction			
	Score 1	**Score 3**	**Score 5**
Scoring grid:	Other than Just-In-Time (JIT) delivery from suppliers few modern manufacturing techniques have been introduced, (or have been introduced in an ad-hoc manner)	Some aspects of modern manufacturing techniques have been introduced, through informal/isolated change programs	All major aspects of modern manufacturing have been introduced (Just-In-Time, autonomation, flexible manpower, support systems, attitudes and behaviour) in a formal way
(2) Modern manufacturing, rationale			
	Score 1	**Score 3**	**Score 5**
Scoring grid:	Modern manufacturing techniques were introduced because others were using them.	Modern manufacturing techniques were introduced to reduce costs	Modern manufacturing techniques were introduced to enable us to meet our business objectives (including costs)
(3) Process problem documentation			
	Score 1	**Score 3**	**Score 5**
Scoring grid:	No, process improvements are made when problems occur.	Improvements are made in one week workshops involving all staff, to improve performance in their area of the plant	Exposing problems in a structured way is integral to individuals' responsibilities and resolution occurs as a part of normal business processes rather than by extraordinary effort/teams

(4) Performance tracking

	Score 1	Score 3	Score 5
Scoring grid:	Measures tracked do not indicate directly if overall business objectives are being met. Tracking is an ad-hoc process (certain processes aren't tracked at all)	Most key performance indicators are tracked formally. Tracking is overseen by senior management.	Performance is continuously tracked and communicated, both formally and informally, to all staff using a range of visual management tools.

(5) Performance review

	Score 1	Score 3	Score 5
Scoring grid:	Performance is reviewed infrequently or in an un-meaningful way, e.g. only success or failure is noted.	Performance is reviewed periodically with successes and failures identified. Results are communicated to senior management. No clear follow-up plan is adopted.	Performance is continually reviewed, based on indicators tracked. All aspects are followed up ensure continuous improvement. Results are communicated to all staff

(6) Performance dialogue

	Score 1	Score 3	Score 5
Scoring grid:	The right data or information for a constructive discussion is often not present or conversations overly focus on data that is not meaningful. Clear agenda is not known and purpose is not stated explicitly	Review conversations are held with the appropriate data and information present. Objectives of meetings are clear to all participating and a clear agenda is present. Conversations do not, as a matter of course, drive to the root causes of the problems.	Regular review/performance conversations focus on problem solving and addressing root causes. Purpose, agenda and follow-up steps are clear to all. Meetings are an opportunity for constructive feedback and coaching.

(7) Consequence management

	Score 1	Score 3	Score 5
Scoring grid:	Failure to achieve agreed objectives does not carry any consequences	Failure to achieve agreed results is tolerated for a period before action is taken.	A failure to achieve agreed targets drives retraining in identified areas of weakness or moving individuals to where their skills are appropriate

(8) Target balance

	Score 1	Score 3	Score 5
Scoring grid:	Goals are exclusively financial or operational	Goals include non-financial targets, which form part of the performance appraisal of top management only (they are not reinforced throughout the rest of organization)	Goals are a balance of financial and non-financial targets. Senior managers believe the non-financial targets are often more inspiring and challenging than financials alone.

(9) Target interconnection

	Score 1	Score 3	Score 5
Scoring grid:	Goals are based purely on accounting figures (with no clear connection to shareholder value)	Corporate goals are based on shareholder value but are not clearly communicated down to individuals	Corporate goals focus on shareholder value. They increase in specificity as they cascade through business units ultimately defining individual performance expectations.

(10) Target time horizon

	Score 1	Score 3	Score 5
Scoring grid:	Top management's main focus is on short term targets	There are short and long-term goals for all levels of the organization. As they are set independently, they are not necessarily linked to each other	Long term goals are translated into specific short term targets so that short term targets become a "staircase" to reach long term goals

(11) Targets are stretching

	Score 1	Score 3	Score 5
Scoring grid:	Goals are either too easy or impossible to achieve; managers provide low estimates to ensure easy goals	In most areas, top management pushes for aggressive goals based on solid economic rationale. There are a few "sacred cows" that are not held to the same rigorous standard	Goals are genuinely demanding for all divisions. They are grounded in solid, solid economic rationale

(12) Performance clarity

	Score 1	Score 3	Score 5
Scoring grid:	Performance measures are complex and not clearly understood. Individual performance is not made public	Performance measures are well defined and communicated; performance is public in all levels but comparisons are discouraged	Performance measures are well defined, strongly communicated and reinforced at all reviews; performance and rankings are made public to induce competition

(13) Managing human capital

	Score 1	Score 3	Score 5
Scoring grid:	Senior management **do not** communicate that attracting, retaining and developing talent throughout the organization is a top priority	Senior management believe and communicate that having top talent throughout the organization is a key way to win	Senior managers are evaluated and held accountable on the strength of the talent pool they actively build

(14) Rewarding high-performance

	Score 1	Score 3	Score 5
Scoring grid:	People within our firm are rewarded equally irrespective of performance level	Our company has an evaluation system for the awarding of performance related rewards	We strive to outperform the competitors by providing ambitious stretch targets with clear performance related accountability and rewards

(15) Removing poor performers

	Score 1	Score 3	Score 5
Scoring grid:	Poor performers are rarely removed from their positions	Suspected poor performers stay in a position for a few years before action is taken	We move poor performers out of the company or to less critical roles as soon as a weakness is identified

(16) Promoting high performers

	Score 1	Score 3	Score 5
Scoring grid:	People are promoted primarily upon the basis of tenure	People are promoted upon the basis of performance	We actively identify, develop and promote our top performers

(17) Attracting human capital

	Score 1	Score 3	Score 5
Scoring grid:	Our competitors offer stronger reasons for talented people to join their companies	Our value proposition to those joining our company is comparable to those offered by others in the sector.	We provide a unique value proposition to encourage talented people join our company above our competitors

(18) Retaining human capital

	Score 1	Score 3	Score 5
Scoring grid:	We do little to try to keep our top talent.	We usually work hard to keep our top talent.	We do whatever it takes to retain our top talent.

Annex Table A2: Performance and Management

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	**Ln(sales)**	**Ln(sales)**	**Ln(sales)**	**Ln(sales)**	**Ln(sales)**	**ROCE**	**ROCE**	**ROCE**
Management Z-score	0.393**	0.408**	0.172**	0.138**	0.023*	0.634*	0.559	1.751**
	(0.025)	(0.035)	(0.021)	(0.018)	(0.014)	(0.367)	(0.482)	(0.953)
Ln(employment)			0.914**	0.554**	0.152**			
			(0.024)	(0.035)	(0.060)			
Ln(capital)				0.344**	0.247**	-0.200	-0.120	-2.671
				(0.024)	(0.029)	(0.227)	(0.295)	(1.130)
Firm fixed effects?	No	No	No	No	Yes	No	No	Yes
Firms	2,983	1,451	1,451	1,451	1,451	3,071	1,387	1,387
Sample	All	2+ obs	2+ obs	2+ obs	2+ obs	All	2+ obs	2+ obs

Notes: **Indicates significance at the 5% level and *at the 10% level. ROCE= Return on capital employed. Coefficients from OLS regressions with standard errors (clustered by firm) in parentheses. For the samples, "All" "2+" restricts the sample to only include firms where we observe twice or more (the relevant sample for the panel estimation). All columns include controls for skills, age, hours worked, listing and ownership status, noise as well as country, industry and year dummies. We observe management scores in 2004, 2006 and 2009.

Annex Table A3: Determinants of the Changes in Management Practices

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	**Management**	**Management**	**Management**	**Management**	**Management**	**Management**
#Competitors	0.028**	0.102**			0.027**	0.096**
	(0.013)	(0.045)			(0.012)	(0.047)
Ln(% College Educated)			0.126**	0.064**	0.126**	0.061**
			(0.006)	(0.028)	(0.006)	(0.028)
Firm fixed effects?	No	Yes	No	Yes	No	Yes
Firms	9,042	9,042	9,042	9,042	9,042	9,042

Notes: **Indicates significance at the 5% level and *at the 10% level. Coefficients from OLS regressions with standard errors (clustered by firm) in parentheses. All columns include controls for firm size, noise (e.g. analyst dummies) as well as country, industry and year dummies. We observe management scores in 2004, 2006 and 2009.

Annex Table A4: Constraints on Management

Dependent variable	(1) Hiring managers with the right skills	(2) Hiring managers with the right skills	(3) Hiring non-managers with the right skills	(4) Hiring non-managers with the right skills	(5) Employment laws and regulations	(6) Employment laws and regulations	(7) Trade Unions	(8) Trade Unions	(9) Obtaining cost-effective consultancy services	(10) Obtaining cost-effective consultancy services	(11) Knowing what new management practices to introduce	(12) Knowing what new management practices to introduce
Management scores In 2006	-0.048 (0.035)	-0.092** (0.045)	-0.083** (0.033)	-0.098** (0.041)	-0.049 (0.031)	-0.100** (0.042)	0.011 (0.026)	-0.002 (0.034)	-0.036 (0.029)	-0.053 (0.037)	-0.056* (0.030)	-0.068* (0.038)
Ln(Firm Size) in 20067		-0.002 (0.027)		-0.047* (0.026)		-0.019 (0.024)		-0.001 (0.019)		-0.013 (0.022)		-0.038* (0.022)
Ln(Plant Age)		0.009 (0.032)		-0.024 (0.031)		0.041 (0.030)		0.078** (0.023)		0.067** (0.026)		0.007 (0.027)
% College degree in 2006		-0.000 (0.002)		0.001 (0.001)		0.000 (0.001)		-0.002* (0.001)		0.001 (0.001)		0.000 (0.001)
Multinational ownership dummies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Industry dummies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Noise controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Sample	1326	1326	1333	1333	1333	1333	1330	1330	1324	1324	1327	1327

Notes: **Indicates significance at the 5% level and *at the 10% level. These are OLS coefficients with robust standard errors in parentheses underneath. The dependent variables are all drawn from the management constraints survey questions. A major constraint is coded as 2, a minor constraint is coded as 1 and no constraint is coded as zero. Respondents were asked whether each of the following factors was a constraint on management practices in their firm. All columns include a full set of 14 country dummies. Industry dummies are at the three-digit level. Noise controls include a full set of interviewer dummies, interview reliability, duration, seniority, tenure of the respondent in the company and in the post.

Annex Table A5: Impact of the Recession/Credit Crunch

Dependent variable	(1) Cost cutting	(2) Cost cutting	(3) Changed product mix	(4) Changed product mix	(5) Reduced employment levels	(6) Reduced employment levels	(7) Reduced investment levels	(8) Reduced investment levels	(9) Cut prices	(10) Cut prices
Management scores in 2006	1.707**	1.489*	-0.048	0.680	0.616	0.456	-0.335	1.657	-0.274	0.281
	(0.625)	(0.813)	(0.536)	(0.666)	(0.684)	(0.825)	(1.478)	(2.337)	(0.407)	(0.604)
Ln(Firm Size) in 2006		0.063		-0.149		-0.041		-2.442		-0.361
		(0.470)		(0.370)		(0.463)		(1.484)		(0.271)
Ln(Plant Age)		-0.255		0.055		-0.009		-1.387		0.034
		(0.534)		(0.481)		(0.544)		(1.968)		(0.311)
% College degree in 2006		-0.014		0.003		-0.028		-0.041		-0.020
		(0.027)		(0.020)		(0.026)		(0.131)		(0.015)
Multinational ownership dummies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Industry dummies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Noise controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Sample	1335	1335	1376	1376	1397	1397	1361	1361	1340	1340

Notes: **Indicates significance at the 5% level and *at the 10% level. These are OLS coefficients with robust standard errors in parentheses underneath. The dependent variables are the proportion of the relevant variable (e.g. general costs in columns (1) and (2)) that was cut as a result of the recession/credit crunch. All columns include a full set of 14 country dummies. Industry dummies are at the three-digit level. Noise controls include a full set of interviewer dummies, interview reliability, duration, tenure of the respondent in the company and in the post.

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