



“Managing Expectations: How Better Managed Firms Make Better Macro and Micro Forecasts”

Nicholas Bloom

(Stanford University)

Takafumi Kawakubo

(London School of Economics)

Charlotte Meng

(Economic Statistics Centre of Excellence)

Paul Mizen

(University of Nottingham)

Rebecca Riley

(King’s College London)

Tatsuro Senga

(Queen Mary University of London)

John Van Reenen

(London School of Economics)

Paper prepared for the IARIW-ESCoE Conference

November 11-12, 2021

Session 2A

Time: Thursday, November 11, 2021 [14:00-15:30 GMT+1]

Managing Expectations: How Better Managed Firms Make Better Macro and Micro Forecasts

Nicholas Bloom, Takafumi Kawakubo, Charlotte Meng, Paul Mizen, Rebecca Riley, Tatsuro Senga, and John Van Reenen

October 2021

Preliminary and incomplete. Please do not cite without permission

Abstract

Do managerial capabilities matter for the accuracy of firm forecasts? This paper takes a novel approach in investigating this by using the largest UK Management and Expectations Survey (MES) and linking this to firm panel data on productivity for manufacturing and non-manufacturing sectors. Consistent with work in other countries, we document (i) a significant variation of management practices across firms; (ii) a positive association of structured management with firm size and foreign ownership, and a negative correlation with firms who are family owned and family run; (iii) that productivity is higher in firms with more structured management. Uniquely, the survey asks firms to make macro forecasts of GDP in the following year. We find that better managed firms make more accurate macro forecasts even after controlling for their size, age, industry and other factors. Similarly, better managed firms are more accurate in their forecasts about their own growth when their forecasts are compared with actual outcomes. These results suggest that one of the reasons for the superior performance of better managed firms (fact (iii) above) is that they make more accurate forecasts and are therefore less likely to make sub-optimal choices of inputs and strategic decisions.

Keywords: Management, productivity, expectations, forecasting

JEL Classification: L2, M2, O32, O33.

Acknowledgements: Financial support was generously provided by the ESRC. We would like to thank the ONS for their partnership in conducting the MES. This work was produced using statistical data from ONS. The use of the ONS statistical data in this work does not imply the endorsement of the ONS in relation to the interpretation or analysis of the statistical data. This work uses research datasets which may not exactly reproduce National Statistics aggregates.

“The sagacious business man represents the other extreme; he is constantly forecasting. Many great corporations, banks, and investment trusts today maintain statistical departments largely for the purpose of gauging the future developments of business. The carefully calculated forecasts made by these and independent services tend to reduce the element of risk, and to aid intelligent speculation.” *Irving Fisher (1930)*

1. Introduction

As proven by Irving Fisher himself, who became broke after the 1929 stock market crash, the managerial ability to accurately forecast future economic conditions may well be related to firm performance. This paper tests this directly by taking data from the Management and Expectations Survey (MES hereafter) executed by the Office for National Statistics (ONS), documenting a new set of empirical facts on the relationship between management practices and firm performance. The MES is the largest ever survey on management capabilities in the UK covering both manufacturing and non-manufacturing firms, with its survey design adopted from the established format of the World Management Survey (WMS).¹ Moreover, the MES collects expectations data at the business level, building on the US Management and Organizational Practices Survey (MOPS) and the Atlanta Fed Survey of Business Uncertainty (SBU).

The MES survey attempts to measure three aspects of firms’ management practices: (1) monitoring -- how well does the firm monitor its operations and use this information for continuous improvement using something like key performance indicators (KPIs)? (2) targets

¹ See Bloom and Van Reenen (2007) and <https://worldmanagementsurvey.org/>

-- are the firm's targets stretching, tracked and appropriately reviewed? (3) incentives -- is the firm promoting and rewarding employees based on performance, managing employee under-performance and providing adequate training opportunities?² The MES was closely aligned to the US MOPS conducted by the Census Bureau.³ Based on the response to each question, we retrieve the management score for each firm using an identical methodology to the US MOPS, ensuring to be able to facilitate comparisons internationally.

The MES survey also collects firm-level expectations of turnover, expenditure, investment and employment growth for 2017 and 2018. In particular, the survey asked respondents to report their 2018 expectations using a 5-point bin, assigning a probability to each bin, for each of the four firm-level indicators. It also asks businesses to provide their UK economy wide GDP forecast using, in the same bins as the Bank of England's survey of external forecasters. This allows us to evaluate business forecasts against professional forecasters.

A set of stylized facts emerging from the MES can be summarized as follows:

- 1) Management practices vary substantially across firms – the 10th percentile of firms lacks robust monitoring or feedback processes, limited performance incentives or employee training, while the 90th percentile are as well managed as leading firms internationally.
- 2) Management practices are strongly associated with superior firm performance - faster growth, higher productivity and greater levels of profits.

² See Buffington, C, Foster, L, Jarmin, R, and Ohlmacher, S (2017) for more information.

³ There was an early pilot of MES in 2016 just on British manufacturing (MPS) that covered a narrower and slightly modified set of questions than the US MOPS.

- 3) Management practices score higher in larger, non-family-owned, and foreign-owned firms. The superior management scores in this group heavily reflects their lack of a left-tail of poorly managed firms. In contrast, small family-owned domestic firms are overrepresented amongst badly managed firms.
- 4) Uncertainty around future expectations for firms own sales growth and national GDP growth is lower in better-managed firms.
- 5) The accuracy of sales and national GDP growth forecasts are robustly higher in better-managed firms, as well are larger and older firms. This suggests one channel for superior management practices to raise firm productivity is through improved forecasting – they are better at predicting (and presumably planning for) the future.

In the following sections, we describe the survey design and the sampling process (Section 2), followed by in-depth description of our analysis on the variation in management practices across firms and the characteristics that appear to “drive” them (Section 3). We then discuss the relationship between productivity and management (Section 4). Section 5 focuses on the relationship between management practices and firm expectations. We conclude in Section 6 by discussing our next wave of the MES and research questions.

2. Survey Design and Sample

The MES was conducted by the ONS, in partnership with the Economic Statistics Centre of Excellence (ESCoE). It is the largest ever survey of UK management practices executed on a population of approximately 25,000 firms, covering both the production and services industries. It was a voluntary survey of firms with ten or more employees, with the same sample frame as the Annual Business Survey (ABS) for 2016, allowing us to match to data on value

added, employment, output and investment.⁴ The sample was drawn through random sampling, stratified by employment size groups, industries and regions. It was stratified by (1) three employment size groups (10 to 49, 50 to 249 and 250 or more), (2) industries in sections B to S, (3) regions, including the nine NUTS1 English regions, Wales and Scotland.⁵

In the MES survey, there are 36 multiple choice questions drawn mostly from the 2015 Management and Organizational Practices Survey (MOPS) of the US Census Bureau. Section A (4 questions) asks business characteristics. Sections B-E (12 questions) ask management practices. Section F (4 questions) asks decentralization practices. Section G (10 questions) asks firm-level forecasts about micro-level outcomes (turnover, expenditure, investment, and hiring) as well as GDP. Section H (6 questions) asks feedback about the survey.

Focusing on the management questions (sections B-E) these ask about practices around monitoring, targets, incentives. For example, Section C asks how many key performance indicators are used and how frequently employees are evaluated against key performance indicators. Section D asks whether targets are set, and if so, how easy or difficult to achieve targets and it also asks who is aware of targets. Section E is about incentives asking how much each employee's performance and ability are reflected in performance bonuses or promotion. Each question is accompanied by a list of options from which respondents chose options closest to the practices within their firms. For each question, scores were awarded to each option on a

⁴Employment is defined as the total number of employees registered on the payroll and working proprietors. Further details on the Annual Business Survey (ABS) can be found in the ABS Quality and Methodology Information report and the ABS Technical Report.

⁵ Sections included in the sample are, B: Mining and quarrying; C: Manufacturing, D: Electricity, gas, steam and air conditioning supply; E: Water supply; sewerage, waste management and remediation activities; F: Construction; G: Wholesale and retail trade; repair of motor vehicles and motorcycles; H: Transportation and storage; I: Accommodation and food service activities; J: Information and communication; L: Real estate activities; M: Professional, scientific and technical activities; N: Administrative and support service activities; P: Education; Q: Human health and social work activities; R: Arts, entertainment and recreation; S: Other service activities.

scale of 0 to 1, where 0 was the least and 1 the most structured management practice. An overall management score was derived as a simple average of a firm's score on all individual questions (so a firm scoring 1 overall had the most structured response to all 12 questions).

Finally, Section G collects information on firm expectations. It asks a point forecast of the current year's sales, expenditures, investment and hiring. It also asks firms to provide five-point subjective probability distributions of forecasts about year-ahead sales, expenditures, investment and hiring, a style adopted from the SBU and US-MOPS.

Firms are given a blank "five-bin" scale and asked to fill five scenarios about their own future outcomes alongside probabilities. Granting them this degree of freedom is important because firm-level outcomes are widely dispersed and largely different across firms, thus making pre-fixed bins are ill-suited for this question. From the subjective probability distributions, we retrieve (1) firm's expectations for 2017 and 2018; (2) a measure of uncertainty surrounding their 2018 expectations. Comparing their expectations and realized outcomes, we also obtain (3) a measure of forecast errors in 2017 and 2018 -- the difference between the firms' expectations and their realized outcomes.

Section G also asks firms to provide their expectations of future UK real GDP growth in 2018. Instead of the "five-bin" scale style, firms are asked to provide probabilities over multiple pre-specified outcomes. There are seven bins defined by intervals: (1) -4% or less, (2) -2% to -2%, (3) -1%, (4) 0%, (5) 1%, (6) 2% to 3 %, (7) 4% or more. The advantage of this approach is that it facilitates comparison between firm-level forecasts and those by professional forecasters as the latter are reported in the same fashion.

Summary statistics and response rates: The MES survey was voluntary and the total response rate was 38.7% (9,681 firms out of 25,006 firms). 56.5% did not respond and 4.8% elected to opt out of the voluntary survey. Among responded firms, the average employment

is 255 and the median employment is 67. The average firm age is 17, while the median firm age is 21.

3. Drivers of Structured Management Practices

This section starts by looking at the cross-sectional dispersion of management scores in the UK business sectors. We examine how firm-level characteristics are related to management practices with controlling for industry and location fixed effects. The next section studies the relationship between management practices and firm-level labor productivity. We show that management practices are strongly related to firm-level labor productivity after controlling for many other factors, making management practices are one of the key correlates of the cross-sectional dispersion of firm-level productivity.

Table 1 reports how management scores are correlated with various firm characteristics including firm size, ownership, and firm age. Firm size is measured by log employment and column (1) shows that management scores are higher among larger firms than smaller firms. Column (2) adds a dummy variable that takes one if the firm is owned by foreign firms and zero otherwise. The result shows that management scores are high for foreign-owned firms after controlling firm size. This is robust to controls for industry and location dummy variables, alongside firm age in columns (3) to (6).

This relationship between management scores and firm size can also be seen in Figure 1 where each curve shows the density for firms with each size category. The mean and median of management scores is higher as we go up the firm size distribution, confirming the regression results in a less parametric fashion. There is also a hint of larger dispersion amongst the smaller firms. We separated the sample into different industries and looked at the relationship between

management score and firm size in Table 2. One notable feature is that firms in service sector, on average, have higher management scores than those in production sector. Larger firms have higher management scores in every broad industry.

In Table 1, family-owned firms who are run by professional outside managers do not worse than other firms. By contrast, firms that are family owned and run by a family member have significantly lower management scores. To dig deeper, Table 3 regresses management scores on the covariates and splits by firm size. The negative effect of family run firms is driven by the largest size category, perhaps indicating that family firms are only a disadvantage when a firm attains a certain scale and needs to introduce more professionalized management. By contrast, foreign ownership is positively associated with better management throughout the size distribution.

4. Management and Productivity

It is well understood that productivity varies substantially across firms and establishments (e.g. Syverson, 2011). Table 4 shows how labor productivity is related to management practices by regressing $\log(\text{gross value added}/\text{worker})$ on management scores. Column (1) reports a basic regression where the right hand side variable is just the management score alongside firm size and industry dummies. The coefficient on management is significant with a positive estimate of 1.232. This implies that a one standard deviation increase in the management score (0.2) is associated with a 0.46 log point increase in productivity. This positive association is robust in that adding other variables such as family ownership, foreign ownership, firm age, firm skills and geographical controls in column (2) through (6). Even with all these included simultaneously in the final column the coefficient on management is still large at 0.919 and statistically significant.

5. Forecast Accuracy and Management

We turn to examine the relationship between management practices and forecast accuracy. We study how a firm's forecasts about macro outcomes (GDP) and firm-level outcomes (turnover) vary with the quality of the firm's management practices. We then analyse the correlation between management practices and expectations and forecast accuracy.

We restrict our sample to satisfy three criteria, which are the same with the sample restrictions in the US MOPS. Firstly, firms must complete at least two bins with full information. Secondly, the values answered must be weakly increasing from the lowest to the highest bin. Lastly, the sum of percentage likelihoods in these bins must be within range of 90% to 110%. The share of the firms in our sample which satisfy these criteria is 87% and is comparable to that in the US MOPS (85%).⁶

5.1. Well-managed firms are more positive about future macroeconomic conditions

The MES was sent out in mid-2017 and asked each firm to forecast the growth rate of real GDP in 2018 as seen in Figure 2. The questionnaire has pre-fixed seven scales, into each of which growth rates were binned: (1) -4% or less, (2) -3% to -2%, (3) -1%, (4) 0%, (5) 1%, (6) 2% to 3%, (7) 4% or more. We obtain expected GDP growth in 2018 as a weighted average of the 7

⁶ Out of 8,222 firms that responded to the MES, 7,161 firms satisfy the criteria on turnover question. For other indicators, 7,161 firms for goods and service expenditure, 6,253 firms for capital expenditure, 6,839 firms for employment satisfy the criteria. For GDP, we restrict our sample based on the last criteria about the sum of percentage likelihoods with 7,418 firms.

bins but we assume that probabilities point-mass are at -5% for the 1st bin, -2.5% for the 2nd bin, 2.5% for the 6th bin, and 5% for the 7th bin.

Table A1 reports the regression of expected real GDP growth on various firm characteristics, controlling for industry and location dummy variables. In column (1), expected GDP growth is regressed on log employment, and shows that larger firms are significantly more positive about macro growth. In column (2), we regress expected real GDP growth on management scores and show that firms with higher management scores also expect significantly greater GDP growth. We also look at the bivariate relationship of expected GDP growth and firm age (column (3)), foreign-ownership (column (4)), family firms (column (5)) and productivity (in column (6)). Foreign-owned and more productive firms are more positive, and family firms more negative on macro growth, whereas age is insignificant. Finally, we include all these variables simultaneously in column (7). Management remains a positive and significant predictor of macro growth expectations even after controlling for all these other covariates.

5.2. GDP forecasts by well-managed firms are more accurate

In Table 5, we report the result of regressing a measure of forecast errors on firm characteristics with industry and location dummy variables. In particular, we take the *absolute value of forecast error*, which is measured as the percentage point difference between the weighted average of GDP forecasts reported by each firm and the actual GDP growth rate in 2018, which is 1.4%. It might be that that well managed firms are just overly optimistic, rather than better at forecasting GDP, so this outcome differs from Table A1, which was just the value of the forecast.

Looking over Table 5, the results are broadly similar to those in Table A1. Firms with more structured management practice make significantly smaller forecast errors in column (2), and this is robust to adding a variety of controls in column (7). Larger and more productive firms also make smaller macro forecast errors.

As a robustness test, we now compare GDP forecasts of firms to those of forecasters in the Bank of England's Survey of External Forecasters. To this end, we convert the original seven bins into four bins: (1) -1% or less, (2) -1% to 1%, (3) 1% to 3%, (4) 3% or more. Figure 4 shows the distribution of the average of forecasts for both firms and BOE's external forecasters. As seen in the figure, the distribution of GDP forecasts by firms are skewed left in that firms assign a higher percentage of likelihood that real GDP growth is -1% or less (bin 1) and -1% to 1% (bin 2), relative to the average of external forecasters. On the other hand, firms assign a lower percentage of likelihood that real GDP growth is 1% to 3% (bin 3) and 3% or more (bin 4) than the average of external forecasters. All in all, firms on average are more pessimistic about real GDP growth in 2018 than external forecasters. We then ask what firm characteristics are correlated to the deviation of each firm's forecast from that of external forecasters. To see this, we construct a measure of disagreement between each firm's forecast and the average of external forecasters' forecasts as follows:

$$Disagreement_i = \frac{\sum_{j=1}^4 |l_{ij} - \bar{l}_j|}{4},$$

where l_{ij} is the percentage of likelihood that each firm i assigns for each bin j , \bar{l}_j is the average of the percentage likelihood of external forecasters for each bin j . We show the results of regression of $Disagreement_i$ on firm characteristics with industry and location dummy variables in column (8) of Table 5.

The coefficients on firm size and management scores are negative and significant similar to the previous result in column (7). On one hand, this is not surprising as external forecasters predicted 2018's real GDP growth well. On the other hand, the measure of disagreement above reflects not only the point estimate of GDP but also densities across all the forecast bins. That is, the degree of uncertainty surrounding the point forecast is also similar between firms and external forecasters. The results of this exercise appear to indicate that large firms with structured management practices and external forecasters have similar information about macroeconomic conditions, perhaps that more efforts are made and more attention are paid among large firms with structured management practices about macroeconomic conditions.

5.3 Well-managed businesses forecast their own future growth more accurately

Table 6 shows the relationship between turnover forecast errors and firm characteristics. Our measure of forecast errors is the absolute value of the difference between actual and expected turnover growth rate. Note that the number of observations in Table 6 is smaller compared to those in the other tables (about 4,600 vs. 7,400) because we need to observe the same firm over two years to calculate the actual growth rate of turnover.

Turnover forecast errors are smaller for better-managed firms as shown in column (2) unconditionally and column (7) conditional on all other controls. As expected, larger, older, and more productive firms also make smaller forecast errors both unconditionally and conditionally. What is slightly more surprising is that family firms also make smaller forecast errors.

5.4 Well-managed businesses face smaller subjective uncertainty

We construct a measure of uncertainty by taking the logarithm of the standard deviation, i.e. mathematically as follows:

$$Uncertainty_i = \ln(\sqrt{\sum_j (Growth_{ij} - \overline{Growth_i})^2 * Likelihood_{ij}}),$$

where $Growth_{ij}$ is the firm i 's forecast in bin j , $\overline{Growth_i}$ is the sample average of the firm i 's forecasts over these bins, and is $Likelihood_{ij}$ the likelihood that firm i attached to bin j . We show the results of regression of $Uncertainty_i$ on firm characteristics with industry and location dummy variables in Table 7.

Table 7 reports how subjective uncertainty is correlated with various firm characteristics. The findings emerging from the regression of our subjective uncertainty measure on firm characteristics are that subjective uncertainty is smaller for larger, better-managed, older, foreign-owned and more productive firms, while family-owned firms are in general faced with larger subjective uncertainty than non-family-owned firms. Column (1) shows a significantly negative coefficient on the log of employment. Column (2) shows that management scores are also negatively correlated with subjective uncertainty about turnover, with a negative and significant coefficient including industry and location dummy variables. As in column (3), firm age is also negatively correlated with subjective uncertainty. Column (4) reports a negative and significant coefficient on a dummy variable of foreign ownership. As seen in column (5), family-owned firms are faced with larger subjective uncertainty and the coefficient is even larger for family-owned and run firms than family-owned firms that are not run by family. Column (6) shows a negative and significant coefficient on log of gross value added per worker, a measure of productivity. All these firm characteristics are included in the full specification as in column (7) and all coefficients except for foreign-ownership remain

statistically significant. Taken together, all the tables show robust results for firm size and management score.

To investigate how the uncertainty measure is related to the uncertainties both at the industry level and at the macro level, we conduct additional analyses in Tables A2 and A3. In each table, we include firm size, management score, firm age, family- and foreign-ownership, log gross value added, and industry and location dummies in the specifications. Table A2 shows that firm's subjective uncertainty is significantly correlated with the volatility in the industry for turnover, expenditure, and employment but not for investment while the coefficients are all positive. Next, we examine how firm's uncertainty of its own performance is related to that of GDP growth. Table A3 reports that uncertainty of real GDP growth is significantly correlated with uncertainty in turnover, expenditure and employment growth. These results confirm that firm's subjective uncertainty is related to both the volatility at industry level and the uncertainty associated with future expectations about GDP.

6. Conclusions

This paper reports results from the MES, the largest management survey in the UK linked to administrative data on productivity. It is comparable to US MOPS including both management practice measures and subjective expectations about macro-economic growth and the firm's own future sales turnover, but goes beyond this data in including non-manufacturing firms as well as manufacturers.

We document that (i) there is a large variation in UK management practices; (ii) that structured management is systematically greater in larger firms and those that are foreign

owned, but are smaller in firms that are owned and run by family members; (iii) that productivity is significantly higher in firms with more structured management.

In terms of expectations, we compare firm's forecasts of one year ahead growth to actual outcomes observed in the years following the survey. We are able to show that firms with higher management scores are significantly more accurate in their forecasts about macro-economic growth (GDP) and their own growth. This statement is true even after controlling for many factors correlated with management. Large and more productive firms are also better at forecasting, for example, and these features are correlated with management as noted already. However, even after conditioning on these firm characteristics (as well as ownership, age, industry and location), well managed firms are significantly better forecasters.

If better management enables superior predictions of growth, then firms are more likely to be making optimal decisions over the appropriate level and composition of factor inputs (as well as other more strategic decisions). The higher productivity and profitability of well managed firms may rest, at least in part, over this better allocation of factors, a micro-level equivalent of the macro-level findings in Hsieh and Klenow (2009). This is a hypothesis we intend to pursue in future work.

Bibliography

- Argote, Linda, Sara Beckman and Dennis Epple (1990) "The Persistence and Transfer of Learning in Industrial Settings" *Management Science*, 36(2) 140-154
- Autor, David H., Frank Levy, and Richard J. Murnane. 2002. "Upstairs, Downstairs: Computers and Skills on Two Floors of a Large Bank." *Industrial and Labor Relations Review* 55: 432-447.
- Bandiera, Oriana, Iwan Barankay and Imran Rasul (2005) "Social Preferences and the Response to incentives: Evidence from Personnel Data", *Quarterly Journal of Economics*, 120(3), 917-962.
- Bandiera, Oriana, Iwan Barankay, and Imran Rasul (2007) "Incentives for Managers and Inequality among Workers: Evidence from a Firm-Level Experiment," *Quarterly Journal of Economics*
- Barley, Steven R. (1986) "Technology as an Occasion for Structuring: Evidence from Observations of CT Scanners and the Social Order of Radiology Departments." *Administrative Science Quarterly* 31: 78-108.

- Bartel, Ann, Casey Ichniowski and Kathryn Shaw (2004) "Using "Insider Econometrics" to Study Productivity" *American Economic Review*, 94 (2): 217-223.
- Bartel, Ann, Casey Ichniowski and Kathryn Shaw (2007) "How Does Information Technology Really Affect Productivity? Plant-Level Comparisons of Product Innovation, Process Improvement and Worker Skills", *Quarterly Journal of Economics*, 122(4), 1721-1758
- Bartelsman, Erik, John Haltiwanger, and Stefano Scarpetta (2013), "Cross Country Differences in Productivity: The Role of Allocation and Selection." *American Economic Review*, 103(1): 305-334.
- Berg, Norman A., and Norman D. Fast. (1975) "The Lincoln Electric Company." Harvard Business School Case 376-028. Cambridge, MA: Harvard Business School.
- Black, Sandra and Lisa Lynch (2001) "How to Compete: The Impact of Workplace Practices and Information Technology on Productivity", *Review of Economics and Statistics*, 83(3), 434-445.
- Black, Sandra and Lisa Lynch (2004) "What's Driving the New Economy? The Benefits of Workplace Innovation", *Economic Journal*, 114(493), 97-116.
- Blader, Steve, Claudine Gartenberg and Andrea Pratt (2016) "The Contingent Effect of Management Practices" CEPR Discussion Paper 11057
- Bloom, Nicholas, Erik Brynjolfsson, Lucia Foster, Ron Jarmin, Megha Patnaik, Itay Saporta-Eksten and John Van Reenen (2019) "What drives differences in management?" *American Economic Review* 109(5) 1648-1683
- Bloom, Nicholas, Benn Eifert, Aprajit Mahajan, David McKenzie, and John Roberts, (2013b), "Does Management Matter? Evidence from India", *Quarterly Journal of Economics*, 128(1), 1-51.
- Bloom, Nicholas, Max Floetotto, Nir Jaimovich, Itay Saporta-Eksten and Stephen Terry, (2018), "Really Uncertain Business Cycles," *Econometrica* 86(3), 1031-1065
- Bloom, Nicholas, Raffaella Sadun and John Van Reenen, (2016), "Management as a Technology," NBER Working Paper No. 22327
- Bloom, Nicholas and John Van Reenen, (2007), "Measuring and Explaining Management Practices Across Firms and Countries," *Quarterly Journal of Economics* 122(4), 1351-1408
- Bloom, Nicholas and John Van Reenen. (2011). "Human Resource Management and Productivity" in *Handbook of Labor Economics Volume 4B*, Orley Ashenfelter and David Card editors.
- Bresnahan, Timothy F., Erik Brynjolfsson, and Lorin M. Hitt. "Information Technology, Workplace Organization, and the Demand for Skilled Labor: Firm-Level Evidence." *Quarterly Journal of Economics* 117(1) (2002): 339-376.
- Bruhn, Miriam, Dean Karlan and Antoinette Schoar (2016), "The Impact of Consulting Services on Small and Medium Enterprises: Evidence from a Randomized Trial in Mexico," forthcoming, *Journal of Political Economy*.
- Brynjolfsson, Erik, Hitt, Lorin M. and Shinkyu Yang (2002) "Intangible Assets: Computers & Organizational Capital," *Brookings Papers on Economic Activity* (1): 137-199.
- Brynjolfsson, Erik, and Paul Milgrom (2013) "Complementarity in Organizations" in Robert Gibbons and John Roberts (eds) *Handbook of Organizational Economics*, 11-55 Princeton: Princeton University Press.
- Brynjolfsson, Erik, Amy Austin Renshaw, and Marshall van Alstyne. 1997. "The Matrix of Change." *Sloan Management Review* 38(2): 37-54.
- Buffington, Catherine, Lucia Foster, Ron Jarmin and Scott Ohlmacher (2017), "The Management and Organizational Practices Survey (MOPS): An Overview," *Journal of Economic and Social Measurement* 1-26.
- Buffington, Catherine, Kenny Herrell and Scott Ohlmacher (2016), "The Management and Organizational Practices Survey (MOPS): Cognitive Testing," Census Bureau Center for Economic Studies Working Paper No. 16-53.
- Capelli, Peter and David Neumark (2001) "Do High-Performance Work Practices Improve Establishment-Level Outcomes?," *Industrial and Labor Relations Review*, 54(4), 737-775.
- Chandra, A, Amy Finkelstein, Adam Sacarny, and Chad Syverson (2016), "Health Care

- Exceptionalism? Performance and Allocation in the US Health Care Sector”, *The American Economic Review*, 106(8) 2110-2144
- Chew, W., Kim Clark, and Tim Bresnahan (1990), “Measurement, Coordination and Learning in a Multi-plant Network” in Robert Kaplan. *Measures for Manufacturing Excellence*, Boston: Harvard Business School Press
- Collard-Wexler, Allan, (2013), “Demand Fluctuations in the Ready-Mix Concrete Industry” *Econometrica*,” 81(3) 1003–1037
- Davis, Steven, John Haltiwanger, Kyle Handley, Ron Jarmin, Josh Lerner and Javier Miranda (2014) “Private Equity, Jobs, and Productivity” *American Economic Review*, 104(12), 3956-90
- Davis, Steven and John Haltiwanger (1992) “Gross Job Creation, Gross Job Destruction and Employment Reallocation” *Quarterly Journal of Economics* 107(3) 819-863
- Easton, George and Sherry Jarrell (1998) “The Effects of Total Quality Management on Corporate Performance: An Empirical Investigation”, *Journal of Business* 71(2), 253–307.
- Ellison, Glenn and Edward L. Glaeser, (1997), “Geographic Concentration in U.S. Manufacturing Industries: A Dartboard Approach,” *Journal of Political Economy*, 105(5).
- Foster, Lucia, John Haltiwanger and C.J. Krizan, (2001), “Aggregate Productivity Growth: Lessons from Microeconomic Evidence,” *New Developments in Productivity Analysis*, NBER, University of Chicago Press.
- Foster, Lucia, John Haltiwanger, and Chad Syverson. (2008). "Reallocation, Firm Turnover, and Efficiency: Selection on Productivity or Profitability?" *American Economic Review*, 98 (1): 394-425.
- Freeman, Richard and Katheryn Shaw (2009) *International Differences in the Business Practices and Productivity of Firms*, Chicago: Chicago University Press.
- Gibbons, Robert, and Rebecca Henderson. (2013), “What Do Managers Do? Exploring Persistent Performance Differences among Seemingly Similar Enterprises.” in Robert Gibbons and John Roberts (eds) *Handbook of Organizational Economics*, 680–731, Princeton: Princeton University Press.
- Giorelli, Michela, (2016), “The Long-Term Effects of Management and Technology Transfer: Evidence from the US Productivity Program,” UCLA mimeo.
- Greenstone, Michael, Richard Hornbeck and Enrico Moretti, (2010), “Identifying Agglomeration Spillovers: Evidence from Winners and Losers of Large Plant Openings,” *Journal of Political Economy* 118(3): 536-598.
- Griffith, Rachel and Andrew Neely (2009) “Incentives and Managerial Experience in Multi-task Teams: Evidence from Within a Firm”, *Journal of Labor Economics*, 27(1), 49-82.
- Halac, Marina and Andrea Prat, (2016) “Managerial Attention and Worker Engagement,” *American Economic Review*, 106(10): 3104–3132
- Henderson, Rebecca and Iain Cockburn (1994) “Measuring Competence? Exploring Firm Effects in Pharmaceutical Research,” *Strategic Management Journal*, 15(S1) 63-84
- Hamilton, Barton H., Jack A. Nickerson, and Hideo Owan (2003) “Team Incentives and Worker Heterogeneity: An Empirical Analysis of the Impact of Teams on Productivity and Participation”, *Journal of Political Economy*, 111(3), 465-497.
- Hopenhayn, Hugo (1992,) “Entry, Exit, and Firm Dynamics in Long-Run Equilibrium,” *Econometrica*. 1127–1150.
- Hsieh, Chiang-Tai and Pete Klenow (2009) “Misallocation and Manufacturing TFP in China and India.” *Quarterly Journal of Economics*, 124(4): 1403-1448.
- Holmes, Thomas J., (1998), "The Effect of State Policies on the Location of Manufacturing: Evidence from State Borders," *Journal of Political Economy* 106(4): 667-705.

- Huselid, Mark (1995) "The Impact of Human Resource Management Practices on Turnover, Productivity and Corporate Financial Performance", *Academy of Management Journal*, 38, 635-672.
- Huselid, Mark and Brian Becker (1996) "Methodological Issues in Cross-sectional and Panel Estimates of the Human Resource-firm Performance link", *Industrial Relations*, 35, 400-422.
- Ichniowski, Casey and Kathryn Shaw (1999), "The Effects of Human Resource Management Systems on Economic Performance: An International Comparison of U.S. and Japanese Plants" *Management Science*, 45(5) 704 - 721
- Ichniowski, Casey, Kathryn Shaw, and Giovanna Prennushi. "The effects of human resource management practices on productivity: A study of steel finishing lines." *American Economic Review* (1997): 291-313.
- Jovanovic, Boyan (1982) "Selection and Evolution of Industry." *Econometrica* 50(3) 649-670
- Lazear, Edward (2000) "Performance Pay and Productivity", *American Economic Review* 90(5), 1346-1361.
- Meagher, K. and Strachan, R. (2016) "Evidence on the Non-Linear Impact of Management" Australian National University mimeo
- Melitz, Marc J., (2003) "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity," *Econometrica*, 71 (6), 1695–1725.
- Milgrom, Paul and John Roberts (1990) "The Economics of Modern Manufacturing: Technology, Strategy, and Organization", *American Economic Review*, 80(3), 511–28.
- Nevins, Allan, (1962) *The State Universities and Democracy*, University of Illinois Press, Urbana, IL.
- Osterman, Paul (1994) "How Common Is Workplace Transformation and Who Adopts It?" *Industrial and Labor Relations Review*, 47(2), 173-188
- Penrose, Edith (1959), *The Theory of Growth of the Firm*, New York: Wiley Publishers
- Schmalensee, Richard (1985), "Do Markets Differ Much" *American Economic Review* 75(3), 341-351
- Syversen, Chad, (2011), "What Determines Productivity?" *Journal of Economic Literature*, 49(2), 326-365.
- Walker, Francis (1887) "The Source of Business Profits." *Quarterly Journal of Economics*. 1(3): 265-288.
- Womack, James, Daniel Jones and Daniel Roos, (1991), *The Machine that Changed the World*, Simon and Schuster Inc: New York.

Table 1: “Drivers” of management scores

	Dependent Variable: Management score					
	(1)	(2)	(3)	(4)	(5)	(6)
Log employment	0.064*** (0.0014)	0.057*** (0.0015)	0.058*** (0.0015)	0.047*** (0.0016)	0.044*** (0.0017)	0.043*** (0.0017)
Family owned but not family run		-0.006 (0.0066)	-0.006 (0.0066)	-0.000 (0.0064)	-0.000 (0.0065)	-0.001 (0.0065)
Family owned and family run		-0.031*** (0.0047)	-0.031*** (0.0047)	-0.015*** (0.0046)	-0.011** (0.0047)	-0.011** (0.0047)
Foreign owned		0.066*** (0.0064)	0.065*** (0.0064)	0.061*** (0.0062)	0.059*** (0.0063)	0.057*** (0.0063)
Age			-0.002*** (0.0003)	-0.002*** (0.0003)	-0.002*** (0.0003)	-0.002*** (0.0003)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Manager Education Dummies	No	No	No	Yes	Yes	Yes
Non-manager Education Dummies	No	No	No	No	Yes	Yes
Location Dummies	No	No	No	No	No	Yes
Observations	7756	7717	7717	7463	7031	7031
R ²	0.236	0.256	0.260	0.314	0.332	0.337

Note: Management score is the unweighted average of the score for each of the 12 questions, with scores on a scale of 0 to 1 for each, where 0 was the least and 1 the most structured management practice. In column (1) the regressor is log of firm employment reported in ABS 2016. In column (2) dummies for foreign and domestic ownership, family and non-family ownership, family and non-family management are included. In column (3) firm age as of 2016 ABS is included. In columns (1), (2), and (3) dummies for industry at two-digit level are included but dummies for whether any managers has a college degree and whether any non-managers has a college degree are added in columns (4) and (5), respectively. In column (6) dummies for location are included on the 11 NUTS1 regions (English, Wales and Scotland regions). Standard errors are in parentheses, * p < 0.10, ** p < 0.05, *** p < 0.01. If more than two question are non-response, firms are excluded from our analysis.

Table 2: Management scores by broad industry

Industry	Employment Size: 10-49			Employment Size: 50+		
	Mean	SD	Share	Mean	SD	Share
Construction	0.38	0.23	7%	0.59	0.18	1%
Retail, distribution, hotels & restaurants	0.41	0.23	26%	0.64	0.16	4%
Real Estate	0.42	0.29	2%	0.67	0.16	0%
Manufacturing	0.44	0.21	9%	0.63	0.16	3%
Non-Manufacturing Production	0.44	0.22	1%	0.63	0.16	0%
Transport, storage, & communication	0.47	0.22	7%	0.62	0.18	2%
Business services	0.50	0.22	16%	0.62	0.18	4%
Other services	0.50	0.20	15%	0.62	0.15	4%
Production	0.41	0.22	16%	0.62	0.16	4%
Services	0.46	0.23	66%	0.63	0.17	14%
Population	0.45	0.23	82%	0.62	0.17	18%

Note: Mean shows the average management score for the firms in the industry and employment size categories. SD stands for standard deviation. Share describes the share of firms in the industry and employment size categories out of the full sample.

Table 3: Lower management scores for family-owned firms in the large firm group

	Dependent Variable: Management score				
	(1): All	(2): 10-49	(3): 50-99	(4):100-249	(5):250+
Log employment	0.043*** (0.0017)	0.088*** (0.0079)	0.021 (0.0222)	0.068*** (0.0178)	0.015*** (0.0038)
Family owned but not family run	-0.001 (0.0065)	-0.009 (0.0125)	0.010 (0.0148)	0.003 (0.0150)	-0.007 (0.0089)
Family owned and family run	-0.011** (0.0047)	0.006 (0.0083)	-0.007 (0.0108)	-0.016 (0.0115)	-0.043*** (0.0072)
Foreign owned	0.057*** (0.0063)	0.084*** (0.0156)	0.067*** (0.0149)	0.048*** (0.0139)	0.035*** (0.0074)
Age	-0.002*** (0.0003)	-0.004*** (0.0005)	-0.002** (0.0007)	-0.001 (0.0007)	0.000 (0.0004)
Industry Dummies	Yes	Yes	Yes	Yes	Yes
Manager Education Dummies	Yes	Yes	Yes	Yes	Yes
Non-manager Education Dummies	Yes	Yes	Yes	Yes	Yes
Location Dummies	Yes	Yes	Yes	Yes	Yes
Observations	7031	2861	1196	1019	1955
R^2	0.337	0.237	0.176	0.168	0.186

Note: Management score is the unweighted average of the score for each of the 12 questions, with scores on a scale of 0 to 1 for each, where 0 was the least and 1 the most structured management practice. In columns (1) through (5), the regressors are log of firm employment reported in ABS 2016, dummies for foreign and domestic ownership, family and non-family ownership, family and non-family management, firm age as of 2016 ABS, dummies for industry at two-digit level and for whether any managers have a college degree and whether any non-managers have a college degree, and dummies for location are included on the 11 NUTS1 regions (English, Wales and Scotland regions). Standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. If more than two question are non-response, firms are excluded from our analysis.

Table 4: Management and productivity

	Dependent Variable: Log (Gross Value Added/Workers)					
	(1)	(2)	(3)	(4)	(5)	(6)
Management score	1.232*** (0.0637)	1.096*** (0.0642)	1.133*** (0.0641)	0.961*** (0.0675)	0.934*** (0.0699)	0.919*** (0.0698)
Log employment	-0.061*** (0.0090)	-0.091*** (0.0093)	-0.102*** (0.0094)	-0.122*** (0.0099)	-0.122*** (0.0102)	-0.124*** (0.0102)
Family owned but not family run		-0.087** (0.0368)	-0.089** (0.0367)	-0.075** (0.0370)	-0.083** (0.0376)	-0.086** (0.0375)
Family owned and family run		-0.151*** (0.0265)	-0.154*** (0.0264)	-0.117*** (0.0268)	-0.104*** (0.0273)	-0.098*** (0.0272)
Foreign owned		0.349*** (0.0360)	0.352*** (0.0359)	0.344*** (0.0365)	0.331*** (0.0368)	0.324*** (0.0367)
Age			0.012*** (0.0015)	0.011*** (0.0015)	0.010*** (0.0016)	0.010*** (0.0016)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Manager Education Dummies	No	No	No	Yes	Yes	Yes
Non-manager Education Dummies	No	No	No	No	Yes	Yes
Location Dummies	No	No	No	No	No	Yes
Observations	7346	7310	7310	7076	6660	6660
R ²	0.219	0.236	0.243	0.251	0.261	0.267

Note: In all regressions the dependent variable is log gross value added per worker. In column (1) the first regressor is the management score, which is the unweighted average of the score for each of the 12 questions, with scores on a scale of 0 to 1 for each, where 0 was the least and 1 the most structured management practice. The second regressor is log of firm employment reported in ABS 2016. In columns (1) through (6) dummies for industry at two-digit level are included. In column (2), dummies for foreign and domestic ownership, family and non-family ownership, family and non-family management are included. In column (3) firm age as of 2016 ABS is included. In column (4) a dummy for whether any managers have a college degree is included. In column (5) a dummy whether any non-managers has a college degree is added. In column (6) dummies for location are included on the 11 NUTS1 regions (English, Wales and Scotland regions). Standard errors are in parentheses, * p < 0.10, ** p < 0.05, *** p < 0.01. If more than two question are non-response, firms are excluded from our analysis.

Table 5: Better-managed firms make smaller GDP forecast errors

	Dependent Variable: GDP forecast error							Disagreement
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log employment	-0.078*** (0.0088)						-0.064*** (0.0107)	-0.253*** (0.0687)
Management score		-0.414*** (0.0628)					-0.191** (0.0743)	-0.901* (0.4781)
Age			0.000 (0.0016)				0.002 (0.0017)	-0.010 (0.0110)
Foreign owned				-0.099*** (0.0363)			0.024 (0.0403)	0.314 (0.2591)
Family owned but not family run					0.067* (0.0396)		0.046 (0.0406)	0.456* (0.2612)
Family owned and family run					0.116*** (0.0262)		0.033 (0.0294)	0.420** (0.1889)
Log GVA per worker						-0.032** (0.0126)	-0.024* (0.0134)	-0.047 (0.0863)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Location Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7402	7143	7411	7411	7374	7030	6741	6741
R ²	0.019	0.016	0.009	0.010	0.012	0.010	0.023	0.012

Note: In all regressions the dependent variable is the absolute value of the difference between expected and actual real GDP growth rate. In column (1) the regressor is log of firm employment reported in ABS 2016. In column (2) the regressor is the management score, which is the unweighted average of the score for each of the 12 questions, with scores on a scale of 0 to 1 for each, where 0 was the least and 1 the most structured management practice. In column (3) firm age as of 2016 ABS is included. In column (4) dummies for foreign and domestic ownership are included. In column (5) dummies for family and non-family ownership, family and non-family management are included. In column (6), the regressor is log value added per worker. In column (7) all these regressors are included together with two-digit industry dummies and NUTS1 location dummies, which are included in all regressions. In column (8), the dependent variable is the measure of GDP disagreement between firms and BOE's external forecasters as defined in the main text. Standard errors are in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. If more than two question are non-response, firms are excluded from our analysis.

Table 6: Firms with higher management scores make smaller forecast errors over their own turnover

	Dependent Variable: Turnover Forecast Error						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log employment	-0.014*** (0.0031)						-0.011*** (0.0029)
Management score		-0.091*** (0.0237)					-0.044** (0.0221)
Age			-0.003*** (0.0006)				-0.002*** (0.0005)
Foreign owned				-0.002 (0.0116)			-0.002 (0.0103)
Family owned but not family run					-0.025* (0.0136)		-0.014 (0.0111)
Family owned and family run					-0.031*** (0.0092)		-0.030*** (0.0083)
Log GVA per worker						-0.026*** (0.0037)	-0.020*** (0.0038)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Location Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4610	4484	4610	4610	4591	4383	4249
R ²	0.036	0.034	0.037	0.032	0.034	0.033	0.040

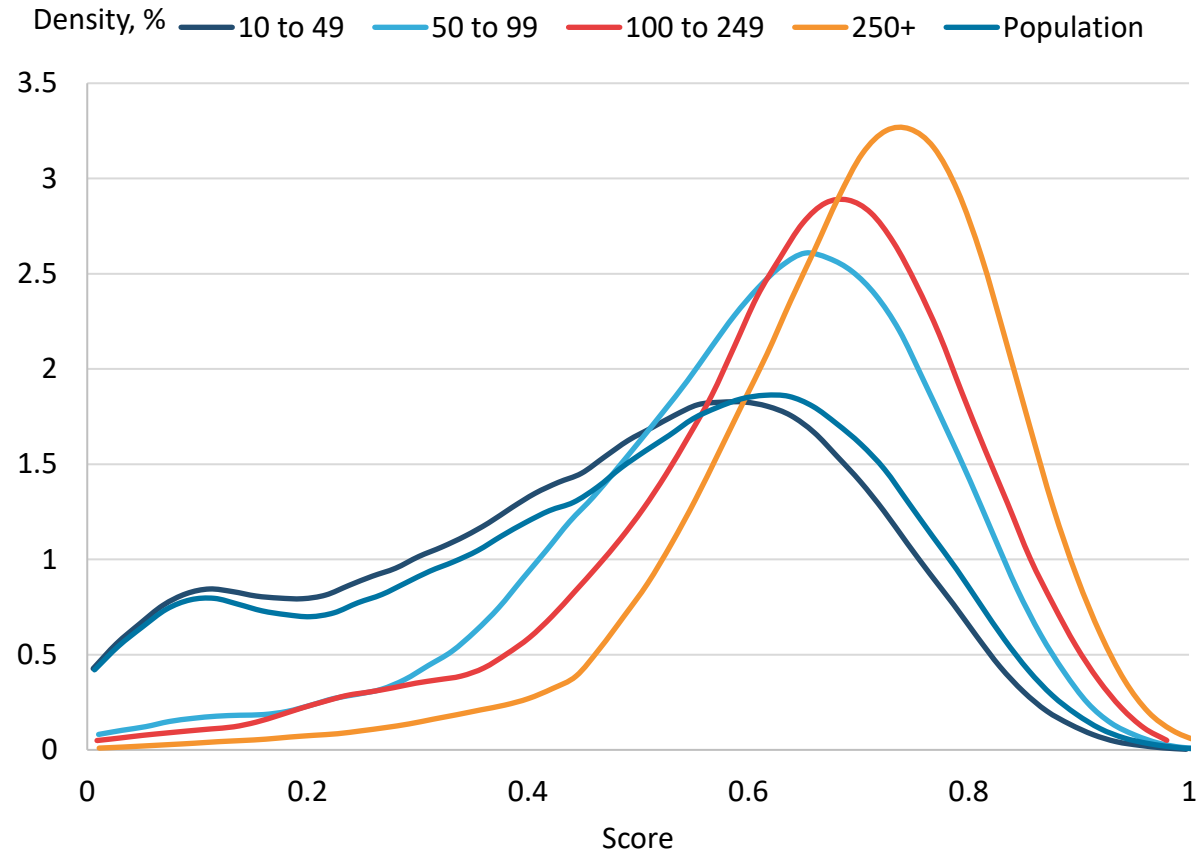
Note: In all regressions the dependent variable is the absolute value of the difference between actual and expected growth rate. In column (1) the regressor is log of firm employment reported in ABS 2016. In column (2) the regressor is the management score, which is the unweighted average of the score for each of the 12 questions, with scores on a scale of 0 to 1 for each, where 0 was the least and 1 the most structured management practice. In column (3) firm age as of 2016 ABS is included. In column (4) dummies for foreign and domestic ownership are included. In column (5) dummies for family and non-family ownership, family and non-family management are included. In column (6), the regressor is log value added per worker. In column (7) all these regressors are included together with two-digit industry dummies and NUTS1 location dummies, which are included in all regressions. Standard errors are in parentheses, * p < 0.10, ** p < 0.05, *** p < 0.01. If more than two question are non-response, firms are excluded from our analysis.

Table 7: Firms with higher management scores have less uncertainty

	Dependent Variable: Turnover Subjective Uncertainty						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log employment	-0.168*** (0.0075)						-0.130*** (0.0090)
Management score		-0.722*** (0.0552)					-0.160** (0.0629)
Age			-0.016*** (0.0014)				-0.011*** (0.0014)
Foreign owned				-0.234*** (0.0320)			0.027 (0.0343)
Family owned but not family run					0.151*** (0.0345)		0.093*** (0.0344)
Family owned and family run					0.300*** (0.0228)		0.178*** (0.0248)
Log GVA per worker						-0.079*** (0.0110)	-0.057*** (0.0113)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Location Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7153	6917	7160	7160	7131	6817	6558
R ²	0.148	0.111	0.104	0.095	0.110	0.091	0.166

Note: In all regressions the dependent variable is the subjective uncertainty regarding turnover forecasts as defined in the main text. In column (1) the regressor is log of firm employment reported in ABS 2016. In column (2) the regressor is the management score, which is the unweighted average of the score for each of the 12 questions, with scores on a scale of 0 to 1 for each, where 0 was the least and 1 the most structured management practice. In column (3) firm age as of 2016 ABS is included. In column (4) dummies for foreign and domestic ownership are included. In column (5) dummies for family and non-family ownership, family and non-family management are included. In column (6), the regressor is log value added per worker. In column (7) all these regressors are included together with two-digit industry dummies and NUTS1 location dummies, which are included in all regressions. Standard errors are in parentheses, * p < 0.10, ** p < 0.05, *** p < 0.01. If more than two question are non-response, firms are excluded from our analysis.

Figure 1: Management scores are highest among larger than smaller firms



Note: Each curve corresponds to the density of firms in each employment size category.

Figure 2: MES Questionnaire on macro growth expectations

30. Please indicate what likelihood you would attach to the possible 2018 rates of UK economic growth (real growth rate of Gross Domestic Product) below.
 Gross Domestic Product (GDP) is the main measure of the size of the UK economy, based on the value of goods and services produced during a given period.

UK Economic Growth in 2018		Percentage likelihood (values in this column should sum to 100)	
Strong decline	-4% or less	<input type="text" value=""/> <input type="text" value=""/> <input type="text" value="2"/>	% 1138
Moderate decline	-2% to -3%	<input type="text" value=""/> <input type="text" value=""/> <input type="text" value="5"/>	% 1139
Slight decline	-1%	<input type="text" value=""/> <input type="text" value="1"/> <input type="text" value="0"/>	% 1140
No change	0%	<input type="text" value=""/> <input type="text" value="3"/> <input type="text" value="0"/>	% 1141
Slight increase	1%	<input type="text" value=""/> <input type="text" value="4"/> <input type="text" value="0"/>	% 1142
Moderate increase	2% to 3%	<input type="text" value=""/> <input type="text" value="1"/> <input type="text" value="0"/>	% 1143
Strong increase	4% or more	<input type="text" value=""/> <input type="text" value=""/> <input type="text" value="3"/>	% 1144
Total		<input type="text" value=""/> <input type="text" value="1"/> <input type="text" value="0"/> <input type="text" value="0"/>	%

Figure 3: MES Questionnaire on micro growth expectations

The example below will help you to complete questions 22, 24, and 26

Example A:
Jane Smith is filling out this survey for Business A. In 2016, Business A had approximately £4,500,000 in turnover, with a forecast of £4,750,000 in 2017.

For calendar years 2016 and 2017, what are the approximate values of turnover, including exports and other receipts within this business? If applicable exclude freight charges, excise taxes and value added tax.

For 2016 calendar year..... £ , 4 , 0 0 , 0 0 0

Forecast for 2017 calendar year..... £ , 4 , 7 5 0 , 0 0 0

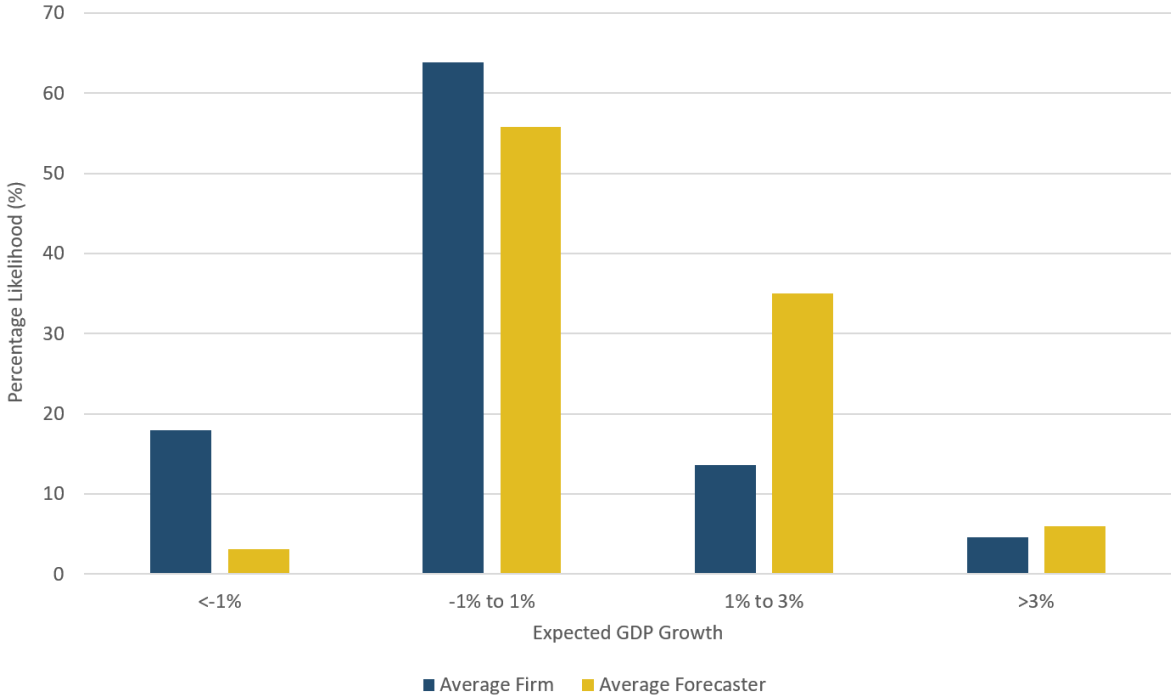
The example below will help you to complete questions 23, 25, 27 and 29

Example B:
Jane also knows that turnover at Business A is forecast to grow approximately an additional 5% in 2018, with predicted annual value of turnover of £5 million. However, Jane knows there is some uncertainty with that forecast and that the value of turnover next year could be more or less than £5 million depending on consumer demand, changes in prices, and other uncertainties in the market. Given this uncertainty, Jane estimates that turnover will be between £2.8 million and £7.5 million, and thinks the likelihood of each scenario is as shown in the table below.

Looking ahead to the 2018 calendar year, what is the approximate value of turnover you would anticipate for this business in the following scenarios, and what likelihood do you assign to each scenario?

2018 scenarios, from lowest to highest	Approximate turnover in 2018	Percentage likelihood (values in this column should sum to 100)
LOWEST	£ <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> 2 , <input type="text"/> <input type="text"/> 8 0 0 , <input type="text"/> <input type="text"/> 0 0 0	<input type="text"/> <input type="text"/> 5 %
LOW	£ <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> 4 , <input type="text"/> <input type="text"/> 2 0 0 , <input type="text"/> <input type="text"/> 0 0 0	<input type="text"/> <input type="text"/> 1 0 %
MEDIUM	£ <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> 5 , <input type="text"/> <input type="text"/> 0 0 0 , <input type="text"/> <input type="text"/> 0 0 0	<input type="text"/> <input type="text"/> 6 0 %
HIGH	£ <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> 6 , <input type="text"/> <input type="text"/> 3 0 0 , <input type="text"/> <input type="text"/> 0 0 0	<input type="text"/> <input type="text"/> 2 0 %
HIGHEST	£ <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> 7 , <input type="text"/> <input type="text"/> 5 0 0 , <input type="text"/> <input type="text"/> 0 0 0	<input type="text"/> <input type="text"/> 5 %
Total		<input type="text"/> <input type="text"/> 1 0 0 %

Figure 4: Businesses are generally more pessimistic than Bank of England external forecasters



Appendix

Table A1: Better-managed businesses are more positive about macro growth

	Dependent Variable: Expected GDP growth 2018						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log employment	0.072*** (0.0102)						0.054*** (0.0124)
Management score		0.492*** (0.0729)					0.304*** (0.0866)
Age			-0.003 (0.0019)				-0.004** (0.0020)
Foreign owned				0.097** (0.0421)			-0.024 (0.0469)
Family owned but not family run					-0.045 (0.0460)		-0.024 (0.0473)
Family owned and family run					-0.103*** (0.0304)		-0.018 (0.0342)
Log GVA per worker						0.024* (0.0147)	0.022 (0.0156)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Location Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7402	7143	7411	7411	7374	7030	6741
R ²	0.015	0.016	0.009	0.009	0.010	0.009	0.020

Note: In all regressions the dependent variable is the expected real GDP growth in the UK. In column (1) the regressor is log of firm employment reported in ABS 2016. In column (2) the regressor is the management score, which is the unweighted average of the score for each of the 12 questions, with scores on a scale of 0 to 1 for each, where 0 was the least and 1 the most structured management practice. In column (3) firm age as of 2016 ABS is included. In column (4) dummies for foreign and domestic ownership are included. In column (5) dummies for family and non-family ownership, family and non-family management are included. In column (6), the regressor is log value added per worker. In column (7) all these regressors are included together with two-digit industry dummies and NUTS1 location dummies, which are included in all regressions. Standard errors are in parentheses, * p < 0.10, ** p < 0.05, *** p < 0.01. If more than two question are non-response, firms are excluded from our analysis.

Table A2: Businesses' uncertainty is positively correlated to past volatility of their industry

Dependent Variable	(1) Turnover Uncertainty	(2) Expenditure Uncertainty	(3) Investment Uncertainty	(4) Employment Uncertainty
Industry Turnover Volatility	0.205*** (0.04)			
Industry Expenditure Volatility		0.240*** (0.05)		
Industry Investment Volatility			0.042 (0.05)	
Industry Employment Volatility				0.086*** (0.02)
Observations	6535	6448	5574	6271
R^2	0.091	0.072	0.035	0.265

Note: In all specifications, we include the following controls: log employment, age, family ownership, foreign ownership, management Score, log gross value added, and industry and location dummies. Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A3 Businesses' uncertainty of their own future performance is positively correlated to their uncertainty of GDP growth

Dependent Variable	(1) Turnover Growth Uncertainty	(2) Expenditure Growth Uncertainty	(3) Investment Growth Uncertainty	(4) Employment Growth Uncertainty
UK Real GDP Growth Uncertainty	0.275*** (0.05)	0.248*** (0.05)	-0.023 (0.08)	0.383*** (0.04)
Observations	6087	6030	5277	5910
R^2	0.197	0.152	0.071	0.333

Note: In all specifications, we include the following controls: log employment, age, family ownership, foreign ownership, management Score, log gross value added, and industry and location dummies. Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.