

Article

An initial assessment of regional management practices: 2015

A small sample of single-site British manufacturing businesses from the Management Practice Survey pilot finds no evidence of regional variation in management practices.

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1 . Introduction

ONS collected information on management practices for the first time in 2016 using the pilot Management Practices Survey (MPS). [Published analysis of these data](#) shows that larger businesses have higher levels of structured management practices, and that there is a positive association between businesses' use of structured management practices and their levels of labour productivity (Awano et al, 2017).

In response to user requests, we have explored whether the pilot dataset could provide management practice results at the regional level. Due to the limitations discussed in detail in the next section, we are only able to provide conditional analysis of relationships for a sample of single-site businesses. We cannot draw conclusions on regional variation in the population of such businesses, or the wider population of all manufacturing businesses. These conditional results show broadly similar results to our previous analysis with no strong regional component to variation in management scores or labour productivity. However, the analysis does exemplify the kind of work that we intend to carry out with a larger sample in the future.

2 . Limitations of this analysis

The limitations arise from features of our data which mean that the sample available for regional analysis is small and unrepresentative of the manufacturing industry when disaggregated to a regional level.

Results for Great Britain

The Management Practices Survey (MPS) sampled 1,026 manufacturing businesses in Great Britain; 68% of this sample responded to the survey, and 59% of the sample provided responses to both the MPS and the Annual Business Survey (ABS). This allowed us to link management and productivity data at the business level, and also to produce average management scores across industries and size bands in Great Britain. Quality measures (that is, standard errors) to indicate the level of the precision of these estimates have not been produced. It is therefore important that the estimates are treated with caution.

Regional results

The sample design for MPS did not include any regional stratification, as the primary aim for this pilot survey was to produce results for Great Britain. This poses the risk that some regions in Great Britain may be under-represented, or within regions, some industries or business size bands may be disproportionately represented relative to the actual business populations in that region. The sample in each region will also be much smaller and this will result in a lower level of precision for any estimates.

Both MPS and ABS collect data at the Reporting Unit level of the business¹. However, as businesses may operate on more than one site and span more than one region, it can be difficult to accurately attribute contributions to the business's management scores and productivity across sites, and hence across regions. For this regional analysis, the sample has been restricted to single-site businesses, so all information can be confidently attributed to a single region. This reduces our sample to just fewer than 350 businesses. The numbers of observations in each region are therefore small and as such if weighted estimates for the population were produced, the resulting estimate could be driven by very few businesses in the sample. The reliability of estimates derived from these small numbers is likely to be very low but cannot be quantified without the associated standard errors. Also, by restricting the sample to single-site businesses, the sample is skewed towards smaller businesses, and is less representative of the manufacturing population as a whole.

Therefore, to avoid overconfident interpretation of these results we have not produced population estimates of management scores and labour productivity by region. Instead we have used this sample of single-site businesses to produce conditional estimates for regional variation using regression analysis. These regression results cannot be used to infer the characteristics of or draw conclusions regarding single-site manufacturing businesses in general, or indeed for the broader manufacturing business population. The purpose of these results is to provide a timely insight using the limited data available, which should be used with caution.

Notes for: Limitations of this analysis

1. [Evans and Welpton \(2009\)](#) provide further information on how we treat businesses for statistical purposes.

3 . Estimating relationships between management score and business characteristics

We used multivariate regressions to estimate conditional relationships between businesses' management scores and their characteristics. In columns (1) and (3) of Table 1 we replicate the analysis in Awano et al. (2017) for our sample of single-site businesses as an initial point of comparison. We find a very similar picture to our previous results: an increase in employment of 10% associated with a management score that is 0.01 points higher, and we see no significant relationships between management score and any other characteristic.

When adding in region indicators we find little change in the estimates for size and other characteristics. These regional indicators use "London and South East" as the reference region. In column (2), estimating regional effects conditional on employment and industry, we find no regional results which are significant at the 5% level or below. However, both the North East and Yorkshire and The Humber have weakly significant (that is, significant at the 10% level) positive associations with management scores; for both regions, scores are higher by 0.08. However, given this low level of significance, we recommend caution in drawing conclusions from these results. The small sample may also make it difficult to pick up any other relationships which may be present, and the special characteristics of this sample may mean that results we observe here may not translate to the overall business population.

In column (4), with regional indicators added to the more detailed specification, we see similar regional results to column (2), with management scores in the North East higher by 0.07 and in Yorkshire and The Humber scores are 0.08 higher; however, we caution against drawing strong conclusions for the reasons outlined above.

Table 1: Regression analysis of management score, Great Britain 2015

	(1)	(2)	(3)	(4)
	Management score	Management score	Management score	Management score
Log(employment)	0.095*** (0.007)	0.095*** (0.007)	0.088*** (0.009)	0.086*** (0.010)
Family-owned and family-managed			-0.019 (0.028)	-0.024 (0.028)
Family-owned and non-family-managed			0.037 (0.022)	0.032 (0.026)
Multinational			0.013 (0.019)	0.015 (0.019)
UK multinational			0.006 (0.021)	0.008 (0.019)
Age (years)			-0.008 (0.009)	-0.010 (0.009)
Age squared			0.000 (0.000)	0.000 (0.000)
North East		0.075* (0.042)		0.073* (0.041)
North West		-0.006 (0.037)		-0.003 (0.036)
Yorkshire and The Humber		0.076* (0.042)		0.080* (0.043)
East Midlands		-0.033 (0.044)		-0.038 (0.046)
West Midlands		0.006 (0.036)		0.007 (0.036)
East of England		-0.010 (0.038)		-0.019 (0.035)
South West		0.020 (0.036)		0.024 (0.035)
Wales		-0.041 (0.043)		-0.041 (0.043)
Scotland		0.007 (0.039)		0.007 (0.039)
Industry group dummies	Yes	Yes	Yes	Yes
R ²	0.334	0.362	0.347	0.378
Observations	349	349	349	349

Notes:

1. All regressions use Ordinary Least Squares. Standard errors in parentheses are clustered by industry and employment size band, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
2. Regions used correspond to NUTS1 regions, except the reference region of "London and South East", which is the corresponding NUTS1 regions combined. The region "London and the South East" is the reference category for the region indicator variables.
3. A constant is included in all regressions.
4. The data used here are an unweighted subset of the original Great Britain sample, which is restricted to single-site manufacturing businesses with at least 10 employment. The results are therefore not representative of the population.

4 . Estimating relationships between productivity and business characteristics

Similarly to the previous section, we estimate relationships with labour productivity, presented in Table 2. We find that for our sample of single-site businesses, the unconditional relationship between management score and labour productivity is positive and significant, with a 0.1 higher management score associated with labour productivity which is 8.9% higher, as we also found in our previous estimates for the population of manufacturing businesses with employment of at least 10 in Great Britain. Column (2) shows the relationship between management score and labour productivity is very similar when introducing regional indicators, and that for our sample there is no significant regional variation. We see no individual region indicator is significant and when testing the joint significance of the regional indicators, we cannot reject the hypothesis that all indicators are equal to zero (the p-value for this test is 0.676).

When we control for business size and industry, the magnitude relationship between management score and productivity for single-site businesses is reduced, but still remains strongly significant. Again, when including regional indicators, we see no significant associations.

Finally we include our other observed business characteristics in columns (5) and (6). Before including the regional indicators, our sample of single-site businesses performs somewhat differently to our previous estimates for our population of interest (manufacturing businesses in Great Britain with employment of at least 10). The association between management score and productivity is slightly lower, with a 0.1 higher management score associated with a 5% higher level of labour productivity. Most notably we do not see a significant negative relationship between family ownership and productivity in this sample. We do however see a weakly significant relationship between multinational status and productivity, with multinational businesses reporting 15% higher productivity.

Once we include regional indicators in column (6) we see very little change in results relative to column (5), and again, no significant regional variation. However, as throughout this analysis, these results cannot be applied to the manufacturing industry as a whole. Estimates for this population require a larger sample designed for regional analysis.

Table 2: Regression analysis of productivity, Great Britain 2015

	(1)	(2)	(3)	(4)	(5)	(6)
	Log(Output per worker)	Log(Output per worker)	Log(Output per worker)	Log(Output per worker)	Log(Output per worker)	Log(Output per worker)
Management score	0.891*** (0.228)	0.871*** (0.215)	0.542*** (0.182)	0.556*** (0.170)	0.502*** (0.161)	0.503*** (0.149)
Log(employment)			0.056 (0.035)	0.052 (0.031)	0.013 (0.037)	0.011 (0.035)
Family-owned and family-managed					-0.109 (0.072)	-0.102 (0.070)
Family-owned and non-family-managed					-0.037 (0.091)	-0.065 (0.095)
Multinational					0.151* (0.082)	0.163* (0.081)
UK multinational					-0.084 (0.105)	-0.101 (0.109)
Age (years)					0.015 (0.041)	0.009 (0.041)
Age squared					0.000 (0.001)	0.000 (0.001)
North East		0.087 (0.178)		0.103 (0.185)		0.146 (0.185)
North West		-0.160 (0.106)		-0.099 (0.114)		-0.090 (0.115)
Yorkshire and The Humber		-0.176 (0.187)		-0.189 (0.187)		-0.149 (0.164)
East Midlands		-0.174 (0.111)		-0.101 (0.105)		-0.092 (0.119)
West Midlands		-0.021 (0.116)		-0.003 (0.106)		0.020 (0.101)
East of England		-0.042 (0.182)		-0.041 (0.175)		-0.032 (0.176)
South West		-0.105 (0.169)		-0.143 (0.163)		-0.150 (0.154)
Wales		0.021 (0.162)		-0.001 (0.166)		-0.029 (0.170)
Scotland		-0.104 (0.119)		-0.060 (0.118)		-0.060 (0.115)
Industry dummies	No	No	Yes	Yes	Yes	Yes

R ²	0.060	0.073	0.130	0.141	0.159	0.170
Observations	341	341	341	341	341	341

Source: Office for National Statistics

Notes:

1. All regressions use Ordinary Least Squares. Standard errors in parentheses are clustered by industry and employment size band, * p < 0.1, ** p < 0.05, *** p < 0.01.
2. Regions used correspond to NUTS1 regions, except the reference region of "London and South East", which is the corresponding NUTS1 regions combined. The region "London and the South East" is the reference category for the region indicator variables.
3. A constant is included in all regressions.
4. The data used here are an unweighted subset of the original Great Britain sample, which is restricted to single-site manufacturing businesses with at least 10 employment. The results are therefore not representative of the population.
5. Labour productivity is measured as output per worker (GVA/employment) in 2015 current prices.
6. The number of observations for each region is given in Table 3, in the annex of this article.

5 . Conclusion

The overall picture from this analysis is that there is no strong regional component to variation in management scores or labour productivity in our sample of single-site manufacturing businesses with employment of at least 10. As the data have not been weighted to represent the population, due to the reasons discussed, the results are not representative of the population at the regional level, even for single-site businesses, so this may not reflect true underlying differences. We continue to see strong positive associations between management score and labour productivity, with a 0.1 increase in management score associated with an unconditional increase in labour productivity of 8.9%, or a conditional increase of 5%. We intend that future data collection for the Management Practices Survey (MPS) will use a larger sample and will be designed to collect data at a regional level.

6 . References

Awano, G., Heffernan, A. and Robinson, H. 2017, "[Management practices and productivity among manufacturing businesses in Great Britain: Experimental estimates for 2015](#)", Office for National Statistics.

Evans, Peter and Richard Welpton, 2009, "Business Structure Database", Economic & Labour Market Review, 3 (6), pp. 71 to 75

7 . Links to related statistics

5 April 2017: [UK productivity introduction: Oct to Dec 2016](#) draws together the headlines of the productivity releases into a single release, providing additional analysis of our productivity statistics.

5 April 2017: [Labour productivity: Oct to Dec 2016](#) contains the latest estimates of labour productivity for the whole economy and a range of industries, together with estimates of unit labour costs.

5 April 2017: [International comparisons of UK productivity \(ICP\), final estimates: 2015](#) presents an international comparison of labour productivity across the G7 nations, in terms of growth in GDP per hour and GDP per worker.

5 April 2017: [Multi-factor productivity estimates: Experimental estimates to 2015](#) decomposes output growth into the contributions that can be accounted for by labour and capital inputs. The contribution of labour is further decomposed into quantity (hours worked) and quality dimensions.

5 April 2017: [Labour productivity measures from the Annual Business Survey, 2006 to 2015](#) presents an analysis of detailed productivity trends and distributions among businesses in the UK from 2006 to 2015, using firm-level data from the Annual Business Survey (ABS).

5 April 2017: [Quarterly public service productivity \(experimental statistics\): Oct to Dec 2016](#) presents experimental estimates for quarterly UK total public service productivity, inputs and output to provide a short-term, timely indicator of the future path of the annual productivity estimates.

5 April 2017: [Introducing quarterly regional labour input metrics](#) provides a first look at the new experimental quarterly regional labour input metrics. Hours and jobs for the NUTS1 regions.

5 April 2017: [Exploring labour productivity in rural and urban areas in Great Britain](#) investigates differences in rural and urban labour productivity in Great Britain using firm-level microdata analysis of the business economy.

5 April 2017: [An initial assessment of regional management practices](#) presents analysis of a small sample of single-site British manufacturing businesses from the Management Practice Survey pilot, and finds no evidence of regional variation in management practices.

6 January 2017: [Regional and sub-regional productivity in the UK: Jan 2017](#) provides statistics for several measures of labour productivity. Statistics are provided for the NUTS1, NUTS2 and NUTS3 subregions of the UK, and for selected UK city regions.

6 January 2017: [Regional firm-level productivity analysis for the non-financial business economy: Jan 2017](#) provides experimental analysis on the sources of regional differences in labour productivity in the non-financial business economy in Great Britain.

6 January 2017: [Volume index of UK capital services \(experimental\): estimates to 2015](#) provide estimates of the contribution of the capital stock to production in the economy, split by asset and industry.

6 January 2017: [Management practices and productivity for manufacturing businesses in Great Britain: experimental estimates for 2015](#) is a secondary paper analysing the relationship between management practices and productivity, following the release of initial results in October.

6 January 2017: [Public service productivity estimates: total public service, UK: 2014](#) presents updated measures of output, inputs and productivity for public services in the UK between 1997 and 2013, in addition to new estimates for 2014. Includes service area breakdown, as well as impact of quality adjustment and latest revisions.

6 January 2017: [Public service productivity estimates: healthcare, 2014](#) presents updated estimates of output, inputs and productivity for public service healthcare in the UK between 1995 and 2013, and new estimates for 2014.

6 October 2016: [Quality adjusted labour input: UK estimates to 2015](#) includes estimates of changes in the number of hours supplied in the UK economy adjusted for changes in the quality of the labour supply.

6 October 2016: [Measuring output in the Information Communication and Telecommunications industries: 2016](#) presents initial findings from a review of data sources and methods used in estimating output of the information communication and telecommunications industries, with a focus on the telecommunications industry.

8 . Annex

Table 3: Number of Management Practices Survey observations by region, Great Britain, 2015

Region	Number of observations
North East	16
North West	41
Yorkshire and The Humber	27
East Midlands	33
West Midlands	50
East of England	27
London and South East	45
South West	39
Wales	24
Scotland	39
Total	341

Source: Office for National Statistics

Notes

1. Observation counts correspond to number of observations used in the regressions in Table 2
2. All observations represent single-site manufacturing businesses with employment of at least 10.