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UK Management and Expectations Survey

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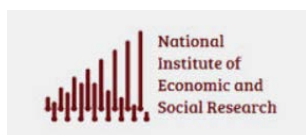
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An analysis of business expectations and uncertainty from the UK Management and Expectations Survey

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Abstract

In the current climate, it is difficult to over-state the importance of improving our understanding of the economic impact of uncertainty. While it is widely accepted that uncertainty depresses economic activity, there is scarce quantitative evidence, particularly at the firm-level, to examine this relationship. This paper exploits a new data source on business-level expectations – the Management and Expectations Survey conducted by the Office for National Statistics (ONS) in collaboration with the Economic Statistics Centre of Excellence (ESCoE) – to give insight into British firms' expectations and uncertainty concerning their turnover, expenditure, investment and employment growth for 2017 and 2018, as well as real UK GDP growth for 2018.

Our results suggest that firms' expectations of UK GDP growth for 2018 are more pessimistic, compared with recent trends and professional forecasters. We find that younger businesses and those with more structured management practices are more optimistic of their future turnover growth, while foreign-owned firms are more pessimistic than domestically-owned firms. We measure the uncertainty that businesses have around these expectations, and find that firms that are smaller, younger, domestically-owned, family-owned-and-family-managed and less productive display higher levels of uncertainty. We also identify a relationship between firms' micro- and macro-economic expectations: firms that are more optimistic of future GDP growth are also more optimistic of their own future performance, and firms that are more uncertain of future GDP growth are also more uncertain of their own future performance. We establish a relationship between firms' past experiences and their uncertainty for the future: firms that operate in industries with typically volatile growth are more uncertain of their future growth.

Keywords: Expectations, uncertainty, productivity, management practices

JEL classification: L2, M2

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1. Introduction

In the current climate, it is difficult to over-state the importance of improving our understanding of the economic impact of uncertainty. Following ‘surprise’ election results in the US and the UK and the resulting marked changes in long-standing economic and trade policy arrangements, it is widely accepted that the global outlook is more uncertain in recent years than in the period prior to the Great Recession. It is also widely accepted that uncertainty depresses economic activity: inducing households to hold back on spending (Romer, 1990), limiting labour mobility (Arellano et al., 2016), reducing and delaying corporate investment (Dixit and Pindyck, 1994) and inhibiting risk appetite. These forces are thought to slow economic growth and to impede resource reallocation across the economy, which in turn limits aggregate productivity growth (Bloom, 2009). However, with notable exceptions, there is little quantitative evidence which examines these effects.

This paper is the first of a sequence, which aims to quantify the dynamic effects of business expectations on employment, investment and productivity. To achieve this, we use a new British survey of business-level expectations – the Management and Expectations Survey (MES) –, conducted by the Office for National Statistics (ONS) in collaboration with the Economic Statistics Centre of Excellence (ESCoE), to provide new evidence on levels of corporate uncertainty. This new survey collected information on businesses’ expectations of turnover, expenditure, investment and employment growth in 2017 and 2018. For each of the four indicators, the MES asked respondents to report their 2018 forecasts using a 5-point bin, assigning a percentage likelihood to each bin. A distinct feature of this survey is that it also asked for business expectations of future UK GDP growth, enabling analyses of the link between micro- and macro-level expectations.

In this paper we introduce this new survey by addressing three questions on which data, at this scale, has never previously been available in the UK. Firstly, we examine business expectations about future GDP growth. We examine these forecasts against those of professional forecasters and analyse the factors that are associated with a measure of forecast ‘disagreement’ with the professionals. Secondly, we examine businesses’ expectations for their own performance, including their expectations for turnover, expenditure, investment and employment. These results offer quantitative insights into how the current economic and political climate – as well as longer-term factors – are affecting business sentiment. Finally, we examine how uncertain businesses are in their expectations, and how this uncertainty correlates with their characteristics.

Our results suggest that firms’ expectations of UK real GDP growth are more pessimistic on average and in their distribution than professional forecasters, or compared with recent trends. We find that younger businesses and those with more structured management practices are more optimistic of their future turnover growth, while foreign-owned firms are more pessimistic than domestically-owned firms. We measure the uncertainty that businesses have around these expectations and find that firms that are smaller, younger, less productive, domestically-owned¹ and family-owned-and-family-managed² display higher levels of uncertainty. We also identify a relationship between firms’ micro- and macro-economic expectations: firms that are more optimistic of future GDP growth are also more optimistic of their own future performance, and firms that are more uncertain of future GDP growth are more uncertain of their own future performance. We establish a relationship

¹ Compared with foreign-owned firms.

² Compared with non-family-owned firms.

between firms' past experiences and their uncertainty for the future: firms that operate in industries with typically volatile growth are more uncertain of their future growth.

The rest of this paper proceeds as follows. Section 2 offers a survey of the existing literature on the economic impact of uncertainty, highlighting the measures of uncertainty used by other studies which provide empirical evidence on this topic. Section 3 provides a summary of our data – including details of the MES – while sections 4 and 5 present our results and conclusions respectively.

2. Literature Review

With the aforementioned lack of direct quantitative data measuring uncertainty in the economy, a broad range of measures have been used in the literature, exploring uncertainty at both macro- and micro-level³. These include the volatility of the stock market, forecaster disagreement and even the mentioning of “uncertainty” in the news.

One robust finding in the literature is that cross-sectional measures of uncertainty rise in recessions. Bloom (2009) finds that a variety of cross-sectional dispersion measures like the standard deviation of firms' profit growth are correlated with time-series stock market volatility. Bloom, Floetotto, Jaimovich, Saporta-Eksten, and Terry (2018) show that the cross-sectional dispersion of establishment-level TFP shocks is countercyclical (see also Kehrig (2015) and Bloom (2014) for discussion on the cyclicity of uncertainty measures). Bachmann, Elstner, and Sims (2013) use disagreement amongst professional forecasters as a proxy for uncertainty and find that forecaster disagreement is higher in downturns. Baker, Bloom, and Davis (2016) develop a measure of economic policy uncertainty, which counts the frequency of articles mentioning the words “uncertain or uncertainty” and find this measure is also countercyclical.

Turning to micro-level uncertainty, one stylized fact that has emerged from the literature is the negative uncertainty-investment relationship. Leahy and Whited (1996) and Bloom, Bond, and Van Reenen (2007) use realized stock returns volatility as a measure of firm-level uncertainty and show a negative relationship between uncertainty and business investment. Stein and Stone (2013) use the option price to create a forward-looking measure of uncertainty and arrive at a similar conclusion on the uncertainty-investment relationship. By using the policy uncertainty index developed by Baker, Bloom, and Davis (2016), Gulen and Ion (2015) show that firm-level capital investment is negatively affected by uncertainty associated with future policies. Moreover, firm-level uncertainty appears to vary both in the cross-section and in the time-series. Bachmann, Elstner and Hristov (2017) and Senga (2018) find substantial cross-sectional heterogeneity and time-variation in measures of firm-idiosyncratic uncertainty using survey data. Senga (2018) also finds that smaller and younger firms face higher uncertainty.

Some of the literature tries to construct a more direct and subjective measure of business-level uncertainty. The previous measures discussed do not observe uncertainty in the minds of business managers, nor how they form expectations or forecast future outcomes. However, business surveys can directly collect information about managers' expectations. Guiso and Parigi (1999), Bontempi, Golinelli and Parigi (2010), and Morikawa (2013) all adopt this approach. Guiso and Parigi (1999) and

³ Macro-level uncertainty refers to uncertainty about the wider economy, while micro-level uncertainty refers to measures of firms' uncertainty regarding their future outcomes.

Bontempi, Golinelli and Parigi (2010) use 3-point probability distributions from the Bank of Italy's Survey of Investment in manufacturing (SIM), and they find a large negative relationship between uncertainty and investment. Morikawa (2013) uses 2-point distributions from his original survey conducted at the Research Institute of Economy, Trade and Industry (RIETI), and finds that uncertainty related to the tax system and trade policy matters for firms' capital investment and overseas activities.

Our paper takes a similar approach and is closely related to Bloom, Davis, Foster, Lucking, Ohlmacher and Saporta-Eksten (2017), who collect 5-point distributions of firms' expectations of future performance for more than 30,000 manufacturing plants in the U.S. Our survey has two new features. Firstly, in addition to firm-specific forecasts on key indicators – turnover, expenditure, investment and employment – our survey includes forecasts of real GDP growth made by businesses managers. This inclusion of a macro-level forecast by businesses managers allows us to separately examine micro- and macro-level uncertainty and their disparate effects on firm activities and performance. Secondly, we collected responses from both manufacturing and non-manufacturing businesses, covering a broadly representative sample of the non-financial business economy of Great Britain.

Comparable to our survey is the Bank of England's 'Decision Maker Panel' (DMP) – this survey captures similar 5-point distributions of UK firms' expectations. However, the DMP is designed to be a higher frequency survey (quarterly), with a smaller sample size (around 4000 businesses)⁴.

3. Data sources and methodology

This paper uses data from the Management and Expectations Survey (MES), a survey developed and conducted in 2017 by ONS (Office for National Statistics) in partnership with Economic Statistics Centre of Excellence (ESCoE). This was a voluntary postal survey of approximately 25,000 businesses with employment of 10 or more⁵, drawn from the 2016 Annual Business Survey⁶ (ABS) sample, covering both the production and services industries in Great Britain. The MES sample was drawn through random sampling, stratified by three employment size groups (10 to 49, 50 to 249 and 250 or more), industries in sections B to S⁷ and the 11 NUTS1 regions – composed of the nine regions in England, plus Wales and Scotland – of Great Britain⁸.

The MES collected information on three aspects of businesses' activities: (1) their use of structured management practices⁹; (2) the level of disaggregation of decision making among multi-site firms;

⁴ Details of the Bank of England's 'Decision Maker Panel' can be found in these articles: '[Tracking the views of British businesses: evidence from the Decision Maker Panel](#)' and '[Agent's summary of business conditions and results from the Decision Maker Panel - 2018 Q2](#)'.

⁵ Employment is defined as the total number of employees registered on the payroll and working proprietors.

⁶ Further details on the Annual Business Survey (ABS) can be found in the [ABS Quality and Methodology Information report](#) and the [ABS Technical Report](#).

⁷ Excluding section K – financial and insurance activities, and including manufacturing sub-sections CA to CM.

⁸ The MES survey covers businesses in Great Britain and is consistent with the scope of ONS's ABS as the Department for Finance and Personnel Northern Ireland (DFPNI) is responsible for conducting the ABS for businesses in Northern Ireland.

⁹ See ONS 2018, "Management practices and productivity in British production and services industries – initial results from the Management and Expectations Survey: 2016"

(3) current and future expectations of business performance¹⁰. This paper focuses on the latter section of the survey, aimed at gaining an insight into firms' expectations and uncertainty concerning four key indicators: turnover, expenditure, investment and employment.

Inspired by the Management and Organisational Practice Survey (MOPS)⁶, conducted by the US Census Bureau, respondents were asked to give their realised performance for 2016, as well as forecasts for 2017 and 2018. The 2017 forecast is a point estimate, while for 2018, firms were required to give estimates for 5 scenarios (lowest, low, medium, high, highest) and assign a percentage likelihood to each scenario. An additional question, not found in MOPS, attempts to gauge firms' expectations for real UK GDP growth in 2018, requiring firms to assign probabilities to a pre-determined range of possible growth rates¹¹.

To calculate expected growth and uncertainty for each of our four indicators, we imposed some minimum quality thresholds for our survey responses¹². These included:

- responses must be for a period of one whole year, plus or minus one month;
- responses must include a point estimate for 2016 and 2017;
- a minimum of two bins must be completed for the 2018 forecast;
- the outcomes given in these bins must be weakly ascending (from lowest to highest);
- the percentage likelihoods assigned to the outcomes must sum to within the range 90 to 110 (inclusive) – these were subsequently scaled to total 100.

In addition to the data provided directly by this survey, we also derive several variables of interest which are subject to analysis in this paper. Firstly, we estimated a firm's expected UK GDP growth rate as the weighted average of the pre-determined range of possible growth outcome, using the probabilities assigned to each outcome¹³. Secondly, we calculated business-level growth rates for turnover, intermediates, investment and employment. For 2016 to 2017 we used a firm's realised outcome for 2016 and their point estimate for 2017. For the 2017 to 2018 growth rates, we constructed a point estimate for 2018 as the weighted average of the five-bin responses and compared this to their 2017 estimate.

Thirdly, to examine business-level uncertainty about their growth forecast for 2018 – that is, the probability weight around their central case – we use the logarithm of the standard deviation of the variation across the five bins (see section 4.3 for details). This yields a measure of the variance of growth rates which is unit free, and which is therefore comparable across different businesses.

Alongside these firm-level responses on expectations, we use contextual data from the ABS. In particular, the paper analyses the relationships of business growth expectations and uncertainty with past industry growth and past industry volatility respectively. The measure of past industry

¹⁰ This section also asked business managers to provide a forecast of UK real GDP growth in 2018, as an exogenous source of business uncertainty.

¹¹ An example of the two types of questions can be found in Section 7.1 of the Annex, while the full set of questions can be found on the MES [questionnaire](#).

¹² Full details of the data cleaning procedure are outlined in Section 7.2 in the Annex.

¹³ Where the possible growth outcome was a range, the midpoint was used. For the outcomes “-4% or less” and “4% or more”, -5% and 5% were used respectively.

growth is the growth of each indicator from 2015 to 2016¹⁴ for each industry as recorded in previous waves of the ABS. The volatility measure is the logarithm of the standard deviation of past annual growth rates of the industry, between 2008 to 2016¹⁵. Where estimates of productivity are included, we use a measure of Gross Value Added per worker, also drawn from the ABS.

Finally, we also include a measure of structured management – management score – as a control in our regressions. This score is derived from the management practices section of the MES survey, as the average of 12 questions on a scale of 0 to 1, where a higher score indicates a higher prevalence of structured management practices within the firm¹⁶.

Further to the data cleaning discussed, this analysis involves some outlier treatment. A small number of firms, while meeting the minimum quality threshold described, provided responses that we deemed to be of poor quality – these have been excluded from the analysis. We also winsorise at the 1st and 99th percentiles of our measures of expected growth and uncertainty.

4. Results

This section provides our results for three separate questions:

1. **What are businesses' expectations about future GDP growth?** We examine these forecasts against those of professional forecasters and analyse the factors that are correlated with a measure of forecast 'disagreement'.
2. **What are businesses' expectations for their own performance?** These results offer quantitative insights into how the current economic and political climate – as well as longer-term factors – are affecting business sentiment.
3. **How uncertain are businesses in their expectations?** How does this uncertainty correlate with their characteristics?

4.1. GDP growth expectations

The Management and Expectations Survey (MES) asked respondents to assign percentage likelihoods to a range of real GDP growth outcomes between -4% and +4%. While these bins were symmetric, they included both ranges – greater than 4%, less than -4% – and point estimates – minus 1%, 0% and 1%, for instance. We begin by exploring these macro-forecasts, before analysing whether firm's sentiment about their performance influences their outlook on the economy and vice-versa.

In Figure 1 we present two measures of the average probability assigned to each of the GDP growth scenarios. The first measure shows the mean probability assigned to each bin for all businesses – with each business assigned equal weight – while the second measure weights the probabilities by turnover, to amplify the sentiment of large firms who typically account for a large share of output.

¹⁴ A three-year growth average, over the period 2013 to 2017, was also examined, and finds no difference to the results presented in this paper.

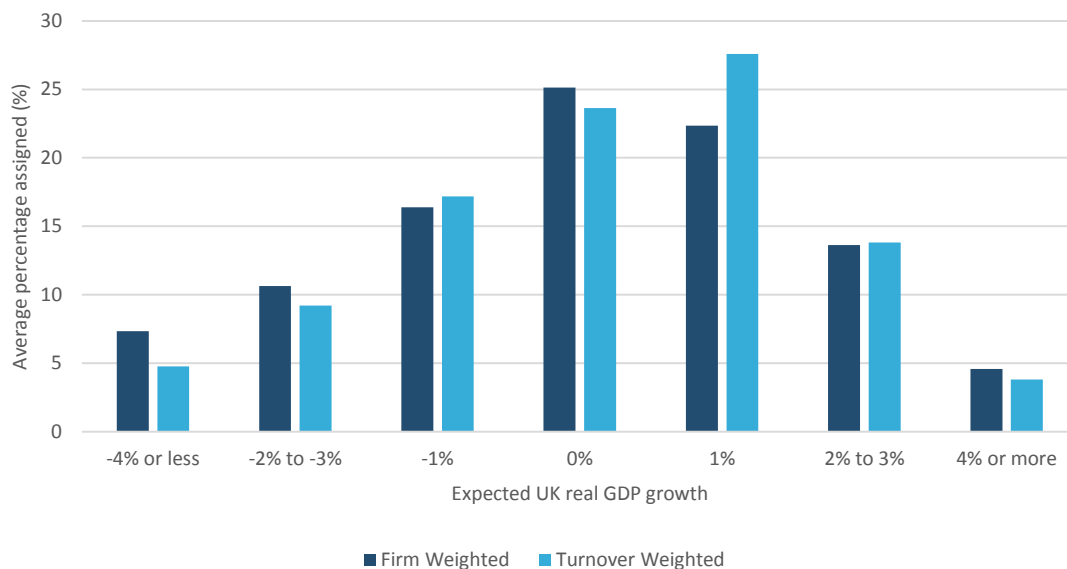
¹⁵ Past industry growth and volatility are calculated at the 2-digit SIC level.

¹⁶ See ONS 2018 for a detailed discussion, "[Management practices and productivity in British production and services industries – initial results from the Management and Expectations Survey: 2016](#)"

Using the first measure, we observe that the highest average probability was assigned to a 0% growth rate (25% likelihood on average), followed by 1% and -1% growth respectively. These expectations are notably lower than the post-downturn average annual real GDP growth of around 2%¹⁷. While pessimistic, the distribution is also dispersed: for instance, the average probability weight on GDP growth of -4% or less was around 7%. This expectation is also out of step with historic norms: excluding the year following the Great Recession, a fall of this magnitude has not occurred in the official records since the end of the Second World War. Although the probabilities assigned to the tails are relatively small, they either indicate a genuine belief that GDP growth is likely to differ considerably from recent trends, or they may be indicative of a lack of awareness of the wider economy among some firms.

Weighting the same data by turnover, the results suggest that some of this mass in the tails is accounted for by relatively small businesses. The turnover-weighted distribution is shifted slightly rightwards, with notable falls in the average probability accruing to very negative outcomes. The highest average probability shifts from 0% to 1% growth, and we observe a decline in the probabilities assigned to the tails, especially the left-hand tail. This suggests larger firms, in terms of turnover, have higher expectations of future UK GDP growth.

Figure 1: Average probabilities assigned to UK real GDP growth rates for 2018



Source: ONS and authors' calculations

Notes:

1. Our population of interest covers businesses in production and services industries with employment of at least 10, in Great Britain.
2. The MES sample excludes firms in section A (Agriculture, forestry and fishing), and section K (Financial and insurance activities).
3. Firm Weighted refers to the use of the sample frequency weights. Turnover weighted uses the sample frequency weights and firms' reported turnover for 2016 from the Annual Business Survey (ABS).
4. Average percentage assigned refers to the average percentage likelihood assigned, across all firms, to each bin.

¹⁷ The data for annual GDP growth rates are available on the ONS [website](#), and the post down-turn period covers the years 2010 to 2017

Using conditional analysis, we can analyse firms' expectations of future GDP growth in more detail, observing the firm characteristics associated with higher expectations. Table 1 reports the coefficients from regressions of business-level expected GDP growth on firm-level characteristics. These results reinforce our finding that larger firms have higher expectations of GDP growth. We also find that firms with more structured management practices expect higher levels of growth. While it appears that larger firms and firms with more structured management practices are more optimistic, this outcome may also reflect that these firms are more informed and aware of their wider economic environment, bringing their expectations closer to the actual GDP growth trend.

Table 1: Regression analysis of firms' expectations of UK real GDP growth for 2018

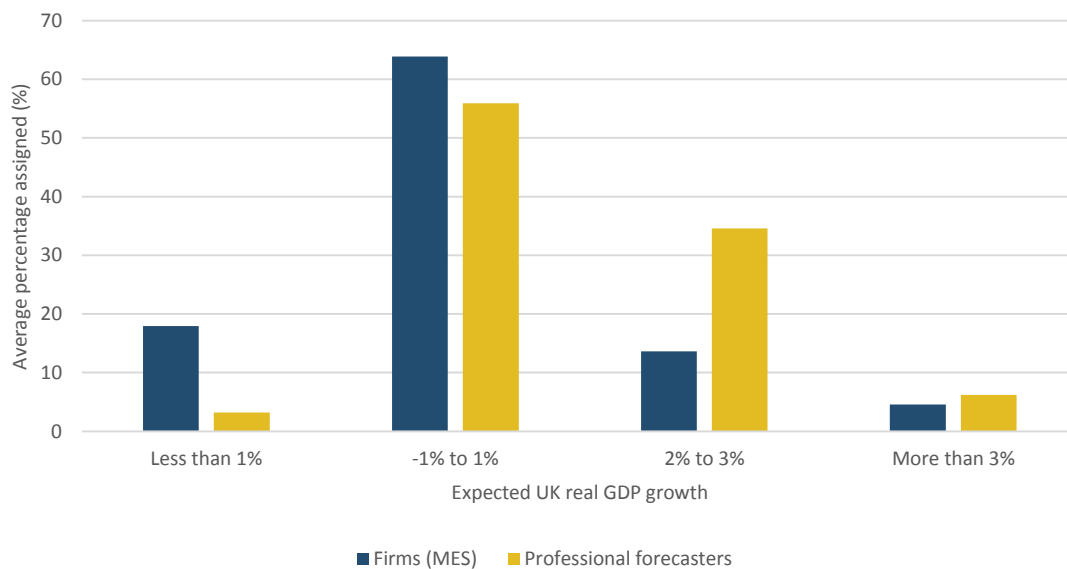
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Expected UK real GDP growth, 2018						
Log Employment	0.078 ^{***} (0.03)						0.068 ^{**} (0.03)
Management Score		0.531 ^{***} (0.17)					0.494 ^{**} (0.23)
Age			-0.009 ^{**} (0.00)				-0.007 (0.00)
Foreign-owned				0.139 [*] (0.08)			0.054 (0.09)
Family-owned and non-family-managed					0.024 (0.11)		0.023 (0.11)
Family-owned and family-managed					-0.011 (0.08)		0.073 (0.09)
Log GVA/Worker						-0.060 (0.06)	-0.078 (0.07)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Location Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7424	7155	7424	7424	7387	7044	6755
R^2	0.044	0.052	0.044	0.042	0.042	0.044	0.060

Notes:

1. Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors were used.
2. Where we have indicated the inclusion of industry dummies, these are at the two-digit (division) level, based on the 2007 Standard Industrial Classification. A constant is also included in all regressions.
3. Our population of interest covers businesses in production and services industries with employment of at least 10, in Great Britain.
4. The MES sample excludes firms in section A (Agriculture, forestry and fishing), and section K (Financial and insurance activities).
5. Results are weighted to reflect the population of firms.

While the accuracy of firms' GDP growth expectations for 2018 cannot be analysed yet, we can compare firms' expectations with those of professional forecasters. For this comparison, we use data from the Bank of England's Survey of External Forecasters¹⁸. This survey, similarly to the Management and Expectations Survey (MES), asks external forecasters to assign probabilities to ranges of possible GDP growth rates between -1% and 3% or more. For comparability, we collapse the growth bins on both the MES and Bank of England survey such that they align. Both sources show the highest concentration of expected GDP growth to be between -1% and 1% (Figure 2). However, we observe a leftward shifted distribution among firms, indicating a more pessimistic outlook than professional forecasters¹⁹. This pessimism is marked at the left-hand tail, where professional forecasters on average assigned only a 3% likelihood of GDP growth being less than -1%, compared to an average likelihood of 18% for firms.

Figure 2: Comparing average probabilities assigned to UK real GDP growth rates for 2018, by firms on the MES with professional forecasters



Source: ONS, Bank of England and authors' calculations

Notes:

1. Our population of interest covers businesses in production and services industries with employment of at least 10, in Great Britain.
2. The MES sample excludes firms in section A (Agriculture, forestry and fishing), and section K (Financial and insurance activities).
3. Results are weighted to reflect the population of firms.
4. We adjusted the bins from the MES and the Bank of England surveys to align to the presentation above.

¹⁸ We use data from 'Other forecasters' expectations: November 2017', which provides forecasters' expectation of annual UK GDP growth to 2018 Q4 – this data was collected at a similar time to MES and the forecasts are for a similar period. Details found on the Bank of England [Inflation Report](#).

¹⁹ The level of forecast disagreement between the MES and the Survey of External forecasters may not be unrelated to differences in the industry coverage of the two surveys. The MES for instance excludes firms in financial services industries.

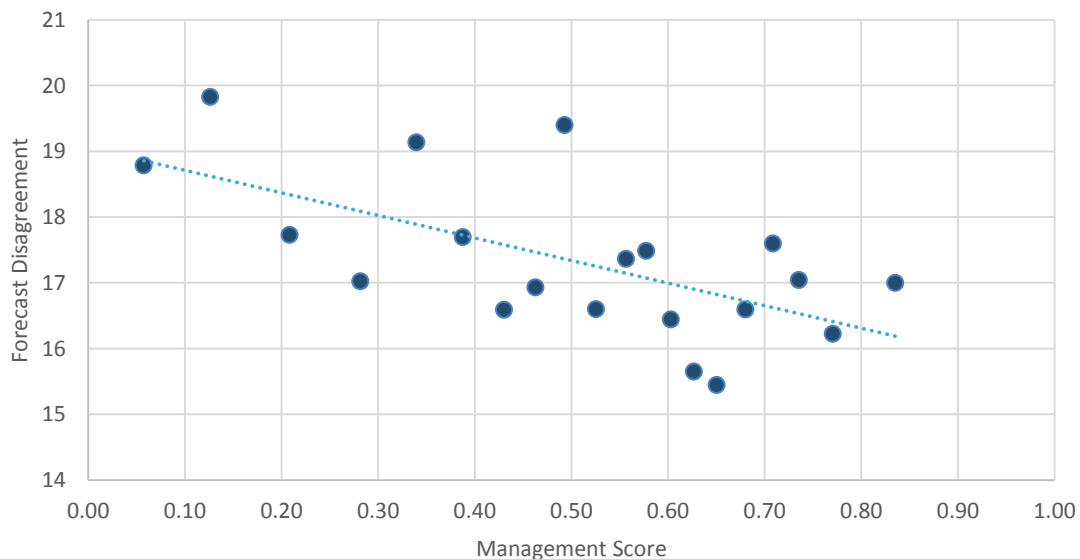
To better understand why businesses are more pessimistic than GDP forecasters, we introduce information about these firms to our analysis. Specifically, we construct a measure of forecast disagreement between each business and the Bank of England’s professional forecasters survey, taking the absolute difference between the weight assigned to each GDP outcome by the business and the professional forecasters, averaged across the four GDP growth bins.

$$Forecaster\ Disagreement = \frac{\sum_i |Firm\ Likelihood_i - Forecaster\ Likelihood_i|}{4}$$

Where i gives the relevant range of growth rates: ‘Less than 1%’, ‘-1% to 1%’, ‘2% to 3%’ and ‘More than 3%’.

If a business weighed the likelihood of GDP growth outcomes the same as the average of professional forecasters, our measure of forecast ‘disagreement’ is very low; if a business places very different weights on the four GDP growth outcome ranges, then our measure of forecast disagreement is quite high.

Figure 3: Binned scatter plot of firms’ management score and GDP forecast disagreement



Source: ONS, Bank of England and authors’ calculations

Notes:

1. Our population of interest covers businesses in production and services industries with employment of at least 10, in Great Britain.
2. The MES sample excludes firms in section A (Agriculture, forestry and fishing), and section K (Financial and insurance activities)
3. Results are weighted to reflect the population of firms.
4. The industries represented in the MES sample and those represented by the sample of professional forecasters may not be directly comparable

We begin by plotting the average measure of forecast disagreement for businesses with different levels of management practices score²⁰ (Figure 3) to explore the relationship between structured management and our measure of forecast disagreement. In this chart, we show the mean forecast disagreement (vertical axis) for businesses grouped by management score (horizontal axis), rising from low management score on the left to high management score on the right. It shows a clear association between management score and forecast disagreement, suggesting some link between these business characteristics.

Table 2: Regression analysis of firms' GDP forecast disagreement

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	GDP forecast disagreement						
Log Employment	-0.781 ^{***} (0.18)						-0.631 ^{***} (0.20)
Management Score		-4.010 ^{***} (1.07)					-3.451 ^{**} (1.39)
Age			0.027 (0.03)				0.022 (0.03)
Foreign-owned				-0.519 (0.53)			0.309 (0.68)
Family-owned and non-family-managed					0.617 (0.74)		0.429 (0.75)
Family-owned and family-managed					0.113 (0.50)		-0.244 (0.53)
Log GVA/Worker						0.195 (0.34)	0.410 (0.38)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Location Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7424	7155	7424	7424	7387	7044	6755
R ²	0.046	0.051	0.040	0.040	0.041	0.042	0.058

Notes:

1. Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors were used.
2. Where we have indicated the inclusion of industry dummies, these are at the two-digit (division) level, based on the 2007 Standard Industrial Classification. A constant is also included in all regressions.
3. Our population of interest covers businesses in production and services industries with employment of at least 10, in Great Britain.
4. The MES sample excludes firms in section A (Agriculture, forestry and fishing), and section K (Financial and insurance activities)
5. Results are weighted to reflect the population of firms.
6. The industries represented in the MES sample and those represented by the sample of professional forecasters may not be directly comparable

²⁰ Each firm's management score is derived as an average of 12 questions on the Management and Expectations Survey, aimed at measuring the level of structured management practices on activities relating to having a culture of continuous improvement, monitoring of key performance indicators, target setting and incentives as well as employment related practices. See [ONS \(2018\)](#) for the initial results of the management practices section of the survey.

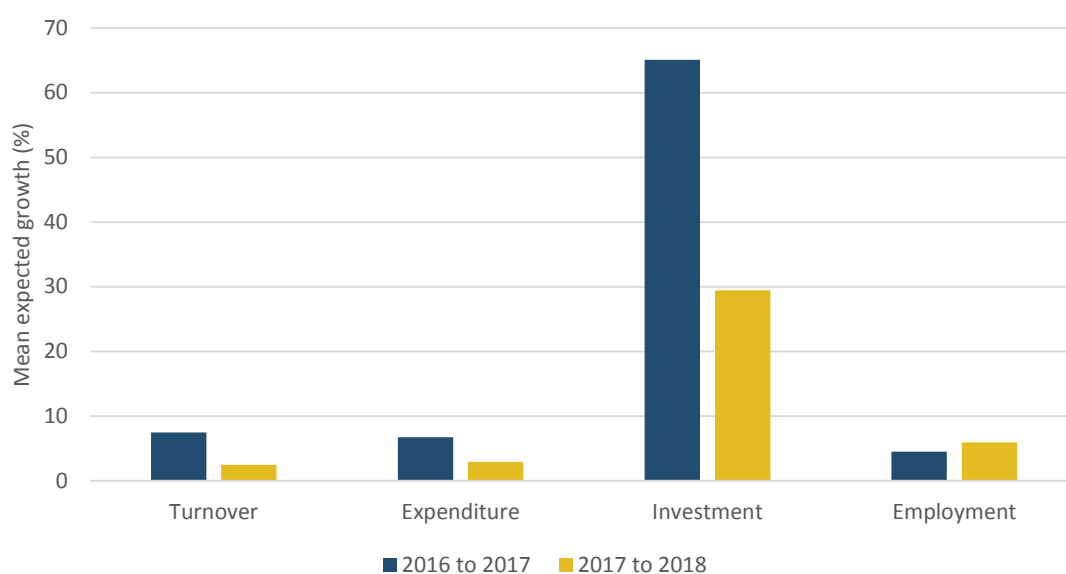
To explore the determinants of these variations in more detail, we regress firms' GDP forecast disagreement on various firm characteristics (Table 2). We find that firm size has a significant association with forecast disagreement, with firms that are larger in terms of employment having lower forecast disagreement on average. We also find that the GDP expectations of firms with a higher management score are more aligned with the professional forecasters, controlling for age, foreign ownership, family ownership, GVA per worker and including industry and location fixed effects. We find no significant relationship between labour productivity (GVA per worker) and GDP forecast disagreement, nor is there any evidence here that foreign-owned businesses disagree with professional forecasters to a different extent than domestic businesses.

4.2. Firm-level business expectations

The Management and Expectations Survey (MES) also collected firm's expectations of their own growth concerning four key indicators – turnover, expenditure, investment and employment – for the periods 2016 to 2017 and 2017 to 2018²¹. These data enable us to examine a business's expectations for their own growth over this period. Expected growth in the earlier period reflects the difference between the 2016 outturn and the expected 2017 value, while growth between 2017 and 2018 reflects the difference between the expected 2017 value and the probability weighted 'bin' outcome for 2018.

The expectation of growth varies greatly by both the indicator and time period (Figure 4). The firm-weighted mean expected growth rates of turnover, expenditure and employment are lower than the expected growth rates of investment in both periods. This is likely to reflect the inherent 'lumpiness' of investment and the impact of some businesses planning to increase investment from a relatively low base (Doms and Dunne, 1998). These data also suggest that the growth of turnover, expenditure and investment is expected to be much lower in 2017 to 2018 than in 2016 to 2017. However, employment growth is expected to be slightly higher in the latter period.

Figure 4: Mean expected growth of key indicators for 2016 to 2017 and 2017 to 2018



Source: ONS and authors' calculations

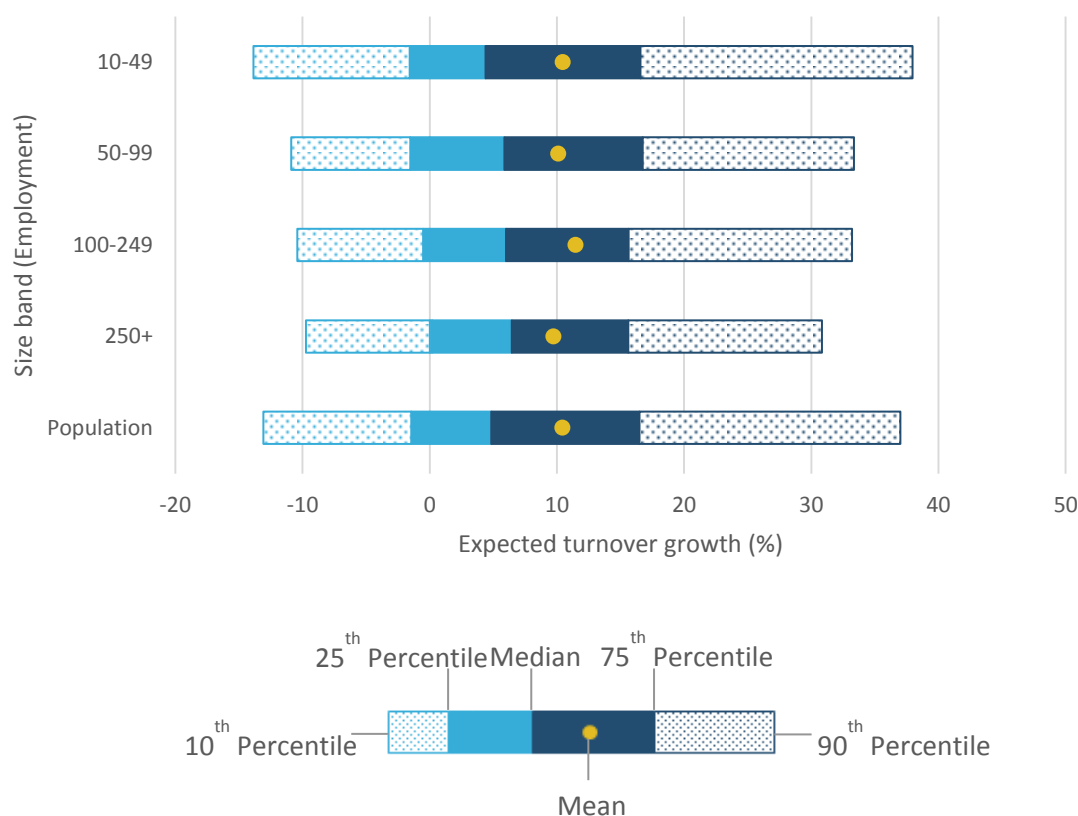
Notes:

1. Our population of interest covers businesses in production and services industries with employment of at least 10, in Great Britain.
2. The MES sample excludes firms in section A (Agriculture, forestry and fishing), and section K (Financial and insurance activities)
3. Results are weighted to reflect the population of firms.

²¹ The MES questionnaire was despatched in July 2017, meaning that businesses did not know their full outcomes for the year 2017.

While mean expectations vary by time and by measure, there is also considerable variation in expected growth across firms. Expected turnover growth is particularly widely distributed across the survey population: at the 10th percentile, firms are expecting turnover growth of less than -10% between 2016 and 2018, while at the 90th percentile, expected growth exceeds 35% (Figure 5). This distribution varies by firm size: large firms have more concentrated growth expectations, likely reflecting the difficulty of achieving extreme growth rates from an already high base.

Figure 5: Distribution of expected turnover growth (2016 to 2018), by size band



Source: ONS and authors' calculations

Notes:

1. Our population of interest covers businesses in production and services industries with employment of at least 10, in Great Britain.
2. The MES sample excludes firms in section A (Agriculture, forestry and fishing), and section K (Financial and insurance activities)
3. Results are weighted to reflect the population of firms.

Using conditional analysis, we identify the characteristics of firms that are related to higher expected growth of turnover (Table 3)²². Firms that are younger expect turnover growth to be higher, as do those with a higher management score. By contrast, after controlling for size, management and age,

²² Regression analyses of expected growth of expenditure, investment and employment can be found in Section 7.3 in the Annex.

this analysis suggests that foreign-owned firms are more pessimistic: expecting turnover growth to be around 4 percentage points lower than domestically-owned businesses.

Table 3: Regression analysis of firms' expected turnover growth, 2016 to 2018

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Expected turnover growth 2016-2018						
Log Employment	-0.360 (0.57)						-0.976 (0.66)
Management Score		16.338*** (3.36)					14.626*** (3.68)
Age			-0.647*** (0.10)				-0.565*** (0.10)
Foreign-owned				-1.477 (1.88)			-3.813** (1.89)
Family-owned and non-family-managed					-2.745 (2.56)		-4.594** (2.14)
Family-owned and family-managed					-0.645 (1.61)		-0.981 (1.83)
Log GVA/Worker						0.445 (1.06)	0.655 (1.04)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Location Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7170	6926	7170	7170	7141	6826	6567
R ²	0.051	0.062	0.075	0.051	0.052	0.055	0.088

Notes:

1. Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors were used.
2. Where we have indicated the inclusion of industry dummies, these are at the two-digit (division) level, based on the 2007 Standard Industrial Classification. A constant is also included in all regressions.
3. Our population of interest covers businesses in production and services industries with employment of at least 10, in Great Britain.
4. The MES sample excludes firms in section A (Agriculture, forestry and fishing), and section K (Financial and insurance activities)
5. Results are weighted to reflect the population of firms.

4.3. Measuring firm-level uncertainty

Thirdly, we use the data from the Management and Expectations Survey (MES) to assess the levels of uncertainty within businesses about their outlook. Using the 5-bin format of the expectations question for 2018 forecasts, we derived a subjective uncertainty measure for each key indicator as the log standard deviation of the variation across the bins.

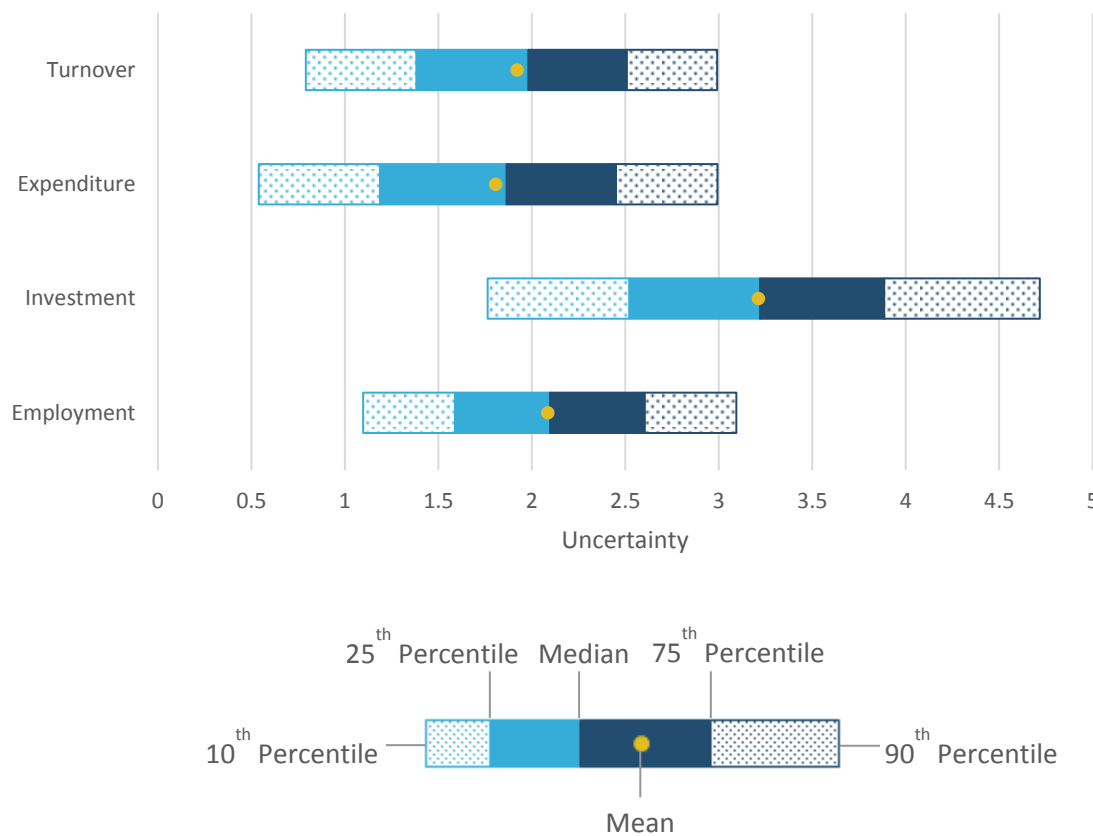
$$Uncertainty = \ln \left(\sqrt{\sum_i (Growth_i - Growth_{wavg})^2 * Likelihood_i} \right)$$

Where *i* reflects the five scenarios on the questionnaire form: lowest, low, medium, high and highest. 'wavg' is the weighted average of the 5-bin 2018 forecast. 'Growth' refers to the growth rate of these variables with respect to the 2016 realised figure. 'Likelihood' is the probability assigned to the scenario.

Businesses which provided data indicating a wide spread of likely outcomes consequently have a higher level of forecast uncertainty than businesses who had more confidence in a narrower range of outcomes. The uncertainty measure is therefore an indication of the level of confidence firms have in relation to their 2018 forecasts.

Figure 6 shows the distribution of this uncertainty measure across firms, for each indicator. The uncertainty of investment forecasts is higher than the uncertainty of turnover, expenditure and employment forecasts at all points in the distribution, while firms appear most certain about their future expenditure growth.

Figure 6: Distribution of the growth uncertainty of key indicators, 2016 to 2018



Source: ONS and authors' calculations

Notes:

1. Our population of interest covers businesses in production and services industries with employment of at least 10, in Great Britain.
2. The MES sample excludes firms in section A (Agriculture, forestry and fishing), and section K (Financial and insurance activities)
3. Results are weighted to reflect the population of firms.
4. Uncertainty relates to firms' expected growth between 2016 and 2018.

In Figure 7, we examine the level of uncertainty associated with the average growth rates of our four indicators for the period 2016 to 2018, by industry. Across all indicators, there is generally a positive correlation – industries that have higher average expected growth are also more uncertain. There are some industries, however, that do not follow this trend. Firms in industry D (*Electricity, Gas, Steam, Air Conditioning Supply*) have relatively positive growth expectations, while also having a high degree of certainty of this future growth. Firms in Industry F (*Construction*), on the other hand, are consistently uncertain across the indicators, while not expecting particularly high levels of growth, compared to the other industries. Firms in Industry B (*Mining and Quarrying*) are expecting a fall in turnover and employment and very low growth in expenditure, on average – they are fairly uncertain of this growth. These descriptive statistics correspond well with our understanding of these industries – apparently reflecting business conditions in each industry.

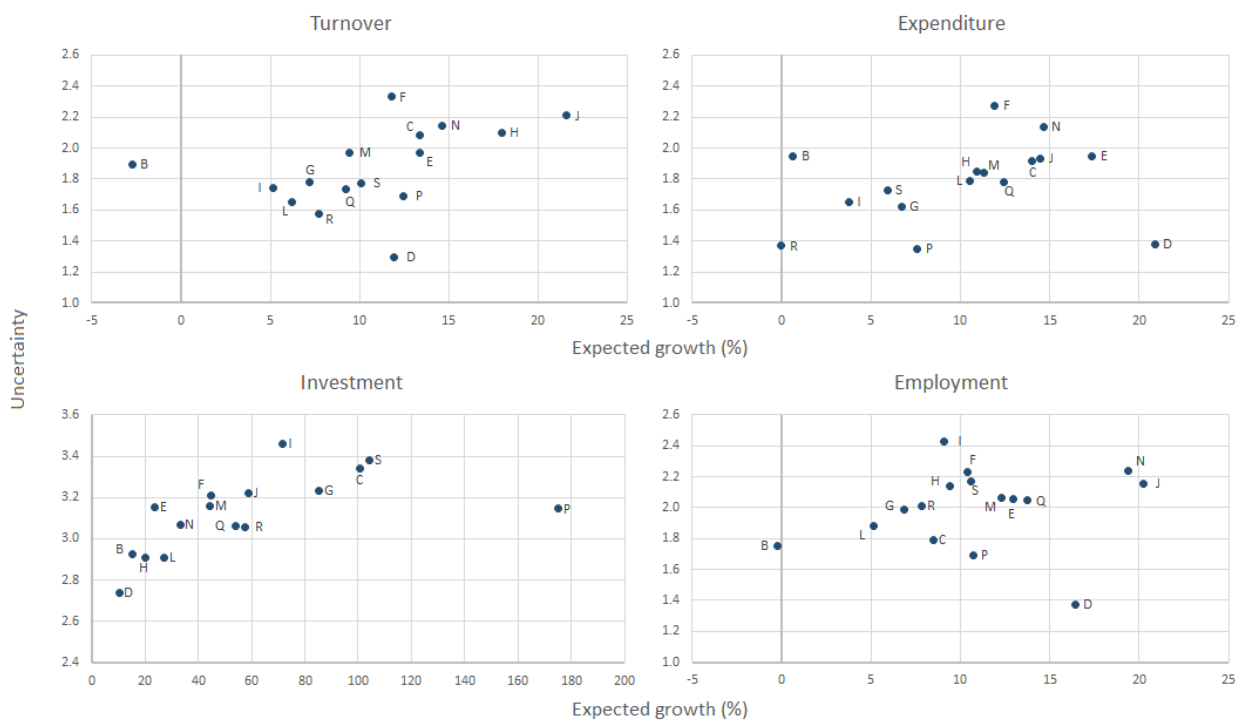


Figure 7: Expected growth and uncertainty of key indicators, by industry, 2016 to 2018

Source: ONS and authors' calculations

Notes:

1. Our population of interest covers businesses in production and services industries with employment of at least 10, in Great Britain.
2. The MES sample excludes firms in section A (Agriculture, forestry and fishing), and section K (Financial and insurance activities)
3. Results are weighted to reflect the population of firms.
4. Uncertainty relates to firms' expected growth between 2016 and 2018.
5. Key:

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

As with expected growth, we can use conditional analysis to identify the firm characteristics that are most strongly related to firms' uncertainty of turnover growth (Table 4)²³. Smaller firms, in terms of employment, are more uncertain of future growth – possibly because larger firms have more resources devoted to accurately predicting and modelling future business outcomes and are likely to be more resilient to external shocks. Younger firms are also more uncertain regarding future turnover growth. This may display the role of past experience when forming expectations (Trieb and Tumlinson, 2013), but it is also possible that there is a wider range of potential outcomes in the early years of a firm, with growth becoming steadier, and therefore more predictable, with age. We find a negative relationship between uncertainty and productivity – firms with lower productivity tend to also be more uncertain of their future growth.

Table 4: Regression analysis of firms' uncertainty of turnover growth, 2016 to 2018

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Uncertainty of turnover growth						
Log Employment	-0.164 ^{***} (0.02)						-0.135 ^{***} (0.02)
Management Score		-0.040 (0.12)					0.207 (0.13)
Age			-0.024 ^{***} (0.00)				-0.020 ^{***} (0.00)
Foreign-owned				-0.279 ^{***} (0.06)			-0.105 [*] (0.06)
Family-owned and non-family-managed					0.060 (0.08)		-0.033 (0.07)
Family-owned and family-managed					0.196 ^{***} (0.05)		0.106 [*] (0.06)
Log GVA/Worker						-0.086 ^{***} (0.03)	-0.064 ^{**} (0.03)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Location Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7170	6926	7170	7170	7141	6826	6567
R ²	0.137	0.109	0.147	0.114	0.119	0.117	0.174

Notes:

1. Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors were used.
2. Where we have indicated the inclusion of industry dummies, these are at the two-digit (division) level, based on the 2007 Standard Industrial Classification. A constant is also included in all regressions.
3. Our population of interest covers businesses in production and services industries with employment of at least 10, in Great Britain.
4. The MES sample excludes firms in section A (Agriculture, forestry and fishing), and section K (Financial and insurance activities)
5. Results are weighted to reflect the population of firms.
6. Uncertainty relates to firms' expected growth between 2016 and 2018.

²³ Regression analyses of uncertainty of expenditure, investment and employment can be found in Section 7.3 in the Annex.

4.4. Past industry experience and expectations

We cannot observe firms' performance from year to year due to a large proportion of the Annual Business Survey (ABS) sample being rotated annually. Instead, we can use data from the ABS to construct industry level growth rates from 2008 to 2016²⁴. Using industry growth from 2015 to 2016²⁵ as a proxy for each firm's growth in the previous year, the relationship between past experience and expectations of the future can be analysed. For all four indicators, we find no relationship between past industry growth and managers' expectation of future growth.

Table 5: Regression analysis of firms' expected growth for 2016 to 2018, on past industry growth from 2015 to 2016

	Expected Turnover Growth 2016-2018	Expected Expenditure Growth 2016-2018	Expected Investment Growth 2016-2018	Expected Employment Growth 2016-2018
Industry Turnover Growth 2015-2016	-0.017 (0.07)			
Industry Expenditure Growth 2015-2016		-0.047 (0.07)		
Industry Investment Growth 2015-2016			-0.042 (0.03)	
Industry Employment Growth 2015-2016				-0.033 (0.16)
Observations	6535	6448	5574	6271
R ²	0.046	0.053	0.008	0.081
Controls: Log Employment, Age, Family Ownership, Foreign Ownership, Management Score, Log GVA, Location				

Notes:

1. Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors were used.
2. Where we have indicated the inclusion of industry dummies, these are at the two-digit (division) level, based on the 2007 Standard Industrial Classification. A constant is also included in all regressions.
3. Our population of interest covers businesses in production and services industries with employment of at least 10, in Great Britain.
4. The MES sample excludes firms in section A (Agriculture, forestry and fishing), and section K (Financial and insurance activities)
5. Results are weighted to reflect the population of firms.

Similarly, we can analyse the relationship between firm's uncertainty and the volatility of the industry they are navigating. Industry growth volatility is defined as the logarithm of the standard deviation of past annual growth rates of the industry, from 2008 to 2016 – derived from the ABS. With the exception of investment, firms in industries with volatile growth in the past form more uncertain expectations of future outcomes.

²⁴ Past industry experience is measured at the two-digit SIC level

²⁵ A three-year growth average, over the period 2013 to 2017, was also examined, and finds no difference to the results presented in this paper.

Table 6: Regression analysis of firms' uncertainty, on past volatility of industry growth

		(1)	(2)	(3)	(4)
		Turnover Uncertainty	Expenditure Uncertainty	Investment Uncertainty	Employment Uncertainty
Industry Volatility	Turnover	0.205 ^{***} (0.04)			
Industry Volatility	Expenditure		0.240 ^{***} (0.05)		
Industry Volatility	Investment			0.042 (0.05)	
Industry Volatility	Employment				0.086 ^{***} (0.02)
Observations		6535	6448	5574	6271
R^2		0.091	0.072	0.035	0.265
Controls: Log Employment, Age, Family Ownership, Foreign Ownership, Management Score, Log GVA, Location					

Notes:

1. Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors were used.
2. Where we have indicated the inclusion of industry dummies, these are at the two-digit (division) level, based on the 2007 Standard Industrial Classification. A constant is also included in all regressions.
3. Our population of interest covers businesses in production and services industries with employment of at least 10, in Great Britain.
4. The MES sample excludes firms in section A (Agriculture, forestry and fishing), and section K (Financial and insurance activities)
5. Results are weighted to reflect the population of firms.
6. Past volatility is the logarithm of the standard deviation of past industry growths, from 2008 to 2016
7. Uncertainty relates to firms' expected growth between 2016 and 2018.

4.5. Expectations of GDP and the firm

Finally, we examine the link between firms' expectations of their own performance and their macro-economic expectations. The results of this analysis suggest a strong link between business-level expectations and those for the wider economy. Table 7 shows that, with the exception of investment, firms that are expecting higher UK GDP growth are also more optimistic of their own subjective expected growth. Table 8 shows how the same relationship holds when analysing businesses' uncertainty: those that are more uncertain of UK GDP growth are also more uncertain of their own subjective growth.

Table 7: Regression analysis of firms' expected growth of indicators, and expectations of UK real GDP growth for 2018

	(1)	(2)	(3)	(4)
	Expected Turnover Growth 2016-2018	Expected Expenditure Growth 2016-2018	Expected Investment Growth 2016-2018	Expected Employment Growth 2016-2018
Expected UK Real GDP Growth 2018	2.028 ^{***} (0.51)	1.103 [*] (0.59)	0.083 (4.37)	1.109 [*] (0.64)
Observations	6345	6281	5452	6110
R ²	0.097	0.088	0.034	0.110
Controls: Log Employment, Age, Family Ownership, Foreign Ownership, Management Score, Log GVA, Industry, Location				

Notes:

1. Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors were used.
2. Where we have indicated the inclusion of industry dummies, these are at the two-digit (division) level, based on the 2007 Standard Industrial Classification. A constant is also included in all regressions.
3. Our population of interest covers businesses in production and services industries with employment of at least 10, in Great Britain.
4. The MES sample excludes firms in section A (Agriculture, forestry and fishing), and section K (Financial and insurance activities)
5. Results are weighted to reflect the population of firms.

Table 8: Regression analysis of firms' uncertainty surrounding indicators and of UK real GDP growth for 2018

	(1)	(2)	(3)	(4)
	Uncertainty of Turnover Growth	Uncertainty of Expenditure Growth	Uncertainty of Investment Growth	Uncertainty of Employment Growth
Uncertainty of UK Real GDP Growth	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
Controls: Log Employment, Age, Family Ownership, Foreign Ownership, Management Score, Log GVA, Industry, Location				

Notes:

1. Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors were used.
2. Where we have indicated the inclusion of industry dummies, these are at the two-digit (division) level, based on the 2007 Standard Industrial Classification. A constant is also included in all regressions.
3. Our population of interest covers businesses in production and services industries with employment of at least 10, in Great Britain.
4. The MES sample excludes firms in section A (Agriculture, forestry and fishing), and section K (Financial and insurance activities)
5. Results are weighted to reflect the population of firms.
6. Uncertainty relates to firms' expected growth between 2016 and 2018.

5. Conclusions

It is widely accepted that uncertainty depresses economic activity: inducing households to hold back on spending, limiting labour mobility and reducing and delaying corporate investment. These forces are thought to slow economic growth and to impede resource allocation across the economy, which in turn limits aggregate productivity growth. However, with notable exceptions, there are few studies which quantify the size of these effects. Nor is there a wealth of evidence on how business expectations and uncertainty vary across businesses, which may have important implications for their aggregate effect.

This paper uses new data from the Management and Expectations Survey, conducted by the Economic Statistics Centre of Excellence in collaboration with the Office for National Statistics, to provide the first evidence on these questions. This new survey collected quantitative data on businesses' expectations of turnover, expenditure, investment and employment growth in 2017 and 2018, as well as their expectations of aggregate GDP growth for 2018. In the first of a sequence of papers using these data, we introduce this new source and present measures of uncertainty and expected growth at the business level.

Our analysis is focussed on three main questions. Firstly, we examine business expectations about future GDP growth. We examine these forecasts against those of professional forecasters and analyse the factors that are associated with a measure of forecast 'disagreement' with professionals. Secondly, we examine businesses' expectations for their own performance, including their expectations for turnover, expenditure, investment and employment. These results offer quantitative insights into how the current economic and political climate – as well as longer-term factors – are affecting business sentiment. Finally, we examine how uncertain businesses are in their expectations, and how this uncertainty correlates with their characteristics.

Our results suggest that firms' expectations of UK GDP growth differ markedly from recent trends and professional forecasters' outlook. Businesses are more pessimistic – both on average and in the distribution of their expectations. Smaller firms and those with less structured management practices account for some of this disparity. Our analysis also suggests that younger business and those with more structured management practices are more optimistic about their own performance, expecting higher rates of turnover growth. Compared to domestic firms, foreign-owned firms are more pessimistic, expecting turnover growth to be around 4 percentage points lower on average than equivalent domestic businesses.

Our analysis of business uncertainty suggests that expectations of investment are more uncertain than expectations of employment, turnover and expenditure growth. We also find that smaller and younger firms display higher levels of uncertainty on average, and that businesses with lower levels of productivity tend to be more uncertain of their future performance as well. Finally, we find a relationship between firm's micro- and macro-economic expectations. Firms that are more optimistic of future GDP growth are also more optimistic of their own future performance, and firms that are more uncertain of future GDP growth are also more uncertain of their own future performance.

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7. Annex

7.1. Questionnaire Examples

Example question regarding businesses' realised and expected levels of turnover. The question format shown here is also used for expenditure, investment and employment.

22. 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.

Please refer to **Example A** on Page 9 if needed, which explains how this question should be completed.

For 2016 calendar year..... £ , , , 1086

Forecast for 2017 calendar year..... £ , , , 1087

23. 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?

Please refer to **Example B** on Page 9 if needed, which explains how this question should be completed.

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"/> <input type="text"/> , <input type="text"/> <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> <input type="text"/> 1088	<input type="text"/> <input type="text"/> <input type="text"/> % 1089
LOW	£ <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> <input type="text"/> 1090	<input type="text"/> <input type="text"/> <input type="text"/> % 1091
MEDIUM	£ <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> <input type="text"/> 1092	<input type="text"/> <input type="text"/> <input type="text"/> % 1093
HIGH	£ <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> <input type="text"/> 1094	<input type="text"/> <input type="text"/> <input type="text"/> % 1095
HIGHEST	£ <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> <input type="text"/> 1096	<input type="text"/> <input type="text"/> <input type="text"/> % 1097
	Total	<input type="text"/> <input type="text"/> <input type="text"/> %

Example question regarding businesses' expectations for UK real GDP growth.

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"/> <input type="text"/> <input type="text"/> %	1138
Moderate decline	-2% to -3%	<input type="text"/> <input type="text"/> <input type="text"/> %	1139
Slight decline	-1%	<input type="text"/> <input type="text"/> <input type="text"/> %	1140
No change	0%	<input type="text"/> <input type="text"/> <input type="text"/> %	1141
Slight increase	1%	<input type="text"/> <input type="text"/> <input type="text"/> %	1142
Moderate increase	2% to 3%	<input type="text"/> <input type="text"/> <input type="text"/> %	1143
Strong increase	4% or more	<input type="text"/> <input type="text"/> <input type="text"/> %	1144
Total		<input type="text"/> <input type="text"/> <input type="text"/> %	

7.2. Data Cleaning

Editing and Imputation

1. Reporting period imputed as the requested reporting period, if missing.
2. Multiplied/divided outcomes by 1000 if response had not acknowledged the 000s given on the form.
3. Response gave “1, 2, 3, 4, 5” as outcomes for 5-bin forecast for 2018, while 2016 and 2017 point estimates suggest this was simply numbering the bins.
4. Missing percentage likelihoods imputed as zero.
5. Outcomes associated with zero percentage likelihood imputed as missing.
6. Percentage likelihoods associated with a missing outcome imputed as zero.
7. Percentages likelihoods that summed to between 90 and 110 were rescaled to sum to 100.
8. Responses that were not weakly ascending (from lowest to highest) were reordered to be weakly ascending.

Response quality threshold

1. Responses must be for a period of one whole year, plus or minus one month;
2. Responses must include a point estimate for 2016 and 2017;
3. A minimum of two bins must be completed for the 2018 forecast;
4. The outcomes given in these bins must be weakly ascending (from lowest to highest);
5. The percentage likelihoods assigned to the outcomes must sum to within the range 90 to 110 (inclusive) – these were subsequently scaled to total 100.

7.3. Further Results

7.3.1. Regression Analyses of Firms' Expectations

Table 9: Regression analysis of firms' expected expenditure growth, 2016 to 2018

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Expected Expenditure Growth 2016-2018						
Log Employment	-0.009 (0.60)						-0.884 (0.72)
Management Score		14.944 ^{***} (3.09)					9.878 ^{***} (3.73)
Age			-0.600 ^{***} (0.11)				-0.543 ^{***} (0.10)
Foreign-owned				0.615 (2.24)			-3.446 (2.26)
Family-owned and non-family-managed					-0.334 (4.07)		-1.663 (3.62)
Family-owned and family-managed					-1.224 (1.73)		-1.883 (1.74)
Log GVA/Worker						2.537 ^{***} (0.83)	2.736 ^{***} (0.82)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Location Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7070	6834	7070	7070	7043	6728	6479
R^2	0.059	0.069	0.081	0.059	0.059	0.062	0.088

Notes:

1. Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors were used.
2. Where we have indicated the inclusion of industry dummies, these are at the two-digit (division) level, based on the 2007 Standard Industrial Classification. A constant is also included in all regressions.
3. Our population of interest covers businesses in production and services industries with employment of at least 10, in Great Britain.
4. The MES sample excludes firms in section A (Agriculture, forestry and fishing), and section K (Financial and insurance activities)
5. Results are weighted to reflect the population of firms.

Table 10: Regression analysis of firms' expected investment growth, 2016 to 2018

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Expected Investment Growth 2016-2018						
Log Employment	-7.439 (5.79)						-4.494 (6.98)
Management Score		-57.677 (49.70)					-19.134 (39.40)
Age			-0.079 (0.89)				-0.512 (0.75)
Foreign-owned				2.930 (24.06)			-2.243 (27.58)
Family-owned and non-family-managed					-11.366 (34.39)		-14.540 (36.98)
Family-owned and family-managed					-11.235 (15.34)		-15.918 (17.19)
Log GVA/Worker						-0.277 (10.89)	-0.117 (9.88)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Location Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6072	5905	6072	6072	6047	5785	5601
R^2	0.029	0.031	0.028	0.028	0.031	0.030	0.035

Notes:

1. Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors were used.
2. Where we have indicated the inclusion of industry dummies, these are at the two-digit (division) level, based on the 2007 Standard Industrial Classification. A constant is also included in all regressions.
3. Our population of interest covers businesses in production and services industries with employment of at least 10, in Great Britain.
4. The MES sample excludes firms in section A (Agriculture, forestry and fishing), and section K (Financial and insurance activities)
5. Results are weighted to reflect the population of firms.

Table 11: Regression analysis of firms' expected employment growth, 2016 to 2018

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Expected Employment Growth 2016-2018						
Log Employment	-2.188 ^{***} (0.73)						-1.563 ^{**} (0.64)
Management Score		15.697 ^{***} (3.62)					16.874 ^{***} (3.89)
Age			-0.908 ^{***} (0.12)				-0.788 ^{***} (0.12)
Foreign-owned				-5.606 ^{***} (1.40)			-4.068 ^{**} (1.74)
Family-owned and non-family-managed					5.403 (3.98)		0.245 (2.98)
Family-owned and family-managed					4.480 ^{***} (1.73)		3.500 [*] (1.84)
Log GVA/Worker						1.131 (1.20)	0.559 (1.13)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Location Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6849	6647	6849	6849	6821	6521	6302
R ²	0.068	0.050	0.115	0.065	0.068	0.068	0.109

Notes:

1. Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors were used.
2. Where we have indicated the inclusion of industry dummies, these are at the two-digit (division) level, based on the 2007 Standard Industrial Classification. A constant is also included in all regressions.
3. Our population of interest covers businesses in production and services industries with employment of at least 10, in Great Britain.
4. The MES sample excludes firms in section A (Agriculture, forestry and fishing), and section K (Financial and insurance activities)
5. Results are weighted to reflect the population of firms.

7.3.2. Regression Analyses of Firms' Uncertainty

Table 12: Regression analysis of firms' uncertainty of expenditure growth, 2016 to 2018

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Uncertainty of Expenditure Growth						
Log Employment	-0.134 ^{***} (0.02)						-0.115 ^{***} (0.02)
Management Score		-0.049 (0.13)					0.112 (0.14)
Age			-0.022 ^{***} (0.00)				-0.019 ^{***} (0.00)
Foreign-owned				-0.205 ^{***} (0.07)			-0.087 (0.08)
Family-owned and non-family-managed					0.174 [*] (0.09)		0.077 (0.09)
Family-owned and family-managed					0.180 ^{***} (0.06)		0.107 [*] (0.06)
Log GVA/Worker						-0.040 (0.03)	-0.020 (0.03)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Location Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7070	6834	7070	7070	7043	6728	6479
R ²	0.111	0.096	0.122	0.096	0.100	0.096	0.138

Notes:

1. Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors were used.
2. Where we have indicated the inclusion of industry dummies, these are at the two-digit (division) level, based on the 2007 Standard Industrial Classification. A constant is also included in all regressions.
3. Our population of interest covers businesses in production and services industries with employment of at least 10, in Great Britain.
4. The MES sample excludes firms in section A (Agriculture, forestry and fishing), and section K (Financial and insurance activities)
5. Results are weighted to reflect the population of firms.
6. Uncertainty relates to firms' expected growth between 2016 and 2018.

Table 13: Regression analysis of firms' uncertainty of investment growth, 2016 to 2018

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Uncertainty of Investment Growth						
Log Employment	-0.203 ^{***} (0.03)						-0.191 ^{***} (0.03)
Management Score		-0.266 (0.17)					0.217 (0.19)
Age			-0.013 ^{***} (0.00)				-0.007 (0.00)
Foreign-owned				-0.446 ^{***} (0.11)			-0.206 [*] (0.11)
Family-owned and non-family-managed					-0.059 (0.11)		-0.182 (0.11)
Family-owned and family-managed					0.087 (0.08)		-0.071 (0.08)
Log GVA/Worker						-0.117 ^{***} (0.04)	-0.115 ^{***} (0.04)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Location Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6072	5905	6072	6072	6047	5785	5601
R ²	0.068	0.042	0.051	0.051	0.048	0.052	0.072

Notes:

1. Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors were used.
2. Where we have indicated the inclusion of industry dummies, these are at the two-digit (division) level, based on the 2007 Standard Industrial Classification. A constant is also included in all regressions.
3. Our population of interest covers businesses in production and services industries with employment of at least 10, in Great Britain.
4. The MES sample excludes firms in section A (Agriculture, forestry and fishing), and section K (Financial and insurance activities)
5. Results are weighted to reflect the population of firms.

Table 14: Regression analysis of firms' uncertainty of employment growth, 2016 to 2018

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Uncertainty of Employment Growth							
Log Employment	-0.318 ^{***} (0.01)						-0.262 ^{***} (0.02)
Management Score		-0.640 ^{***} (0.09)					-0.095 (0.09)
Age			-0.027 ^{***} (0.00)				-0.021 ^{***} (0.00)
Foreign-owned				-0.518 ^{***} (0.05)			-0.092 [*] (0.05)
Family-owned and non-family-managed					0.284 ^{***} (0.07)		0.113 [*] (0.06)
Family-owned and family-managed					0.272 ^{***} (0.04)		0.109 ^{***} (0.04)
Log GVA/Worker						-0.152 ^{***} (0.02)	-0.114 ^{***} (0.02)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Location Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6849	6647	6849	6849	6821	6521	6302
R^2	0.246	0.121	0.176	0.130	0.135	0.143	0.298

Notes:

1. Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors were used.
2. Where we have indicated the inclusion of industry dummies, these are at the two-digit (division) level, based on the 2007 Standard Industrial Classification. A constant is also included in all regressions.
3. Our population of interest covers businesses in production and services industries with employment of at least 10, in Great Britain.
4. The MES sample excludes firms in section A (Agriculture, forestry and fishing), and section K (Financial and insurance activities)
5. Results are weighted to reflect the population of firms.

7.3.3. Correlation Coefficients of Expectations and Uncertainty of Indicators

Table 15: Correlation coefficients of expected growth of key indicators, 2016 to 2018

Observations: 5399		(1)			
		Expected Turnover Growth 2016-2018	Expected Expenditure Growth 2016-2018	Expected Investment Growth 2016-2018	Expected Employment Growth 2016-2018
Expected Turnover Growth 2016-2018	Turnover	1			
Expected Expenditure Growth 2016-2018	Expenditure	0.681***	1		
Expected Investment Growth 2016-2018	Investment	0.0336	0.0241	1	
Expected Employment Growth 2016-2018	Employment	0.505***	0.446***	0.0546	1

Notes:

1. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
2. Our population of interest covers businesses in production and services industries with employment of at least 10, in Great Britain.
3. The MES sample excludes firms in section A (Agriculture, forestry and fishing), and section K (Financial and insurance activities)
4. Results are weighted to reflect the population of firms.

Table 16: Correlation coefficients of uncertainty of key indicators

Observations: 5397		Uncertainty of Turnover Growth	Uncertainty of Expenditure Growth	Uncertainty of Investment Growth	Uncertainty of Employment Growth
Uncertainty of Turnover Growth	of	1			
Uncertainty of Expenditure Growth	of	0.698***	1		
Uncertainty of Investment Growth	of	0.142***	0.175***	1	
Uncertainty of Employment Growth	of	0.463***	0.426***	0.243***	1

Notes:

1. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
2. Our population of interest covers businesses in production and services industries with employment of at least 10, in Great Britain.
3. The MES sample excludes firms in section A (Agriculture, forestry and fishing), and section K (Financial and insurance activities)
4. Results are weighted to reflect the population of firms.
5. Uncertainty relates to firms' expected growth between 2016 and 2018.