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**Expectation Formation and Firm Activities:
New evidence from a business outlook survey in Japan***

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Abstract

This paper uses the Japanese Business Outlook Survey to examine the role of expectations in shaping business investment and hiring plans. We combine qualitative assessments of both macro- and micro-level business conditions and information of firm-level outcomes such as sales and investment. We then document five new facts concerning firm expectations. First, forecasts made earlier are less precise and more optimistic. Second, forecasted sales are less volatile than realized sales adjusted based on realized sales in the past. Third, volatility of firms' sales growth and variance of their forecast errors co-move over the business cycles. Fourth, firms' forecasts of micro- and macro-level business conditions are positively correlated with their investment and hiring plans. Firms' assessments about micro-level business conditions have larger impacts on their investment and hiring plans than their assessments about macro-level business conditions, and these results are more pervasive among smaller firms. Finally, firms' investment and hiring plans are positively correlated with past sales growth. In particular, if such sales growth is higher than the forecast, firms adjust their investment and hiring plans upward. These results suggest both an extrapolative and forward-looking structure of business outlook and plans.

Keywords: Business expectations, Investment and hiring plans, Business surveys

JEL classification: D84, E22

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1 Introduction

Expectations are virtually everywhere in modern economic models of investment and hiring. Despite the importance of expectations for firm activities, empirical research on the role of expectations in shaping investment and hiring is scarce.¹ Due to the lack of direct expectations data, little is known about expectation formation and its impacts on firm behavior.²

We study the cross-sectional and time series properties of business-level expectations using a large business survey. The survey is run by the Japanese Ministry of Finance and the Cabinet Office over the sample of around 16,000 businesses on a quarterly basis. We combine firms' qualitative assessments of micro- and macro-level business conditions and quantitative information like sales and investment. We build a panel of businesses in both manufacturing and service sectors over the period from 2004 to 2016. Our major findings are as follows.

First, forecasts made earlier are less precise and more optimistic than those made later. Second, forecasted sales are less volatile than realized sales overtime and adjusted based on realized past sales, which suggests the existence of belief updating and firm learning. Third, volatility of firms' sales growth and variance of their forecast errors (FEs) co-move over the business cycles except for the period after the financial crisis, which hints the increasing uncertainty of Japanese economy after the financial crisis. Fourth, firms' assessments of micro- and macro-level business conditions are positively correlated with their investment and hiring plans. Firms' assessments about micro-level business conditions has stronger impacts on their investment and hiring plans than their assessments about macro-level business conditions. These results are more pervasive among smaller firms, indicating the information frictions they face are probably more severe than bigger firms. Finally, firms' investment and hiring plans are positively correlated with past sales growth. Moreover, if such sales growth is higher than what each firm forecasted in the preceding period, their investment and hiring plans become larger. These results suggests both extrapolative and forward-looking structure of business outlook and plans.

Our paper is related to Tanaka et al. (2018) with a shared interest in better understanding the relationship between firms' forecasting ability and performance. On the use of qualitative business surveys, Bachmann and Elstner (2015) use the German ifo Business Survey and examine the patterns and features of expectations at the business level. For Japan, Morikawa (2016a), a quarterly business survey conducted by the Bank of Japan, to show that manufacturing and small companies tend to face higher uncertainty. Using the same data as this study, Morikawa

¹ There are some earlier studies that use density forecasts of businesses and investigate the impact of subjective uncertainty on investment. See Guiso and Parigi (1999) and Bontempi et al. (2010) for Italian data and Morikawa (2016c) for Japanese data.

² In light of this, the recent literature is moving forward by collecting direct business-level density forecast data as in Bloom et al. (2017).

(2018) find that firms who responded “unsure” about their business conditions are likely to decrease their investments in next quarters. Bachmann et al. (2013) include more discussion and references to previous studies that tried to measure business expectations. This study contributes to the literature in three ways: (1) we use a quarterly panel data and construct both qualitative and quantitative measures of firm-level uncertainty (forecast errors) and find both of them affect firm investment and hiring plans, (2) both the macro- and micro-level business conditions affect firm activities while the impact of micro-level business conditions is larger, (3) we show evidence that firms rely on past experience (sales growth), current judgment of business conditions, and expectations to make investment and hiring plans.

The remainder of the paper is organized as follows. Section 2 describes the data and construction of forecast errors and document some basic facts. Sections presents the empirical specifications and results of panel data analysis. Section 5 concludes.

2 Data and Facts

2.1 Data Description

The data we use are called Business Outlook Survey (BOS) implemented by the Ministry of Finance and the Cabinet Office of Japan every quarter. The survey covers all big firms (i.e., firms with registered capital more than 2 billion JPY) and a representative sample of medium-sized and small firms.³ In addition, the survey includes both manufacturing firms and non-manufacturing firms. The frequency of the data is quarterly, and we have obtained the data from 2004/Q2 to 2017/Q1 (52 quarters and 26 semi-years in total). Strictly speaking, the raw dataset we have obtained from the Ministry is a repeated cross-sectional dataset, as medium-sized and small firms are sampled randomly. However, as large firms (registered capital more than 2 billion JPY) are sampled with the probability of 100% and medium-sized firms (registered capital between 0.5 billion JPY and 2 billion JPY) are sampled with the probability of 50%, we manage to link most large and medium-sized firms overtime in our dataset.

The unique feature of this dataset is that it asks the firm to report both realized and forecasted (i.e., projected) sales, operating profits, and three types of investment (equipment, land and software). See Survey Form in Figure 6 in Appendix. The frequency of reporting realized and forecasted sales and operating profits is semi-year,⁴ while the frequency of reporting realized

³For firms with registered capital between 0.5 billion JPY and 2 billion JPY, 50% of them are randomly sampled every quarter. For firms with registered capital between 0.1 billion JPY and 0.5 billion JPY, 10% of them are randomly sampled every quarter. For firms with registered capital less than 0.1 billion JPY, roughly 1% of them are randomly sampled every quarter.

⁴For instance, a firm in 2011/Q2 is asked to report realized sales for the second half of 2010 fiscal year

and forecasted investment is quarterly.⁵ In addition to providing quantitative forecasts for sales, operating profits and investment, the firm also reports the diffusion index for a set of variables such as domestic demand, foreign demand, inventory level, input price, output price etc.⁶ As quantitative forecasts provide much more information for the calculation of forecast errors than the qualitative forecasts (i.e., diffusion indices), we focus on the forecasts of sales, operating profits and investment in what follows. Finally, in order to use various forecasts at the same frequency level, we calculate various variables which include forecast errors all at the semi-year frequency level.

In order to measure how well the firm forecasts its own sales, we define the forecast error (FE) of sales using the log deviation of the realized sales from the projected sales made several quarters in advance. Specifically, FE of sales in semi-year t caused by the forecast made k quarters prior to the end of semi-year t is defined as:

$$FE_{i,t}^k(\text{sales}) \equiv \log(\text{sales}_{i,t}) - \log\left(E_{i,t}^k(\text{sales})\right),$$

where $\text{sales}_{i,t}$ is firm i 's realized sales in semi-year t , and $E_{i,t}^k(\text{sales})$ is firm i 's projected sales made k quarters in advance. For instance, if t refers to the first half of 2011 fiscal year (i.e., 2011/Q2-Q3) and $k = 2$, $FE_{i,2011-1st}^2(\text{sales})$ means the forecast is made in the beginning of 2011/Q2. For future use, we define $FE_{i,t}^1(\text{sales})$, $FE_{i,t}^2(\text{sales})$ and $FE_{i,t}^3(\text{sales})$ as the short-run, medium-run and long-run FE of sales. Similarly, we can define FE of operating profits and investment in the same way as above (i.e., $FE_{i,t}^k(\text{profits})$ and $FE_{i,t}^k(\text{invest})$). Intuitively, a negative value of sales FE implies that the firm over-forecasts its sales and vice versa. Naturally, we are interested in investigating how the first-order (i.e., mean) and second-order (i.e., standard deviation) moments of the forecasts and FEs have evolved over the business cycles such as the financial crisis. Finally, as FEs calculated using above methods contain extreme values, we trim top and bottom one percent observations of various FEs.

In addition to quantitative measure of FEs, we also use the qualitative information on firms' judgment on macro- and micro-level business conditions to construct alternative FEs, i.e., judgment errors. The BOS data asks respondent firms' outlook for both their own business conditions (micro) and the overall domestic business conditions (macro). The answer choices include "im-

(i.e., 2010/Q4-2011/Q1) and forecasted sales for both the first half and the second half of 2011 fiscal year (i.e., 2011/Q2-2011/Q3 and 2011/Q4-2012/Q1).

⁵For instance, a firm in 2011/Q2 is asked to report realized investment in 2011/Q1 and forecasted investment in 2011/Q2 and 2011/Q3. Moreover, in the first three quarters of each year, the firm is asked to report its forecasted investment in the next semi-year. For instance, a firm in 2011/Q2 will report its investment plan for 2011/Q4-2012/Q1.

⁶For instance, the firm reports whether its domestic demand will increase in the current quarter (and in the next quarter) compared to the previous quarter.

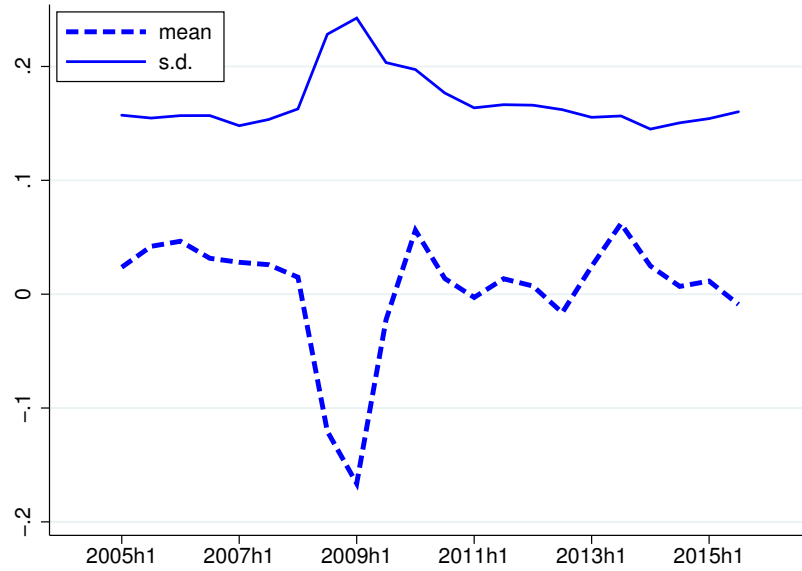
provement”, “no changes”, “deterioration”, and “unsure”. See Survey Form in Figure 6 in Appendix. Following Bachmann et al. (2013) and Morikawa (2018), we define numerical judgment errors as follows. When a firm’s realized judgment is consistent with the previous survey’s forecast, “0” is assigned to the firm. If the realized judgment improves (deteriorates) by one unit compared with the forecast, “+0.5” (“-0.5”) is assigned. Similarly, if the realized judgment improves (deteriorates) by two units compared with the forecast, the judgment errors are “+1” (“-1”). Furthermore, in practice, for each judgement variable, we assign “1” to “improvement”, “0” to “no changes” and “-1” to “deterioration”, respectively. We expect firms with response “improvement” are likely to have positive business plans. In our panel data analysis, we use both these judgment errors and judgment itself on macro- and micro-level business conditions.

2.2 Stylized Facts

We group our stylized facts into three categories. First, Figure 1 plots average growth in log sales (i.e., growth rate of sales) and the standard deviation of log sales growth for firms in our sample. Very strongly, the cross-sectional mean of sales growth rates is shown to be pro-cyclical, while the cross-sectional variation of sales growth rates is shown to be counter-cyclical. On average, firms in our sample had achieved an average growth rate of 0.4% from 2004-2016, and the correlation coefficient between the cross-sectional standard deviation of sales growth and its (arithmetic) mean is 0.81. Moreover, the drop in average growth rate of sales (from 2% in 2008/Q2-Q3 to -16% in 2009/Q2-Q3) and the increase in the standard deviation of sales growth (from 0.16 in 2008/Q2-Q3 to 0.25 in 2009/Q2-Q3) are extremely large in the midst of the financial crisis in the case of Japan. These findings suggest that firm-level volatility did increase in the recent financial crisis and are consistent with findings from recent literature on uncertainty shocks (Bloom (2009); Fajgelbaum et al. (2017); Bachmann et al. (2013); Bachmann and Bayer (2014)).

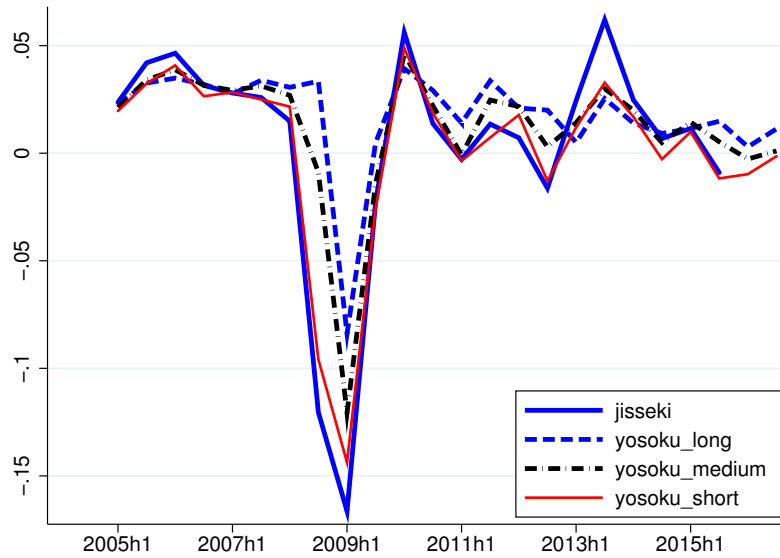
Next, we focus on the evolution of firm-level forecasts and emphasize two key findings. First, Figure 2 shows that average *realized* sales growth is more volatile than average *forecasted* sales growth. And, this is especially true for long-run average forecasts. Moreover, the positive correlation between forecasted sales growth and realized sales growth becomes strong, when the forecasts are made nearer (i.e., *yosoku_{short}* versus *yosoku_{long}*). These evidence together hints that there is gradual adjustment of firms’ belief (about their future sales) which takes into account realized sales. Moreover, this is consistent with the learning story in which firms use their past sales to form expectations. Next, we find that forecasts made earlier are less accurate but less volatile than forecasts made nearer in Table 1. Specifically, average forecasts for sales growth are higher and less volatile for forecasts made three quarters in advance than

Figure 1: Sales growth



Note: 2005h1 means the first semi-year of 2005 fiscal year (i.e., 2005/Q2-Q3).

Figure 2: Sales growth forecasts versus realizations



Note: 2005h1 means the first semi-year of 2005 fiscal year (i.e., 2005/Q2-Q3). *jisseki* refers to average realized sales growth rates, *yosoku* refers to average forecasted sales growth rates. *short*, *medium* and *long* are defined in the subsection of data description.

those made one or two quarters in advance. In addition, the standard deviation of FEs is smaller when forecasts made nearer (i.e., $yosoku_{short}$ versus $yosoku_{long}$). Again, these evidence suggests the existence of firm-level learning.

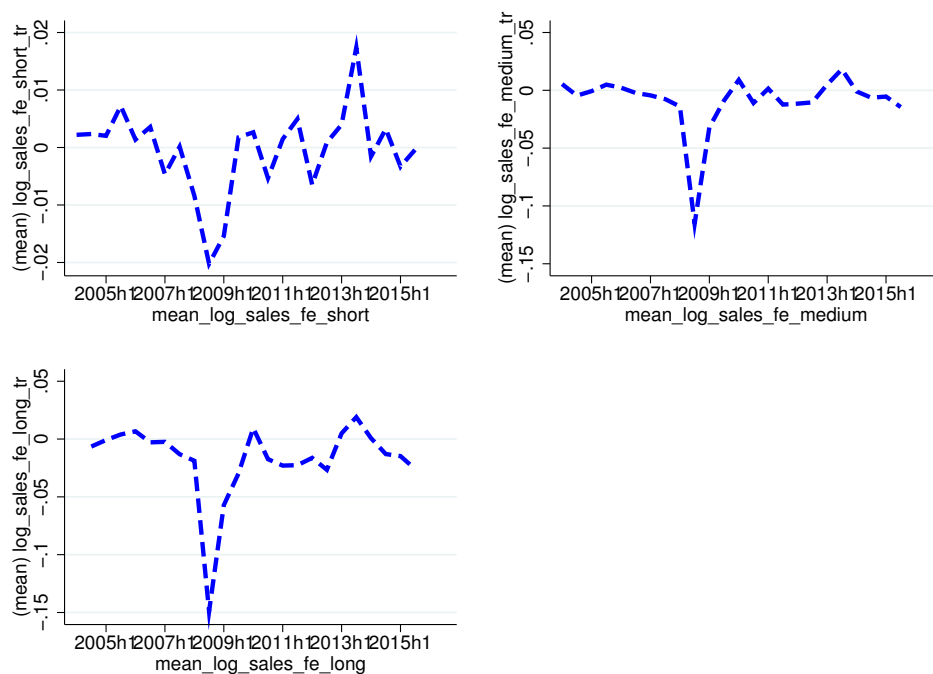
Table 1: Long-run and short-run forecasts of sales growth

	mean	sd	skewness	kurtosis	p5	p25	p50	p75	p95
log_gr_sales	0.004	0.053	-2.122	7.157	-0.120	-0.003	0.014	0.028	0.056
log_gr_sales_yosoku_long	0.018	0.024	-3.155	14.020	0.003	0.011	0.022	0.032	0.035
log_gr_sales_yosoku_medium	0.011	0.032	-2.952	12.967	-0.014	0.002	0.021	0.030	0.039
log_gr_sales_yosoku_short	0.002	0.042	-2.217	7.854	-0.096	-0.007	0.014	0.026	0.041
log_sales_fe_short	-0.000	0.007	-0.593	4.739	-0.015	-0.004	0.001	0.003	0.007
log_sales_fe_medium	-0.009	0.025	-3.459	15.669	-0.032	-0.011	-0.005	0.002	0.009
log_sales_fe_long	-0.017	0.033	-2.881	12.235	-0.057	-0.023	-0.013	0.001	0.009

Note: 2005h1 means the first semi-year of 2005 fiscal year (i.e., 2005/Q2-Q3). *fe* means forecast error. *short*, *medium* and *long* are defined in the subsection of data description.

Finally, we focus on the evolution of firm-level FEs and show two key findings. First, Figure 3 and Figure 4 validate that the cross-sectional mean of sales FEs is pro-cyclical, while the cross-sectional variation of sales FEs is counter-cyclical. Specifically, Figure 3 show that Japanese firms over-estimated their sales during the financial crisis (2008/Q4-2009/Q3), and this over-estimation is particularly significant when the forecasts are made three quarters in advance (i.e., $yosoku_{long}$). These evidence together suggest that both the arrival and the strong persistence of the financial crisis were unanticipated by Japanese firms. Moreover, Figure 4 shows that the standard deviation of sales FEs (and especially $yosoku_{short}$) had increased substantially during the financial crisis. This piece of evidence suggests that it became hard for firms to predict their own future during the financial crisis. These evidence is consistent with findings from papers that use forecasting data from Germany (Bachmann et al. (2013); Bachmann and Bayer (2014); Bachmann et al. (2017)). Second, we find that smaller and medium-sized firms make larger FEs than bigger firms, as shown by Table 2. Specifically, the standard deviation of FEs made by firms decreases with firm size. In addition, Figure 5 verifies this finding by validating that the distribution of FEs is more concentrated for big firms than for small and medium-sized firms. Finally, we find that firms are more optimistic in the long run than in the short run (i.e., average FEs are smaller for long-run forecasts) in Table 2. A caveat here is that these evidence does not necessarily suggest the existence of sentiment and irrational behavior. More analysis on this topic is needed in the near future.

Figure 3: Average sales forecast errors



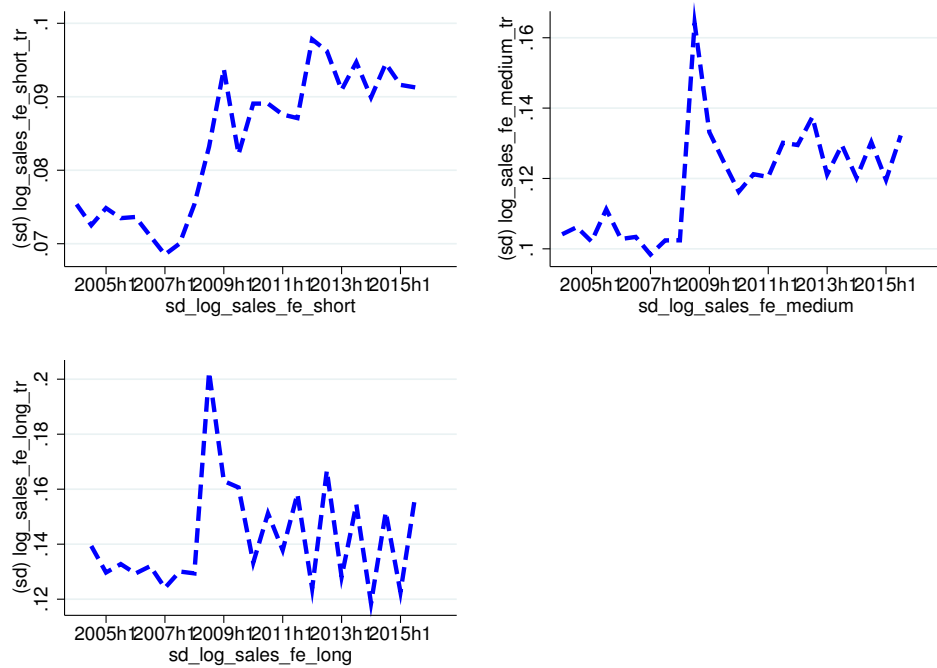
Note: 2005h1 means the first semi-year of 2005 fiscal year (i.e., 2005/Q2-Q3). *short*, *medium* and *long* are defined in the subsection of data description.

Table 2: Small and big firms: forecasts and forecast errors

Small firms	mean	sd	skewness	kurtosis	p5	p25	p50	p75	p95
log_sales_fe_short_tr	0.017	0.135	-0.057	5.202	-0.220	-0.027	0.000	0.069	0.265
log_sales_fe_medium_tr	0.014	0.186	-0.203	4.559	-0.310	-0.065	0.000	0.099	0.336
log_sales_fe_long_tr	0.004	0.219	-0.402	4.464	-0.404	-0.091	0.000	0.113	0.372
Medium-sized firms	mean	sd	skewness	kurtosis	p5	p25	p50	p75	p95
log_sales_fe_short_tr	0.000	0.083	-0.333	10.299	-0.128	-0.022	0.000	0.026	0.120
log_sales_fe_medium_tr	-0.010	0.119	-0.596	7.864	-0.209	-0.053	-0.001	0.039	0.167
log_sales_fe_long_tr	-0.019	0.143	-0.721	7.679	-0.264	-0.070	-0.007	0.044	0.190
Big firms	mean	sd	skewness	kurtosis	p5	p25	p50	p75	p95
log_sales_fe_short_tr	-0.003	0.076	-0.628	11.859	-0.120	-0.023	0.000	0.022	0.100
log_sales_fe_medium_tr	-0.011	0.112	-0.849	9.245	-0.196	-0.047	-0.002	0.036	0.142
log_sales_fe_long_tr	-0.020	0.144	-0.897	7.952	-0.267	-0.067	-0.006	0.043	0.181

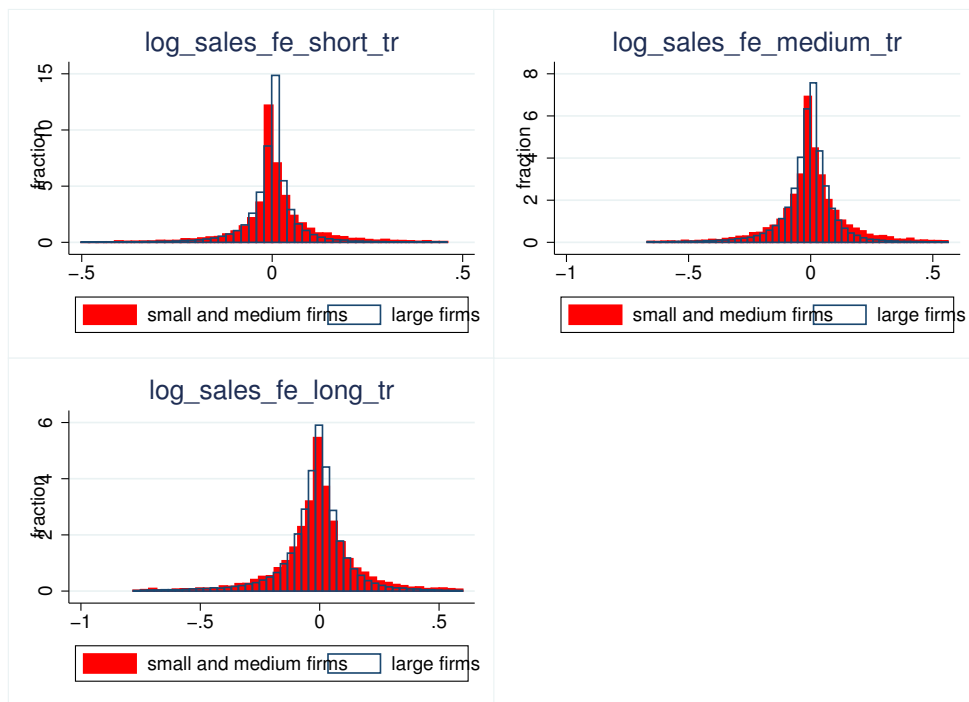
Note: 2005h1 means the first semi-year of 2005 fiscal year (i.e., 2005/Q2-Q3). *short*, *medium* and *long* are defined in the subsection of data description. The size of the firm is determined by the amount of registered capital.

Figure 4: Standard deviation of sales forecast errors



Note: 2005h1 means the first semi-year of 2005 fiscal year (i.e., 2005/Q2-Q3). *short*, *medium* and *long* are defined in the subsection of data description.

Figure 5: Distribution of forecast errors: small versus big firms



Note: *fe* means forecast error of log sales. *short*, *medium* and *long* are defined in the subsection of data description.

2.3 Financial Crisis and Evolution of Forecast Errors

In the last subsection of this paper, we show that cross-sectional volatility of firm's sales growth started to diverge from the cross-sectional variance of FEs (for future sales) after the financial crisis. First, Figure 1 shows that both the average sales growth and the volatility of sales growth have returned to the pre-crisis levels after the first half of 2011 fiscal year. This means that consumer taste and the process of firm's productivity evolution have entered into the normal regime (i.e., the pre-crisis regime) again. However, Figure 4 validates that even in fiscal years 2015 and 2016 (i.e., seven or eight years after the financial crisis), the variance of sales FEs is still much higher than the pre-crisis levels. Furthermore, this pattern is particularly pronounced for short-run and medium-run forecasts. Now, we want to understand why it becomes more difficult for Japanese firms to forecast their future sales, even though the volatility of realized sales has returned back to its pre-crisis level. Models with an exogenous change in firm's productivity or demand process cannot be used to rationalize this finding, as the process itself is shown to have returned to its pre-crisis level after 2011.

The most likely explanation we can think of is the change in economic policy uncertainty (EPU). First, using the same approach used in Baker et al. (2016), Arbatli et al. (2017) show that overall EPU began to increase after 2008 (compared to the period of 2004-2007) and has not returned back to its pre-crisis level even by the end of 2016. Specifically, uncertainty in fiscal policies (government expenditure and budget deficit), monetary policies (money supply and inflation-targeting policies), trade/FDI policies (e.g., enactment of TPP) and tax policies (consumption tax hikes) all began to increase from 2008 and have not returned back to their pre-crisis level even by the end of 2016. Moreover, other work by Morikawa (2016b) and Morikawa (2016c) shows that EPU matters for firm's decision making and sales to a large extent in Japan.⁷ Therefore, the increasing EPU is a natural candidate for explaining why the difficulty of projecting future sales has become harder for Japanese firms after the financial crisis. Another explanation we can think of is the change in information rigidity after the financial crisis which might be caused by increasing EPU. Recent work by Coibion and Gorodnichenko (2012); Coibion et al. (2015); Coibion and Gorodnichenko (2015) show that there is substantial information rigidity both at the forecaster's side and at the firm side, when they forecast their future income or aggregate economic variables such as inflation rates and GDP growth rates. Coibion and Gorodnichenko (2015) also show that information rigidity has decreased in the great

⁷For instance, the inability of firms to predict future inflation rates makes it hard for firms to set prices, which leads to less precise forecasts for its own sales. Moreover, if the firm cannot predict consumption tax hikes in the future, it becomes harder for firms to predict its own demand in the future. Finally, if the cannot predict trade/FDI policy changes in the future, then it becomes more difficult for firms to project its foreign demand, which leads to less precise forecasts for the overall sales.

moderation period for the U.S. In the case of Japan, we suspect that the level of information rigidity has gone up after the financial crisis in Japan. Future work is needed for us to better understand this point.

3 Panel Analysis

3.1 Main Results

We analyze the relationship between firm expectations, uncertainty and business plans. Here, business plans indicate firms’ current period’s judgment about hiring (the number of total employees or the number of part-timers) and capacity (equipment for both production and sales). See Survey Form in Figure 8 in Appendix. We estimate an OLS regression as follows.

$$Judgment_i^k = \alpha + \beta X_{i,t}^k + \delta_i + \delta_k + \varepsilon_{ik},$$

For judgement for part-timer, we assign “1” to “increase”, “0” to “no changes” and “-1” to “decrease”, respectively. For judgement for overall employment and capacity, we assign “1” to “insufficient”, “0” to “proper” and “-1” to “excessive”, respectively. So we can compare the results for overall employment and capacity directly. $\beta X_{i,t}^k$ is a vector of explanatory variables, including past sales growth, forecast errors and forecasts of business conditions defined in Section 2.1. δ_i represents the firm fixed effects and δ_k represents the quarter fixed effects. We have 52 quarters and 26 semi-years in total. We also control for firm size (log registered capital) in all regressions. Since the dependent variables take values in ordered outcomes, we also run a ordered Logit model with industry fixed effects instead of the firm fixed effects to address potential concerns on our specifications.

We report the regression results in Table 3. Columns 1 and 2 show the main results for overall employment and part-timer. First, sales growth rates in previous periods are positively related to the current period’s judgment about total employment and part-timers. The coefficients of past sales growth are all positive and significant at the one percent level. Second, this relationship is stronger if the sales growth was more than what firms forecasted. Firms underpredict their sales previously, i.e., firms with positive sales forecast errors are likely to feel the shortage of workers. The magnitude for total employment and part-timers are quantitatively similar. Third, both judgment about their own business (micro) conditions and about overall domestic economy (macro) conditions have a positive impact on the current period’s judgment about employment. But the impact of their own business conditions is stronger than that of overall macroeconomic conditions. These results hold in terms of lagged judgment errors, current period judgment

and especially next period judgment on micro-level business conditions. Regarding the capacity judgment, Column 3 shows the results are similar with employment except for one period lagged forecast errors. Compared with judgment on employment, the magnitude of impacts of forecast errors, past sales growth, and forecasts of business conditions are small. On average, the Japanese firms feel more insufficient in overall employment than capacity. It suggests that to Japanese firms, ensuring labor force is a more urgent issue than equipment investment due to the low birthrate and aging population.

The results of ordered logit estimation in Table 4 are similar with those of OLS estimations. Most of the variables on forecast errors, past sales growth, and judgment of business conditions are positively correlated with the current period's judgment about employment, part-timer and equipment capacity. In addition, the coefficients of log capital are all negative and significant at the one percent level, suggesting that compared with large firms, small firms are likely to face the increasing constraints of both employment and capacity.

Table 3: Main results: FE regression

	Overall employment (1)	Part-timer (2)	Capacity (3)
One-quarter-lagged forecast error (short)	0.0444*** (0.0131)	0.0507*** (0.0121)	0.0155 (0.0101)
One-quarter-lagged squared forecast error (short)	0.000885 (0.00515)	-0.00391 (0.00486)	0.00397 (0.00482)
Past sales growth	0.201*** (0.0108)	0.197*** (0.0121)	0.170*** (0.00973)
Lagged judgment error (macro condition)	0.0179*** (0.00614)	0.0207*** (0.00730)	0.00880* (0.00498)
Lagged judgment error (micro condition)	0.0456*** (0.00504)	0.0267*** (0.00631)	0.0395*** (0.00422)
Current period judgement (macro condition)	0.0197*** (0.00315)	0.0156*** (0.00408)	0.0131*** (0.00282)
Current period judgement (micro condition)	0.0480*** (0.00285)	0.0772*** (0.00418)	0.0331*** (0.00247)
Next period judgement (macro condition)	-0.00251 (0.00472)	0.00229 (0.00573)	-0.00298 (0.00405)
Next period judgement (micro condition)	0.0334*** (0.00415)	0.0188*** (0.00513)	0.0262*** (0.00333)
Capital	-0.0112 (0.0139)	-0.0302** (0.0121)	-0.00763 (0.0118)
Firm FE	Yes	Yes	Yes
Quarterly FE	Yes	Yes	Yes
Observations	129062	98407	120886
R ²	0.348	0.218	0.333

Notes: Std. err. clustered at firm level. * 0.10 ** 0.05 *** 0.01.

Table 4: Main results: Ordered Logit

	Overall employment (1)	Part-timer (2)	Capacity (3)
<hr/>			
main			
One-quarter-lagged forecast error (short)	0.177** (0.0713)	0.262*** (0.0657)	0.142 (0.0887)
One-quarter-lagged squared forecast error (short)	0.0121 (0.0159)	0.0130 (0.0155)	0.0369 (0.0266)
Past sales growth	1.426*** (0.0654)	1.547*** (0.0728)	1.520*** (0.0797)
Lagged judgement error (macro condition)	0.117*** (0.0429)	0.101** (0.0478)	0.0846 (0.0527)
Lagged judgement error (micro condition)	0.349*** (0.0373)	0.269*** (0.0431)	0.453*** (0.0473)
Current period judgement (macro condition)	0.114*** (0.0222)	0.0818*** (0.0268)	0.116*** (0.0293)
Current period judgement (micro condition)	0.332*** (0.0209)	0.567*** (0.0267)	0.368*** (0.0272)
Next period judgement (macro condition)	-0.00840 (0.0357)	-0.0204 (0.0390)	-0.0591 (0.0458)
Next period judgement (micro condition)	0.241*** (0.0321)	0.201*** (0.0363)	0.297*** (0.0420)
Capital	-0.0701*** (0.0161)	-0.0302** (0.0134)	-0.0400* (0.0207)
<hr/>			
Industry FE	Yes	Yes	Yes
Quarterly FE	Yes	Yes	Yes
Observations	129062	98407	120886
Pseudo R ²	0.071	0.062	0.063
<hr/>			

Notes: Std. err. clustered at firm level. * 0.10 ** 0.05 *** 0.01.

Table 5: FE regression by firm size

	Overall employment			Part-timer			Capacity		
	Large (1)	SMEs (2)	SMEs (3)	Large (4)	SMEs (5)	SMEs (6)	Large (7)	SMEs (8)	SMEs (9)
One-quarter-lagged forecast error (short)	0.0455*** (0.0140)	0.0441 (0.0347)	0.0559*** (0.0130)	0.0255 (0.0324)	0.0126 (0.0214)	0.0307 (0.0214)	0.0126 (0.0110)	0.0307 (0.0214)	0.0307 (0.0214)
One-quarter-lagged squared forecast error (short)	0.00573 (0.00519)	-0.0244* (0.0136)	-0.00258 (0.00488)	-0.0188 (0.0181)	0.00512 (0.00554)	0.000366 (0.00578)	0.00512 (0.00554)	0.000366 (0.00578)	0.000366 (0.00578)
Past sales growth	0.193*** (0.0115)	0.246*** (0.0316)	0.193*** (0.0130)	0.217*** (0.0333)	0.169*** (0.0104)	0.167*** (0.0273)	0.169*** (0.0104)	0.167*** (0.0273)	0.167*** (0.0273)
Lagged judgement error (macro condition)	0.0161** (0.00660)	0.0270 (0.0164)	0.0188** (0.00607)	0.0199** (0.00791)	0.0235 (0.0184)	0.00774 (0.00777)	0.0113** (0.00539)	-0.00487 (0.0132)	0.00651 (0.00497)
Lagged judgement error (micro condition)	0.0481*** (0.00546)	0.0326** (0.0132)	0.0591*** (0.00547)	0.0279*** (0.00673)	0.0242 (0.0169)	0.0430*** (0.00695)	0.0409*** (0.00461)	0.0316*** (0.0101)	0.0366*** (0.00440)
Current period judgement (macro condition)	0.0224*** (0.00343)	0.00633 (0.00803)	0.0264*** (0.00320)	0.0187*** (0.00440)	-0.00379 (0.0106)	0.0224*** (0.00430)	0.0143*** (0.00308)	0.00707 (0.00708)	0.0170*** (0.00269)
Current period judgement (micro condition)	0.0466*** (0.00308)	0.0545*** (0.00754)	0.0862*** (0.00297)	0.0759*** (0.00450)	0.0868*** (0.0108)	0.0897*** (0.00406)	0.0335*** (0.00272)	0.0305*** (0.00564)	0.0381*** (0.00241)
Next period judgement (macro condition)	-0.00477 (0.00510)	0.0113 (0.0126)	0.00592 (0.00447)	-0.000562 (0.00624)	0.0163 (0.0142)	0.00117 (0.00577)	-0.00432 (0.00440)	0.00274 (0.00999)	-0.00127 (0.00374)
Next period judgement (micro condition)	0.0349*** (0.00446)	0.0240** (0.0113)	0.0405*** (0.00420)	0.0210*** (0.00554)	0.0104 (0.0134)	0.0207*** (0.00527)	0.0282*** (0.00369)	0.0160** (0.00740)	0.0200*** (0.00333)
Capital	-0.0241 (0.0188)	0.141 (0.0882)	-0.0164 (0.0120)	-0.0380** (0.0165)	0.0964 (0.129)	-0.00129 (0.0125)	-0.0185 (0.0147)	-0.0281 (0.0672)	-0.0345*** (0.0103)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarterly FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	111229	17833	198830	85195	13212	122909	104207	16679	174745
R ²	0.345	0.388	0.588	0.220	0.219	0.445	0.325	0.394	0.584

Notes: Std. err. clustered at firm level. * 0.10 ** 0.05 *** 0.01.

To dig deeper the heterogeneous effects of firm expectations on business plans by firm size, we divide our sample to large firms and small- and medium enterprises (SMEs) and run the FE regressions. Specifically, SMEs are defined as firms with capital amount less than 10 billion yen. The results are presented in Table 5. Columns 1 to 9 compares the results for judgment about overall employment, part-timer and capacity between large firms and SMEs. In Columns 3, 6 and 9, we exclude sales forecast errors and past sales growth since smaller firms are randomly sampled and the sales information is only available at half year and a large number of observations will drop. The results show that past sales growth are positively correlated with the judgment about employment and capacity for both large firms and SMEs, however, the coefficients of lagged sales forecast errors are not significant for SMEs probably due to the limited observations. Similar with previous results, both the macro- and micro-level business conditions affect the firms' judgment about employment, part-timer and capacity but the impacts of micro-level business conditions are larger. Importantly, compared with large firms, SMEs' judgments about employment and capacity respond more significantly to their own business conditions rather than the macroeconomic conditions.

3.2 Robustness Checks

We further conduct a series of additional analysis and robustness checks in the Appendix. First, we include medium-run forecasts, i.e., two-quarter-lagged forecasts errors in Table 6. The results show that even if the sales growth was more than what firms forecasted two quarters previously, firms tend to feel constraints of capacity and employment and are likely to increase part-timers. Second, we use balanced panel data to re-run the FE regressions and report the results in Table 7. The results again reconfirm our main results using full samples though the number of observations decreased substantially. Third, we examine the possible differences among manufacturing, wholesale and retail, and other sectors. Table 8 shows that there no much differences across industry. Finally, instead of semi-year quantitative sales FEs, we use sales judgment errors one quarter lagged and rerun the regressions. Table 9 shows the results are similar with quantitative sales FEs for overall employment and part-timer. As for capacity, the sales judgment errors are positive and significant at one percent level, suggesting that firms underpredicting their sales (positive sales errors) are likely to feel the shortage of capacity.

4 Conclusion

This paper uses a business outlook survey from Japan over 16,000 businesses on a quarterly basis from 2004 to 2016 to investigate how firms form expectations and how their expectations affect firm

activities and business plans. We combine firms' qualitative assessments of micro- and macro-level business conditions and quantitative information like sales to construct sales forecasts errors and judgment errors. We find that forecasts made earlier are less precise and more optimistic than those made later. The forecasted sales are less volatile than realized sales overtime and adjusted based on realized past sales, which suggests the existence of belief updating and firm learning. Furthermore, volatility of firms' sales growth and variance of their forecast errors comove over the business cycles. In empirical analysis, we examine the relationship between expectation formation and firm activities including business plans. The results show that sales growth rates in previous periods are positively related to the current period's judgment about employment and capacity. This relationship is stronger if the sales growth was more than what firms forecasted. Importantly, both judgment about their own business conditions and about overall macroeconomic conditions have a significant and positive impact on the current period's judgment about employment and capacity but the impact of their own business conditions is stronger than that of overall macroeconomic conditions. We also find that the disparity of impact between micro- and macro-business conditions is more pervasive for small and medium sized enterprises.

References

- Arbatli, Elif C., Steven J. Davis, Arata Ito, Naoko Miake, and Ikuo Saito**, “Policy uncertainty in Japan,” NBER Working Paper, National Bureau of Economic Research 2017.
- Bachmann, Rüdiger and Christian Bayer**, “Investment Dispersion and the Business Cycle,” *American Economic Review*, April 2014, *104* (4), 1392–1416.
- **and Steffen Elstner**, “Firm Optimism and Pessimism,” *European Economic Review*, October 2015, *79*, 297–325.
- , – , **and Atanas Hristov**, “Surprise, Surprise – Measuring Firm-Level Investment Innovations,” *Journal of Economic Dynamics and Control*, October 2017, *83*, 107–148.
- , – , **and Eric R Sims**, “Uncertainty and Economic Activity: Evidence from Business Survey Data,” *American Economic Journal: Macroeconomics*, 2013, *5* (2), 217–249.
- Baker, Scott R., Nicholas Bloom, and Steven J. Davis**, “Measuring Economic Policy Uncertainty,” *The Quarterly Journal of Economics*, 2016, *131* (4), 1593–1636.
- Bloom, Nicholas**, “The Impact of Uncertainty Shocks,” *Econometrica*, 2009, *77* (3), 623–685.
- , **Steven J. Davis, Lucia Foster, Brian Lucking, Scott Ohlmacher, and Itay Saporta Eksten**, “Business-Level Expectations and Uncertainty,” SSRN Scholarly Paper 3085377, Social Science Research Network, Rochester, NY December 2017.
- Bontempi, Maria Elena, Roberto Golinelli, and Giuseppe Parigi**, “Why demand uncertainty curbs investment: Evidence from a panel of Italian manufacturing firms,” *Journal of Macroeconomics*, 2010, *32* (1), 218–238.
- Coibion, Olivier and Yuriy Gorodnichenko**, “What Can Survey Forecasts Tell Us About Information Rigidities?,” *Journal of Political Economy*, 2012, *120* (1), 116–159.
- **and –**, “Information Rigidity and the Expectations Formation Process: A Simple Framework and New Facts,” *American Economic Review*, 2015, *105* (8), 2644–78.
- , – , **and Saten Kumar**, “How Do Firms Form Their Expectations? New Survey Evidence,” NBER Working Paper 2015.
- Fajgelbaum, Pablo D., Edouard Schaal, and Mathieu Taschereau-Dumouchel**, “Uncertainty Traps,” *The Quarterly Journal of Economics*, November 2017, *132* (4), 1641–1692.

- Guiso, Luigi and Giuseppe Parigi**, “Investment and Demand Uncertainty,” *The Quarterly Journal of Economics*, February 1999, *114* (1), 185–227.
- Morikawa, Masayuki**, “Business Uncertainty and Investment: Evidence from Japanese Companies,” RIETI Discussion Papers 16-E-014, Research Institute of Economy, Trade and Industry 2016.
- , “How uncertain are economic policies? New evidence from a firm survey,” *Economic Analysis and Policy*, December 2016, *52*, 114–122.
- , “What Types of Policy Uncertainties Matter for Business?,” *Pacific Economic Review*, December 2016, *21* (5), 527–540.
- , “Measuring Firm-level Uncertainty: New Evidence from a Business Outlook Survey,” RIETI Discussion Papers 18-E-030, Research Institute of Economy, Trade and Industry 2018.
- Tanaka, Mari, Nicholas Bloom, Joel M David, and Maiko Koga**, “Firm Performance and Macro Forecast Accuracy,” Working Paper 24776, National Bureau of Economic Research June 2018.

Appendix

Figure 6: Survey Form 1

II. 計数調査 (百万円単位で記入してください。百万円未満は四捨五入してください。)

1. 企業収益

項目	期間	28年度上期	28年度下期	29年度上期	29年度下期	*****	*****
		(28年4~9月)	(28年10~29年3月)	(29年4~9月)	(29年10~30年3月)	*****	*****
		実績	実績	実績見込み	見通し	*****	*****
		百万円	百万円	百万円	百万円	百万円	百万円
10 売上高						*****	*****
9 常利						*****	*****

Figure 7: Survey Form 2

I. 判断調査 (季節的要因を除いた実勢でご判断ください。)

1. 貴社の景況 各期ともその直前の四半期と比較してご回答ください。 ※売上、受注、経常利益などを総合的に判断して記入してください。		1 上昇 2 不変 3 下降 4 不明	29年 4~6月	7~9月	10~12月
2. 貴社の景況判断の決定要因 上記1.欄で上昇又は下降と回答された場合、以下の選択肢から各期とも3項目を重要度の高い順にご回答ください。					
1 国内需要(売上)の動向 2 海外需要(売上)の動向 3 販売価格の動向 4 仕入価格の動向 5 仕入以外のコストの動向		6 資金繰り・資金調達の動向 7 株式・不動産等の資産価格の動向 8 為替レートの動向 9 税制・会計制度等の動向 10 その他 ()			
3. 国内の景況 各期ともその直前の四半期と比較してご回答ください。 ※業界に限らず国内全体の景況について記入してください。		1 上昇 2 不変 3 下降 4 不明	29年 4~6月	7~9月	10~12月

Figure 8: Survey Form 3

14. 生産・販売 などのための 設備		
29年 6月末	9月末	12月末
期末判断		
1 不足 2 適正	3 過大 4 不明	

15. 従業員数						
			16. うち臨時・パートの数			
29年 6月末	9月末	12月末	臨時・パート の有無	29年 4~6月	7~9月	10~12月
期末判断			1 あり 2 なし	直前の四半期と比べて		
1 不足気味 2 適正	3 過剰気味 4 不明			1 増加 2 不変	3 減少 4 不明	

Table 6: Short-run and medium-run forecasts (appendix)

	Short			Mid		
	Overall employment (1)	Part-timer (2)	Capacity (3)	Overall employment (4)	Part-timer (5)	Capacity (6)
One-quarter-lagged forecast error (short)	0.0444*** (0.0131)	0.0507*** (0.0121)	0.0155 (0.0101)			
One-quarter-lagged squared forecast error (short)	0.000885 (0.00515)	-0.00391 (0.00486)	0.00397 (0.00482)			
Past sales growth	0.201*** (0.0108)	0.197*** (0.0121)	0.170*** (0.00973)	0.197*** (0.0109)	0.191*** (0.0123)	0.166*** (0.00977)
Lagged judgement error (macro condition)	0.0179*** (0.00614)	0.0207*** (0.00730)	0.00880* (0.00498)	0.0189*** (0.00619)	0.0215*** (0.00732)	0.00862* (0.00502)
Lagged judgement error (micro condition)	0.0456*** (0.00504)	0.0267*** (0.00631)	0.0395*** (0.00422)	0.0461*** (0.00504)	0.0263*** (0.00634)	0.0390*** (0.00423)
Current period judgement (macro condition)	0.0197*** (0.00315)	0.0156*** (0.00408)	0.0131*** (0.00282)	0.0195*** (0.00316)	0.0157*** (0.00410)	0.0128*** (0.00284)
Current period judgement (micro condition)	0.0480*** (0.00285)	0.0772*** (0.00418)	0.0331*** (0.00247)	0.0488*** (0.00286)	0.0775*** (0.00421)	0.0337*** (0.00248)
Next period judgement (macro condition)	-0.00251 (0.00472)	0.00229 (0.00573)	-0.00298 (0.00405)	-0.00150 (0.00476)	0.00312 (0.00576)	-0.00217 (0.00408)
Next period judgement (micro condition)	0.0334*** (0.00415)	0.0188*** (0.00513)	0.0262*** (0.00333)	0.0340*** (0.00417)	0.0190*** (0.00516)	0.0265*** (0.00335)
Capital	-0.0112 (0.0139)	-0.0302** (0.0121)	-0.00763 (0.0118)	-0.0119 (0.0140)	-0.0291** (0.0123)	-0.00788 (0.0118)
Two-quarter-lagged forecast error (short)				0.0596*** (0.0116)	0.0771*** (0.0143)	0.0601*** (0.0115)
Two-quarter-lagged squared forecast error (short)				0.00606 (0.00549)	0.00315 (0.00713)	0.00799 (0.00610)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarterly FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	129062	98407	120886	127367	97216	119341
R ²	0.348	0.218	0.333	0.349	0.219	0.335

Notes: Std. err. clustered at firm level. * 0.10 ** 0.05 *** 0.01.

Table 7: Balanced panel results (appendix)

	Short		
	Overall employment (1)	Part-timer (2)	Capacity (3)
One-quarter-lagged forecast error (short)	0.0442* (0.0238)	0.0549*** (0.0188)	0.0206 (0.0181)
One-quarter-lagged squared forecast error (short)	-0.00229 (0.0109)	-0.00584 (0.00887)	0.0103 (0.0146)
Past sales growth	0.230*** (0.0174)	0.195*** (0.0182)	0.181*** (0.0158)
Lagged judgement error (macro condition)	0.0230** (0.00926)	0.0101 (0.0111)	0.00757 (0.00744)
Lagged judgement error (micro condition)	0.0415*** (0.00730)	0.0360*** (0.00969)	0.0366*** (0.00613)
Current period judgement (macro condition)	0.0109** (0.00446)	0.0123** (0.00608)	0.0108*** (0.00409)
Current period judgement (micro condition)	0.0464*** (0.00434)	0.0719*** (0.00627)	0.0298*** (0.00370)
Next period judgement (macro condition)	0.00325 (0.00716)	-0.00294 (0.00864)	-0.00465 (0.00613)
Next period judgement (micro condition)	0.0292*** (0.00630)	0.0218*** (0.00832)	0.0198*** (0.00502)
Capital	-0.00203 (0.0264)	-0.0509*** (0.0170)	-0.0168 (0.0163)
Firm FE	Yes	Yes	Yes
Quarterly FE	Yes	Yes	Yes
Observations	58038	44378	54631
R ²	0.314	0.173	0.313

Notes: Std. err. clustered at firm level. * 0.10 ** 0.05 *** 0.01.

Table 8: Industry results(appendix)

	Manufacturing			Wholesale and retail			Other industries		
	Overall employment (1)	Part-timer (2)	Capacity (3)	Overall employment (4)	Part-timer (5)	Capacity (6)	Overall employment (7)	Part-timer (8)	Capacity (9)
One-quarter-lagged forecast error (short)	0.0420* (0.0224)	0.0460 (0.0419)	0.0444*** (0.0131)	0.0645*** (0.0202)	0.0718 (0.0446)	0.0507*** (0.0121)	0.0195 (0.0181)	-0.0456 (0.0277)	0.0155 (0.0101)
One-quarter-lagged squared forecast error (short)	0.00514 (0.0179)	0.00989 (0.0131)	0.000885 (0.00515)	-0.0113 (0.0114)	0.0116 (0.0212)	-0.00391 (0.00486)	0.0205 (0.0191)	-0.0152 (0.00948)	0.00397 (0.00482)
Past sales growth	0.266*** (0.0167)	0.127*** (0.0301)	0.201*** (0.0108)	0.243*** (0.0177)	0.122*** (0.0297)	0.197*** (0.0121)	0.232*** (0.0153)	0.0553*** (0.0210)	0.170*** (0.00973)
Lagged judgement error (macro condition)	0.0108 (0.00917)	0.00942 (0.0158)	0.0179*** (0.00614)	0.0214** (0.0101)	0.0211 (0.0172)	0.0207*** (0.00730)	0.0128 (0.00835)	0.00658 (0.0102)	0.00880* (0.00498)
Lagged judgement error (micro condition)	0.0552*** (0.00746)	0.0301** (0.0133)	0.0456*** (0.00504)	0.0290*** (0.00834)	0.0385** (0.0160)	0.0267*** (0.00631)	0.0588*** (0.00670)	0.00863 (0.00938)	0.0395*** (0.00422)
Current period judgement (macro condition)	0.0217*** (0.00455)	0.00898 (0.00727)	0.0197*** (0.00315)	0.0255*** (0.00575)	-0.00328 (0.00915)	0.0156*** (0.00408)	0.0231*** (0.00470)	0.000957 (0.00545)	0.0131*** (0.00282)
Current period judgement (micro condition)	0.0547*** (0.00411)	0.0313*** (0.00679)	0.0480*** (0.00285)	0.0727*** (0.00547)	0.0866*** (0.00981)	0.0772*** (0.00418)	0.0424*** (0.00376)	0.0115** (0.00559)	0.0331*** (0.00247)
Next period judgement (macro condition)	-0.00464 (0.00709)	-0.00106 (0.0115)	-0.00251 (0.00472)	-0.00657 (0.00825)	0.00966 (0.0131)	0.00229 (0.00573)	-0.00294 (0.00685)	0.00312 (0.00825)	-0.00298 (0.00405)
Next period judgement (micro condition)	0.0398*** (0.00633)	0.0291*** (0.0110)	0.0334*** (0.00415)	0.0338*** (0.00705)	0.0116 (0.0125)	0.0188*** (0.00513)	0.0405*** (0.00551)	0.00225 (0.00713)	0.0262*** (0.00333)
Capital	-0.0202 (0.0204)	0.0434 (0.0380)	-0.0112 (0.0139)	-0.0246 (0.0168)	0.00223 (0.0308)	-0.0302** (0.0121)	0.0126 (0.0162)	0.0553 (0.0352)	-0.00763 (0.0118)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarterly FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	55782	20883	129062	45025	17864	98407	55375	19860	120886
R ²	0.306	0.348	0.348	0.191	0.293	0.218	0.336	0.371	0.333

Notes: Std. err. clustered at firm level. * 0.10 ** 0.05 *** 0.01.

Table 9: Sales judgment errors (appendix)

	Short		
	Overall employment (1)	Part-timer (2)	Capacity (3)
Sales judgment error	0.0205*** (0.00362)	0.0438*** (0.00565)	0.0179*** (0.00297)
Past sales growth	0.198*** (0.0111)	0.197*** (0.0123)	0.166*** (0.00985)
Lagged judgement error (macro condition)	0.0202*** (0.00633)	0.0200*** (0.00753)	0.0103** (0.00507)
Lagged judgement error (micro condition)	0.0444*** (0.00515)	0.0246*** (0.00652)	0.0378*** (0.00427)
Current period judgement (macro condition)	0.0178*** (0.00323)	0.0147*** (0.00420)	0.0112*** (0.00288)
Current period judgement (micro condition)	0.0423*** (0.00315)	0.0630*** (0.00419)	0.0275*** (0.00270)
Next period judgement (macro condition)	-0.00162 (0.00482)	0.00186 (0.00590)	-0.00139 (0.00414)
Next period judgement (micro condition)	0.0326*** (0.00425)	0.0178*** (0.00528)	0.0254*** (0.00341)
Capital	-0.0102 (0.0141)	-0.0317** (0.0129)	-0.00945 (0.0118)
Firm FE	Yes	Yes	Yes
Quarterly FE	Yes	Yes	Yes
Observations	123961	94519	116319
R ²	0.353	0.221	0.338

Notes: Std. err. clustered at firm level. * 0.10 ** 0.05 *** 0.01.