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Uncertainty of Firms' Medium-Term Outlook during the COVID-19 Pandemic*

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Abstract

This study, based on original surveys conducted before and after the COVID-19 outbreak in Japan, documents firms' medium-term outlook and its uncertainty. The results show that, the uncertainty related to the outlooks of firms, measured as a subjective confidence interval of their point forecasts, increased substantially at the onset of the COVID-19 pandemic. Uncertainty over the macroeconomic outlook declined slightly by the end of 2021, but uncertainty over the firms' sales outlook remained high. Second, uncertainty over the firms' sales outlook is significantly related to uncertainty over the macroeconomic outlook, even when firm fixed effects are controlled. Third, forecasts regarding the end of the COVID-19 pandemic are highly dispersed. The expectation regarding the duration of the pandemic is correlated with the macroeconomic outlook and its uncertainty, but correlations with firms' sales outlook and its uncertainty are not observed.

Keywords: COVID-19, uncertainty, subjective probability distribution, medium-term outlook
JEL Classifications: D84, E22, E32

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Uncertainty of Firms' Medium-Term Outlook during the COVID-19 Pandemic

1. Introduction

The COVID-19 pandemic has increased uncertainty regarding the future, including how long movement restrictions and social distancing policies will last, when a vaccine will be developed and disseminated, and when the pandemic will come to an end. A significant increase in macroeconomic uncertainty is observed in various uncertainty measures, such as stock market volatility, the macroeconomic uncertainty (MU) index, and the economic policy uncertainty (EPU) index.

Several studies have been conducted on uncertainty during the COVID-19 pandemic (e.g., Arbatli *et al*., 2022; Altig *et al*., 2020; Baker *et al*., 2020; Buchheim *et al*., 2022; Caggiano *et al*., 2020; Coibion *et al*., 2020; Chen *et al*., 2021; Dietrich *et al*., 2022; Gormsen *et al*., 2021; Ludvigson *et al*., 2021; Meyer *et al*., 2022; Miescu and Rossi, 2021; Moran *et al*., 2022; Morikawa, 2022; Pellegrino *et al*., 2021). Although the uncertainty measures used and the methods of analysis are diverse, all these studies confirm the increase in uncertainty since the onset of the COVID-19 pandemic.

The uncertainty faced by economic agents is not directly observable, therefore, various proxy variables and indicators of uncertainty have been developed and used (see Bloom, 2014 and Shinohara *et al*., 2020 for surveys measuring uncertainty]. There is a consensus that the best way to capture the uncertainty faced by firms and households is to ask about their probabilistic expectations along with point forecasts (Manski, 2004, 2018). Against this backdrop, an increasing number of studies have been conducted in recent years using survey data to investigate the probabilistic expectations of firms (e.g., Altig *et al*., 2021; Chen *et al*., 2021; Coibion *et al*., 2018; Coibion *et al*., 2021; Faccini and Palombo, 2021; Morikawa, 2016, 2021). Among the empirical studies related to the COVID-19 pandemic mentioned above, Altig *et al*. (2020) and Meyer *et al*. (2022), for example, use the probabilistic expectations taken from the Survey of Business Uncertainty in the United States to document trends in uncertainty about firms' business performance. [1] In Japan, Chen *et al*. (2021) is an example of using data from such a type of firm survey to analyze the uncertainty faced by Japanese firms during the early stages of the COVID-19 pandemic.

[1] The Survey of Business Uncertainty is a monthly survey of executives of firms in the United States asking them about the subjective probability distribution of their firms' one year ahead performance (sales, employment, and investment).

Many studies have shown that uncertainty affects production and investment behavior. Uncertainty over the medium-term outlook, several years into the future, can strongly affect the medium- and long-term investments in research and development (R&D), employee hiring, and business restructuring. However, few studies have captured uncertainty in the medium-term outlook in the form of subjective probability distributions for firms.[2]

Under these circumstances, this study presents observations about the medium-term (five years ahead) real economic growth outlook and its subjective uncertainty (90% confidence interval for point estimates) and the outlook for sales growth and its subjective uncertainty based on an original survey of Japanese firms conducted in 2019, 2020, and 2021. We analyzed the relationship between the sales outlook and its uncertainty with past sales growth and volatility. In addition, we examined the relationship between the expected end of the COVID-19 pandemic and the subjective uncertainty of the macroeconomy and firms' businesses.

The main contributions of this study are first, to clarify how the medium-term outlook of Japanese firms and uncertainty, measured as a subjective probability distribution, changed over the three years before and after the COVID-19 pandemic. Second, we show the relationship between macroeconomic uncertainty and firms' own business uncertainty as well as the relationship between the uncertainty and the expected end of the COVID-19 pandemic.

The remainder of this paper is organized as follows. Section 2 describes the firm-survey data used in this study. Section 3 reports the results of the medium-term outlook and its uncertainty regarding macroeconomic growth and firm sales. Section 4 summarizes the conclusions and discusses their implications.

2. Survey Data

The survey data used in this study are micro-data from the Survey of Corporate Management and Economic Policy (SCMEP) conducted by the Research Institute of Economy, Trade, and Industry (RIETI) in 2019, 2020, and 2021.[3] The sample consists of firms selected from a registered list of approximately 30,000 firms in the Basic Survey of Japanese Business Structure and Activities (BSJBSA), an annual statistical survey conducted by the Ministry of Economy,

[2] Morikawa (2021) indicates that firms' subjective probability distributions of medium-term outlook contain useful information, although the study only covers the period before the COVID-19 pandemic.

[3] The author designed the questionnaire of SCMEP and RIETI contracted out to Tokyo Shoko Research Inc. to conduct the survey. In the SCMEP, respondents were the manager themself or a person from their department who could write on behalf of the manager.

Trade and Industry. The sample consists of firms with 50 or more regular employees and capital of 30 million yen or more. The 2019 SCMEP was conducted from January to February (first quarter), the 2020 SCMEP from August to September (third quarter), and the 2021 SCMEP from October to December (fourth quarter). The 2019 SCMEP was sent to 15,000 firms selected from the 30,000 firms surveyed in the BSJBSA, of which 2,535 firms responded. The 2020 SCMEP is a follow-up to the 2019 SCMEP. The survey questionnaire was sent to 2,498 firms that responded to the 2019 SCMEP and whose survival was confirmed. We received responses from 1,579 firms. The 2021 survey questionnaire was sent to 15,000 firms, including those that responded to the 2020 SCMEP, and additional firms selected from the BSJBSA. A total of 3,194 firms responded, of which 961 firms had also responded to the 2019 and 2020 surveys (hereafter referred to as "panel firms"). [4]

The main survey items used in this study were the outlook for Japan's real economic growth rate over the next five years and its subjective uncertainty, the outlook for the firm's sales over the next five years, its subjective uncertainty, and the expected end of the COVID-19 pandemic (2020 and 2021 surveys only).

The specific question regarding the outlook for the economic growth rate was "What do you think will be the average annual rate of real economic growth in Japan over the next five years?" Some responses had extremely large absolute values for the outlook of the economic growth rate and could have been erroneous, therefore responses with the economic growth rate (annualized) exceeding ±10% were dropped from the analysis sample of this study. The question of the subjective uncertainty of the outlook requires a 90% confidence interval for the point forecast in a choice format. Specifically, the question asked was, "Please select from the following choices the range within which you expect your outlook to be realized with a 90% probability." The eight choices were "less than ±0.1%," "±0.1% to less than ±0.3%," "±0.3% to less than ±0.5%," "±0.5% to less than ±1%," "±1% to ±2%," "±2% to less than ±3%," "±3% to less than ±5%", and "±5% or more." When conducting the regression, the central values of the categories are used ("±5% or more" is treated as ±6%).

The specific question regarding the firm's sales forecast was, "How do you expect your firm's sales to be in five years' time compared to last year's results?" That is, we ask what percentage increase or decrease is expected compared with the actual results of the previous year. Some of the answers were extremely large or small, therefore we dropped responses which were over 100% and less than minus 50% from the sample for the analysis. Similar to the question regarding

[4] Except for firms that responded to the 2019 and 2020 surveys, firms were randomly selected from the registered list of the BSJBSA that belong to the manufacturing, wholesale, retail, information and communication, and service industries.

economic growth rate, a 90% confidence interval for the point estimate was required of the uncertainty, with eight choices: "less than ±1%," "±1% to ±3%," "±3% to ±5%," "±5% to ±7%," "±7% to ±10%," "±10% to ±15%," "±15% to ±20%," and "±20% or more." Similar to macroeconomic uncertainty, when conducting regression, the central values of the categories are used ("±20% or more" is treated as ±22.5%).

The question regarding the outlook for the end of the COVID-19 pandemic included in the 2020 and 2021 surveys was "In your opinion, when will the COVID-19 pandemic be over and business activities resume like before the pandemic?" The respondents were asked to select from nine choices for the 2020 survey and 11 choices for the 2021 survey. [5] When analyzing these data, the figures were converted to the number of quarters ahead of the time of the survey.

Since this SCMEP was conducted on firms registered in the BSJBSA, firm-level information included in the BSJBSA is also available. For this purpose, the SCMEP and BSJBSA are linked at the firm-level, and BSJBSA's industry classification (manufacturing, wholesale, retail, information and communications, services, and others), number of regular employees, and annual sales are used for the analysis. Industry classification and the number of regular employees are used as control variables for basic firm characteristics. The rate of change in sales for the past five years until the previous year ($\Delta Sales_{it\text{-}6,\ t\text{-}1}$) and the volatility of sales in the past five years (coefficient of variation: $Sales\_vol_{\ it\text{-}6,\ t\text{-}1}$) are calculated based on actual annual sales and used as explanatory variables in the estimations. However, since the BSJBSA data available at the time of this writing are limited to FY2019 figures (stock variables are as of March 2020), the FY2019 industry classification, number of regular employees, and sales figures for the past five years as of FY2014-2019 are applied to both the 2020 and 2021 SCMEP.

Using the above dataset, we present findings about medium-term economic growth and sales outlooks and their subjective uncertainty. The main variables used in the analysis and the summary statistics are listed in **Table 1**.

3. Results

3-1. Medium-term Economic Growth Outlook

[5] The specific choices for the 2020 survey are "through September 2020," "October-December 2020," "January-March 2021," "April-June 2021," "July-September 2021," "October-December 2021," "early 2022," "late 2022," and "2023 or later." The choices for the 2021 survey are "I think the pandemic has already ended," "October-December 2021," "January-March 2022," "April-June 2022," "July-September 2022," "October-December 2022," "January-March 2023," "April-June 2023," "July-September 2023," "October-December 2023," and "2024 or later."

Table 2 compares the mean medium-term outlook of the real economic growth rate (on an annual basis: ΔGDP^e) for 2019, 2020, and 2021. The medium-term growth rate expectation declined significantly in 2020 but rebounded in 2021. However, the subjective uncertainty of the medium-term growth rate (90% confidence interval for point forecasts: GDP^e_unc) increased significantly in 2020 and declined slightly in 2021. The differences between the figures for each year are significant at the 1% level for both the point forecasts of the economic growth rate and its uncertainty. The figures are similar for the subsample of the panel firms that responded to all three surveys (Panel B of the table), so there is little bias arising from compositional change.[6]

Table 3 shows the distribution of subjective uncertainty. The number of firms with wide 90% confidence intervals (i.e., high subjective uncertainty) for the forecast of economic growth increased significantly in 2020 compared to 2019, and the number of firms with narrow confidence intervals (i.e., low subjective uncertainty) decreased significantly. In the 2021 survey, the trends were reversed.

Table 4 shows the expected duration until the end of the COVID-19 pandemic ($Covid\_end^e$) in the 2020 and 2021 surveys.[7] The figures indicate the mean number of quarters before the end of the pandemic. Mean figures by industry and region are also reported. The mean duration in the 2020 survey was 5.9 quarters ahead, while the mean in the 2021 survey was 4.2 quarters ahead (Panel A). However, since the timing of the survey itself differs by about five quarters, the expected end of the pandemic has been delayed by nearly one year compared to the expected timing as of 2020. Panel B of the table shows the results for each industry. There are no marked differences by industry, but the expected period is slightly shorter for manufacturing firms and slightly longer for retail firms. The results by region (Tokyo Prefecture, Tokyo Metropolitan Area, three major metropolitan areas, and others) based on the location of the firm's headquarters are shown in Panel C of the table, and the differences by region are small.[8] In the 2020 survey, the expected time until the end of the pandemic for firms headquartered in Tokyo was longer, whereas in the 2021 survey, it was longer for firms outside the three major metropolitan areas.

There is a significant positive correlation at the firm-level between the expected end of the

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[6] The tabulation results of economic growth forecast and its uncertainty by industry and headquarters location are reported in **Appendix Table A1**.

[7] Strictly speaking, the mean figures of the two surveys cannot simply be compared, because, as explained in the previous section, the number of choices are different in 2020 and 2021 surveys. The choice "2023 or later" option in the 2000 survey is calculated as 9.5 quarters ahead, and the choice "2024 or later" in the 2021 survey is calculated as 11 quarters ahead.

[8] The Tokyo metropolitan area includes Saitama, Chiba, Tokyo, and Kanagawa prefectures. The three major metropolitan areas include Gifu, Aichi, Mie, Kyoto, Osaka, Hyogo, and Nara prefectures.

pandemic in the 2020 and 2021 surveys, with firms that originally expected the pandemic to last longer tending to make the same prediction in the 2021 survey. However, since the correlation coefficient is not very high at about 0.27, a significant number of firms have either accelerated or delayed their expectations.

Using pooled data from the 2020 and 2021 surveys, **Table 5** shows the estimated relationship between the expected end of the COVID-19 pandemic and the expected economic growth rate, controlling for survey year, firm size (logarithm of the number of employees), industry dummies, and headquarters location (dummy for three major metropolitan areas). [9] According to the OLS estimation (Column (1)), the coefficient of the expected end of the pandemic ($Covid\_end^e$) is significantly negative at the 1% level, indicating that firms that expect the pandemic to last longer tend to make lower medium-term economic growth rate forecasts. The economic growth rate forecast is significantly lower in the 2020 survey, indicating that the macroeconomic outlook has improved in 2021. The same result is observed in the FE estimation that considers firm fixed effects (Column (2)), with a relationship where the growth rate forecast becomes lower as the expected duration of the pandemic increases. [10]

Columns (3) and (4) of the table show the estimation results with the uncertainty of the economic growth forecast (GDP^e_unc) as the dependent variable. According to the OLS estimation, the coefficient for the expected end of the pandemic is significantly positive at the 1% level, indicating that the longer a firm expects it to take until the end of the COVID-19 pandemic, the more uncertain its macroeconomic growth forecasts are. In the FE estimation, the coefficient for the expected duration of the pandemic is positive but statistically insignificant, whereas the coefficient for the 2020 survey dummy is significantly positive, indicating that firms' subjective uncertainty about the outlook for economic growth has decreased by the end of 2021.

3-2. Medium-term Sales Outlook

Table 6 compares the medium-term outlook for sales growth ($\Delta Sales^e$) and its uncertainty ($Sales^e\_unc$) in the 2019, 2020, and 2021 surveys. The medium-term outlook for sales growth declined significantly in 2020 and rose significantly in 2021, partly because of a rebound. However, uncertainty about the medium-term outlook for sales growth increased significantly in

[9] Industry dummies and the three metropolitan area dummy were not included as explanatory variables in the FE estimations. While not reported in the table, estimates restricted to the subsample of firms that responded to all three surveys show little difference.

[10] As noted before, the number of employees in the 2021 survey is the same as in 2020, so it is excluded from the explanatory variables in the FE estimation.

2020 and remains high in 2021 (both significantly different from the 2019 survey at the 1% level). While not reported in the table, the results do not differ significantly when calculated only for panel firms that responded to all the three surveys. **Table 7** shows the distribution of uncertainty in the sales outlook. The pattern in which uncertainty remains high at the end of 2021 differs from the uncertainty in the macroeconomic growth rate (somewhat lowered in the 2021 survey).

The tabulation results of the sales forecast and its uncertainty by industry and headquarters location are presented in **Appendix Table A2**. There are large differences in the medium-term forecast of sales growth by industry, while there are almost no differences in uncertainty by industry (Panel B). This result does not indicate that the COVID-19 pandemic has increased uncertainty in any particular industry but rather that there are large differences among firms within the same industry. By region (Panel C), the medium-term outlook for sales growth is slightly higher for firms headquartered in Tokyo and other metropolitan areas. The uncertainty also tends to be slightly higher in metropolitan areas, but the quantitative differences are small. In short, the pattern of change in sales outlook uncertainty between 2019, 2020, and 2021 is common across all industries and regions.

Table 8 shows the results of the estimations that explain the medium-term outlook for sales growth ($\Delta Sales^{e}$) using pooled data from the three surveys.[11] The explanatory variables are the sales growth rate over the past five years ($\Delta Sales_{it\text{-}6,\ t\text{-}1}$), survey year dummies, industry dummies, location of headquarters (a metropolitan area dummy), and firm size (number of employees expressed in logarithm). [12] According to the OLS estimation (Column (1)), firms that have experienced higher sales growth over the past five years tend to have a higher outlook for sales growth. The outlook is significantly lower in 2020 and significantly higher in 2021. However, in the FE estimation with firm fixed-effects (Column (2)), the coefficient of the sales growth rate over the past five years reverses to a significant negative value, possibly reflecting the effect of regression toward the mean. In the FE estimation, the outlook in the 2020 survey is significantly lower, and the outlook in the 2021 survey is significantly higher, similar to the OLS estimation.

Columns (3) and (4) of the table show the estimation results when the medium-term macroeconomic growth rate (ΔGDP^{e}) is added as an explanatory variable. The coefficient of the outlook for economic growth is significantly positive at the 1% level, indicating that the outlook for sales is linked to the outlook for the macroeconomy. In the FE estimation, the absolute value of the coefficient is smaller, however, it is still positive at a high significance level. This suggests that the relationship between the sales outlook and macroeconomic outlook is not due to firms'

[11] The results are essentially unchanged even if we restrict to the subsample of firms that responded to all three surveys.

[12] Industry dummies and the metropolitan area dummy are not included as explanatory variables in the FE estimation.

response bias (e.g., optimism or pessimism), but rather that the macroeconomic outlook is a precondition for business planning.

Columns (5) and (6) of the table show the results obtained using the expected duration of the COVID-19 pandemic ($Covid\_end^e$) as an additional explanatory variable. These estimations use data from two surveys in 2020 and 2021, therefore, the year dummy is for the 2020 survey only.[13] Controlling for past sales growth, survey year, firm size, and industry, the outlook regarding the end of the pandemic is statistically insignificant. Unlike the outlook for economic growth, the lack of association between the expected duration of the COVID-19 pandemic and sales growth is possibly due to the fact that the impact of the pandemic is negative for some firms, but also positive for others, and that there are a variety of factors other than the COVID-19 pandemic that affect individual firms' performance.

Table 9 reports the estimation results using sales outlook uncertainty ($Sales^e\_unc$) as the dependent variable. In these estimations, the volatility of sales over the past five years ($Sales\_vol$) is used as an explanatory variable. We also use the uncertainty in the outlook for macroeconomic growth over the next five years (GDP^e_unc) and the expected end of the COVID-19 pandemic ($Covid\_end^e$) as additional explanatory variables.

According to the OLS estimation (Column (1)), after controlling for survey year, firm size, and industry, firms with higher sales volatility over the past five years have higher sales outlook uncertainty, which is a natural result. The coefficients for the 2020 and 2021 dummies are positive at high significance levels and their absolute values are of similar magnitude. However, in the FE estimation with firm fixed effects (Column (2)), the coefficient for sales volatility over the past five years is positive, but loses statistical significance. The coefficients for the 2020 and 2021 dummies are still positive and significant at the 1% level. The result confirms that the uncertainty of firms' sales outlook has increased compared to that before the COVID-19 pandemic and remains high at the end of 2021.

When the medium-term outlook uncertainty of economic growth (GDP^e_unc) is used as an additional explanatory variable (Columns (3) and (4)), this coefficient is positive and significant at the 1% level in both the OLS and FE estimations, indicating that macroeconomic outlook uncertainty is linked to uncertainty about a firm's sales outlook. Note that, in this case, the coefficients for the 2020 and 2021 survey dummies almost lose statistical significance. In contrast, when the expected duration until the end of the pandemic ($Covid\_end^e$) is used as an explanatory variable (Columns (5) and (6)), this coefficient is positive but statistically insignificant.[14] Our

[13] The coefficient of $\Delta Sales_{it-6,t-1}$ is not estimated in the FE estimation (Column (6)), because both the 2020 and 2021 data commonly use FY2014-2019 figures for sales changes over the past five years, as noted before.

[14] This estimation uses only two years of data from the 2020 and 2021 surveys, so the year

interpretation regarding this, is that various firm-specific factors other than COVID-19 have a strong impact on sales outlook uncertainty.

4. Conclusion

This study documents the medium-term macroeconomic and sales outlooks and their subjective uncertainty over the next five years for a sample of Japanese firms during the COVID-19 pandemic, based on an original firm survey conducted in 2019 before the COVID-19 pandemic, and in 2020 and 2021 during the pandemic. The important contributions of this study are that it uses survey data that ask about the subjective uncertainty of firms in the form of a probability distribution of point forecasts, and that it deals with medium-term outlooks for five years in the future, rather than short-term outlooks for the next quarter or the next year.

The major findings are summarized as follows. First, compared to before the COVID-19 pandemic, uncertainty over the growth outlook has increased substantially. This is not surprising, but the difference is that macroeconomic uncertainty declined slightly by the end of 2021, while uncertainty about sales has remained high. Second, a macroeconomic outlook is strongly related to the outlook regarding a firm's sales, and macroeconomic uncertainty is strongly related to uncertainty about a firm's sales, which is clearly confirmed even after controlling for firm fixed-effects. Third, there is significant variation among firms in their expectations regarding the timing of the end of the pandemic, which is closely related to the outlook for macroeconomic growth and its uncertainty. In contrast, no significant relationships were observed between the duration of the pandemic and the forecast of sales and its uncertainty. This is possibly because the impact of COVID-19 is negative for some firms, but also positive for others, and various firm-specific factors other than COVID-19 affect the outlook for sales of individual firms.

These results confirm the characteristics of the COVID-19 pandemic as an uncertain shock. At the time of writing, the number of people infected with COVID-19 in Japan is rapidly increasing, and the future course of the pandemic remains unpredictable. This suggests that it is important for economic policy to continue to take measures to combat infectious diseases to avoid increasing uncertainty among businesses and to make policies related to the pandemic as predictable as possible.

Although analyzing the relationship between uncertainty and firm behavior is beyond the scope

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dummy is for the 2020 survey only. The coefficient of *Sales_vol* is not estimated in the FE estimation (Column (6)), because the sales volatility between FY2014-2019 is applied for both survey years.

of this study, it is possible that the increased uncertainty in the medium-term outlook during the pandemic has affected medium- to long-term investment behavior, such as R&D activities, employee hiring, and business restructuring. Such an analysis could be conducted in the future when data on actual firm behavior for FY2020 and FY2021 become available.

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Table 1. Major variables and summary statistics

	Obs.	Mean	Std. dev.	Min	Max
ΔGDP^e	6,444	0.475	2.704	-10	10
GDP^e_unc	5,894	1.954	2.009	0.05	6
$\Delta Sales^e$	6,269	7.460	16.552	-50	100
$Sales^e\_unc$	5,764	11.745	5.344	0.5	22.5
$\Delta Sales_{it\text{-}6,\ t\text{-}1}$	5,641	0.050	0.267	-2.375	3.679
$Sales\_vol$	5,061	0.081	0.070	0	1.751
$Covid\_end^e$	4,620	4.787	2.780	0	10.5

Notes: Pooled data from the 2019, 2020, and 2021 surveys. GDP^e_unc and $Sales^e\_unc$ represent the uncertainty regarding real economic growth rate and sales growth rate for the next five years. $\Delta Sales_{it\text{-}6,\ t\text{-}1}$ is the five-year sales growth rate until the year prior to the survey. $Sales\_vol$ is the volatility (coefficient of variation) in five-year sales until the year prior to the survey. $Covid\_end^e$ is the number of expected until the end of the COVID-19 pandemic.

Table 2. Mean and uncertainty of economic growth rate

		2019	2020	2021
A. All firms	ΔGDP^e	0.39	-0.49	1.01
	$GDP^e\ unc$	1.25	2.64	2.13
B. Panel firms	ΔGDP^e	0.36	-0.41	1.10
	$GDP^e\ unc$	1.23	2.63	2.28

Notes: The economic growth rate is annual. Uncertainty is defined as the subjective 90% confidence interval for the point outlook of the economic growth rate.

Table 3. Distribution of subjective uncertainty over the medium-term economic growth rate

Uncertainty	2019 survey	2020 survey	2021 survey
Less than ±0.1%	13.3%	4.5%	7.8%
±0.1-0.3%	12.8%	3.5%	6.4%
±0.3-0.5%	19.2%	13.2%	17.9%
±0.5-1%	27.2%	13.1%	11.9%
±1-2%	9.5%	14.6%	15.0%
±2-3%	4.7%	13.3%	11.0%
±3-5%	5.5%	16.7%	15.5%
±5% or lrger	7.6%	21.0%	14.6%

Note: Uncertainty is the subjective 90% confidence interval for the point outlook of the economic growth rate (on an annual basis) over the next five years.

Table 4. Expected duration until the end of the COVID-19 pandemic (by industry and region)

		2020 survey	2021 survey
A. All firms		5.94	4.20
B. Industry	Manufacturing	5.60	4.06
	Wholesale	6.29	4.17
	Retail	6.27	4.61
	Information and communications	6.27	4.17
	Services	6.14	4.51
C. Region	Tokyo prefecture	6.06	4.18
	Tokyo metropolitan area	5.83	4.09
	Three metropolitan areas	5.97	4.08
	Other regions	5.91	4.34

Note: The figures indicate the expected number of quarters until the end of the COVID-19 pandemic.

Table 5. Relationship between the expected end of the pandemic and macroeconomic outlook

	(1)	(2)	(3)	(4)
	ΔGDP^e	ΔGDP^e	GDP^e unc	GDP^e unc
Covid end^e	-0.068 ***	-0.139 ***	0.044 ***	0.049
	(0.018)	(0.048)	(0.013)	(0.033)
2020 dummy	-1.386 ***	-1.354 ***	0.390 ***	0.280 **
	(0.115)	(0.169)	(0.076)	(0.116)
Firm size	yes	yes	yes	yes
Industry dummies	yes	no	yes	no
Region dummy	yes	no	yes	no
Firm FE	no	yes	no	yes
Nobs.	4,033	4,092	3,728	3,784
R-squared	0.0549	0.1376	0.0168	0.0209

Notes: OLS estimates (Columns (1) and (3)) and FE estimates (Columns (2) and (4)) using data from the 2020 and 2021 surveys. The figures in parentheses are the robust standard errors. ***: $p<0.01$, **: $p<0.05$. The R-squared value of the FE estimations is within R^2. *Covid-end*^{e} is the expected quarter until the end of the COVID-19 pandemic. Firm size is the number of employees (expressed logarithmically). The regional dummy is a dummy variable for the three metropolitan areas.

Table 6. Medium-term sales outlook and its uncertainty

		2019	2020	2021
A. All firms	$\Delta Sales^e$	6.26	3.40	10.69
	$Sales^e\_unc$	7.67	9.10	9.31
B. Panel firms	$\Delta Sales^e$	5.89	3.25	10.20
	$Sales^e\_unc$	7.38	9.21	9.31

Notes: The sales growth outlook is a percentage of the previous year of the survey. Uncertainty is the subjective 90% confidence interval for the sales growth outlook.

Table 7. Distribution of subjective uncertainty over sales outlook

Uncertainty	2019 survey	2020 survey	2021 survey
Less than ±1%	4.5%	4.0%	4.4%
±1-3%	11.9%	6.2%	6.6%
±3-5%	24.1%	22.6%	21.6%
±5-7%	22.3%	15.4%	14.2%
±7-10%	12.5%	17.6%	18.4%
±10-15%	12.4%	16.6%	15.6%
±15-20%	5.0%	8.4%	8.3%
±20% or larger	7.2%	9.3%	11.0%

Note: Uncertainty is the subjective 90% confidence interval for the point forecast of sales growth (compared with the previous year of the survey) over five years.

Table 8. Estimation result for medium-term sales outlook

	(1)	(2)	(3)	(4)	(5)	(6)
	$\Delta Sales^{e}$	$\Delta Sales^{e}$	$\Delta Sales^{e}$	$\Delta Sales^{e}$	$\Delta Sales^{e}$	$\Delta Sales^{e}$
$\Delta Sales_{it-6,\ t-1}$	4.261 ***	-7.906 ***	4.536 ***	-7.460 ***	3.437 ***	
	(0.973)	(1.966)	(1.001)	(1.975)	(1.276)	
2020 dummy	-2.368 ***	-3.097 ***	-1.586 ***	-2.488 ***	-6.535 ***	-7.318 ***
	(0.483)	(0.514)	(0.494)	(0.533)	(0.562)	(0.773)
2021 dummy	4.419 ***	3.945 ***	3.737 ***	3.229 ***		
	(0.481)	(0.569)	(0.483)	(0.576)		
$\Delta GDP^{e}_{it-1.\ t+5}$			0.757 ***	0.467 ***		
			(0.087)	(0.105)		
Covid end^{e}					-0.163	0.102
					(0.108)	(0.218)
Firm size	yes	yes	yes	yes	yes	yes
Industry dummies	yes	no	yes	no	yes	no
Region dummy	yes	no	yes	no	yes	no
Firm FE	no	yes	no	yes	no	yes
Nobs.	5,578	5,641	5,193	5,250	3,631	3,631
R-squared	0.0580	0.0738	0.0736	0.0785	0.0565	0.1320

Notes: OLS estimates (Columns (1), (3), and (5)) and FE estimates (Columns (2), (4), and (6)), with robust standard errors in parentheses. ***: p<0.01. The R-squared value of the FE estimations is within R^2. $\Delta Sales_{it-6,\ t-1}$ is sales growth over the past 5 years. $\Delta GDP^{e}_{it-1,\ t+5}$ is the expected economic growth rate over the next 5 years. *Covid-end*^{e} is the expected quarter until the end of the COVID-19 pandemic. Firm size is the number of employees (expressed logarithmically). The region dummy variable is for the three metropolitan areas.

Table 9. Estimation result for uncertainty over sales

	(1)	(2)	(3)	(4)	(5)	(6)
	Sales_unc	*Sales_unc*	*Sales_unc*	*Sales_unc*	*Sales_unc*	*Sales_unc*
Sales_vol	4.548 ***	0.619	4.633 ***	4.528	3.509 ***	
	(1.199)	(3.623)	(1.195)	(3.839)	(1.355)	
2020 dummy	1.002 ***	1.171 ***	-0.005	0.374	-0.032	-0.222
	(0.196)	(0.219)	(0.207)	(0.247)	(0.203)	(0.316)
2021 dummy	0.979 ***	1.125 ***	0.250	0.471 *		
	(0.174)	(0.242)	(0.179)	(0.257)		
GDP^e *unc*			0.747 ***	0.604 ***		
			(0.044)	(0.067)		
Covid end^e					0.026	0.090
					(0.038)	(0.091)
Firm size	yes	yes	yes	yes	yes	yes
Industry dummies	yes	no	yes	no	yes	no
Region dummy	yes	no	yes	no	yes	no
Firm FE	no	yes	no	yes	no	yes
Nobs.	5,006	5,061	4,538	4,584	3,266	3,266
R-squared	0.0178	0.0192	0.0945	0.0689	0.0110	0.0017

Notes: OLS estimates (Columns (1), (3), and (5)) and FE estimates (Columns (2), (4), and (6)), with robust standard errors in parentheses. ***: p<0.01, **: p<0.05, *: p<0.10. The R-squared value of the FE estimations is within R^2. *Sales_vol* is the coefficient of variation in sales over the past 5 years. GDP^e*_unc* is the uncertainty in the economic growth outlook over the next 5 years. *Covid-end*^{e} is the expected quarter until the end of the COVID-19 pandemic. Firm size is the number of employees (expressed logarithmically). The regional dummy is a dummy variable for the three metropolitan areas.

Appendix Table A1. Medium-term economic growth outlook and its uncertainty by industry and by region

		(1) Economic growth outlook			(2) Growth uncertainty		
		2019	2020	2021	2019	2020	2021
A. All firms		0.40	-0.47	1.01	1.26	2.64	2.18
B. Industry	Manufacturing	0.43	-0.45	1.08	1.28	2.62	2.21
	Wholesale	0.39	-0.45	0.94	1.19	2.66	2.04
	Retail	0.28	-0.14	0.93	1.15	2.37	1.98
	Information and communications	0.41	-0.59	0.93	1.52	2.78	2.32
	Services	0.35	-0.90	0.97	1.25	2.85	2.36
C. Region	Tokyo prefecture	0.39	-0.20	0.94	1.24	2.80	2.23
	Tokyo metropolitan area	0.43	-0.43	1.03	1.25	2.70	2.11
	Three metropolitan areas	0.46	-0.42	1.02	1.30	2.68	2.22
	Other regions	0.33	-0.54	1.01	1.20	2.61	2.13

Note: Figures for all firms include firms classified in other industries.

Appendix Table A2. Medium-term sales outlook and Its Uncertainty by industry and region

		(1) Sales outlook			(2) Sales uncertainty		
		2019	2020	2021	2019	2020	2021
A. All firms		6.26	3.40	10.69	11.18	12.03	12.07
B. Industry	Manufacturing	6.67	3.61	10.69	11.34	12.26	12.42
	Wholesale	5.24	2.90	9.70	10.95	11.83	11.41
	Retail	2.86	1.84	6.19	10.51	11.67	11.30
	Information and communications	12.85	7.24	14.71	11.64	11.60	12.53
	Services	5.57	3.27	14.65	11.11	11.97	12.15
C. Region	Tokyo prefecture	9.28	5.24	12.95	11.84	12.27	12.42
	Tokyo metropolitan area	8.43	4.44	12.15	11.68	12.28	12.15
	Three metropolitan areas	7.65	4.26	11.80	11.54	12.25	12.11
	Other regions	4.85	2.54	9.48	10.80	11.82	12.03

Note: Figures for all firms include firms classified in other industries.