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Uncertainty, corporate investment, and hiring: The case of COVID-19

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ABSTRACT

We investigate how the COVID-19 pandemic affected CFOs' self-assessed uncertainty about revenue growth and its impact on investment and hiring plans, using data from two consecutive surveys of the same CFOs conducted before and during the pandemic. Following the WHO's declaration, firm-level uncertainty increased, and investment plans were restrained. Furthermore, heightened firm-level uncertainty dampened firms' investment and hiring plans, even after controlling for other pandemic-related factors, as well as financial and investment flexibility.

1. Introduction

Recent research shows that uncertainty affects corporate investment and hiring plans (e.g. Bloom et al., 2007, Bloom, 2009, Bontempi et al., 2010), and the negative impact of uncertainty on risky R&D investments and firm value (Bansal et al. 2023). Companies collect and analyze information about future demand for their products and services to develop their investment and hiring plans. If the collected information indicates increasing uncertainty in business conditions, companies may reduce or postpone their investment and hiring.

Several studies use survey data on firms to examine changes in managers' forecasts of firm-level uncertainty and its economic effects (e. g. Bachmann et al., 2021, and Fiori and Scoccianti, 2023). However, since managers usually have incentives to avoid uncertainty about their own firm's earnings, they may behave in a way that reduces uncertainty ex-ante. In the normal decision-making process, some unobservable factors might affect both the uncertainty reduction and investment behavior. Additionally, investment behavior and firm-level uncertainty might be interdependently determined.

To address these endogeneity issues between firm-level uncertainty and investment, we focus on the COVID-19 pandemic. The COVID-19 pandemic was an unpredictable event for all firms; therefore, companies could not take any proactive measures, and the increase in uncertainty arising from it can be viewed as an exogenous shock. Therefore, we can examine how the increase in uncertainty affects investment planning in a setting with minimal concern about endogenous or anticipatory choices.

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Specifically, we conducted two surveys on the same panel of CFOs on their investment and hiring plans, one before COVID-19 and the other during the pandemic, and collected data on changes in uncertainty and revisions to investment and hiring plans. Using these unique data, we examine the impact of pandemic-induced changes in firm-level uncertainty on investment plans. This is the first paper to study the effects of the change in self-assessed own-firm uncertainty of a consistent panel of top executives on own-firm investment and hiring plans.

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2. Research design

The data we use are from two surveys for CFOs of U.S. and Japanese companies conducted as part of the DUKE CFO Global Business Outlook¹: the first during March–April 2019 and the second during March–April 2020.² Since the purpose of this study is to examine the effect of changes in uncertainty between 2019 and 2020 on corporate investment and hiring plans, we limit the sample to the respondents who provided the key variables for both the first and second surveys. Although requiring responses to both surveys limits the number of usable observations, this procedure is an essential part of our design to allow us to isolate and study the effects from changes in firm-level uncertainty during COVID pandemic. Restricting observations with variables used in the analysis, the final sample size is 147 (135 US firms and 12 Japanese firms).

The questions for the two surveys are posted on the DUKE CFO Global Business Outlook webpage.³ In March 2019 and March 2020, each CFO provided base-case forecasts for revenue growth. The CFOs also provided a "very good scenario" and a "very bad scenario" for revenue growth forecasts (10th and 90th percentile revenue growth forecasts, respectively). We define firm-level uncertainty (*Uncertainty*) as the difference between the survey-provided values for "very good scenario" and "very bad scenario". Thus, *Uncertainty* represents the range of the company's revenue growth 80 % confidential interval. This measurement is similar to that employed by Fiori and Scoccianth (2023). Based on this, we measure the change in uncertainty faced by the firm by defining *Change in Uncertainty* as the difference in *Uncertainty* between 2019 and 2020.

We hypothesize that the increase in firm-level uncertainty attributable to the COVID-19 pandemic is associated with a revision of firms' plans; that is, to reduce planned investment and employment. Since the COVID-19 pandemic was an unpredictable event as of March 2019, the framework of this study allows us to analyze the impact of firm-level uncertainty on investment and employment planning without considering the endogenous effects between firm-level uncertainty and investment. In addition, it is important to note that since the survey measures the difference in uncertainty projected by the same CFO, we implicitly control for the effect of individual respondent attributes.

To isolate the effect of increased firm-level uncertainty on corporate investment and hiring plans, we control for other factors to the extent possible. A potential concern about our analysis could be that a negative macro shock might simultaneously cause not only an increase in the second-order moment (uncertainty effect) but also a decrease in the first-order moment (demand effect). To address this concern, we control for changes in the first-order moment (the mean of the firm-specific distribution of revenue growth forecast) using the forecast of expected revenue growth rates from the same survey (*Change in Revenue Growth Forecast*). We also control whether the response is made after the March 11, 2020 pandemic declaration by WHO (*Post-Pandemic Declaration*). In addition, to account for the possibility that the economy-wide shock affects firms differently across industries, we control for industry fixedeffects (*Industry dummies*), as well as firm size classified by revenue (*Firm* *size dummies*). Using the same CFO Survey data by Duke University that we use, Barry et al. (2022) report that workplace, investment, and financial flexibilities contribute to stronger employment and investment during the COVID-19 shock. Therefore, we also control for *Investment Flexibility* and *Changes in Financial Flexibility* from the previous year.

To measure revisions of firms' investment and employment plans, we use the year-on-year percentage change in capital spending (*Capex Growth Forecast*) and the number of domestic full-time employees (*Employee Growth Forecast*), as ascertained in the 2019 and 2020 surveys; we define *Change in Capex Growth Forecast* and *Change in Employee Growth Forecast* as the first difference between 2019 and 2020 for *Capex Growth Forecast* and *Employee Growth Forecast*, respectively.

Table 1 presents the descriptive statistics. Detailed definitions of the variables used in this study are summarized in Table A1 in the online appendix. The means of *Change in Capex Growth Forecast* and *Change in Employee Growth Forecast* are negative (-10.72 and -2.94, respectively), indicating that firms made negative revisions to their investment and employment plans due to COVID-19. On the other hand, the mean of *Change in Uncertainty* is 3.50, indicating an increase in firm-level uncertainty due to COVID-19. This result is consistent with Fiori and Scoccianti (2023). Furthermore, the mean of *Change in Revenue Growth Forecast* is -10.19, indicating that the negative macro shock is associated not only an increase in the second-order moment (uncertainty effect) but also a decrease in the first-order moment (demand effect).

3. Empirical results

Table 2 presents the results of the analysis of the changes in revenue growth forecasts and investment and employment plans before and after the pandemic declaration announced by the WHO on March 11, 2020. The coefficient of *Post-Pandemic Declaration* indicates a significant increase in the uncertainty of the revenue growth forecast (column (1)) and a significant decrease in the mean level of forecasted revenue growth (column (2)). Notably, after the post-pandemic declaration, planned capital investment (column (3)) and planned employment growth (column (4)) are revised downward. Thus, *Post-Pandemic Declaration* captures the direct impact of the pandemic on a firm's performance and financial planning.

Table 3 presents the main results: the effect of change in firm-level uncertainty on capital spending plans and on plans for employment growth, controlling for the overall impact of the pandemic using the

Table 1
Descriptive statistics.

Variable	Ν	Mean	S.D.	25th percentile	Median	75th percentile
Change in Capex	134	-10.72	51.72	-25.00	-2.00	4.00
Growth						
Forecast						
Change in	137	-2.94	19.76	-5.00	0.00	1.00
Employee						
Growth						
Forecast						
Change in	147	3.50	21.74	-5.00	0.00	8.00
Uncertainty	1.45	10.10	06.05	10.00	F 00	0.00
Change in	147	-10.19	26.25	-13.00	-5.00	0.00
Crowth						
Forecast						
Post-Pandemic	147	0.48	0.50	0.00	0.00	1.00
Declaration	117	0110	0.00	0.00	0.00	1100
Change in	147	-0.21	1.26	-1.00	0.00	0.00
Financial						
Flexibility						
Investment	131	3.26	1.76	2.00	3.00	5.00
Flexibility						
Private	147	0.72	0.45	0.00	1.00	1.00
Japan	147	0.08	0.27	0.00	0.00	0.00

¹ Although the survey period is different, Sharpe and Suarez (2021) also use the DUKE CFO Global Business Outlook survey and examine the sensitivity of investment plans to interest rate expectations.

² Cororaton and Rosen (2021) find that the ability to obtain Paycheck Protection Program (PPP) loans, provided by the U.S. federal government as corporate support for COVID-19, are associated with different outcomes regarding sales and employment growth. We note, however, that our study is not affected by these outcomes because the second round of our survey was completed before U.S. firms were able to receive PPP financing, which did not begin until April or May 2020 at the earliest.

³ https://cfosurvey.fuqua.duke.edu/2019q1/survey/index.htm, https:// cfosurvey.fuqua.duke.edu/2020q1/survey/index.htm

Table 2

Effect of COVID-19 shock on revenue growth forecasts and investment and employment plans.

	Change in uncertainty (1)	Change in revenue growth forecast (2)	Change in capex growth forecast (3)	Change in employee growth forecast (4)
Post-Pandemic	14.58***	-11.07***	-19.81**	-8.01**
Declaration	(4.45)	(-2.94)	(-2.00)	(-2.51)
Private	7.52	2.16	22.14	-0.24
	(1.29)	(0.43)	(1.50)	(-0.07)
Japan	10.86	-4.36	7.75	10.39
	(1.27)	(-0.39)	(0.27)	(1.21)
Constant	-16.29**	-3.37	-50.66**	1.75
	(-2.12)	(-0.52)	(-2.00)	(0.33)
Firm size	yes	yes	yes	yes
dummies				
Industry	yes	yes	yes	yes
dummies				
Observations	147	147	134	137
Adjusted R- squared	0.11	0.13	-0.00	0.17

Note: The t-statistics, in parentheses, are based on robust standard errors. *, **, and *** indicate significance at 0.10, 0.05, and 0.01 levels, respectively.

Table 3 Effect of change in own-firm uncertainty on their investment and employment plans.

	Change in capex growth forecast		Change in growth f	employee forecast
	(1)	(2)	(3)	(4)
Change in Uncertainty	-0.37**	-0.41*	-0.16***	-0.15**
	(-2.09)	(-1.89)	(-2.88)	(-2.13)
Change in Revenue Growth	0.25	0.26	0.47***	0.41***
Forecast	(1.46)	(1.21)	(5.52)	(4.00)
Post-Pandemic Declaration	-11.29	-7.55	0.01	0.26
	(-1.02)	(-0.67)	(0.00)	(0.09)
Change in Financial Flexibility	6.21*	6.37**	2.06	2.16
	(1.93)	(2.10)	(1.44)	(1.46)
Investment Flexibility		6.25**		1.16
		(2.05)		(1.53)
Private	25.95	15.05	-0.28	-3.47
	(1.65)	(0.80)	(-0.07)	(-0.78)
Japan	12.50	-0.70	11.63	9.00
	(0.42)	(-0.02)	(1.62)	(1.15)
Constant	-53.94**	-58.51**	1.77	0.36
	(-2.04)	(-2.02)	(0.31)	(0.05)
Firm size dummies	yes	yes	yes	yes
Industry dummies	yes	yes	yes	yes
Observations	134	122	137	123
Adjusted R-squared	0.04	-0.02	0.55	0.44

Note: The t-statistics, in parentheses, are based on robust standard errors. *, **, and *** indicate significance at 0.10, 0.05, and 0.01 levels, respectively.

pandemic declaration. We also control for changes in the mean level of revenue growth forecast, industry effects, firm size, changes in financial flexibility and investment flexibility. Even controlling for these variables, we find that *Change in Uncertainty* negatively affects plans for both capital spending and employment growth, which is consistent with our hypothesis. A one standard deviation increase in *Change in Uncertainty* reduces *Change in Capex Growth Forecast* by 7.96 % in column (1) and *Change in Employee Growth Forecast* by 3.56 % in column (3).

Interestingly, while the regression results show a strong effect of firm-level uncertainty in the revision of investment and employment plans, factors such as the pandemic declaration and changes in expected revenue growth forecasts no longer have significant explanatory power in the revision of investment plans.

4. Conclusion

The contribution of this study is that it shows the channels through which firm-level uncertainty affects investment and employment planning in a context with minimal endogeneity concerns. Our analysis of a consistent panel of CFOs indicates that an increase in self-assessed, ownfirm uncertainty leads to a decrease in own-firm investment and hiring plans after controlling other factors such as the pandemic declaration and changes in expected revenue growth forecasts.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.econlet.2024.112025.

Data availability

The data that has been used is confidential.

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