



COVID-19 pandemic and firm performance: Cross-country evidence[☆]

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ABSTRACT

Using financial data on firms worldwide, we assess the impact of COVID-19 on corporate performance. We show that firm performance deteriorates during the COVID-19 pandemic. The adverse effects of COVID-19 on firm performance are less pronounced in countries with better healthcare systems, more advanced financial systems, and better institutions. Finally, uncertainty avoidance strengthens the adverse effect of the COVID-19 pandemic.

1. Introduction

The pandemic of Novel Coronavirus (COVID-19) triggered a massive spike in uncertainty and broad impacts on health care, population mobility, and economic growth (Baker, Bloom, Davis, & Terry, 2020, p. 26983). Most studies of the burgeoning literature on COVID-19 focus on the effect of pandemic outbreak on financial markets, including stock market volatility (Narayan & Phan, 2020; Baek, Mohanty, & Glambosky, 2020), liquidity (Just & Echaust, 2020), riskiness (Rizwan, Ahmad, & Ashraf, 2020), and firm returns (Narayan, Phan, & Liu, 2020; Shen, Fu, Pan, Yu, & Chen, 2020). On the contrary, firm-level analysis of the real effect of COVID-19 is scarce, in part, due to data limitation. It is worthwhile to investigate the impact of such a severe public health crisis on corporate performance. This research aims to assess the near-term and medium-term real effects of the COVID-19 associated shocks regarding supply disruption, halted production, and uncertainties. We attempt to test whether COVID-19 hurts firm performance and quantify the magnitude of the real effect.

Using the quarterly firm-level accounting data from Compustat Global and Compustat North America during 2020Q1–2020Q3, complemented with data on cumulative cases and new cases of COVID-19 from the World Health Organization (WHO), we construct a large international sample. We find that firms' return on assets (ROA) is negatively associated with the severity of the COVID-19 pandemic in the baseline regression, measured by cumulative or new cases. While firms have suffered due to COVID-19, we observe remarkable cross-country heterogeneity. Therefore, we exploit how the adverse effect of the COVID-19 pandemic on corporate performance depends on country-specific variables. First, we find that more healthcare expenditure is effective in combating the adverse

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shock of COVID-19. Second, we find that pandemic less hurt firms in countries with better financial development. Third, better institutional quality, in terms of accountability, government effectiveness, regulatory quality, and the rule of law, helps firms to get through difficulties during the COVID-19 downturn. Finally, uncertainty avoidance strengthens the adverse effect of COVID-19.

Our paper adds to the growing literature on the effects of COVID-19 on the real economy. First, most empirical studies were conducted immediately after the inception of the COVID-19 pandemic. At that time, stock returns are the only available measure for firm performance (see, for example, Ding, Levine, Lin, & Xie, 2020, p. 27055; Fahlenbrach, Rageth, & Stulz, 2020; Hassan, Hollander, van Lent, & Tahoun, 2020, p. 26971). As financial statements of recent quarters have been released and become available for empirical studies, we can evaluate the effect of COVID-19 on firm performance measured by accurate accounting variables. Second, we uncover how cross-country heterogeneities, such as healthcare systems, financial development, governance, and uncertainty avoidance, influence the relationship between COVID-19 and firm performance. This cross-country analysis enriches the main findings from a global perspective. Third, we shed light on the studies in international business on culture and firm behavior. Extant literature studies how uncertainty avoidance shapes firm behavior (Allred & Swan, 2004; Pan, 2002). We examine this issue in a unique setting of the pandemic when uncertainty is heightened.

The remainder of this article is structured as follows. In Section 2, we show our data sources and present our econometric strategy. Section 3 presents baseline results and further exploits cross-country heterogeneity, including country-specific healthcare systems, financial development, governance, and uncertainty avoidance. Section 4 concludes this paper with a review of its central insights and policy implications.

2. Data, empirical method and sample

We collect data on cumulative cases and new cases of COVID-19 from the website of the World Health Organization (WHO),¹ which tabulates reported daily numbers by country. The WHO declared it a Public Health Emergency of International Concern on January 30, 2020, named the disease COVID-19 on February 11 and classified COVID-19 as a pandemic on March 11, 2020.

We collect firm-level accounting variables from Compustat Global and Compustat North America for companies worldwide. We restrict the sample period to 2020Q1–2020Q3. Note that only a few companies have released financial reports on 2020Q3.

To evaluate the adverse impact of COVID-19 pandemic on firm performance, we consider the following baseline model:

$$\text{Performance}_{it} = c + \beta_1 \text{COVID19}_{ct} + \gamma \text{Firm controls}_{it-1} + \delta_i + \delta_j + \varepsilon_{it}$$

where i , j , c , and t denote firm, industry, country/economy, and year-quarter, respectively. Dependent variable Performance_{it} is the firm performance of firm i in year-quarter t , proxied by return on assets (ROA). We measure our key explanatory variable COVID19_{ct} by either the logarithm of cumulative COVID-19 cases or the logarithm of new COVID-19 cases over quarter t in country c where the firm is incorporated. We control for a set of firm characteristics as follows. *Firm Size* is the logarithm of the book value of total assets. *Leverage* is total debt divided by total assets in percentage. *Tangibility* is tangible assets (property, plant, and equipment) over total assets in percentage. *Cash Holding* is cash and short-term investments over total assets in percentage. *Cash Flow* is operating income before depreciation over total assets in percentage. All firm controls are lagged by one period to mitigate the potential effect of reserve causality. We include firm fixed effects to absorb time-invariant firm heterogeneity. In addition, we employ industry by year-quarter fixed effects to absorb any time-varying industry shocks. Firms are classified into Fama-French 48 industries based on the SIC code.² Robust standard errors are clustered at the country level to allow for arbitrage correlation of errors across firms within a country.

To examine how country-specific attributes influence the adverse impact of COVID-19 pandemic on firm performance, we extend the following baseline model:

$$\text{Performance}_{it} = c + \beta_1 \text{COVID19}_{ct} + \beta_2 \text{Country}_c + \beta_3 \text{COVID19}_{ct} \times \text{Country}_c + \gamma \text{Firm controls}_{it-1} + \delta_i + \delta_j + \varepsilon_{it}$$

We consider a couple of country-specific factors that may dampen or strengthen the adverse effect of COVID-19 pandemic. First, a healthcare system works as a safety net against the pandemic. We use the pre-pandemic value of health expenditure (% of GDP) and logarithm of health expenditure per capita (current US\$) from the World Development Indicators (WDI). Second, advanced financial intermediaries and financial markets could cushion pandemic shocks and alleviate financial constraints. Therefore, we include *Credit* (domestic credit to private sector % of GDP) and *MarktCap* (stock market capitalization % of GDP) from WDI. As WDI updates statistics as of 2017, we adopt the latest values of 2017. Third, good governance and institutional quality are relevant to combating the pandemic crisis. We include *Voice and Accountability*, *Governance Effectiveness*, *Regulatory Quality*, and *Rule of Law* from the World Governance Indicators. Again, we take the values of the four governance variables of 2017. Last, we examine the role of culture. Some cultures are featured by extremely high uncertainty avoidance or uncertainty aversion, while firms confront uncertainty during and beyond the COVID-19 pandemic. Therefore, we include the Hofstede uncertainty avoidance index (UA) and GLOBE (Global Leadership and Organizational Behavior Effectiveness) uncertainty avoidance value.

We include an interaction term of COVID-19 and country-specific variables throughout all specifications in the cross-country heterogeneity analysis. As our country variables are either fixed at 2017 (healthcare, financial development, and institutional quality) or time-invariant (uncertainty avoidance), the level effect will not be identified but instead absorbed by firm fixed effects. Our variable of

¹ <https://covid19.who.int/table>.

² Results are insensitive to industry classification. We find similar results when classifying firms according to 2-digit SIC codes.

interest is the coefficient of the interaction term, β_3 , reflecting the sign and significance of the impact of COVID-19 pandemic on firm performance conditional on the country characteristics.

Our sample consists of 16,148 firms located in 107 countries/economies over 2020Q1 to 2020Q3. All firm-level accounting variables are winsorized at the 1% and 99% levels to mitigate outliers' impact. Table 1 outlines the descriptive statistics. Appendix Table A1 provides a detailed variable definition.

3. Empirical results

3.1. Baseline

The devastating effects of the COVID-19 pandemic on business performance may come from both the supply and demand sides (Guerrieri, Lorenzoni, Straub, & Werning, 2020). On the one hand, many governments responded with quarantine policy and even lockdowns to contain the spread of COVID-19. Across the globe, businesses deemed nonessential closed, supply chains disrupted, manufacturing halted, and numerous workers were instructed to stay home. In extreme cases, the pandemic may seriously push a large number of small and medium enterprises into financial distress and bankruptcy. Taken together, the COVID-19 pandemic caused a vast supply shock. Consequently, corporate performance deteriorated. On the other hand, COVID-19 depressed demand. Service industries, including airlines, restaurants, and tourism, saw declining clients as customers fear the disease spread. Rising unemployment and loss of income further depress the consumption of workers in the shocked industries. Besides, uncertainty and pessimism could even dampen the willingness of unaffected workers to consume. What's worse, according to Guerrieri et al. (2020), demand may overreact to the supply shock and even lead to a demand-deficient recession. By all means, firm performance is likely to plummet during the pandemic period.

Table 2 reports the results for the baseline regression. The first column reports the baseline regression with the logarithm of cumulative cases as the explanatory variable. We find that firm ROA is negatively associated with cumulative cases, which is statistically significant at the 5% level. It suggests that the average firm ROA drops as cumulative cases skyrocket. The effect is also economically sizable. As the explanatory variable is in the logarithm form, the estimated coefficient of -0.14 implies that firm ROA will drop by 1.4 percentage points if cumulative cases increase by 10%. As the sample median of ROA is 1.31 percentage points, such a drop in firm performance is remarkable.

Despite that industry by year-quarter fixed effects absorbing time-varying shocks, we are concerned that cumulative cases might capture time trends in the pandemic. As an alternative, we adopt the logarithm of new cases as a measure for the pandemic. The analogous regression in column 2 also documents a negative association between new cases and firm ROA, which is statistically significant at the 1% level. In sum, regressions using both cumulative and new cases confirm that COVID-19 pandemic hammers businesses and harms firm performance.

3.2. Cross-country heterogeneity

3.2.1. Healthcare system

As COVID-19 pandemic is essentially a public health crisis, healthcare systems are central in combating the disease and restore prosperity. For countries with strong health systems and a sufficient budget for healthcare expenditures, the economy is less likely to be prone to low labor force participation, lockdowns and isolation, supply chain, and market disruption. In addition, lockdowns and rising

Table 1

Summary statistics.

	Observations	Mean	SD	Min	Median	Max
CumulativeCases (raw)	33900	425491.68	1104298.29	0	50223	7077015
CumulativeCases	33900	10.27	2.80	0	10.82	15.77
NewCases (raw)	33900	363742.66	878327.18	0	19296	4539379
NewCases	33900	9.88	2.87	0	9.87	15.33
ROA	33900	0.16	6.23	-38.90	1.31	9.53
Firm Size	33900	7.57	3.18	0.07	7.52	15.87
Leverage	33900	26.85	20.36	0.00	24.39	93.43
Tangibility	33900	31.61	25.41	0.00	26.02	94.31
Cash Holding	33900	16.52	18.86	0.06	10.10	92.19
Cash Flow	33900	0.08	7.48	-49.75	1.53	10.16
HealthRatio	31938	9.44	4.80	1.77	8.97	17.06
HealthExpenditure	31938	7.59	1.50	3.47	7.95	9.23
Credit	29418	133.18	50.01	8.84	144.80	194.39
MarketCap	28694	115.81	53.67	4.63	115.75	352.16
Voice and Accountability	33183	0.43	1.03	-1.84	0.78	1.69
Government Effectiveness	33725	1.07	0.69	-1.55	1.35	2.22
Regulatory Quality	33725	1.01	0.82	-1.56	1.16	2.12
Rule of law	33725	0.94	0.86	-1.38	1.16	2.03
Hofstede UA	30927	52.96	21.00	8.00	46.00	112.00
GLOBE UA value	29016	4.42	0.60	3.16	4.22	5.61

Table 2
Baseline regression.

ROA	(1)	(2)
CumulativeCases	−0.140** (0.070)	
NewCases		−0.116*** (0.043)
Firm Size	−0.814* (0.463)	−0.829* (0.460)
Leverage	0.019*** (0.006)	0.020*** (0.006)
Tangibility	−0.033*** (0.010)	−0.032*** (0.010)
Cash Holding	−0.018*** (0.005)	−0.016*** (0.005)
Cash Flow	−0.270*** (0.039)	−0.268*** (0.041)
Constant	8.590** (3.448)	8.335** (3.347)
Firm FE	Yes	Yes
Industry*Year-Quarter FE	Yes	Yes
Observations	33900	33900
R-square	0.908	0.909

This table shows how firm performance responds to the COVID-19 pandemic from 2020Q1 to 2020Q3. The dependent variable is the firms' ROA. We include firm and industry by year-quarter fixed effects in all specifications. Appendix Table A1 provides a detailed variable definition. Robust standard errors are clustered at the country level and reported below coefficients in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

unemployment rates lead to a severe demand shock for firms. Consequently, firms' operations and business are expected to be less affected in economies with strong health systems.

In this section, we examine whether a country's healthcare system safeguards firm performance. In column 1 of Table 3, we continue to find the negative association between log cumulative cases and firm ROA. In addition, we control for the interaction of log cumulative cases and *HealthRatio*. The latter is defined as health expenditure (% of GDP). The interaction term's estimated coefficient is positive and significant at the 10% level, suggesting that more pre-pandemic healthcare expenditure helps alleviate the negative effect of COVID-19 pandemic. In column 2, we change the proxy for the healthcare system's resilience by log health expenditure per capita. The coefficient of the interaction term remains positive and is now statistically significant at the 5% level. Our findings are unaltered when changing the pandemic variable to log new cases. In sum, the positive and significant estimates of the interaction term between COVID-19 cases and healthcare variables in Table 3 confirm that the firms operating in a country with better healthcare systems weather the pandemic better.

3.2.2. Financial development

This section examines whether advanced financial intermediaries and financial markets alleviate the adverse shock of COVID-19.

Table 3
Healthcare system.

ROA	CumulativeCases		NewCases	
	(1)	(2)	(3)	(4)
Cases	−0.203*** (0.071)	−0.307*** (0.083)	−0.210*** (0.062)	−0.387*** (0.114)
Cases*HealthRatio	0.008* (0.004)		0.012** (0.005)	
Cases*HealthExpenditure		0.025** (0.012)		0.040*** (0.014)
Constant	8.553** (3.621)	8.363** (3.610)	8.080** (3.492)	7.922** (3.451)
Firm controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry*Year-Quarter FE	Yes	Yes	Yes	Yes
Observations	31938	31938	31938	31938
R-square	0.909	0.909	0.909	0.909

This table shows how health system prior to 2020 affects firm performance in response to the COVID-19 pandemic from 2020Q1 to 2020Q3. The dependent variable is the firms' ROA. We include firm controls, firm fixed effects, and industry by year-quarter fixed effects in all specifications. Appendix Table A1 provides a detailed variable definition. Robust standard errors are clustered at the country level and reported below coefficients in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Though firm financing was rarely mentioned in the first quarter, it has appeared to become a paramount concern to many firms since the second quarter of 2020 (Hassan et al., 2020, p. 26971). Firms in mostly-affected countries are vulnerable to tightened financial flexibility and increased costs of capital, resulting in worse performance (Goodell, 2020). Financial development has been confirmed to help alleviate financial constraints and foster economic growth (Chong, Lu, & Ongena, 2013; Levine, 2005; Love, 2013). Therefore, we expect that financial development in financial intermediation and markets might reduce the negative effect of a pandemic crisis on firm performance.

In column 1 of Table 4, we continue to find the negative association between log cumulative cases and firm ROA. In addition, we control for the interaction of log cumulative cases and domestic credit to the private sector (% of GDP). The interaction term's estimated coefficient is positive and significant at the 1% level, suggesting that an advanced banking sector helps alleviate the negative effect of COVID-19 pandemic. This echoes with the observation in Li, Strahan, and Zhang (2020) that firms drew funds on a massive scale from pre-existing credit lines and loan commitments, while US banks are willing to accommodate liquidity demands.

In column 2, we change the proxy for the financial development by stock market capitalization to GDP. The coefficient of the interaction term remains positive and is now statistically significant at the 1% level. Our findings are largely unaltered when changing the pandemic variable to log new cases. Except when including the interaction of new cases and credit to GDP, our estimates lose statistical significance. In a nutshell, the positive and significant estimates of the interaction term of COVID-19 cases and financial development in Table 4 confirm that the firms operating in a country with better financial system weather the pandemic better.

3.2.3. Governance

In this section, we examine whether good governance and institutions dampen the devastating effects of COVID-19. Good governance is crucial in responding to a global pandemic crisis. On the one hand, well-function institutions and good governance have been essential in effectively addressing the spread and impact of COVID-19. Without capable and accountable governments, effectively keeping the COVID-19 pandemic under control and achieving economic recovery will remain a pipe dream. On the other hand, law and institutions shape financial arrangements and indirectly influence firm performance during a crisis (Qian & Strahan, 2007; Bae & Goyal, 2009).

In the first four columns of Table 5, we continue to find the negative association between log cumulative cases and firm ROA. In addition, we include the interaction term of log cumulative cases and four various proxies for institutional quality, i.e., *Voice and Accountability* in column 1, *Government Effectiveness* in column 2, *Regulatory Quality* in column 3, and *Rule of Law* in column 4, respectively. The interaction terms' estimated coefficients are positive and statistically significant, suggesting that better governance helps alleviate the negative effect of COVID-19 pandemic. We continue to find positive estimates for interaction terms in the last four columns when changing the pandemic variable to log new cases. In addition, the statistical significance improves to the 1% level. To conclude, the positive and significant estimates of the interaction term between COVID-19 cases and governance variables in Table 5 confirm that the firms operating in a country with better governance and institutions contain the pandemic better.

3.2.4. Uncertainty avoidance

As COVID-19 disease started to spread globally since the first quarter of 2020, firms faced a collapse of demand, increased uncertainty, and disruption in supply chains (Hassan et al., 2020, p. 26971). This section examines whether firms in a culture of high uncertainty aversion experience severe shocks in the COVID-19 pandemic crisis. As Choi (2020) has shown, economic uncertainty stemming from COVID-19 pandemic has had a substantial adverse impact on all US sectors. Economic policy uncertainty has been demonstrated to affect bank lending (Hu & Gong, 2019) and even Bitcoin returns (Demir, Gozgor, Lau, & Vigne, 2018). Therefore, we expect that uncertainty avoidance may amplify the negative effect of COVID-19 pandemic on corporate performance.

Table 4
Financial development.

ROA	CumulativeCases		NewCases	
	(1)	(2)	(3)	(4)
Cases	−0.226*** (0.065)	−0.217*** (0.066)	−0.188*** (0.040)	−0.216*** (0.049)
Cases*Credit	0.001*** (0.000)		0.000 (0.000)	
Cases*MarketCap		0.001*** (0.000)		0.001*** (0.000)
Constant	5.724** (2.272)	10.078** (4.108)	5.876*** (2.002)	9.626** (3.984)
Firm controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry*Year-Quarter FE	Yes	Yes	Yes	Yes
Observations	29418	28694	29418	28694
R-square	0.911	0.908	0.912	0.908

This table shows how financial development prior to 2020 affects firm performance in response to the COVID-19 pandemic from 2020Q1 to 2020Q3. The dependent variable is the firms' ROA. We include firm controls, firm fixed effects, and industry by year-quarter fixed effects in all specifications. Appendix Table A1 provides a detailed variable definition. Robust standard errors are clustered at the country level and reported below coefficients in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 5
Governance.

ROA	CumulativeCases				NewCases			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cases	−0.145** (0.072)	−0.164** (0.070)	−0.164** (0.070)	−0.158** (0.072)	−0.079*** (0.019)	−0.166*** (0.046)	−0.155*** (0.040)	−0.144*** (0.037)
Cases*Voice and Accountability	0.057* (0.032)				0.115*** (0.024)			
Cases*Government Effectiveness		0.064** (0.030)				0.091*** (0.026)		
Cases*Regulatory Quality			0.063** (0.028)				0.104*** (0.026)	
Cases*Rule of law				0.067** (0.027)				0.107*** (0.023)
Constant	8.347** (3.525)	7.969** (3.477)	8.053** (3.474)	7.997** (3.483)	7.251** (3.334)	7.646** (3.339)	7.388** (3.311)	7.370** (3.311)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year-Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	33183	33725	33725	33725	33183	33725	33725	33725
R-square	0.909	0.909	0.909	0.909	0.909	0.909	0.909	0.909

This table shows how governance and institutions prior to 2020 affect firm performance in response to the COVID-19 pandemic from 2020Q1 to 2020Q3. The dependent variable is the firms' ROA. We include firm controls, firm fixed effects, and industry by year-quarter fixed effects in all specifications. Appendix Table A1 provides a detailed variable definition. Robust standard errors are clustered at the country level and reported below coefficients in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Hofstede extracted data on cultural attributes based on a survey covering many IBM employees between 1967 and 1973 in more than 70 countries (Hofstede, 1980). This work has been updated and expanded in Hofstede (2001). Consequently, the Hofstede model of national culture continues to be widely cited and used by scholars in management and international business studies. On the other hand, conducted in the mid-1990s and involved 127 investigators in 62 countries or regions, the GLOBE study was designed to replicate and expand on Hofstede's (1980) work (House, Hanges, Javidan, Dorfman, & Vipin, 2004). Survey questionnaires were developed and collected from more than 17,000 middle managers in 951 organizations across three specific industries.

We gauge the impact of uncertainty avoidance on the adverse effect of COVID-19 pandemic on corporate performance, using uncertainty avoidance measures in both Hofstede and GLOBE surveys. In column 1 of Table 6, we control the interaction of log cumulative cases and Hofstede UA (uncertainty avoidance). The interaction term's estimated coefficient is negative and significant at the 5% level, suggesting that uncertainty avoidance may enhance the negative effect of COVID-19 pandemic. In column 2, we change the proxy for uncertainty avoidance by GLOBE UV value. The coefficient of the interaction term remains negative and is significant. Our findings are largely unaltered when changing the pandemic variable to log new cases, except that our estimates lose statistical significance when including the interaction of new cases and Hofstede uncertainty avoidance. Overall, the negative and significant estimates of the interaction term between COVID-19 cases and uncertainty avoidance index in Table 6 confirm that the rising uncertainty stemmed from pandemic hurt firms more in the uncertainty avoidance environment.

Table 6
Uncertainty avoidance.

ROA	CumulativeCases		NewCases	
	(1)	(2)	(3)	(4)
Cases	−0.032 (0.089)	0.691** (0.285)	−0.131 (0.091)	1.205*** (0.230)
Cases*Hofstede UA	−0.002** (0.001)		0.000 (0.001)	
Cases*GLOBE UA value		−0.184*** (0.053)		−0.278*** (0.049)
Constant	9.034** (3.666)	8.891** (3.538)	7.937** (3.662)	6.562* (3.336)
Firm controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry*Year-Quarter FE	Yes	Yes	Yes	Yes
Observations	30927	30927	29016	29016
R-square	0.909	0.909	0.909	0.910

This table shows how uncertainty avoidance affects firm performance in response to the COVID-19 pandemic from 2020Q1 to 2020Q3. The dependent variable is the firms' ROA. We include firm controls, firm fixed effects, and industry by year-quarter fixed effects in all specifications. Appendix Table A1 provides a detailed variable definition. Robust standard errors are clustered at the country level and reported below coefficients in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

4. Conclusions

An enormous uncertainty shock stemming from the advance shock of COVID-19 pandemic heightened in 2020. As the corporate performance is crucial for economic prosperity, we examine how the COVID-19 affects corporate performance through tracking and characterizing this massive increase in uncertainty. We use cumulative and new COVID-19 cases to measure economic uncertainty. Using the quarterly data of 107 countries/economies consisting of 16,148 firms during 2020Q1 to 2020Q3, we have a couple of findings. First, firm ROA is negatively associated with cumulative cases, suggesting that the average corporate performance drops as cumulative cases skyrocket. The effect is also economically large. Second, we find that firms operated in a country with a better healthcare system, better financial system, and better governance can thrive amid the pandemic. Finally, rising uncertainty associated with pandemic hurts firms more in the uncertainty avoidance environment.

This study complements earlier and concurrent work on the effects of COVID-19 pandemic on the financial markets and the real economy. As firm performance is fundamental to the asset performance in equity and debt markets, our findings offer a new angle to understand the impact of a pandemic on asset returns and volatility. Also, the international setting and cross-country comparison have some significant policy implications. First, a robust healthcare system, an advanced financial system, and high-quality institutions and governance help firms to be better able to survive a crisis. Second, culture, more specifically, uncertainty avoidance, is relevant to firm performance amid uncertainty.

Our empirical framework presents several limitations that we acknowledge. First, the severity of pandemic may depend on some country-specific policies or actions, and arguably the measurement of COVID-19 cases might be prone to the classic endogeneity issue. As our sample period mostly covers the first wave of the spread of COVID-19, we believe the measurement is less contaminated by governments' policy intervention but reflects the exogenous nature of virus spread and transmission. Second, being aware of the underlying channels, we cannot precisely disentangle the supply shock from demand shock in the empirical analysis. Instead, we take an international perspective and focus on the cross-country comparison. Nevertheless, our estimates can be interpreted as capturing the real effects of COVID-19 pandemic on businesses and suggesting that the impacts could be large and heterogeneous across countries.

Author statement

Shiwei Hu: Data curation, Formal analysis, Conceptualization, Funding acquisition, Methodology, Writing - original draft, Writing - review & editing. Yuyao Zhang: Conceptualization, Methodology, Writing - original draft, Writing - review & editing.

Appendix

Table A1

Variable definition

Variable	Definition	Source
CumulativeCases (raw)	Number of cumulative COVID-19 cases.	WHO
CumulativeCases	Logarithm of number of cumulative COVID-19 cases.	WHO
NewCases (raw)	Number of new COVID-19 cases.	WHO
NewCases	Logarithm of number of new COVID-19 cases.	WHO
ROA	Return on assets.	Compustat
Firm Size	Logarithm of the book value of total assets.	Compustat
Leverage	Total debt divided by total assets in percentage.	Compustat
Tangibility	Tangible assets (property, plant, and equipment) over total assets in percentage.	Compustat
Cash Holding	Cash and short-term investments over total assets in percentage.	Compustat
Cash Flow	Operating income before depreciation over total assets in percentage.	Compustat
HealthRatio	Current value of health expenditure (% of GDP).	WDI
HealthExpenditure	Logarithm of health expenditure per capita (current US\$).	WDI
Credit	Domestic credit to private sector (% of GDP).	WDI
MarketCap	Stock market capitalization (% of GDP).	WDI
Voice and Accountability	It captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. It ranges from -2.5 (weak) to 2.5 (strong).	WGI
Government Effectiveness	It captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. It ranges from -2.5 (weak) to 2.5 (strong).	WGI
Regulatory Quality	It captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. It ranges from -2.5 (weak) to 2.5 (strong).	WGI
Rule of law	It captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. It ranges from -2.5 (weak) to 2.5 (strong).	WGI
Hofstede UA	Uncertainty avoidance index of Hofstede.	Hofstede
GLOBE UA value	Uncertainty avoidance social value in GLOBE survey.	GLOBE

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