Corporate Governance and Stock Performance: The Case of COVID-19 Crisis

Abstract

This paper analyzes the impact of COVID-19 on firm-level stock behaviors (including stock price volatility, trading volume and stock returns). Using US data, this paper examines whether confirmed cases (and deaths) of COVID-19 or COVID-19-associated online searches affect stock behaviors. The results show that our five COVID-19 proxies are all positively associated with stock price volatility and trading volume and negatively associated with stock returns. This paper further investigates the mitigating effect of corporate governance (viz., board and ownership structures) in this COVID-19 crisis. Overall, the results suggest that good corporate governance can mitigate the impact of COVID-19 on stock price volatility and trading volume but may not help to enhance stock returns. This paper also considers key policies used to tackle the COVID-19 pandemic and finds that government intervention plays an important role in stabilizing stock markets in this COVID-19 crisis.

Keywords: COVID-19, corporate governance, online searches, price volatility, stock returns, CARES Act

1. Introduction

Since the beginning of 2020, COVID-19 has had a huge impact on society and the global economy. Until August 4, 2020, it resulted in 690,257 deaths and more than 18 million confirmed cases (WHO, 2020). More than 100 countries have COVID-19 confirmed

cases. COVID-19 also creates large shocks in global stock markets. For example, the S&P 500 index fell 33% in just one month (from February 21 to March 23, 2020). A similar plummet can also be observed in other stock markets, such as Hong Kong or Germany.

An increasing number of studies have started to investigate the impact of COVID-19 on stock markets or firm performance (Chatjuthamard et al., 2021; Chiah and Zhong, 2020; Ding et al., 2021). For instance, Zhang et al. (2020) provide simple descriptive statistics showing that volatility in 12 stock markets increases significantly in March 2020 due to COVID-19. Examining US and Canadian firm data, Xu (2021) reports that the increase in confirmed COVID-19 cases negatively affects stock returns. Focusing on Chinese data, Shen et al. (2020) find that firms' return on assets decreased considerably after the outbreak of COVID-19. Using simulation techniques, De Vito and Gomez (2020) suggest that COVID-19 would bring severe liquidity issues to firms. Supporting the argument of De Vito and Gomez (2020), Chebbi et al. (2021) show that COVID-19 results in lower firm liquidity. As can be observed above, COVID-19 tends to have a negative impact on stock markets or firm performance. To date, however, there has been little discussion in accounting studies about the role of accounting or relevant policies in this COVID-19 crisis. Hence, our paper aims to analyze whether corporate governance, an important accounting issue, may help to mitigate the negative impact of COVID-19. Currently, several studies have been able to discuss the role of country-level governance in the

COVID-19 crisis. For example, using data from 67 countries, Zaremba et al. (2021) report that government effectiveness has a positive impact on stock market returns during the COVID-19 pandemic. However, Ashraf (2021), also investigating the COVID-19 crisis, fails to find an improvement in stock market returns in countries with stronger investor protection. By reviewing the literature on corporate governance and prior financial crises, Jebran and Chen (2021) attempt to address the potential effect of corporate governance in the COVID-19 crisis and urge future research to provide empirical firm-level evidence in this area. Similarly, conducting a systematic review of the literature on corporate governance and COVID-19, Koutoupis et al. (2021) point out that the current literature is mainly theoretical and that more empirical evidence is required. Thus, our research will make an important contribution to the governance literature by providing firm-level evidence on corporate governance and stock performance. Moreover, the COVID-19 pandemic remains prominent in local and global economies, and many countries have implemented relevant policies to assist businesses. Nonetheless, it is not yet clear whether these policies are effective, and scholars have highlighted the need for future research to investigate how governments can help to alleviate the negative impact of COVID-19 (Goodell, 2020). Therefore, key COVID-19-associated policies, e.g., the Coronavirus Aid, Relief, and Economic Security (CARES) Act, will also be discussed in this paper.

This paper examines how COVID-19 affects firm-level stock behaviors and whether corporate governance influences stock performance during the COVID-19 crisis. This paper focuses on US data because the US is heavily affected by COVID-19 (e.g., currently, it is the country with the highest number of confirmed cases) and given the importance of its stock market. When estimating the impact of COVID-19, this paper uses both the number of confirmed cases of COVID-19 (direct proxy) and the number of COVID-19-associated online searches (indirect proxy). Different from prior studies that mainly discuss the number of confirmed cases, this paper uses two types of proxies to provide additional evidence on whether COVID-19 (captured by the direct proxy) or the subsequent reaction to COVID-19 (captured by the indirect proxy) affects stock performance and hence will contribute to the ongoing discussion on the role of investor sentiments in stock markets (Dimpfl and Jank, 2016; Mbanga et al., 2019). Furthermore, this paper, considering three main aspects of stock performance (i.e., stock price volatility, trading volume and stock returns), will produce a more complete analysis than previous literature, which tends to focus on a single aspect of stock performance. In addition, this paper will enhance our understanding of the role of corporate governance in this unpredictable crisis and extend the current literature by examining the efficacy of corporate governance in a new and important setting (Bhagat and Bolton, 2019; Dong et al., 2020; Jebran and Chen, 2021; Koutoupis et al., 2021). The findings of this research

will provide insights for future policy development in corporate governance. This paper, considering key measures (e.g., lockdown) and economic policies (e.g., the CARES Act) used to tackle the COVID-19 pandemic, will also offer useful policy implications.

The remainder of the paper proceeds as follows: Section 2 reviews the literature and develops hypotheses. Section 3 explains the research methods, and Section 4 analyzes the results. Finally, Section 5 concludes this paper.

2. Literature and Hypotheses

2.1 Negative information and stock performance

Stock price volatility, trading volume and stock returns are three important aspects that are usually considered in prior studies addressing stock performance (Bessembinder and Seguin, 1993; Erkens et al., 2012; Fahlenbrach et al., 2012). One of the aims of this paper is to examine the impact of COVID-19 on these three aspects of stock performance. In addition to the number of confirmed cases that is widely used in the current literature (Phan and Narayan, 2020), this paper also uses the number of COVID-19-relevant online searches to estimate the impact of COVID-19 based on the findings of prior studies that online searches reflecting investor behavior are helpful for explaining stock behavior (Dimpfl and Jank, 2016).

Previous literature often finds that negative shocks, such as political crises, would lead to higher stock price volatility due to increased risks (Chan and Wei, 1996; Huang et al., 2011). Using country-level data, a series of studies has shown that COVID-19 significantly increases the volatility of stock market indexes, and the higher uncertainty and stronger investor sentiment during the pandemic contribute to this result (Albulescu, 2021; Chatjuthamard et al., 2021; Engelhardt et al., 2021; Tripathi and Pandey, 2021; Uddin et al., 2021).[1] Likewise, several studies focusing on firm-level data also show that overall COVID-19, associated with high uncertainty, results in higher volatility (Höhler and Lansink, 2021; Lin et al., 2021; Mazur et al., 2021; Yang and Yang, 2021). Höhler and Lansink (2021) further indicate that the impact of COVID-19 on volatility varies across firms and that sectors less adversely affected by COVID-19, such as food retailers, have lower stock price volatility than others during the pandemic. Following these COVID-19 studies and based on noise trading theory (Black, 1986; Chatjuthamard et al., 2021; Tripathi and Pandey, 2021), we expect that COVID-19 will increase stock price volatility.

Furthermore, prior research shows that trading volume is positively associated with stock price volatility (Bessembinder and Seguin, 1993; Bittlingmayer, 1998). Therefore,

[1] The COVID-19 proxies used in these papers are: the number of COVID-19 confirmed cases, the growth rate of confirmed cases and deaths, and the COVID-19 fatality ratio.

COVID-19 may result in higher trading volume of stocks, following the larger stock price volatility. The larger amount of news during the pandemic may also induce more trading activities (Hoffmann et al., 2013). Indeed, using data from 37 stock markets, Chiah and Zhong (2020) find that trading volume increases dramatically during the COVID-19 pandemic. They argue that working from home during the lockdown, giving retail investors more time in investing, may be one of the key drivers of the increased trading volume. However, as trading volume is also positively associated with the change in stock prices (i.e., trading volume increases when the stock price increases), the decrease in stock price due to COVID-19 may also reduce trading volume (Flannery et al., 2013).

It is also commonly known that negative information is associated with lower stock returns (Hitz et al., 2012; Mian and Sankaraguruswamy, 2012). A series of studies has documented the negative impact of COVID-19 on stock returns, and the result is mainly due to the higher risk and uncertainty during the pandemic (Aggarwal et al., 2021). For example, Xu et al. (2021) report that the stock returns of Chinese companies decrease during the COVID-19 crisis. Ding et al. (2021), using firm-level data of 61 countries, show that the higher the weekly growth of confirmed COVID-19 cases, the lower the weekly stock returns. More evidence can be found in studies using country-level data (Aggarwal et al., 2021; Xu, 2021). For instance, using data on 43 stock market indexes, Chatjuthamard et al. (2021) find that the higher the growth in confirmed COVID-19 cases

and deaths, the lower the stock market returns. Additionally, using country-level data, Phan and Narayan (2020) document a negative relationship between the number of confirmed COVID-19 cases (and deaths) and stock returns. However, they point out that this relationship may change later due to the overreaction at the beginning of this COVID-19 crisis. It can thus be suggested that COVID-19 will lead to lower (firm-level) stock returns, at least at the beginning of the crisis.

Overall, the vast volume of news associated with COVID-19 and the highly uncertain business environment during the pandemic are expected to affect stock markets (Chatjuthamard et al., 2021; Hoffmann et al., 2013; Huang et al., 2011; Yang and Yang, 2021). Following the discussion above, this paper develops and examines the hypothesis below to investigate the impact of COVID-19 on firm-level stock performance.

Hypothesis 1: The number of confirmed cases of COVID-19 (or the number of COVID-19 relevant online searches) is associated with stock market indicators (i.e., stock price volatility, trading volume or stock returns).

2.2 Corporate governance

Corporate governance is a major area of interest within the field of accounting and finance (Bhagat and Bolton, 2019; Dong et al., 2020). A significant amount of literature has investigated its effectiveness in different scenarios, such as in a financial crisis (Erkens et al., 2012; Huang et al., 2011). Few papers attempt to discuss the potential effect of

corporate governance in the COVID-19 crisis using previous literature on corporate governance and other financial crises (Jebran and Chen, 2021; Zattoni and Pugliese, 2021). However, scholars (Zattoni and Pugliese, 2021) argue that previous findings from other financial crises may not be directly applicable to the COVID-19 crisis, which originates as a health issue, and indicate the importance of providing empirical firm-level evidence on the role of corporate governance in the COVID-19 crisis (Jebran and Chen, 2021; Koutoupis et al., 2021). To date, only a few scholars have managed to empirically examine the relationship between corporate governance and stock performance during the COVID-19 pandemic (Ding et al., 2021; Xiong et al., 2020). For example, using data from 61 countries, Ding et al. (2021) contend that board size and board independence are not helpful in mitigating the negative impact of COVID-19 (measured by the weekly growth rate of confirmed cases) on weekly stock returns. They also find that certain types of ultimate controlling owners, such as families, can alleviate the negative impact of COVID-19 on weekly stock returns. Different from their study, our paper uses daily data, which arguably helps to provide more accurate information given the rapid changes in stock markets during the COVID-19 pandemic. Moreover, using the event study method, Xiong et al. (2020) show that institutional ownership is associated with lower cumulative abnormal returns (CAR) in the outbreak of COVID-19, while board size and board independence are not significantly associated with CAR. In the papers of Ding et al.

(2021) and Xiong et al. (2020), corporate governance is not the focus but one of the several firm characteristics discussed in their research; therefore, the discussion on corporate governance is relatively brief, and certain key corporate governance proxies, such as CEO duality or foreign shareholders, are not discussed. Their papers also do not analyze the effect of corporate governance on stock price volatility and trading volume during the COVID-19 pandemic. Our paper aims to extend the current literature by providing a more complete and deeper analysis of the role of corporate governance in the COVID-19 crisis and address a research gap in this area (Jebran and Chen, 2021; Koutoupis et al., 2021). Two key aspects of corporate governance, *board structure* and *ownership structure*, will be discussed in this paper (Eng and Mak, 2003).

2.2.1 Board structure

Previous literature on board structure mainly looks at board size, duality, and board independence. First, while some studies find that a larger board size is beneficial for firms (e.g., helping to reduce the cost of debt) (Anderson et al., 2004), others show that a larger board size has a negative impact on firms (e.g., resulting in lower firm performance) (Guest, 2009). A larger board consisting of experts in more areas can be helpful in certain conditions (e.g., when the operation of a company is complicated) (Coles et al., 2008), but it also makes communication and coordination more difficult (Cheng, 2008). Hence,

although we expect board size to affect stock performance in the COVID-19 crisis, no specific sign of its effect is predicted.

Additionally, there is a consensus among scholars that higher board independence (implying better monitoring and lower agency costs) is helpful for reducing the cost of capital and risks, even during a crisis (Erkens et al., 2012; Huang et al., 2011). In contrast, CEO duality tends to be regarded as representing less effective monitoring and having a negative impact on firms (Bliss et al., 2007; Duru et al., 2016). Therefore, based on agency theory, we anticipate that board independence may mitigate the negative impact of COVID-19 on stock performance but CEO duality would not. Nonetheless, from the perspective of stewardship theory, CEO duality, with the benefit of consistent order from the top and effective implementation of plans, may also improve stock performance (Elsayed, 2007; Peng et al., 2007). Hence, CEO duality may also help to mitigate the negative impact of COVID-19.

2.2.2 Ownership structure

Foreign shareholders, institutional investors, managerial ownership and the largest shareholders are four central issues for research on ownership structure. Previous studies have reported that foreign shareholders, improving governance mechanisms, help to increase firm value and alleviate the negative effect of crises on firm stock performance

(Aggarwal et al., 2011; Baek et al., 2004). Similarly, prior research shows that institutional investors with more professional knowledge can enhance the effectiveness of monitoring and therefore benefit firms (e.g., reducing stock volatility in a crisis) (Huang et al., 2011; Velury and Jenkins, 2006).

However, previous findings on the effect of managerial ownership and the largest shareholders have been inconsistent. An inverted U-shaped relationship between managerial ownership and firm value has been widely documented in prior research (Benson and Davidson III, 2009). While greater managerial ownership could benefit firms (due to the increased consistency in the interests of managers and other shareholders), the associated entrenchment effect could make powerful managers sacrifice others' wealth (Chen et al., 2003; Cheng et al., 2012). Likewise, large shareholders are associated with the entrenchment effect (Claessens et al., 2002). Nevertheless, they could also enhance monitoring (given more incentives and resources to do so) and thus affect stock performance during a crisis (Baek et al., 2004).

Overall, good corporate governance, associated with more effective monitoring (and hence less information asymmetry) or better decision-making, should help to mitigate the effect of COVID-19 on stock markets (Cutting and Kouzmin, 2000; Elsayed, 2007; Huang et al., 2011; Uddin et al., 2021). The following hypothesis is developed to analyze

whether corporate governance (including board and ownership structures) has a mitigating effect in the COVID-19 crisis.

Hypothesis 2: Corporate governance can mitigate the effect of COVID-19 on stock performance.

3. Research Methods

3.1 Sample and data

Our initial sample consists of all US firms listed on NYSE and NASDAQ. Their daily stock trading data, board information (viz., board size and board independence), and other financial data were collected from the Datastream Worldscope database. Information on CEO duality was collected from the BoardEx Database. Ownership information was from the Osiris Database. After merging these databases, we exclude financial and utility firms and observations with missing information required for regression analysis. Online search data were collected from the Google Trends website, and the daily cases and deaths of COVID-19 were from the European Centre for Disease Prevention and Control (ECDC) website. The sample period is from December 31, 2019, to May 31, 2020, and our final sample consists of 116,596 observations.[2]

[2] Based on the data collected from the ECDC, the earliest cases (in China) are confirmed on December 31, 2019. Accordingly, our sample period starts from December 31, 2019.

3.2 Empirical models

This study analyzes firm-level stock behaviors from three perspectives: stock price volatility, trading volume and stock returns. Daily stock price volatility is measured by the range of stock price fluctuation (i.e., the difference between the highest and lowest stock prices, divided by the average of these two prices) (Huang et al., 2011). We follow the study of Seok et al. (2019) and use realized stock returns, which are helpful for capturing the mispricing resulting from investor sentiment. We also control for the market[3] by including the returns of the S&P 500 index in our model. Corporate governance variables include three board variables (board size, board independence, CEO duality) and four ownership variables (foreign shareholders, institutional investors, managerial ownership, and the largest shareholders). To measure the effect of COVID-19, this paper utilizes the numbers of confirmed cases and deaths (i.e., fact of COVID-19) and COVID-19-associated online searches (i.e., measure of investor sentiments in this crisis; cf. Dimpfl and Jank, 2016; Mbanga et al., 2019). In this paper, three comprehensive Google Trends search volume indexes[4] are considered. Index 1 includes three terms directly related to COVID-19: “Coronavirus”, “COVID-19”, and

[3] We do not use the market adjusted return in analyzing the effect of COVID-19 as the mean market-adjusted returns will be close to zero in our setting and hence it is not suitable.

[4] For each search term, Google Trends provides an index (from 0 to 100) showing how popular, in terms of search volume, this term is. Each of our comprehensive search volume indexes considers multiple search terms and adds up the search volume of individual search terms. Google Trends also provides popular related search queries which are used to assist with our selection of search terms.

"Pandemic". Index 2 consists of all search terms in Index 1 and includes additional terms (i.e., "stay at home", "lockdown", "COVID lockdown", and "Coronavirus lockdown") that directly capture the effect of COVID-19 on economic activity. Index 3 considers optimism about fighting the pandemic and includes terms related to relevant economic policies and vaccine development: "CARES Act", "Economic impact payment", "Unemployment insurance", "Unemployment benefits", "Stimulus", "Stimulus check", "Stimulus checks", "Stimulus checks irs", "COVID trials", "COVID-19 trials", "COVID-19 clinical trials", "COVID-19 vaccine", "Coronavirus vaccine", and "COVID vaccine". Furthermore, the US government introduced the CARES Act to tackle the negative economic effect of COVID-19, and our paper will consider the impact of this Act to provide policy insights.

To investigate the impact of COVID-19 on firm-level stock behaviors and the role of corporate governance in this crisis, this paper proposes three empirical models as follows:

$$Volatility_{i,t} = \alpha_0 + \alpha_1 Cov19_t + \alpha_2 CGov_i + \alpha_3 CGov_i \times Cov19_t + \alpha_4 CARES + \alpha_5 Volume_{i,t} + \alpha_6 Size_i + \alpha_7 ROA_i + \alpha_8 Leverage_i + Industry + \varepsilon_{i,t} \quad (1)$$

$$Volume_{i,t} = \alpha_0 + \alpha_1 Cov19_t + \alpha_2 CGov_i + \alpha_3 CGov_i \times Cov19_t + \alpha_4 CARES + \alpha_5 Return_{i,t} + \alpha_6 Size_i + \alpha_7 ROA_i + \alpha_8 Leverage_i + Industry + \varepsilon_{i,t} \quad (2)$$

$$Return_{i,t} = \alpha_0 + \alpha_1 Cov19_t + \alpha_2 CGov_i + \alpha_3 CGov_i \times Cov19_t + \alpha_4 CARES + \alpha_5 SP500_t + \alpha_6 Volume_{i,t} + \alpha_7 Size_i + \alpha_8 ROA_i + \alpha_9 Leverage_i + Industry + \varepsilon_{i,t} \quad (3)$$

where *Volatility* is the daily stock price volatility; *Volume* is the natural logarithm of daily trading volume; and *Return* refers to daily stock returns. *Cov19* refers to five COVID-19 proxies: *Cases* is the natural logarithm of daily confirmed cases in the US; *Deaths* is the natural logarithm of daily COVID-19 deaths in the US; *Search1, Search2, and Search3* refer to the natural logarithm of the three comprehensive Google search volume indexes (i.e., Indexes 1 to 3) mentioned earlier in this section.

CGov refers to seven corporate governance variables: *Board_Size* is the natural logarithm of the total number of directors on a board; *Duality* equals one if the CEO is also the chairman of the board and zero otherwise; *IndepBoard* is the percentage of independent board members on a board. *S_forei* is the percentage of shares held by foreign shareholders; *S_insti* is the percentage of shares held by institutional investors; *S_manag* is the percentage of shares owned by managers; and *S_large* is the percentage of shares owned by the largest shareholder.

CARES equals one for observations on or after March 27, 2020 (i.e., after the CARES Act has been enacted into law) and zero otherwise. *SP500* is the daily returns of the S&P 500 index. *Size* is the natural logarithm of total assets; *ROA* is the profit before interest after tax divided by total assets; *Leverage* is the total liabilities divided by total equity. *Industry* refers to industry fixed effects, which are controlled in all models.

Since there are seven corporate governance variables and seven interaction terms of *CGov*Cov19*, the values of the variance inflation factor (VIF) in regressions (1) to (3) are very high. To resolve the multicollinearity issue, this paper uses the mean centering technique (i.e., centering independent variables) (Shieh, 2011).

4. Results

Descriptive statistics and correlation

The descriptive statistics of all variables are presented in Table 1. The mean of the daily stock price volatility (*Volatility*) is 1.53%; the mean of stock returns (*Returns*) is -0.02%, implying that firms, on average, could not avoid suffering from the COVID-19 crisis. The mean and standard deviation of daily confirmed cases in the US are 11,060 and 12,282, respectively, showing that the number of confirmed cases is growing dramatically.

Table 2 presents the Pearson correlation matrix. Various corporate governance variables are often significantly correlated. We also observe that the number of COVID-19-associated online searches is strongly and positively correlated with the number of confirmed cases, implying that investor sentiment closely follows COVID-19.

[INSERT TABLES 1 and 2 ABOUT HERE]

4.1 Stock price volatility

The results of the relationship among COVID-19, corporate governance, and daily stock price volatility are presented in Table 3. The coefficients of our five COVID-19 proxies are significant and positive. This evidence supports Hypothesis 1 and shows that the more confirmed cases and investors' attention to COVID-19, the higher the daily stock price volatility. This result is consistent with recent studies showing that COVID-19 increases volatility (Mazur et al., 2021; Yang and Yang, 2021). This may be because the pandemic brings a large amount of news frequently and increases business risk and uncertainty, causing divergence of investor beliefs or stronger investor sentiment (Chatjuthamard et al., 2021; Hoffmann et al., 2013; Huang et al., 2011; Yang and Yang, 2021). The result also shows that the introduction of the CARES Act significantly reduces volatility, suggesting that governments aiming to reduce the risk in stock markets can consider introducing similar policies.

In addition, *Board_Size*, *IndepBoard*, *S_forei*, and *S_insti* are significantly negatively associated with stock price volatility. However, higher values of *S_manag* or *S_large* would increase volatility. Looking at the interaction terms, we can find that larger board size, CEO duality, and higher board independence can mitigate the negative impact of COVID-19 on volatility. In this COVID-19 crisis, the business environment changes rapidly, and the complexity of business operations also increased (Uddin et al., 2021). Large board size, with more experts, can help companies cope with complicated

situations, such as this crisis, better (Coles et al., 2008). CEO duality can help to implement plans effectively and efficiently (Elsayed, 2007; Peng et al., 2007). Therefore, large board size and CEO duality, implying better responses to the pandemic, may help to reduce business risk and hence volatility. Furthermore, the higher volatility during the pandemic may result from the larger amount of information associated with COVID-19 (Hoffmann et al., 2013) and increased information asymmetry. Higher board independence can provide more effective monitoring and reduce agency costs (Huang et al., 2011) and hence mitigates the effect of COVID-19 on volatility.

We also find that large shareholders exacerbate the negative impact of COVID-19 (driven by internet-based investor sentiment) on volatility. This may be because large shareholders force management to make decisions that are good for themselves but bad for the entire company (Claessens et al., 2002) when investor sentiment associated with COVID-19 is strong, hence increasing volatility. There is also weaker evidence that greater managerial ownership, helping to reduce agency costs, can mitigate the negative effect of COVID-19 (driven by internet-based investor sentiment) on volatility (Cheng et al., 2012). Overall, the results support Hypothesis 2 and show that corporate governance plays an important role in mitigating the fluctuation of stock prices during the COVID-19 pandemic.

[INSERT TABLE 3 ABOUT HERE]

4.2 Trading volume

Table 4 presents the relationship among COVID-19, corporate governance, and trading volume of stocks. The results show that the numbers of confirmed cases and deaths and COVID-19-associated online searches significantly and positively affect trading volume. The results support Hypothesis 1 and are consistent with the findings of Chiah and Zhong (2020). This could be because the unusually large amount of information during the pandemic prompts investors to trade more often (Hoffmann et al., 2013). Table 4 also reveals that the introduction of the CARES Act significantly decreases trading volume.

Additionally, *Board_Size*, *IndepBoard*, and *S_forei* are significantly positively associated with trading volume, while *Duality*, *S_insti*, *S_manag* and *S_large* have significantly negative impacts on trading volume. The result shows a strong connection between all corporate governance variables and the trading volume in this COVID-19 crisis. Moreover, foreign shareholders (see *S_forei* x *Cov19*)) can mitigate the effect of COVID-19 (including its direct effect, captured by *Cases* and *Deaths*, and indirect effect, captured by online searches) on trading volume. This may be because foreign shareholders tend to make long-term investments; hence, investors' trading activities are relatively less affected by the news during the pandemic (Jeon et al., 2011). The evidence supports

Hypothesis 2 that corporate governance can mitigate the effect of COVID-19 on trading volume.[5]

[INSERT TABLE 4 ABOUT HERE]

4.3 Stock returns

The results of the relationship among COVID-19, corporate governance, and daily stock returns are provided in Table 5. The coefficients of all COVID-19 proxies are significant and negative. Consistent with Hypothesis 1, the result suggests that the more severe the pandemic, the lower the stock returns. Interestingly, even the number of online searches on measures for fighting the pandemic (see *Search3*, including terms such as "COVID-19 vaccine" and "Unemployment benefits") is negatively associated with stock returns. Considering the high correlation between *Cases* (or *Deaths*) and *Search3* shown in Table 2, the result here suggests that when the pandemic is more severe, people seek solutions to fight the pandemic online more often. This strong investor sentiment hence leads to lower stock returns (Schmeling, 2009). Overall, our findings are in accordance with recent literature that COVID-19 associated with higher uncertainty and stronger investor

[5] However, larger board size seems to increase trading volume when the internet-based investor sentiment associated with COVID-19 is stronger.

sentiment has a negative impact on stock returns (Chatjuthamard et al., 2021; Ding et al., 2021; Xu et al., 2021).

[INSERT TABLE 5 ABOUT HERE]

Phan and Narayan (2020) show that the relationship between the number of COVID-19 confirmed cases and the returns of various countries' stock markets was initially negative but turned positive later. They assert that this is a market overreaction and correction. Before controlling for the effect of the CARES Act, we also observed a positive relationship between the number of confirmed cases and stock returns in our sample. However, after the *CARES* variable is added, their relationship becomes negative. This suggests that relevant COVID-19 aid policies will influence stock market performance and should be considered when discussing the results of this COVID-19 crisis.

Moreover, *CARES* is significantly positively associated with stock returns. This may be because financial support following the CARES Act increases income and there are limited spending opportunities during the pandemic (Falcettoni and Nygaard, 2021), resulting in savings flowing to stock markets, hence increasing stock returns. The relatively stable economy and increased investor confidence resulting from these economic measures, such as unemployment benefits, may also explain why stock returns are improving (Chang et al., 2021). Recalling Sections 4.1 and 4.2, *CARES* is negatively

associated with volatility and trading volume. The results together provide useful policy insight that government intervention plays an important role in stabilizing stock markets during the COVID-19 crisis.

Furthermore, among all interaction terms, only the coefficient of *Board_Size* x *Cov19* is significant but it is negative. The result suggests that a larger board size leads to lower stock returns when the pandemic is more severe. This may be because communication and coordination, which are important in the COVID-19 crisis, are more difficult on larger boards, resulting in less effective decision-making. Overall, consistent with previous literature on the financial crisis (Erkens et al., 2012) and recent evidence on COVID-19 (Ding et al., 2021), the result implies that good corporate governance may not necessarily improve stock returns during the pandemic.

4.4 Robustness tests

To evaluate the robustness of our results, we split our sample into two subsamples based on the level of governance (i.e., high and low), using each of the seven corporate governance proxies separately and using an aggregated governance proxy (*Gov*)[6].

[6] Based on previous literature, governance level is categorized as high if the value of *Board_Size*, *IndepBoard*, *S_forei*, or *S_insti* is above median, if the presence of CEO duality, or if the value of *S_manag* and *S_large* is below median. We then follow the same rule and the research of Gompers et al. (2003) to construct an aggregated governance proxy (*Gov*). One point will be given to high-level governance for each governance aspect (seven aspects in total as shown above), and hence the aggregated proxy ranges from 0 to 7, where 7 presents the highest governance level. Gompers et al. (2003) indicate that the aggregated governance index helps to provide a comprehensive analysis.

We then use subsamples to separately estimate regressions that are similar to regressions (1) to (3) but without $\alpha_2 CGov_i$ and $\alpha_3 CGov_i \times Cov19_t$. We further test whether the coefficients of COVID-19 proxies (i.e., the impact of COVID-19 on stock market indicators) are different in the high-level and low-level governance subsamples using the following regressions.

$$Volatility_{i,t} = \alpha_0 + \alpha_1 Cov19_t + \alpha_2 CG\_high_i + \alpha_3 CG\_high_i \times Cov19_t + \alpha_4 CARES + \alpha_5 Volume_{i,t} + \alpha_6 Size_i + \alpha_7 ROA_i + \alpha_8 Leverage_i + Industry + \varepsilon_{i,t} \quad (4)$$

$$Volume_{i,t} = \alpha_0 + \alpha_1 Cov19_t + \alpha_2 CG\_high_i + \alpha_3 CG\_high_i \times Cov19_t + \alpha_4 CARES + \alpha_5 Return_{i,t} + \alpha_6 Size_i + \alpha_7 ROA_i + \alpha_8 Leverage_i + Industry + \varepsilon_{i,t} \quad (5)$$

$$Return_{i,t} = \alpha_0 + \alpha_1 Cov19_t + \alpha_2 CG\_high_i + \alpha_3 CG\_high_i \times Cov19_t + \alpha_4 CARES + \alpha_5 SP500_t + \alpha_6 Volume_{i,t} + \alpha_7 Size_i + \alpha_8 ROA_i + \alpha_9 Leverage_i + Industry + \varepsilon_{i,t} \quad (6)$$

where *CG_high* equals one if the observation belongs to the high-level governance subsample and zero otherwise. The coefficient α_3 in regressions (4) to (6) captures the differences in the coefficients of COVID-19 proxies in the high-level and low-level governance subsamples and helps to examine whether corporate governance has a mitigating effect. Consistent with our earlier findings, the untabulated[7] results obtained using individual governance proxies show that corporate governance mitigates the effect of COVID-19 on volatility and trading volume, but good governance may not alleviate the negative impact of COVID-19 on stock returns. We also create two subsamples based

[7] The results are not tabulated because there are 105 regressions (5 COVID-19 proxies x 7 corporate governance proxies x 3 stock market indicators).

on the aggregated governance proxy (*Gov*; above and below median) and estimate regressions (4) to (6). The overall results (partially tabulated in Table 6) are again in line with our earlier findings.

[INSERT TABLE 6 ABOUT HERE]

5. Conclusion

This paper investigates the impact of COVID-19 on firm-level stock performance and the role of corporate governance in this crisis. The results show that both the numbers of confirmed cases (and deaths) and COVID-19-associated online searches are positively associated with stock price volatility and trading volume. Furthermore, the relationship between our five COVID-19 proxies and stock returns is negative. Overall, our findings are consistent with recent literature that COVID-19 increases volatility and trading volume while reducing stock returns (Chatjuthamard et al., 2021; Chiah and Zhong, 2020; Ding et al., 2021; Yang and Yang, 2021).

This research further finds that good corporate governance could help to mitigate the negative impact of COVID-19 on stock price volatility and trading volume. However, corporate governance may not be helpful for alleviating the impact of COVID-19 on stock returns (Ding et al., 2021). The result also shows that the introduction of the CARES Act significantly reduces volatility and trading volume and improves stock returns. This

shows the effectiveness of the CARES Act and suggests that governments can introduce similar policies to reduce stock market risk and improve stock market performance during the pandemic.

This paper is the first to show that both the fact of COVID-19 (i.e., confirmed cases and deaths) and the subsequent reaction to COVID-19 (i.e., online searches) affect stock performance and it contributes to the investor sentiment literature (Dimpfl and Jank, 2016; Mbanga et al., 2019). This study, analyzing the role of corporate governance in the COVID-19 crisis and considering relevant anti-epidemic measures and policies, adds to the ongoing discussion on corporate governance (Bhagat and Bolton, 2019; Dong et al., 2020) and fills a research gap in this area (Jebran and Chen, 2021; Koutoupis et al., 2021). The results of this research also suggest that, in addition to providing financial support for companies or individuals, governments could mitigate the negative impact of COVID-19 (and similar crises in the future) by encouraging companies to enhance their corporate governance through relevant policy development. Furthermore, previous literature shows that later in the pandemic, the number of confirmed cases is positively associated with stock returns and argues for a market overreaction and correction (Phan and Narayan, 2020). Initially, we also observed this positive relationship, but after controlling for the CARES Act, this relationship becomes negative. This finding suggests that the effect of

relevant COVID-19 aid policies should be taken into consideration when interpreting stock market results during the pandemic.

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Table 1 Descriptive Statistics

Variable	Mean	Std. dev	Minimum	Median	Maximum
Volatility	0.0153	0.0134	0.0000	0.0115	0.3726
Return	-0.0002	0.0628	-0.8046	-0.0006	5.8500
Volume	6.7412	1.6106	-0.9163	6.7472	12.7538
Cases_raw	11,060	12,282	0.0000	887	37,289
Deaths_raw	690	948	0.0000	12	4928
Search1	3.4685	1.6880	0.0000	4.1431	5.5373
Search2	3.9106	1.6199	0.6932	4.4773	6.3386
Search3	4.6515	1.7458	1.5041	5.7301	6.8596
Board_Size_raw	9.2262	2.1255	4	9	16
Duality	0.2164	0.4118	0.0000	0.0000	1.0000
IndepBoard	0.8021	0.1186	0.2500	0.8333	1.0000
S_forei	0.2105	0.1836	0.0000	0.1759	1.0000
S_insti	0.7042	0.2413	0.0000	0.7623	1.0000
S_manag	0.0002	0.0040	0.0000	0.0000	0.1017
S_large	0.1055	0.1569	0.0000	0.0814	0.9795
CARES	0.4272	0.4947	0.0000	0.0000	1.0000
SP500	-0.0001	0.0308	-0.1198	0.0017	0.0938
Size_raw	13,857,230	38,829,475	24,884	2,488,148	551,669,000
ROA	1.1825	20.1017	-163.7700	5.1300	98.8100
Leverage	0.5380	37.5360	-663.6304	1.2194	733.8000
Num. of obs.	116,596	116,596	116,596	116,596	116,596

This table presents descriptive statistics of all variables for 116,596 US firm-day observations in our sample during the period from December 31, 2019 to May 31, 2020. The definitions of variables are as follows: *Volatility* is the daily stock price volatility (i.e., the difference between the highest and lowest stock prices, divided by the average of these two prices); *Volume* is the natural logarithm of daily trading volume; *Return* refers to daily stock returns. *Cases_raw* and *Deaths_raw* show the numbers of daily confirmed cases and deaths in the US, respectively. *Cases* is the natural logarithm of daily confirmed cases in the US; *Deaths* is the natural logarithm of daily COVID-19 deaths in the US. *Search1, Search2, and Search3* refer to the natural logarithm of the three comprehensive Google search volume indexes mentioned in Section 3.2. *Board_Size_raw* shows the total number of directors on a board. *Board_Size* is the natural logarithm of total number of directors on a board; *Duality* equals one if the CEO is also the chairman of the board, and zero otherwise; *IndepBoard* is the percentage of independent board members on a board. *S_forei* is the percentage of shares held by foreign shareholders; *S_insti* is the percentage of shares held by institutional investors; *S_manag* is the percentage of shares owned by managers; *S_large* is the percentage of shares owned by the largest shareholder. *CARES* equals one for observations on or after March 27, 2020 (i.e., after the CARES Act has been enacted into law), and zero otherwise. *SP500* is the daily returns of the S&P 500 index. *Size_raw* shows the total assets. *Size* is the natural logarithm of total assets; *ROA* is the profit before interest after tax divided by total assets; *Leverage* is the total liabilities divided by total equity.

Table 2 Correlation

Variable	*Cases*	*Deaths*	*Search1*	*Search2*	*Search3*	*Board_Size*	*Duality*	*IndepBoard*	*S_forei*	*S_insti*	*S_manag*	*S_large*	*CARES*	*SP500*	*Size*	*ROA*	*Leverage*
Cases	1.0000																
Deaths	0.9470***	1.0000															
Search1	0.8674***	0.7809***	1.0000														
Search2	0.8990***	0.8202***	0.9875***	1.0000													
Search3	0.9621***	0.9316***	0.9178***	0.9459***	1.0000												
Board_Size	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000											
Duality	0.0000	0.0000	0.0000	0.0000	0.0000	0.0588***	1.0000										
IndepBoard	0.0000	0.0000	0.0000	0.0000	0.0000	0.2180***	-0.0210***	1.0000									
S_forei	0.0000	0.0000	0.0000	0.0000	0.0000	0.0531***	-0.0056*	0.0291***	1.0000								
S_insti	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0022	-0.0449***	0.0986***	0.1581***	1.0000							
S_manag	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0330***	-0.0256***	-0.0121***	-0.0494***	-0.0236***	1.0000						
S_large	0.0000	0.0000	0.0000	0.0000	0.0000	0.0728***	0.0075**	-0.1685***	-0.2523***	-0.2376***	0.0288***	1.0000					
CARES	0.8023***	0.8821***	0.5503***	0.5864***	0.7744***	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000				
SP500	0.0582***	0.1331***	-0.0208***	-0.0085***	0.0311***	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1027***	1.0000			
Size	0.0000	0.0000	0.0000	0.0000	0.0000	0.2839***	0.1531***	0.1165***	-0.0127***	-0.0555***	-0.0138***	0.0238***	0.0000	0.0000	1.0000		
ROA	0.0000	0.0000	0.0000	0.0000	0.0000	0.2231***	0.0669***	0.0548***	-0.0625***	0.0402***	-0.0044	0.1089***	0.0000	0.0000	0.1003***	1.0000	
Leverage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0037	-0.0548***	0.0159***	-0.0079***	-0.0050**	0.0010	0.0216***	0.0000	0.0000	-0.0146***	0.0097***	1.0000

All variables are defined in Table 1. *, **, and *** mark statistical significance at the 10, 5, and 1 percent levels, respectively.

Table 3 Volatility, COVID-19, and Corporate Governance

	(A)	(B)	(C)	(D)	(E)
Cases	0.0017***				
	[0.0000]				
Deaths		0.0023***			
		[0.0000]			
Search1			0.0045***		
			[0.0000]		
Search2				0.0052***	
				[0.0000]	
Search3					0.0063***
					[0.0000]
Board_Size	-0.0013***	-0.0014***	-0.0013***	-0.0013***	-0.0013***
	[0.0002]	[0.0002]	[0.0002]	[0.0002]	[0.0002]
Duality	-0.0000	-0.0000	0.0002	0.0003	0.0003
	[0.0001]	[0.0001]	[0.0002]	[0.0002]	[0.0002]
IndepBoard	-0.0029***	-0.0031***	-0.0030***	-0.0029***	-0.0029***
	[0.0003]	[0.0003]	[0.0003]	[0.0003]	[0.0003]
S_forei	-0.0007***	-0.0007***	-0.0007***	-0.0007***	-0.0006***
	[0.0002]	[0.0002]	[0.0002]	[0.0002]	[0.0002]
S_insti	-0.0006***	-0.0006***	-0.0006***	-0.0006***	-0.0006***
	[0.0001]	[0.0001]	[0.0001]	[0.0001]	[0.0001]
S_manag	0.0336***	0.0386***	0.0338***	0.0308***	0.0294***
	[0.0077]	[0.0079]	[0.0078]	[0.0075]	[0.0075]
S_large	0.0012***	0.0012***	0.0012***	0.0011***	0.0011***
	[0.0002]	[0.0002]	[0.0002]	[0.0002]	[0.0002]
Board_Size×Cov19	-0.0001***	-0.0001***	-0.0005***	-0.0005***	-0.0005***
	[0.0000]	[0.0000]	[0.0001]	[0.0001]	[0.0001]
Duality×Cov19	-0.0000*	-0.0000	-0.0000**	-0.0001**	-0.0000**
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
IndepBoard×Cov19	-0.0002***	-0.0002***	-0.0006***	-0.0007***	-0.0007***
	[0.0000]	[0.0000]	[0.0002]	[0.0002]	[0.0001]
S_forei×Cov19	-0.0000	0.0000	-0.0000	-0.0000	-0.0000
	[0.0000]	[0.0000]	[0.0001]	[0.0001]	[0.0001]
S_insti×Cov19	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	[0.0000]	[0.0000]	[0.0001]	[0.0001]	[0.0001]
S_manag×Cov19	-0.0009	-0.0002	-0.0088*	-0.0097**	-0.0046
	[0.0012]	[0.0014]	[0.0045]	[0.0046]	[0.0042]
S_large×Cov19	0.0000	0.0000	0.0003**	0.0003**	0.0002**
	[0.0000]	[0.0000]	[0.0001]	[0.0001]	[0.0001]
CARES	-0.0164***	-0.0216***	-0.0076***	-0.0091***	-0.0163***
	[0.0001]	[0.0001]	[0.0000]	[0.0000]	[0.0000]
Volume	-0.0028***	0.0030***	0.0028***	0.0027***	0.0026***
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Size	-0.0029***	-0.0030***	-0.0029***	-0.0028***	-0.0027***
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
ROA	-0.0000***	-0.0000	-0.0000***	-0.0000***	-0.0000***
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Leverage	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Intercept	0.0471***	0.0500***	0.0434***	0.0436***	0.0465***
	[0.0004]	[0.0004]	[0.0004]	[0.0004]	[0.0003]
Industry	Included	Included	Included	Included	Included
Num. of obs.	116,596	116,596	116,565	116,596	116,596
F-value	2801.63	2815.15	2781.54	3174.27	3326.47
Adjusted R^2	0.4106	0.3850	0.4088	0.4411	0.4527

This table presents the estimation results of the following model.

$$Volatility_{i,t} = \alpha_0 + \alpha_1 Cov19_t + \alpha_2 CGov_i + \alpha_3 CGov_i \times Cov19_t + \alpha_4 CARES + \alpha_5 Volume_{i,t} + \alpha_6 Size_i + \alpha_7 ROA_i + \alpha_8 Leverage_i + Industry + \varepsilon_{i,t} \quad (1)$$

where *Cov19* refers to five COVID-19 proxies: *Cases, Deaths, Search1, Search2,* and *Search3,* which are used in specifications (A) to (E), respectively. *CGov* refers to seven corporate governance variables, i.e., *Board_Size*, *Duality*, *IndepBoard*, *S_forei*, *S_insti*, *S_manag*, and *S_large*. All variables are defined in Table 1. Industry fixed effects are controlled. Standard errors are in brackets, and *, **, and *** mark statistical significance at the 10, 5, and 1 percent levels, respectively.

Table 4 Trading Volume, COVID-19, and Corporate Governance

	(A)	(B)	(C)	(D)	(E)
Cases	0.0607***				
	[0.0009]				
Deaths		0.0770***			
		[0.0013]			
Search1			0.1596***		
			[0.0024]		
Search2				0.1778***	
				[0.0026]	
Search3					0.2168***
					[0.0030]
Board_Size	0.1464***	0.1464***	0.1465***	0.1465***	0.1465***
	[0.0170]	[0.0171]	[0.0170]	[0.0170]	[0.0170]
Duality	-0.0937***	-0.0916***	-0.1214***	-0.1201***	-0.1038***
	[0.0094]	[0.0082]	[0.0175]	[0.0200]	[0.0217]
IndepBoard	0.5008***	0.5005***	0.5010***	0.5010***	0.5010***
	[0.0287]	[0.0288]	[0.0287]	[0.0286]	[0.0286]
S_forei	0.1438***	0.1438***	0.1438***	0.1438***	0.1438***
	[0.0179]	[0.0180]	[0.0179]	[0.0179]	[0.0178]
S_insti	-0.0367***	-0.0367***	-0.0367***	-0.0367***	-0.0367***
	[0.0136]	[0.0137]	[0.0136]	[0.0136]	[0.0135]
S_manag	-22.5811***	-22.5816***	-22.5808***	-22.5808***	-22.5809***
	[0.8025]	[0.8069]	[0.8025]	[0.8012]	[0.8005]
S_large	-0.2160***	-0.2163***	-0.2157***	-0.2158***	-0.2158***
	[0.0218]	[0.0219]	[0.0218]	[0.0218]	[0.0218]
Board_Size×Cov19	0.0026	0.0003	0.0338***	0.0319***	0.0135*
	[0.0022]	[0.0025]	[0.0081]	[0.0084]	[0.0078]
Duality×Cov19	0.0004	-0.0002	0.0084*	0.0072	0.0025
	[0.0012]	[0.0014]	[0.0045]	[0.0047]	[0.0044]
IndepBoard×Cov19	0.0050	0.0055	0.0202	0.0193	0.0167
	[0.0044]	[0.0051]	[0.0164]	[0.0170]	[0.0158]
S_forei×Cov19	-0.0111***	-0.0130***	-0.0303***	-0.0354***	-0.0380***
	[0.0028]	[0.0033]	[0.0105]	[0.0110]	[0.0102]
S_insti×Cov19	0.0013	0.0019	0.0023	0.0042	0.0050
	[0.0022]	[0.0025]	[0.0080]	[0.0083]	[0.0077]
S_manag×Cov19	0.0604	0.0703	0.1672	0.1417	0.1348
	[0.1267]	[0.1465]	[0.4702]	[0.4892]	[0.4535]
S_large×Cov19	-0.0046	-0.0059	-0.0124	-0.0129	-0.0155
	[0.0034]	[0.0040]	[0.0127]	[0.0133]	[0.0123]
CARES	-0.5083***	-0.6358***	-0.1917***	-0.2369***	-0.4861***
	[0.0106]	[0.0135]	[0.0077]	[0.0079]	[0.0100]
Return	0.1559***	-0.0720	0.3185***	0.2974***	0.2713***
	[0.0518]	[0.0520]	[0.0519]	[0.0518]	[0.0517]
Size	0.6621***	0.6621***	0.6621***	0.6621***	0.6621***
	[0.0024]	[0.0024]	[0.0024]	[0.0024]	[0.0024]
ROA	-0.0187***	-0.0187***	-0.0187***	-0.0187***	-0.0187***
	[0.0002]	[0.0002]	[0.0002]	[0.0002]	[0.0002]
Leverage	-0.0004***	-0.0004***	-0.0004***	-0.0004***	-0.0004***
	[0.0001]	[0.0001]	[0.0001]	[0.0001]	[0.0001]
Intercept	-2.9903***	-2.9369***	-3.1230***	-3.1056***	-2.9992***
	[0.0367]	[0.0370]	[0.0365]	[0.0365]	[0.0365]
Industry	Included	Included	Included	Included	Included
Num. of obs.	116,596	116,596	116,596	116,596	116,596
F-value	5112.96	5013.76	5113.14	5142.07	5159.60
Adjusted R^2	0.5598	0.5549	0.5598	0.5612	0.5620

This table presents the estimation results of the following model.

$$Volume_{i,t} = \alpha_0 + \alpha_1 Cov19_t + \alpha_2 CGov_i + \alpha_3 CGov_i \times Cov19_t + \alpha_4 CARES + \alpha_5 Return_{i,t} + \alpha_6 Size_i + \alpha_7 ROA_i + \alpha_8 Leverage_i + Industry + \varepsilon_{i,t} \quad (2)$$

where *Cov19* refers to five COVID-19 proxies: *Cases, Deaths, Search1, Search2,* and *Search3,* which are used in specifications (A) to (E), respectively. *CGov* refers to seven corporate governance variables, i.e., *Board_Size*, *Duality*, *IndepBoard*, *S_forei*, *S_insti*, *S_manag*, and *S_large*. All variables are defined in Table 1. Industry fixed effects are controlled. Standard errors are in brackets, and *, **, and *** mark statistical significance at the 10, 5, and 1 percent levels, respectively.

Table 5 Stock Returns, COVID-19, and Corporate Governance

	(A)	(B)	(C)	(D)	(E)
Cases	-0.0004***				
	[0.0000]				
Deaths		-0.0009***			
		[0.0000]			
Search1			-0.0017***		
			[0.0001]		
Search2				-0.0016***	
				[0.0001]	
Search3					-0.0017***
					[0.0001]
Board_Size	-0.0005	-0.0005	-0.0005	-0.0005	-0.0005
	[0.0008]	[0.0008]	[0.0008]	[0.0008]	[0.0008]
Duality	0.0008*	0.0008**	0.0003	0.0004	0.0006
	[0.0004]	[0.0004]	[0.0008]	[0.0009]	[0.0010]
IndepBoard	-0.0018	-0.0019	-0.0019	-0.0019	-0.0019
	[0.0013]	[0.0013]	[0.0013]	[0.0013]	[0.0013]
S_forei	0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	[0.0008]	[0.0008]	[0.0008]	[0.0008]	[0.0008]
S_insti	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	[0.0006]	[0.0006]	[0.0006]	[0.0006]	[0.0006]
S_manag	0.0216	0.0237	0.0251	0.0245	0.0237
	[0.0374]	[0.0373]	[0.0373]	[0.0373]	[0.0374]
S_large	-0.0012	-0.0012	-0.0011	-0.0011	-0.0012
	[0.0010]	[0.0010]	[0.0010]	[0.0010]	[0.0010]
Board_Size×Cov19	-0.0002**	-0.0002*	-0.0006*	-0.0009**	-0.0011***
	[0.0001]	[0.0001]	[0.0004]	[0.0004]	[0.0004]
Duality×Cov19	0.0000	0.0000	0.0001	0.0001	0.0000
	[0.0000]	[0.0000]	[0.0002]	[0.0002]	[0.0002]
IndepBoard×Cov19	0.0000	-0.0001	0.0003	0.0003	-0.0002
	[0.0002]	[0.0002]	[0.0007]	[0.0008]	[0.0007]
S_forei×Cov19	-0.0000	-0.0000	-0.0000	-0.0000	-0.0001
	[0.0001]	[0.0002]	[0.0005]	[0.0005]	[0.0005]
S_insti×Cov19	0.0000	0.0000	-0.0000	-0.0000	0.0000
	[0.0000]	[0.0001]	[0.0004]	[0.0004]	[0.0004]
S_manag×Cov19	-0.0012	-0.0021	0.0065	0.0014	-0.0046
	[0.0059]	[0.0068]	[0.0218]	[0.0227]	[0.0211]
S_large×Cov19	0.0000	0.0000	0.0002	0.0002	0.0001
	[0.0002]	[0.0002]	[0.0006]	[0.0006]	[0.0006]
CARES	0.0079***	0.0123***	0.0070***	0.0069***	0.0086***
	[0.0005]	[0.0006]	[0.0004]	[0.0004]	[0.0005]
SP500	1.1309***	1.1397***	1.1259***	1.1271***	1.1282***
	[0.0048]	[0.0048]	[0.0048]	[0.0048]	[0.0048]
Volume	0.0011***	0.0012***	0.0012***	0.0012***	0.0012***
	[0.0001]	[0.0001]	[0.0001]	[0.0001]	[0.0001]
Size	-0.0006***	-0.0006***	-0.0007***	-0.0006***	-0.0006***
	[0.0001]	[0.0001]	[0.0001]	[0.0001]	[0.0001]
ROA	0.0000	0.0000*	0.0000*	0.0000*	0.0000*
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Leverage	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Intercept	-0.0046***	-0.0061***	-0.0037**	-0.0037**	-0.0045***
	[0.0018]	[0.0018]	[0.0018]	[0.0018]	[0.0018]
Industry	Included	Included	Included	Included	Included
Num. of obs.	116,596	116,596	116,596	116,596	116,596
F-value	1953.54	1958.89	1960.76	1958.42	1956.8
Adjusted R^2	0.3346	0.3351	0.3352	0.3350	0.3348

This table presents the estimation results of the following model.

$$Return_{i,t} = \alpha_0 + \alpha_1 Cov19_t + \alpha_2 CGov_i + \alpha_3 CGov_i \times Cov19_t + \alpha_4 CARES + \alpha_5 SP500_t + \alpha_6 Volume_{i,t} + \alpha_7 Size_i + \alpha_8 ROA_i + \alpha_9 Leverage_i + Industry + \varepsilon_{i,t} \quad (3)$$

where *Cov19* refers to five COVID-19 proxies: *Cases, Deaths, Search1, Search2,* and *Search3,* which are used in specifications (A) to (E), respectively. *CGov* refers to seven corporate governance variables, i.e., *Board_Size*, *Duality*, *IndepBoard*, *S_forei*, *S_insti*, *S_manag*, and *S_large*. All variables are defined in Table 1. Industry fixed effects are controlled. Standard errors are in brackets, and *, **, and *** mark statistical significance at the 10, 5, and 1 percent levels, respectively.

Table 6 The Results of Robustness Check

	(A)			(B)		
	Volatility	Volume	Return	Volatility	Volume	Return
Cases	0.0017***	0.0617***	-0.0004***			
	[0.0000]	[0.0009]	[0.0000]			
Search1				0.0045***	0.1631***	-0.0017***
				[0.0000]	[0.0025]	[0.0001]
H_Gov	-0.0006***	0.0898***	0.0001	-0.0002	0.0962***	-0.0001
	[0.0001]	[0.0087]	[0.0004]	[0.0002]	[0.0161]	[0.0007]
H_Gov ×Cov19	-0.0000***	-0.0032***	-0.0000	-0.0001***	-0.0058	0.0001
	[0.0000]	[0.0011]	[0.0001]	[0.0000]	[0.0042]	[0.0002]
CARES	-0.0164***	-0.5082***	0.0079***	-0.0076***	-0.1958***	0.0070***
	[0.0001]	[0.0107]	[0.0005]	[0.0001]	[0.0077]	[0.0004]
SP500			1.1309***			1.1259***
			[0.0048]			[0.0048]
Volume	0.0028***		0.0010***	0.0028***		0.0012***
	[0.0000]		[0.0001]	[0.0000]		[0.0001]
Return		0.1518***			0.3144***	
		[0.0521]			[0.0523]	
Size	-0.0030***	0.6789***	-0.0006***	-0.0030***	0.6789***	-0.0007***
	[0.0000]	[0.0020]	[0.0001]	[0.0000]	[0.0020]	[0.0001]
ROA	-0.0000***	-0.0191***	0.0000	-0.0000***	-0.0191***	0.0000*
	[0.0000]	[0.0002]	[0.0000]	[0.0000]	[0.0002]	[0.0000]
Leverage	0.0000***	-0.0003***	-0.0000	0.0000***	-0.0003***	-0.0000
	[0.0000]	[0.0001]	[0.0000]	[0.0000]	[0.0001]	[0.0000]
Intercept	0.0418***	-3.5479***	-0.0020	0.0296***	-3.9826***	-0.0031**
	[0.0003]	[0.0302]	[0.0015]	[0.0003]	[0.0310]	[0.0015]
Industry	Included	Included	Included	Included	Included	Included
Num. of obs.	116,596	116,596	116,596	116,596	116,596	116,596
F-value	4,746.65	8,511.45	3,254.96	4,711.45	8,508.96	3,267.22
Adjusted R^2	0.4090	0.5537	0.3344	0.4072	0.5578	0.3352

We split our sample into two subsamples based on the level of governance (i.e., high and low), using the aggregated governance proxy (see Section 4.4 for further information on this proxy). The table presents the estimation results of the following models.

$$Volatility_{i,t} = \alpha_0 + \alpha_1 Cov19_t + \alpha_2 CG\_high_i + \alpha_3 CG\_high_i \times Cov19_t + \alpha_4 CARES + \alpha_5 Volume_{i,t} + \alpha_6 Size_i + \alpha_7 ROA_i + \alpha_8 Leverage_i + Industry + \varepsilon_{i,t} \quad (4)$$

$$Volume_{i,t} = \alpha_0 + \alpha_1 Cov19_t + \alpha_2 CG\_high_i + \alpha_3 CG\_high_i \times Cov19_t + \alpha_4 CARES + \alpha_5 Return_{i,t} + \alpha_6 Size_i + \alpha_7 ROA_i + \alpha_8 Leverage_i + Industry + \varepsilon_{i,t} \quad (5)$$

$$Return_{i,t} = \alpha_0 + \alpha_1 Cov19_t + \alpha_2 CG\_high_i + \alpha_3 CG\_high_i \times Cov19_t + \alpha_4 CARES + \alpha_5 SP500_t + \alpha_6 Volume_{i,t} + \alpha_7 Size_i + \alpha_8 ROA_i + \alpha_9 Leverage_i + Industry + \varepsilon_{i,t} \quad (6)$$

where *Cov19* refers to COVID-19 proxies: *Cases* and *Search1,* which are used in specifications (A) and (B), respectively. *CG_high* equals one if the observation belongs to the high-level governance subsample, and zero otherwise. In this table, *CG_high* refers to *H_Gov*, a dummy variable which equals one if the observation belongs to the high-level governance subsample, based on the aggregated governance proxy. All other variables are defined in Table 1. Industry fixed effects are controlled. Standard errors are in brackets, and *, **, and *** mark statistical significance at the 10, 5, and 1 percent levels, respectively.