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## Insider Share Pledging and Firm Value Consequences under the COVID-19

He Xiao, Xin Chen, Heyang Fang, Yifei Zhang\*

### Abstract

Share pledging, the practice in which shareholders secure a loan using their shares, has become a global phenomenon in recent years. In this paper, we investigate the effect of such corporate *insider* actions on *outsider* wealth during the pandemic. Concretely, we examine how firms' market value change when corporate insiders pledge their shareholdings during China's COVID-19 outbreak. It is found that market investors responded adversely to share pledging announcements by firms in the high pandemic-affected regions. Besides, the state ownership and better corporate governance structures of the pledged firms could mitigate such adverse impacts. Our study highlights a specific externality generated by corporate insiders to outside shareholders during a crisis period.

**Keywords:** COVID-19; Event Study; Firm Value; Managerial Incentive; Share Pledging.

**JEL Classification Codes:** G31, G32.

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## 1. Introduction

Share pledging (*i.e.*, when shareholdings are used as collateral to secure personal loans) has become an international phenomenon in recent years. According to the survey by Lacker & Tayan (2010), over 20% of U.S. firms have insider pledging. By the end of 2015, U.S. corporate managers and directors have pledged at least 15 billion USD of their shareholdings for personal use (McLaughlin, 2015). Share pledging also prevails in emerging markets such as China, India, and Taiwan, in which around 35% to 50% of the publicly listed firms have pledging activities (Dou *et al.*, 2019).

Corporate insiders often pledge their shareholdings as an effective way to alleviate their liquidity constraints while keeping control rights (Dou *et al.*, 2019). Such relief motivation could be especially pivotal during the Coronavirus disease (COVID-19) outbreak. On the one hand, the pandemic hits the real economy severely and further heightens the liquidity constraints in financial markets (Ruiz Estrada *et al.*, 2020). On the other hand, individual consumptions and personal credit constraints are deteriorating during the pandemic, as documented by Chen *et al.* (2020) and Guerrieri *et al.* (2020)<sup>1</sup> Therefore, insider shareholders could have more incentives to pledge their shares after the pandemic outbreak.

Thus, it is intriguing to investigate the effect of such corporate *insider* actions on *outsider* wealth during this challenging period. The related literature suggests two competing forces of share pledging on firm value. Share pledging can increase firm value through enhanced investment efficiency (Meng *et al.*, 2019). On the other hand, it could impair firm value through insiders' self-serving behaviors, and the stock price would drop due to the increased crash risk triggered by margin call pressure. For instance, Chan *et al.* (2018) study the share pledging market in Taiwan and find that controlling shareholders repurchase shares to alleviate margin call pressures and protect their benefits.<sup>2</sup> In a similar vein, Dou *et al.* (2019) investigate the stock pledging activity of publicly listed firms in Taiwan and document a 9.6% value increase in firms that experience an exogenous decline in pledging relative to the control firms.

In this paper, we examine whether and how shareholders' pledging activities would affect firm value during the COVID-19 outbreak. Moreover, we investigate what corporate characteristics would moderate the effect. The Chinese stock market provides an ideal

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<sup>1</sup> Chen *et al.* (2020) find that people in Chinese cities highly exposed to the pandemic experienced a significant decrease in their consumption during the three-month post-outbreak period. Similarly, Guerrieri *et al.* (2020) argue that individuals' credit constraints cause a significant drop in U.S. household consumptions amid the COVID-19 crisis.

<sup>2</sup> Using an event study approach, they further show that the positive investor reaction following the repurchase announcement decreases with the share pledge ratio, suggesting a discounted repurchase benefits from pledger's pursuit of personal interests.

laboratory to test the empirical questions for two reasons. First, share pledging is prevailing in China in recent years. For instance, He & Liu (2020) document that 40.5% of the public firms had share pledged loans by the end of 2019. Second, the China Securities Regulatory Commission (CSRC)'s compulsory share pledging disclosure requirement provides well-documented pledging records for our study.<sup>3</sup>

In terms of research methodology, we adopt an event study approach to compute the cumulative abnormal returns (CARs) from the [0,1] event window and compare the CARs for firms from different regions with different pandemic severity. Our baseline results show that firms located in more pandemic-affected provinces suffered from a more severe reduction in firm value when announcing share pledging, compared to those from less severely affected areas. Quantitatively, a one percentage point increase in provincial pandemic death proportion would result in a 1.5 percentage points more decline in market value.

Furthermore, we find that state-owned enterprises (SOEs) exhibit less adverse market reactions than non-state-owned enterprises (non-SOEs). As Chinese SOEs have institutional advantages relative to non-SOEs, state ownership may mitigate stock price crash risk during the COVID-19 outbreak. Besides, we argue that the negative effect on firm value could also be mitigated by firms' corporate governance characteristics, such as ownership structure, board meeting frequencies, and auditing quality. This result aligns with Fan & Wong (2005) and Francis *et al.* (2012). In addition, we also discuss the role of corporate social responsibility (CSR) in mediating share pledging's adverse effect during the pandemic outbreak. We find that better CSR performance would significantly relieve the negative market response to share pledging since CSR efforts signal a trustworthy and stable firm image to market investors (Lins *et al.*, 2017; Borghesi *et al.*, 2019).

Our baseline results are robust to a range of alternative specifications. First, we find that *more* pledged shares in the pandemic affected region would translate to an even lower market value. Also, we show that state-owned *pledgers*, complementing state-owned *firms*, would also mitigate the loss of firm value. Moreover, our results remain virtually unchanged when adopting an alternative proxy of the regional pandemic severity and an extended event window. Besides, we further change the estimation window to cover 150 days ending on 23 January 2020 and still document a strong negative effect.

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<sup>3</sup> According to the CSRC, firms should disclose the share pledging by their block shareholders (*i.e.*, shareholders that own at least 5% of the common stock).

One might concern that the research design could suffer from reversed causality and thus bias the empirical results. Specifically, firms' share-pledging activities were endogenous and possibly associated with a complex grouping of factors, especially the firm's market value. In other words, expecting a reduction in firm value, corporate insiders from more pandemic-affected provinces were more likely to pledge shares. We further test whether firms residing in more pandemic-affected regions pledged more after the pandemic outbreak to deal with such concern. The insignificant results confirm that the anticipation effect was not strong enough, and the reverse-causality would not contaminate our main results. Furthermore, we carry the Impact Threshold for a Confounding Variable (ITCV) test to address the possible omitted variable bias concern.

Our study contributes to the existing research in two ways. First, while a growing literature relates to stock prices and the COVID-19 (Ding *et al.*, 2020; Ramelli & Wagner, 2020), we are among the first to examine firms' valuation caused by shareholders' activities under this unpredictable pandemic crisis. Besides, we emphasize how the regional pandemic severity, such as the COVID-19 death or the confirmed cases, would shape our results. Our study also complements Xu *et al.* (2019) that share pledging exasperated the stock price crash risk during a financial crisis.

Second, we complement the current share pledging literature (Chan *et al.*, 2018; Dou *et al.*, 2019; Meng *et al.*, 2019; He *et al.*, 2021) and generate fresh insights into the role by the ownership structure, corporate governance, and corporate social responsibilities. Concretely, we show that state ownership and better corporate governance would reduce the adverse market reactions to share pledges. We use different state-owned statuses (firms and shareholders) and corporate governance indicators such as ownership structure, institutional ownership, board meeting frequencies, auditing quality to show the robustness of our findings.

## **2. Institutional background**

### **2.1 Share pledging in China**

Share pledging is the practice in which corporate insiders pledge some of their shareholdings as collateral to financial institutions for personal loans. In China, the stock pledging system was officially established by the Chinese Guarantee Act in 1995 (Li *et al.*, 2019). Blockholders (*i.e.*, shareholders that own at least 5% of the common stock) of publicly listed Chinese firms are allowed to pledge their shareholdings to banks and trust companies starting from 2000. In 2013, the Chinese pledging market was further stimulated by the stock pledge repo instrument,

making the securities companies the primary lender in the market. Since then, share pledged loans have become increasingly prevalent as a financing source.

Owing to the concentrated ownership structure in China, most of the Chinese listed firms have controlling shareholders who are either connected to the government or wealthy individuals/families (Huang *et al.*, 2011; Xu *et al.*, 2020). According to the Company Law of China, it is not necessary for controlling shareholders to hold the largest ownership in a firm. Thus, controlling shareholders can exert significant controls on firms without considerable shareholdings. By the end of 2017, around 10% of the total outstanding shares in the Chinese A-share market are pledged by controlling shareholders, which amount to a market value of 5 trillion RMB (Pang & Wang, 2020).

The widespread share pledging in China in recent years also stems from the clear benefits to both pledgors and financial institutions. For shareholders, share-pledged loans are more convenient when compared to traditional collateral loans with cumbersome procedures. Pledgors can use the obtained loans for personal consumption without affecting their rights attached to the shares. From the lenders' perspective, loans pledged by shares are backed by the maintenance margin, allowing lenders to sell the shares in open markets when borrowers cannot meet the repayment requirements or the share price falls significantly before the loan maturity. In this case, lenders can minimize their risk exposure in times of uncertainty.

## **2.2 The COVID-19 in China**

The coronavirus disease (COVID-19) was first found in Wuhan city of Hubei province in early November 2019 and spread rapidly within the region in the following months. A strict Wuhan lockdown policy came into effect on January 23, 2020. All interprovincial transport would be suspended or closed, and Wuhan residents were also not allowed to leave the city. The lockdown policy decreed in Wuhan set a precedent for similar measures in the other 15 Hubei cities, and the entire province enforced a blockade by January 27, 2020. Meanwhile, all Chinese provincial-level regions initiated the highest response level to a public health emergency, and curfew laws and massive quarantine interventions were aggressively implemented across the nation. As the epicenter of the COVID-19 outbreak, Hubei has the highest mortality among all the provinces in China. Table 1 summarizes the death statistics and the percentage of China's total number by May 31, 2020. In March, China successively lifted the nationwide lockdowns, and the outbreak containment in Wuhan was eventually relaxed.

### 3. Hypotheses development

Under the pandemic, share pledging would exert negative impacts on firm values through two channels. First, share pledging exposes firms to higher adverse price shocks. During the COVID-19 outbreak, China's capital market and especially the firms' stock prices from those severely affected regions slumped. According to Ding *et al.* (2020), firms having subsidiaries in Hubei experienced a 0.6 percentage point reduction in their CARs following the lockdown. This suggests that firms in the pandemic's epicenter were particularly struck by the COVID-19 outbreak, which could trigger the margin calls. As a result, corporate insiders with inadequate liquidities might face difficulties meeting the requests, leading to the fire sales of their pledged shares by the lenders in the secondary market (Dou *et al.*, 2019). This propagation could drag the stock prices down even further. Additionally, corporate insiders could avoid taking risky but positive net present value (NPV) projects to prevent the margin calls and the subsequent stock price crash risks. The forgone opportunities may also impede firm values (Dou *et al.*, 2019; Li *et al.*, 2019).

Secondly, behavioral economics literature highlights that investors' risk recognitions could be affected by irrationalities such as herding (Calvo & Mendoza, 2000) and limited focus (Mondria & Quintana-Domeque, 2013) during crisis periods. The theory further predicts that extreme events can capture investors' attention and reflect on asset pricing (Bordalo *et al.*, 2013). As the pandemic brought unprecedented risks to financial markets, investors might pay intense attention to the small probability events that tend to be ignored in normal times. Consequently, investors might be especially sensitive to the negative consequences of share pledging during the crisis. Xu *et al.* (2019) provide empirical evidence that share pledging aggravated the stock price crash risk during the Chinese A-share market crisis in 2015. Therefore, we posit the following hypothesis.

*H1: During the COVID-19 outbreak, market investors would respond more negatively to the share pledging announcements by firms in the more pandemic-affected regions, relative to those in the less-affected areas.*

The impact of share pledging on firm values could be associated with state ownership. For instance, Yu *et al.* (2015) find that SOEs enjoy political favors from the government, which often alleviates the strike of adverse events. The Chinese government often appoints executives to state-owned enterprises (SOEs) (Du *et al.*, 2016; Lin & Fu, 2017). SOEs with executives

who serve as corporate insiders and government officials could leverage their unique institutional advantage that helps the firms better survive the crisis period. More specifically, SOEs have advantages in accessing external financing relative to non-SOEs (Huang *et al.*, 2011). According to Cull & Xu (2003), Chinese SOEs enjoy preferential access to bank financing and government transfers. Through easier access to financial benefits, government support reduces SOEs' financial costs and business risk, thus minimizing the risk brought by adverse shocks such as insider pledging.

Additionally, the stock price crash risk could also be lower for SOEs than non-SOEs. On the one hand, under the strict control of the Communist Party of China, SOEs have minor agency problems and information opaqueness in the market, thus minimizing the stock price crash risk (Li & Chan, 2016). This is because directors with political connections are more likely to comply with the public interest and release information promptly (Luo *et al.*, 2016). On the other hand, SOEs have high levels of social capital, which effectively mitigates impacts from adverse shocks. Li *et al.* (2017) empirically show that firms with higher social trust suffer less during the 2008 financial crisis because of the enhanced managerial credibility and the declining opportunistic activities. Thus, state ownership may serve as insurance against the stock price crash risk during the COVID-19 outbreak.

Moreover, corporate insiders of SOEs are less exposed to the margin call risk and less engage in corporate risk-taking investment to protect their career prospects (Meng *et al.*, 2019). Thus, SOEs tend to have less severe risk-shifting problems induced by the share-pledging events relative to non-SOEs. More importantly, SOEs had superior performance in coping with drastic changes during the pandemic because of government support rather than their innate operating ability (Wu & Xu, 2021). Thus, we propose the second hypothesis.

*H2: State ownership could mitigate the adverse impact of the share pledging announcements on firm values during the COVID-19 outbreak.*

We argue that the negative impact of share pledging on firm values could be alleviated for well-governed firms. Better-governed firms could be proxied with the following characteristics. First, ownership structure performs a key role in corporate governance for listed firms to affect firm value. For example, Cheng *et al.* (2020) suggest that share pledging by firms' largest shareholders could promote corporate performance because of lesser financial constraints. This implies that firms with controlling shareholders who pledge their shares are more likely to

maximize the stock price to avoid margin calls.<sup>4</sup> In addition, there is vast literature highlighting that institutional ownership is an essential determinant of corporate governance (Chung & Zhang, 2011). Firms with better governance structure are more likely to attract institutional investors due to reduced information asymmetry between insiders and market investors, thus having higher market liquidity and lower trading costs. Therefore, it is reasonable to expect that firms with higher institutional ownership signify a well-functioning governance structure of firms to mitigate the adverse shocks brought by the share pledges announcement.

In addition, the board of directors, as internal mechanisms of corporate governance, could promote firm value from various board characteristics (Jensen, 1993). In particular, Vafeas (1999) shows that the increased board meetings could lead to higher firm value because higher board monitoring quality could reduce managerial problems and contribute to an organized corporate structure. Therefore, board members are more likely to schedule frequent meetings for crisis navigation found to execute their monitor management and strategic responses during the financial crisis (Grove *et al.*, 2011; Francis *et al.*, 2012). Finally, better external auditors also serve as an indispensable part in explaining better governance due to less embedded agency conflicts (Fan & Wong, 2005). Consequently, we expect that firms hiring the national big ten auditing companies are more confident of their financial reporting quality, which indirectly shows a better corporate governance structure. We then posit our third hypothesis as follows.

*H3: Firms with better corporate governance would experience fewer losses in firm values when announcing share pledging during the COVID-19 outbreak*

Extant empirical studies confirm a positive relationship between CSR and firm value. For instance, Byun & Oh (2018) find a conducive effect of publicized CSR activities on shareholder value and the forecasted operating performance owing to more significant stakeholders' awareness. Similarly, Lins *et al.* (2017) focus on the trade-off between financial disturbance and social trust and argue that firms with high CSR intensity had a relatively

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<sup>4</sup> The margin call threat could refrain the majority shareholders from engaging in expropriation (*i.e.*, tunneling) at the expense of minority shareholders (Li *et al.*, 2019). In this regard, high tunneling is subject to poor corporate governance, which could lead to lower firm profitability. In other words, corporate governance is likely to deteriorate if there exist a large number of transactions by pledging shareholder to tunnel out resources and assets (Wang & Chou, 2018). We, therefore, expect that tunneling, as the governance weakness, has a detrimental effect on firm performance.



positive stock return during the 2008 financial crisis. It indicates that social trust built through CSR activities alleviates adverse shocks because intensive CSR engagement signals a trustworthy and stable firm image to market investors (Borghesi *et al.*, 2019). In addition to increased social capital, CSR could exert positive effects on firm values through reducing information asymmetry between firms and market investors (Cho *et al.*, 2013), ameliorating the agency costs between managers and stakeholders (Jo & Harjoto, 2011), and accessing lower costs of capital (Ghoul *et al.*, 2011). Therefore, we expect that firms with better CSR performance would outperform those firms with lower CSR engagement when announcing share pledging events during the COVID-19 outbreak.

*H4: Firms with better CSR performance would experience fewer losses in firm values when announcing share pledging events during the COVID-19 outbreak.*

## **4. Data, Empirical Strategy, and Main Results**

### **4.1 Data source and Summary Statistics**

Our sample data are from the following sources. To proxy the relative regional pandemic severity, we retrieve the pandemic data up to May 31, 2020 from the China Stock Market & Accounting Research (CSMAR) database. We scale the number of provincial COVID-19 mortalities and confirmed cases by the corresponding nationwide total number. The online Appendix Table 1 lists the pandemic statistics at the province level. The average proportion of provincial deaths is 2.15%, with Hubei province having an exceptional 97.37%.<sup>5</sup> Figure 1 portrays the COVID-19 timeline regarding the total confirmed cases and death cases from January 22, 2020 to May 31, 2020.

[Insert Figure 1 here]

We include all A-share firms listed on the Shanghai and Shenzhen Stock Exchange that announced their share pledging from the pandemic outbreak to the latest available period of share pledging data, *i.e.*, from January 23 to May 31, 2020.<sup>6</sup> The share pledging, stock returns, and firm characteristics are from the CSMAR database as well. Our sample contains 711 pledging firms, of which 9.8 % are state-owned, with an average of 10.13 annual board meeting frequencies. Table 1 shows the definitions of all the variables, and Panel A of Table 2 lists the

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<sup>5</sup> All appendix tables could be accessed online via [https://www.dropbox.com/s/rpbp4fad3hluuy0/2021\\_04\\_Pledging\\_Appendix\\_Table.pdf?dl=0](https://www.dropbox.com/s/rpbp4fad3hluuy0/2021_04_Pledging_Appendix_Table.pdf?dl=0)

<sup>6</sup> We follow Ding *et al.* (2020) and set the Wuhan lockdown announcement date as the pandemic outbreak date.

summary statistics of the key variables used in this study. The CAR is -0.16% and -0.41% in the event window [0,1] and [0,7] with 1% statistical significance, as shown in Panel B of Table 2.

[Insert Table 1 here]

[Insert Table 2 here]

## 4.2 Empirical Strategy

Following Wang & Chou (2018), we employ an event study methodology to assess the impact of share pledging announcement on firm value based on the efficient market hypothesis. Specifically, we adopt a single-factor market model to compute the CARs and set the estimation window of stock betas to be [-180,-30] days.<sup>7</sup> Moreover, we use the firm's share pledging announcement date as the event date and compute the CAR over the [0,1] event window.

To assess the impact of the COVID-19 on the share pledging CARs, we take the following regression-based approach:

$$CAR_i = \beta_0 + \beta_1 \theta_i + \mathbf{X}_i + \mathbf{P}_i + \mu_i + \varepsilon_i \quad (1)$$

where  $CAR_i$  indicates the CAR of firm  $i$  around the share pledging announcement over the event window [0,1].  $\theta_i$  is the number of provincial COVID-19 mortality cases over the total national cases. Following Wang & Chou (2018), we include the firm's one-year lagged control vector  $\mathbf{X}_i$ , which includes CEO duality, leverage ratio, market-to-book ratio, ROE, size of the board, Tobin's Q, and the natural logarithm of market capitalization. Besides, we control for the province-level characteristic vector  $\mathbf{P}_i$  of firm  $i$ , which includes the lagged provincial GDP and a dummy variable for a region with a solid legal environment.<sup>8</sup> The detailed definitions of variables are in Table 2. We also include the industry fixed effects  $\mu_i$ , and cluster the standard error at the industry level to account for arbitrary serial correlation among industries.

Furthermore, we investigate the moderation effect of firm characteristics, particularly the state ownership (*i.e.*, whether firm  $i$  is an SOE or not) and the corporate governance capacity (proxied by the lagged board meeting frequencies). Moreover, we use two measures to proxy one firm's corporate responsibility efforts. First, we use the CSR scores in 2019 from Runlin

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<sup>7</sup> Our results are quantitatively similar when using the Fama-French three-factor model.

<sup>8</sup> We define a province as having a strong legal environment if it is above the median of the index constructed by Wang *et al.* (2017). The results are quantitatively similar if adopting the continuous measure of the index.

Global's Rankings (RKS), which is widely used in the corporate governance literature (Zhong *et al.*, 2019). Second, we also use firms' philanthropic giving during the COVID-19 outbreak to proxy social responsibility. Concretely, we hand-collected corporate donations during the pandemic outbreak from the China Association for Public Companies. The corresponding model is as below:

$$CAR_i = \beta_0 + \beta_1 \theta_i + \beta_2 (\theta_i \times \phi_i) + \mathbf{X}_i + \mu_i + \varepsilon_i \quad (2)$$

where  $\phi_i$  denotes firm  $i$ 's characteristics. Other variables are similarly defined as Eq. (1). Note that our coefficient of interest is  $\beta_2$ , which shows the moderation effect.

### 4.3 Main Results

We report our main regression results in Table 3. Column (1) of Table 3 shows that the CARs of share pledging announcements from firms located in more severely affected provinces experienced a statistically significant decline. Quantitatively, a one percentage point increase of the pandemic death proportion would decrease the CARs by 1.5 percentage points. The finding is consistent with our *Hypothesis 1* that investors' risk recognitions under the COVID-19 would magnify the marginal call risk from share pledging. Our result is consistent with Xu *et al.* (2019) that the stock price crash risk from share pledging intensified during the financial crisis.

The remaining columns of Table 3 exhibit the empirical results of three moderation factors: state ownership, corporate governance quality, and CSR. More specifically, Column (2) indicates that in the high pandemic-affected regions, the negative CARs induced by share pledging were substantially less pronounced for SOEs relative to those of non-SOEs. The finding is consistent with *Hypothesis 2*, highlighting that market investors were relatively confident with SOEs during the COVID-19 outbreak. In addition, we consider the *pledgor's* state-owned status and test our *Hypothesis 2* on the moderation effect of SOE status. We found that if the pledgor is a state-owned *shareholder*, the adverse market reaction will be relieved. The result of state-owned *shareholders* in the online Appendix Table 2 further echoes our main conclusion about the state-owned *firms*.

Moreover, Columns (3) to (7) of Table 3 tells that all the coefficients of interest are statistically significant, suggesting that higher corporate governance levels mitigate the negative effect of sharing pledging and confirming our *Hypothesis 3*. In Column (8) of Table 3,

we find that a higher CSR score results in a fewer loss in firm value from share pledging during the pandemic period, which confirms previous findings from Lins *et al.* (2017) and Ghoul *et al.* (2011). Column (9) of Table 3 shows that the firms that made more donations during the COVID-19 had a less adverse market reaction to their pledging announcements. Our result is in line with Surroca *et al.* (2010) that corporate philanthropy spending could promote firm value through CSR performance.

[Insert Table 3 here]

## 5. Robustness Check

### 5.1 The extend of pledging: share pledging proportions

Our baseline results show that pledging firms (*i.e.*, a dummy treatment variable) from high-affected regions would suffer a more substantial loss in firm value. According to *Hypothesis 1*, such effects would be more pronounced when shareholders pledge more shares. To test it, we use the following two continuous treatment variables: 1) Pledging shares (Ind.), *i.e.*, the proportion of the pledging shares to the *individual pledgor's* total sharing holdings, and 2) Pledging shares (Firm), *i.e.*, the proportion of pledging shares to the *firm's* total shares outstanding. We report the results in Table 4. The interaction term *Death*  $\times$  *Pledging Shares (Ind.)* and *Pledging Shares (Firm)* in Columns (1) and (2) of Table 4 show that firms with larger share pledging proportions from the high-affected regions experienced a more deteriorating market reaction.

[Insert Table 4 here]

### 5.2 Alternative proxy: COVID-19 severity

Next, we use the provincial COVID-19 confirmed proportion as an alternative proxy of the regional pandemic seriousness and find that most of our previous findings hold, as exhibited in Column (1) to (10) of online Appendix Table 2.<sup>9</sup> To show the robustness of our event window, we use an alternative [0,7] window (*i.e.*, *CAR7*) and find our main research results remain virtually unchanged in terms of the statistical significance and the economic magnitude, as shown in Column (1) to (10) of online Appendix Table 3.

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<sup>9</sup> Furthermore, we include the province fixed effects into the above analyses, which explicitly controls for all the regional invariant factors that correlate with firm value. Column (1) to (10) of Appendix Table 2 displays the results, and the statistical significance still holds with an even larger economic magnitude.

### 5.3 Alternative event windows

To analyze the long-term firm performance after the share-pledging announcement, we further extend the buy-and-hold abnormal returns (BHAR) to 90 days and still find persistent negative effects on the firm performance in Table 5. Column (1) shows that a one percentage point increase in the pandemic death proportion would decrease the BHAR by 14.8 percentage points. The long-term effects on post-pledging firm performance are even more prominent than our baseline results (*i.e.*, Table 3).

[Insert Table 5 here]

In Table 3, we confine the sample period for share pledging from 23 January 2020 to 31 May 2020. This gives rise to a concern that the previous estimation window (*i.e.*, [-180, -30]) used for CAR spans both the pandemic and non-pandemic periods, thereby introducing substantial measurement errors into the CAR variable.<sup>10</sup> To address it, we change the estimation window to cover 150 days ending on 23 January 2020 (the presumed starting date of the Covid-19 in China). The result is shown in online Appendix Table 4 and is still robust to our main conclusions.

### 5.4 Endogeneity

#### 5.4.1 Reverse-causality

Firms' share-pledging activities were likely associated with a complex grouping of factors, especially firms' value. In general, the corporate insiders possess superior ability of private information acquisition to foresee the risks on corporate operating performance and stock price crash (He *et al.*, 2021). Therefore, corporate insiders have incentives to pledge more shares as collateral to ameliorate the anticipated negative market returns. This could lead to a reverse-causality concern of this paper.<sup>11</sup> Therefore, to mitigate such concern, we further test whether firms residing in more pandemic-affected regions will pledge more if they anticipate the negative market returns. Specifically, we use the number of share-pledging events and share pledging proportions as our dependent variables, respectively. The results in Table 6 are insignificant, meaning that the pandemic death proportion is unlikely to increase the likelihood of share-pledging activities induced by anticipated business risk. This shows that reverse-causality is not the case and confirms our main findings.

[Insert Table 6 here]

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<sup>10</sup> We thank the anonymous referee for pointing out this problem and gives excellent suggestions.

<sup>11</sup> We appreciate the anonymous referee for this valuable insight.

### 5.4.2 Omitted variable bias

Besides, although we include many firm-level control variables, there still exist omitted variable bias. Following He *et al.* (2021), we conduct the Impact Threshold for a Confounding Variable (ITCV) test to mitigate such concerns. Column (1) of Table 7 reports the impact threshold for a confounding variable. The lowest product of the partial correlation between the dependent variable and the confounding variable causes the coefficient for death rate to be statistically insignificant. The result indicates that the estimated ITCV is 0.0508, which is greater than the absolute value of the impact factor (in Column (8) of Table 7) of all the control variables. Thus, combining the two endogeneity tests, we are confident that potential omitted variables or reverse-causality concerns do not drive our results.

[Insert Table 7 here]

## 6. Conclusions

In this paper, we investigate whether the COVID-19 influences market investors' responses to corporate share pledging and the heterogeneous impacts by firms' and pledgors' characteristics. Our empirical evidence shows that market investors are more pessimistic about sharing pledging announcements in higher pandemic-affected regions. Besides, such aversion is mitigated by the state ownership and board meeting frequencies but aggravated when insiders pledged a more substantial proportion of shares. Moreover, pledgors who are state-owned also cause fewer adverse consequences during the pandemic outbreak, and so do firms' social capital and corporate governance efforts.

Our findings provide valuable insights to corporate insiders and government regulators in emerging markets. First, insiders need to be aware of the negative impacts of their share pledging behaviors on outsiders' wealth during the pandemic outbreak, primarily when the firms are located in the severely affected regions. Also, during the pandemic period, firms that pledge need to avoid risky investments to mitigate the stock price crash risk. Similarly, corporate managers responsible for maximizing firm value and attracting market investors should focus more on corporate governance efforts, especially during a crisis. These efforts could enhance firms' operating performance, reduce agency costs, and signal market investors a trustworthy image.

Furthermore, regulators should increase the monitoring intensity for publicly listed firms during this challenging period when financial markets are sensitive to small probability events. Sufficient financial support should be provided to firms to maintain market stability and restore investor confidence.

**Declaration of Interest**

The authors declare that they have no relevant or material financial interests related to the research described in this paper.

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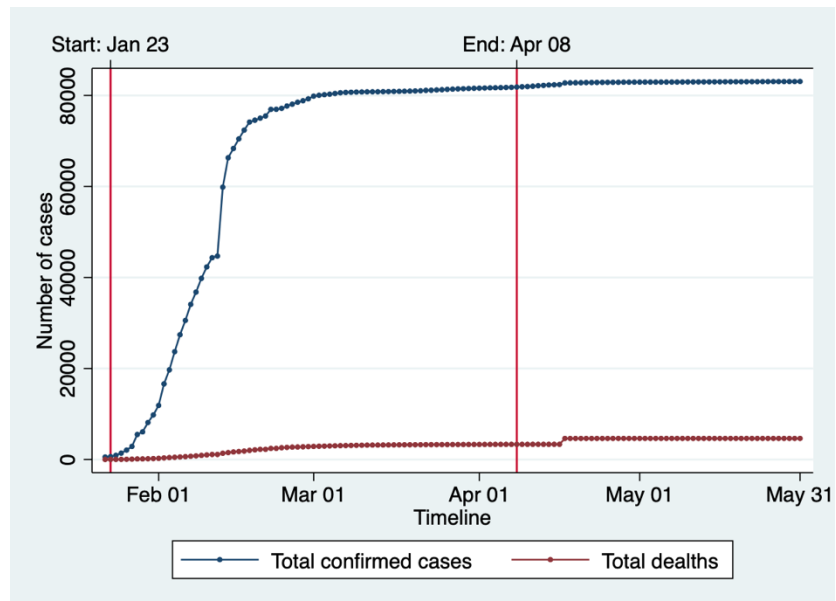
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**Figure 1. Timeline of COVID-19 pandemic outbreak in China.**



*Note:* The data is sourced from COVID-19 Data Repository by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University. The horizontal axis represents the timeline by May 31, 2020 of the COVID-19 outbreak in China, and the vertical axis represents the number of cases. The solid red line depicts the start and end date of Wuhan lockdown.

**Table 1. Variables definitions.**

Variable type	Variables	Definitions
Dependent variables	<i>CAR1</i>	The cumulative abnormal return over the event window [0,1].
	<i>CAR7</i>	The cumulative abnormal return over the event window [0,7].
Main variables	<i>Death</i>	The number of the provincial COVID-19 mortality scaled by the total death in China by May 31 <sup>st</sup> , 2020.
	<i>Confirm</i>	The number of the provincial COVID-19 confirmed cases scaled by the corresponding national total confirmed cases by May 31 <sup>st</sup> , 2020.
	<i>Pledging shares (Ind.)</i>	The proportion of the pledging shares to the <i>individual pledgor's</i> total sharing holdings.
	<i>Pledging shares (Firm)</i>	The proportion of pledging shares to the <i>firm's</i> total shares outstanding.
	<i>Stated-owned pledgor</i>	A dummy variable that equals one if an SOE <i>shareholder</i> pledges the shares and zero otherwise.
	<i>SOEs</i>	A dummy variable that equals one if the firm is an SOE and zero otherwise.
	<i>Ln(Board meeting)</i>	The natural logarithm of the firm's board meeting frequencies.
	<i>Institutional ownership</i>	The firm's institutional investor share percentage.
	<i>Tunneling</i>	The firm's other receivables scaled by its total asset.
	<i>Big 10</i>	A dummy variable equals one if the firm's auditor is a big ten auditing firm and zero otherwise.
	<i>Top 10 ownership</i>	The firm's largest ten shareholders' ownership percentage.
	<i>RKS score</i>	The firm's CSR scores from the Runlin Global's Rankings.
	<i>Ln(Donation)</i>	The natural logarithm of the firm's donation during the COVID-19.
Control variables	<i>Leverage</i>	The firm's total debt versus total asset.
	<i>Market-to-book ratio</i>	The firm's market to its book value.
	<i>Ln(Market cap)</i>	The natural logarithm of the firm's market capitalization.
	<i>Tobin Q</i>	The ratio between a firm's physical asset's market value and its replacement value.
	<i>ROE</i>	The firm's net income versus total equity.
	<i>Board size</i>	Size of the board of the firm.
	<i>Duality</i>	A dummy variable equals one if the firm's CEO is also the chairman of the board of directors and zero otherwise.
	<i>Ln(GDP)</i>	The natural logarithm of the provincial GDP.
	<i>Legal environment</i>	A dummy variable equals one if a province has a legal environment index above the median and zero otherwise.

**Table 2. Panel A Summary statistics.**

VARIABLES	Observation	Mean	Std. Dev.	Min	Max
Death	711	0.022	0.140	0	0.974
Confirm	711	0.271	0.117	0	0.821
Pledging shares (Ind.)	711	0.185	0.288	0	1
Pledging shares (Firm)	711	0.034	0.040	0	0.448
State-owned pledgor	711	0.008	0.092	0	1
SOEs	711	0.098	0.298	0	1
Board meeting	711	10.128	3.967	3	25
Institutional ownership	711	0.394	0.239	0	0.961
Tunneling	711	0.016	0.028	0	0.340
Big 10	711	0.437	0.496	0	1
Top 10 ownership	711	0.601	0.141	0.159	0.949
RKS score	711	40.031	12.405	20.061	73.275
Ln(Donation)	711	5.310	1.533	1.147	9.966
Leverage	711	0.039	0.062	0	0.432
Market-to-book ratio	711	0.612	0.262	0.084	1.442
Ln(Market cap)	711	22.829	1.0367	20.986	26.460
Tobin Q	711	1.816	1.031	0.694	11.849
ROE	711	0.067	0.170	-1.235	0.854
Board size	711	8.376	1.627	5	15
Duality	711	0.347	0.476	0	1
Ln(GDP)	711	11.344	0.393	10.404	12.009
Legal environment	711	0.800	0.400	0	1

**Table 2. Panel B Average CAR statistics.**

Window	No. Firms	CAR	T-Statistic	P-value
[0,1]	711	-0.161%	-5.995	0.000
[0,7]	711	-0.411%	-6.009	0.000

**Table 3. The impact of share pledging on firms' market value.**

Standard errors, clustered at the industry level, are shown in brackets. \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

VARIABLES	(1) CAR1	(2) CAR1	(3) CAR1	(4) CAR1	(5) CAR1	(6) CAR1	(7) CAR1	(8) CAR1	(9) CAR1
Death	-0.015*** (0.005)								
Death × SOEs		6.562*** (1.825)							
Death × Ln(Board Meeting)			0.063*** (0.007)						
Death × Institutional Ownership				0.014* (0.007)					
Death × Tunneling					-0.054*** (0.006)				
Death × Big 10						1.971*** (0.437)			
Death × Top 10 Ownership							0.009** (0.004)		
Death × RKS score								0.150*** (0.028)	
Death × Ln(Donation)									0.188** (0.019)
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	711	711	711	711	711	711	711	711	711
R-squared	0.047	0.048	0.052	0.093	0.046	0.048	0.050	0.394	0.101

**Table 4. The heterogeneous impacts: proportions of share pledged.**

Standard errors, clustered at the industry level, are shown in brackets. The detailed definitions of variables are in Table 2. \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

VARIABLES	(1) CAR1	(2) CAR1
Death × Pledging shares (Ind.)	-0.050** (0.021)	
Death × Pledging shares (Firm)		-1.225*** (0.154)
Firm Controls	Yes	Yes
Province Controls	Yes	Yes
Industry FE	Yes	Yes
Observations	711	711
R-squared	0.046	0.051

**Table 5. Alternative proxy: 90-day buy-and-hold abnormal returns (BHAR).**

Standard errors, clustered at the industry level, are shown in brackets. \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	BHAR90	BHAR90	BHAR90	BHAR90	BHAR90	BHAR90	BHAR90	BHAR90	BHAR90	BHAR90	BHAR90	BHAR90
Death	-0.148** (0.069)											
Death × SOEs		1.272*** (0.234)										
Death × Ln(Board Meeting)			0.042** (0.018)									
Death × Pledging shares (Ind.)				-0.078** (0.034)								
Death × Pledging shares (Firm)					-1.871** (1.332)							
Death × State-owned pledgor						0.090*** (0.021)						
Death × Big 10							2.305*** (2.305)					
Death × Top 10 Ownership								0.003* (0.001)				
Death × Institutional Ownership									0.061** (0.002)			
Death × Tunneling										-0.052** (0.025)		
Death × RKS score											0.950** (0.069)	
Death × Ln(Donation)												0.453** (0.034)
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	711	711	711	711	711	711	711	711	711	711	711	711
R-squared	0.131	0.070	0.059	0.064	0.063	0.063	0.084	0.071	0.062	0.063	0.201	0.082



**Table 6. Endogeneity: reverse-causality.**

Standard errors, clustered at the industry level, are shown in brackets. \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

VARIABLES	(1) Ln(No. of Pledging)	(2) Pledging shares (Ind.)	(3) Pledging shares (Firm)
Death	-0.617 (0.788)	1.644 (4.145)	-0.011 (0.462)
Firm Controls	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Observations	711	711	711
R-squared	0.102	0.154	0.192

**Table 7. Impact threshold for a confounding variable for the test of the correlation between CAR after share pledging announcement and provincial death rate.**

This table shows the effects of possible correlated omitted variables on the multivariate tests of the association between CAR after the share pledging announcement and the corresponding provincial death rate. The dependent variable is CAR[0,1]. The key independent variable is the death rate of where a firm resides. Column (1) reports the impact threshold for a confounding variable (ITCV), which is the lowest product of the partial correlation between the dependent variable and the confounding variable and the partial correlation between the key independent variable and the confounding variable that causes the coefficient for death rate to be statistically insignificant. Column (2) reports the implied minimum correlation a confounding variable must have with the dependent variable and death rate to make the coefficient for death rate statistically insignificant. Column (3) presents the raw correlations between death rate and each control variable in our regression model (1). Column (4) reports the raw correlations between the dependent and control variables in our regression model (1). Column (5) shows each control variable's raw impact, which is defined as the product of the two raw correlations that are reported in Column (3) and Column (4), respectively. Column (6) reports the partial correlations between death rate and each control variable in our regression model (1). Column (7) presents the partial correlations between the dependent and control variables in the regression model (1). Column (8) is each control variable's partial impact, which is defined as the product of the two partial correlations that are reported in Column (6) and Column (7), respectively.

VARIABLES	(1) ITCV	(2) ITCV implied correlations	(3) Cor(x, death)	(4) Cor(x, CAR1)	(5) Impact_raw	(6) Cor(x, death)	(7) Cor(x, CAR1)	(8) Impact
Death	0.0508	0.225						
Leverage			-0.0095	-0.0543	0.0005	-0.0629	-0.0679	0.0043
Market to book ratio			-0.0069	0.014	-0.0001	0.0096	0.0463	0.0004
Ln(Market Cap)			0.1706	0.0018	0.0003	0.1744	0.0071	0.0012
Tobin Q			0.0272	0.0157	0.0004	-0.0071	0.0369	-0.0003
ROE			0.0057	-0.0185	-0.0001	-0.0355	-0.0272	0.001
Board Size			-0.0394	-0.0515	0.002	-0.0879	-0.0798	0.007
Duality			-0.0457	-0.0896	0.0041	-0.0488	-0.092	0.0045
Institutional ownership			0.0567	0.0293	0.0017	0.0066	0.0419	0.0003
Ln(GDP)			-0.0328	0.0145	-0.0005	-0.101	-0.0361	0.0036
Legal Environment			0.073	0.0634	0.0046	0.1174	0.0717	0.0084