Physical proximity, corporate social responsibility, and the impact of negative investor sentiment on stock returns: Evidence from COVID-19 in China

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Abstract
Using the Hubei province in China as the COVID-19 pandemic epicenter and January 23, 2020 as the event date (the date the Chinese government announced the lockdown of Wuhan, the provincial capital), we document that while Chinese firms generally exhibited negative cumulative abnormal returns (CARs) around the event date, firms located far from the Hubei province experienced relatively less adverse impact by way of negative CARs than firms located close to and in the province. Moreover, firms that engaged strongly in corporate social responsibility (CSR) activities in terms of corporate donations prior to the event date experienced less of an adverse impact than those with no or weak CSR activities, suggesting that CSR serves an insurance-like function that alleviates the adverse impact on stock returns precipitated by the negative investor sentiment stemming from COVID-19.

KEYWORDS
COVID-19, investor sentiment, physical proximity

1 INTRODUCTION

COVID-19 erupted in China in late December 2019 and quickly became a serious public health risk. On January 23, 2020, the Chinese government announced the lockdown of Wuhan (the provincial capital of the Hubei province) and the major cities in the province to mitigate the spread of COVID-19. Subsequently, the Chinese economy stalled,
and the world's leading economies were severely impacted. Public health concerns and the adverse economic impact of COVID-19 unavoidably became a systematic risk to financial markets.

Previous studies on the impact of negative investor sentiment on stock returns (Guy & Haim, 2010; Hirshleifer, 2001; Shaikh, 2018) seldom explore the impact of physical proximity of a firm to the epicenter of an event. That is, most studies assume that negative investor sentiment is homogenous, that is, whether a firm is far away or close to an event center is irrelevant to the magnitude of the negative impact on the stock price. Similarly, the emerging literature on COVID-19, while showing the material impacts of the pandemic on financial markets, does not examine the possible role of a firm's physical distance from the epicenter (Adhtaruzzaman, Boubaker, & Sensoy, 2020; Shehzad, Liu, & Kazouz, 2020). In addition, previous studies on corporate social responsibility (CSR) suggest that CSR serves an insurance-like function in terms of alleviating adverse impacts of negative news on firms (Shiu & Yang, 2017; Yang, Chang, Chen, & Shiu, 2019). However, it is not clear whether CSR can serve the same function in the unique circumstances of the public health crisis created by COVID-19.

The objective of this paper is twofold. First, as the Hubei province was COVID-19's epicenter, we examine the potential differential impact on stock returns of a firm's physical proximity to Hubei given the negative investor sentiment due to COVID-19. Hence, our findings address the void in the negative sentiment literature. Second, we investigate whether a firm's CSR activities can alleviate that adverse impact.

Using the January 23, 2020 lockdown of Wuhan as the event date, our findings suggest that, in general, firms had negative cumulative abnormal returns (CARs), reflecting the negative investor sentiment. The finding is consistent with Shehzad et al. (2020), who report that COVID-19 has had a large adverse impact on stock returns. By contrast to Shehzad et al. (2020), we document that firms located in the Hubei province have the worst CARs, while firms located far from the province have relatively less adverse CARs than firms close to the epicenter; and that firms that engage strongly in CSR activities exhibit relatively better CARs than those with a weak engagement in CSR activities.

We make two contributions to the literature. First, using COVID-19 as an external shock, we document that the physical distance between a firm and the source of a shock captures the strength of investor sentiment on stock returns. Hence, we complement the literature on the impact of investor sentiment on stock returns by showing that investor sentiment is not necessarily homogenous. Second, we advance the literature on CSR. We document that the insurance-like effect of CSR alleviates the adverse impact of negative investor sentiment due to public health crises. Thus, a firm's CSR activities is a means to mitigate the negative impact of a systematic risk.

2 | TESTABLE HYPOTHESIS

It is natural that major adverse events induce pessimistic investor sentiment. For instance, the 2008 global financial crisis was an adverse event that negatively affected financial markets. Studies on investor sentiment have also shown a negative impact on financial markets stemming from the September 11, 2001 terrorist attacks (Guy & Haim, 2010) and the Ebola outbreak (Ichev & Marinč, 2018). Essentially, investor sentiment is related to investor psychology, which affects investor decisions leading to stock price changes. We argue that negative events far away from a local firm draw less attention from the firm's investors than those close to the firm, due to less media coverage, or because the impact may not be immediate. Thus, investor negative psychology is less severe when a firm is located far from the event center. Leveraging the COVID-19 experience in China, our first testable hypothesis is:

**H1:** The effect of negative investor sentiment from COVID-19 on stock returns is stronger the closer the firm is to the Hubei epicenter.

A related body of literature suggests that a firm's CSR activities have an insurance-like effect against negative news (Jo & Na, 2012). Accordingly, when an adverse event occurs, the value loss to a CSR firm is less than that to one that does not engage in CSR (Shiu & Yang, 2017). For instance, Shiu and Yang (2017) suggest that, in a crisis communication,
a firm can claim its adherence to CSR to alleviate the negative impact of an adverse event on its stock and bond prices. The authors theorize that CSR activities, such as corporate donations, enhance the moral capital of a firm. The increase in moral capital “... protects the relationship-based assets against loss by moderating the negative assessments of stakeholders” (Shiu & Yang, 2017; p. 457). That is, the build-up of moral capital in a firm affords stakeholders some room to lower the negative view of the firm to rebound in case of a negative event. However, in times of crisis, it is natural that investors rationally put more emphasis with the survival of the firms rather than environmental and social governance (ESG) or CSR communication (Döttling & Kim, 2020). The authors document that the COVID-19 shock made mutual fund investors less aware of funds’ ESG characteristics. That is, in times of crisis, investors may consider ESG a “luxury good”. Hence, it is a research question for the moderating effect of CSR (ESG) on stock returns during a public health crisis. Hence, we present our second testable hypothesis as:

H2: For a firm that engages in CSR activities, the adverse impact from the negative sentiment stemming from COVID-19 is less than that for firms that do not engage in CSR activities.

3 | RESEARCH DESIGN

We use all publicly traded A-share Chinese firms as our sample. The data are from the China Stock Market and Accounting Research database. We exclude financial firms, financially distressed firms, and firms with missing information, to leave us with 3,288 firms around the COVID-19 period. Given that almost the entire Hubei province was locked down on January 23, 2020, we capture the physical proximity of a firm by a nominal variable denoted as DISTANCE. It takes a value of 1, 2, and 3 for a firm located in the Hubei province, the immediate surrounding provinces of the Hubei province, and the provinces not surrounding the Hubei province, respectively. DISTANCE proxies for the magnitude of investor sentiment toward a firm based on the investors’ perceived seriousness of a firm’s exposure to the COVID-19 crisis. For CSR disclosure, we use the natural logarithm of 1 plus the corporate donation amount by a firm in the previous year.

| Table 1 | Variable definitions |
| --- | --- |
| Variable | Definitions |
| CAR(t₁, t₂) | Cumulative abnormal returns from t₁ to t₂ |
| DISTANCE | It takes a value of 1, 2, and 3 for a firm located in the Hubei province, surrounding the Hubei province, and not surrounding the Hubei province, respectively |
| DONATE | The natural logarithm of 1 plus the corporate donation amount in the previous year |
| LIST | If a firm is listed in the Shanghai Stock Exchange, the value is 1, and 0 otherwise. |
| SIZE | The natural logarithm of a firm’s total assets |
| ROE | The ratio of net earnings to total shareholders’ equity |
| INSHOLD | The percentage of institutional investor ownership to total outstanding shares |
| DUAL | If firm CEO and board chair are the same individual, the value is 1, and 0 otherwise |
| GROWTH | Sales growth rate from t – 1 to t |
| LEV | Total liabilities to total assets ratio |
| INCON | If a firm has internal control weakness, the value is 1, and 0 otherwise |
| AGE | The natural logarithm of the listing years |
| PE | Stock price to earnings per share ratio |
| SHARE | The ratio of the sum of the largest and second largest shareholders ownership to total outstanding shares |
| STATE | If a firm is state-owned, the value is 1, and 0 otherwise |
| ANALYST | The natural logarithm of the total number of analysts following a firm |
Following Chen, Deng, and Li (2018), we adopt an event study method to calculate the CAR of a stock by considering the announcement of the lockdown of Wuhan on January 23, 2020 as the event date \((t = 0)\). We focus on stock price reaction to the lockdown announcement. Although one may argue that stock prices generally reacted negatively before January 23, 2020, we contend that the lockdown announcement confirmed that COVID-19 had officially become a serious public health crisis. Operationally, we focus on the various event windows around \((-5, +5)\) in our baseline regression model. We use the following multiple regression model to examine the impact on CAR of a firm’s proximity to the epicenter:

\[
\text{CAR}(t) = \beta_0 + \beta_1 \text{DISTANCE} + \beta_2 \text{LIST} + \beta_3 \text{SIZE} + \beta_4 \text{ROE} + \beta_5 \text{INSHOLD} + \beta_6 \text{DUAL} + \beta_7 \text{GROWTH} + \beta_8 \text{LEV} + \beta_9 \text{INCON} + \beta_{10} \text{AGE} + \beta_{11} \text{PE} + \beta_{12} \text{SHARE} + \beta_{13} \text{STATE} + \beta_{14} \text{ANALYST} + \text{Industry} + \text{Constant} + \epsilon
\]

The impact of the proximity of a firm’s location to the Hubei province on cumulative abnormal returns

| Variables | CAR\((-5, 0)\) | CAR\((-5, 2)\) | CAR\((-5, 3)\) |
|-----------|----------------|----------------|----------------|
| DISTANCE  | 0.478* (1.77)  | 0.866** (2.06) | 0.769* (1.71)  |
| LIST      | 0.429 (1.35)   | 0.385 (0.76)   | 0.186 (0.35)   |
| SIZE      | 0.255* (1.93)  | 0.420** (1.99) | 0.468** (2.12) |
| ROE       | 0.005 (1.52)   | 0.008 (1.53)   | 0.007 (1.26)   |
| INSHOLD   | -0.021 (-0.90) | 0.021 (0.55)   | -0.016 (-0.41) |
| DUAL      | 0.023 (0.08)   | 0.144 (0.32)   | 0.134 (0.29)   |
| GROWTH    | 0.001 (0.24)   | 0.0001 (0.06)  | -0.0001 (-0.07) |
| LEV       | -0.608 (-0.93) | -0.878 (-0.84) | -0.982 (-0.90) |
| INCON     | -0.492* (-1.74)| -0.192 (-0.43) | -0.305 (-0.65) |
| AGE       | 4.513** (1.96) | 5.345 (1.46)   | 4.274 (1.11)   |
| PE        | 0.001* (1.74)  | 0.001 (1.06)   | 0.002 (1.37)   |
| SHARE     | -0.005 (-0.59) | -0.005 (-0.35) | -0.014 (-0.95) |
| STATE     | 0.646** (2.03) | 0.600 (1.18)   | 0.427 (0.80)   |
| ANALYST   | 0.525*** (3.77)| 1.670*** (7.53)| 1.532*** (6.60)|
| Constant  | -56.139** (-2.23)| -73.998* (-1.84)| -61.965 (-1.47)|
| Industry  | Yes            | Yes            | Yes            |
| N         | 3.288          | 3.288          | 3.288          |
| Adj. R²   | 0.162          | 0.340          | 0.311          |

Note: The announcement date was January 23, 2020 (the date of the lockdown in Wuhan). Variable definitions are presented in Table 1. t-statistics are in parentheses.

*10% significance.
**5% significance.
***1% significance.
\[ \text{CAR}(0,T)_i = \alpha_0 + \alpha_1 \text{DISTANCE}_i + \text{CONTROL} + \text{INDUSTRY} + \epsilon_i, \]  

(1)

where CONTROL is a set of control variables. We also control for industry fixed effects. We winsorize the data at the 1% and 99% levels. Table 1 presents detailed definitions of these control variables.

4 | RESULTS AND DISCUSSION

We present the results for Equation (1) in Table 2. For brevity, we present only the results using \( \text{CAR}(-5, 0) \), \( \text{CAR}(-5, 2) \), and \( \text{CAR}(-5, 3) \) as the dependent variables. As expected, the coefficients of DISTANCE are positive and significant at the 5% or 10% level, suggesting that a firm located far from the Hubei province (\( \text{DISTANCE} = 3 \)) exhibits relatively higher CARs than an otherwise equivalent firm located near the Hubei province (\( \text{DISTANCE} = 1 \) or 2). The findings are economically significant. Using \( \text{CAR}(-5, 2) \) as the dependent variable, the coefficient of DISTANCE is 0.886. That is, comparing a firm located far from the Hubei province to a firm located in the province, the average difference is 177.2% (\( 2 \times 0.886 \)).

To examine the moderating effect of a firm’s CSR, we augment Equation (1) with a firm’s corporate donation (DONATE) and the associated interaction term (DONATE*DISTANCE). Because some firms do not make corporate donations, we use Tobit to estimate the regression equation. The findings are presented in Table 3. For brevity, we do not present the coefficients of the control variables. The coefficients of DISTANCE are positive and significant at the 5% level, while those of DONATE are not significant. Most importantly, the coefficients of DONATE*DISTANCE are negative and significant at the 10% level in two out of three columns. That is, when a firm is located near the epicenter of Hubei province (i.e., DISTANCE is smaller), its CAR is larger when it has a large corporate donation. Thus, corporate donation has an

**TABLE 3** The moderating effect of corporate donations

|              | \( \text{CAR}(-5, 0) \) | \( \text{CAR}(-5, 2) \) | \( \text{CAR}(-5, 3) \) |
|--------------|--------------------------|--------------------------|--------------------------|
| **DONATE**   | 0.660                    | 1.792                    | 1.953                    |
|             | (1.07)                   | (1.57)                   | (1.59)                   |
| **DONATE*DISTANCE** | \(-0.255\)               | \(-0.704^*\)             | \(-0.773^*\)             |
|             | \((-1.17)\)              | \((-1.75)\)              | \((-1.78)\)              |
| **DISTANCE** | 0.969**                  | 1.926**                  | 2.235**                  |
|             | (2.07)                   | (2.11)                   | (2.24)                   |
| **Constant**| \(-74.064\)              | \(-156.016^*\)           | \(-163.489\)             |
|             | \((-1.84)\)              | \((-1.99)\)              | \((-1.91)\)              |
| **CONTROL** | Yes                      | Yes                      | Yes                      |
| **Industry**| Yes                      | Yes                      | Yes                      |
| **N**       | 3,288                    | 3,288                    | 3,288                    |
| **Loglikelihood** | \(-5,600.00\)           | \(-5,160.00\)            | \(-5,330.00\)            |

Note: This table presents the moderating effect of corporate donations on the impact of the proximity of a firm’s location to the Hubei province on cumulative abnormal returns. The announcement date was January 23, 2020 (the date of the lockdown of Wuhan). DONATE is natural logarithm of 1 plus the corporate donation by a firm in the previous year. We use Tobit to estimate the equation due to some firms have zero corporate donation. For brevity, we do not include the coefficients of the control variables. Variable definitions are presented in Table 1. t-statistics are in parentheses.

*10% significance.

**5% significance.
insurance-like effect to mitigate some negative sentiment toward its stock price. Our findings on CSR is opposite to those of mutual funds flows during the COVID-19 in Döttling and Kim (2020). Therefore, our evidence on the insurance-like effect of CSR using abnormal stock returns in China cannot be generalized to a wider class of financial assets.

5 | SUMMARY

As a pandemic, COVID-19’s adverse impact on financial markets has become a systematic risk. Using COVID-19 as an external shock, we study the impact of the proximity of a firm's location to the epicenter of COVID-19 (Hubei province) on the magnitude of the adverse impact of negative investor sentiment. Our findings suggest that firms located in the Hubei province exhibit worse CARs than firms farther from the province. In addition, we document that firms that engage in CSR in terms of more corporate donation are better to alleviate the adverse impact of COVID-19 than firms that engage in less CSR. Our findings imply that investor sentiment is not homogenous. It depends on investors' physical distance from the event center; and CSR, such as corporate donations, can alleviate the negative impact of investor sentiment on stock prices. Future research can be extended to examine other factors contributing to investor sentiment heterogeneity. Our study has one caveat. While the lockdown occurred in Hubei province on January 23, 2020, the impact of the pandemic on stock prices might not be fully due to physical distance but the lockdown effect itself. Nonetheless, the CARs capture the combined effect of the lockdown itself, physical distance, and other factors. Thus, physical distance is relevant; it explains some of the variation of CAR in Table 2.

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ENDNOTE

1 It is possible that before January 23, 2020, negative investor sentiment became widespread. For robustness, we conduct a placebo analysis by moving the announcement date to 1 month earlier. The results are not significant. They are available upon request.

REFERENCES

Adhtaruzzaman, M., Boubaker, S., & Sensoy, A. (2020). Financial contagion during COVID-19 crisis. Finance Research Letters (forthcoming).
Chen, Y., Deng, Y., & Li, Z. (2018). Does non-punitive regulation have information content? Evidence based on the inquiry letter. Financial Research, 454(4), 155–171 (in Chinese).
Döttling, R., Kim, S. (2020). Sustainability preferences under stress: Evidence from mutual fund flows during COVID-19. SSRN working paper. Retrieved from https://ssrn.com/abstract=3656756.
Guy, K., & Haim, L. (2010). Sentiment and stock prices: The case of aviation disasters. Journal of Financial Economics, 95(2), 174–201.
Hirshleifer, D. (2001). Investor psychology and asset pricing. Journal of Finance, 56(4), 1533–1597.
Ichev, R., & Marinč, M. (2018). Stock prices and geographic proximity of information: Evidence from the Ebola outbreak. International Review of Financial Analysis, 56, 153–166.
Jo, H., & Na, H. (2012). Does CSR reduce firm risk? Evidence from controversial industry sectors. Journal of Business Ethics, 110(4), 441–456.
Shaikh, I. (2018). Investors, fear and stock returns: Evidence from National Stock Exchange of India. Engineering Economics, 29(1), 4–12.
Shehzad, K., Liu, X., & Kazouz, H. (2020). COVID-19’s disasters are more perilous than global financial crisis: A rumor or fact? Finance Research Letters, 36, 101669.

Shiu, Y., & Yang, S. (2017). Does engagement in corporate social responsibility provide strategic insurance-like effects? Strategic Management Journal, 38(2), 455–470.

Yang, S., Chang, A., Chen, Y., & Shiu, Y. (2019). Can country trade flows benefit from improved corporate social responsibility ratings? Economic Modelling, 80, 192–201.