Pisco Med Publishing

Original Research Article

How Did COVID-19 Affect the Chinese Real Estate Stock Market: An Empirical Research

Lei Hsu*

School of Management, Xiamen University, Xiamen 361005, Fujian, China. E-mail: xl@faxmail

Abstract: COVID-19 has brought disruptions to various industries in China. The real estate industry can't remain immune from the shock as well, which can be presented by the performance of real estate stocks. This study investigates the effects of COVID-19 on the Chinese real estate stocks. Statistical methods, such as OLS regression, are used to explore the effects of new cases, new deaths, new recoveries, bad and good news about COVID-19 of provinces where the headquarters of the sample companies lie on the daily stock returns as well as the changes of volatilities before and after COVID-19. Event study is employed to discover the effects of important events during COVID-19. Results suggest that positive information about COVID-19 significantly increased daily stock returns of the listed real estate company in that province. Total risk and idiosyncratic risk of real estate stocks have increased significantly since COVID-19, while systematic risk has decreased significantly. Among the crucial events during the pandemic, the lockdown of Wuhan significantly caused negative abnormal returns for real estate stocks.

Keywords: COVID-19; Real Estate; Event Study; Volatility

1. Introduction

COVID-19 is the infectious disease caused by SARS-CoV-2, which is a respiratory pathogen. It was first identified in Wuhan, China in December 2019 and has quickly spread all over the world.

On January 23 2020, Wuhan was imposed a "lockdown" for COVID-19. Subsequently, other provinces and cities in China also imposed restrictions from limiting residential movement to workplace closing. As a result, various industries were affected and the GDP of the first quarter of 2020 dropped by 6.8%. Since the real estate industry plays a highly important role in the Chinese economy, it's necessary to investigate how COVID-19 affected the industry, which can be reflected by the performance of real estate stocks.

This study is aimed to investigate how COVID-19 affected the daily returns and volatilities of Chinese real estate stocks and how important events during COVID-19 affected the abnormal returns of these stocks. To gain a better insight, relevant literature is reviewed in Section 2. Subsequently, the required data is illustrated in Section 3 and the event study approach as well as the OLS regression is addressed in Section 4. The results and discussion are included in Section 5. Finally, the study is concluded in Section 6.

2. Literature review

When investigating the impacts of pandemics on the real estate industry, scholars always pay much attention to ho-

doi: 10.18282/ff.v9i4.1539

-using prices or sales. Studies about real estate stock market, especially during the COVID-19 pandemic are rarely seen. For example, it's found that during the Severe Acute Respiratory Syndrome (SARS), the average housing price declined by 1–3 percent if an estate was directly affected by SARS, and by 1.6 percent for all estates due to the outbreak (Wong, 2008)[1]. The housing price drops in Campania Region as a result of COVID-19 was predicted (Del Giudice, Paola and Del Giudice, 2020)[2]. The possible effects of COVID-19 on real estate development and management processes were also examined by making an evaluation and an insight on administrative and media records (Tanrıvermiş, 2020)[3].

There is literature filling the gap. In the first paper to examine the transmission of an asset market shock to the capital markets during COVID-19, a consistent negative relationship between abnormal returns of listed U.S. REITs and the growth of COVID-19 is found (Ling, Wang and Zhou, 2020)[4]. However, literature about the impacts of pandemics on real estate stock market, especially the Chinese real estate stock market, is still limited.

3. Data

The sample companies are the 110 real estate companies listed in A-share market, eliminating one suspended company and one ST[1] stock company. The CSI 300 Index consists of 300 representative stock companies listed in A-share market and is widely considered as one of the most representative stock indices for A-share market. Therefore, the daily returns of the CSI 300 Index are employed as daily market returns. Both the daily sample stock returns and the daily returns of the CSI 300 Index are obtained from the CSMAR database.

The COVID-19 confirmed cases, deaths and recoveries of different provinces are crawled from the most prevalent Chinese news platform Toutiao, whose data can be derived from National Health Commission of the People's Republic of China.

Since COVID-19 was first announced to transmit from person to person in January 20 2020, two periods are divided: pre-COVID19 period (01/01/2019 – 01/19/2020) and COVID19 period (01/20/2020 – 09/30/2020).

4. Methodology

4.1 COVID-19 and stock return

First, the influences of various variables related to COVID-19 are tapped by running the following regression:

$$R_{i,t} = \alpha + \sum_j^n \beta_j K_{j,i,t} + \mu_{i,t} \quad (1)$$

where $R_{i,t}$ is the daily return of stock i at day t, $K_{j,i,t}$ denotes a set of variables for stock i at day t of the province where the headquarter of the stock company i lies, including new confirmed cases, new deaths, new recoveries and the proxies for bad and good news about COVID-19. Similar to Baek, Mohanty and Glambosky (2020)[5], the two proxies are calculated by the Equation 2 and 3. α and β_j are the regression coefficients and $\mu_{i,t}$ is the residual of stock i at day t.

$$\%\ \text{of deaths(t)} = \frac{\text{Number of deaths(t)}}{\text{Cumulative number of confirmed cases(t)}} \times 100 \quad (2)$$

$$\%\ \text{of recoveries(t)} = \frac{\text{Number of recoveries(t)}}{\text{Cumulative number of confirmed cases(t)}} \times 100 \quad (3)$$

4.2 COVID-19 and stock volatility

Following Mohanty *et al*. (2018)[6], the change in total risk before and after COVID-19 can be estimated by the difference between variances of daily returns over pre-COVID19 and COVID19 periods.

$$\Delta\ \text{Volatility}_i = \sigma^2(R_{i,t})_{\text{after}} - \sigma^2(R_{i,t})_{\text{before}} \quad (4)$$

Applying the standard market model:

$$R_{i,t} = \alpha_i' + \beta_i' R_{m,t} + \varepsilon_{i,t} \quad (5)$$

[1] Stocks of listed companies with abnormal financial conditions are marked with "ST" in A-share market, which means Special Treatment, for the risks of delisting

where $R_{m,t}$ is the daily market return at day t, α_i' and β_i' are the regression coefficients and $\varepsilon_{i,t}$ is the residual of stock i at day t. The change in systematic risk is the difference between β_i' estimated over the two periods:

$$\Delta \text{Beta}_i = \beta_i{}'_{\text{after}} - \beta_i{}'_{\text{before}} \quad (6)$$

The change in idiosyncratic risk is the difference between the variances of the residuals from Equation 5, estimated over the two periods:

$$\Delta \text{Idiosyncratic Volatility}_i = \sigma^2(\varepsilon_{i,t})_{\text{after}} - \sigma^2(\varepsilon_{i,t})_{\text{before}} \quad (7)$$

4.3 Event study

The event study approach is designed to measure the effect of an unanticipated event on stock prices (Mcwilliams and Siegel, 1997)[7]. It uses stock prices instead of accounting measures, which helps avoid underlying effects of accounting manipulation (Nicolau, 2002)[8]. It's broadly used to investigate the impacts of certain events on the stock market.

The important events to investigate are listed below. The lockdown of Wuhan, where COVID-19 first broke out, was historic and marked the severity of the COVID-19 epidemic. While the announcement and execution of reopen of Wuhan signaled that COVID-19 had been controlled effectively in the most severe place of China.

(1) the lockdown of Wuhan (Event 1: January 23, 2020)

(2) the announcement that Wuhan would reopen in April 8 (Event 2: March 24, 2020)

(3) the formal reopen of Wuhan (Event 3: April 8, 2020)

An event window should be long enough to capture the significant effect of an event, but short enough to exclude confounding effects (Mcwilliams and Siegel, 1997). Without theoretical reasons for information leakage or slow dissipation, the event window [-1, 1] is sufficient enough for possible information leakage (Ding *et al*. 2018)[9]. Since the lockdown of Wuhan exceeded the expectations of the multitude, the event window for Event 1 is [-1, 1]. However, the decline of confirmed cases and the rise of recoveries made the reopen of Wuhan predictable. Therefore, it's reasonable to prolong the event windows to [-5, 5] for Event 2 and 3.

Using Equation 5 as the estimation model, [-200, -10] as the estimation window, abnormal return of stock i on day t is:

$$AR_{i,t} = R_{i,t} - \hat{\alpha}_i - \widehat{\beta}_i R_{m,t} \quad (8)$$

where $\hat{\alpha}_i$ and $\widehat{\beta}_i$ are the estimated parameters.

Cumulative abnormal return of stock i from day t_1 to t_2 is:

$$CAR_{i,(t_1,t_2)} = \sum_{t=t_1}^{t_2} AR_{i,t} \quad (9)$$

For stock size M, the average abnormal return on day t is:

$$AAR_t = \frac{\sum_{i=1}^{M} AR_{i,t}}{M} \quad (10)$$

Cumulative average abnormal return from time t_1 to t_2 is:

$$C\,AAR_{(t_1,t_2)} = \sum_{t=t1}^{t2} AAR_t \quad (11)$$

5. Results and discussion

5.1 The impact of COVID-19 on real estate stock returns

Table 1 demonstrates the results of the OLS regression. The independent variables are: new confirmed cases (new_cases), new deaths (new_deaths), new recoveries (new_recoveries), the percentage of deaths in Equation 1 (pdeath) and the percentage of recoveries in Equation 2 (precoveries).

Table 1 Results of the OLS regression

Dependent Variables	Coef.	t-statistics
new_cases	-0.0000012	-1.36
new_deaths	-0.0000043	-0.40
new_recoveries	0.0000039	2.25**
pdeath	-0.0673096	-1.70*
precoveries	0.0708585	4.81***

*, **, and *** denote statistical significance at the 10%, 5%, and 1% level respectively

Since the coefficients of new cases and new deaths are both small and insignificant, **Table 1** indicates that new confirmed cases and new deaths have no significant relationships with daily returns of real estate stocks. Though the t-statistic for new recoveries is significant at the 5% level of significance, the coefficient is still considerably small, which cannot draw a convincing conclusion that new recoveries have an effective influence on the daily stock returns[7].

However, the percentages of deaths and recoveries both have relatively high coefficients, and the latter is more significant, inferring that the positive effect of good news about COVID-19 on the real estate stock returns is more significant than the negative effect of bad news.

5.2 The impact of COVID-19 on real estate stock volatilities

Table 2 presents the means, standard errors and t-statistics of the change of total risk (delta_vol), the change of systematic risk (delta_beta) and the change of idiosyncratic risk (delta_idiovol).

Table 2 Statistic properties of the changes of risks

Variables	Mean	Std.Err.	t-statistics
delta_vol	0.0002198	0.0000825	2.6641***
delta_beta	-0.0847966	0.0262730	-3.2275***
delta_idiovol	0.0001524	0.0000750	2.0318***

*, **, and *** denote statistical significance at the 10%, 5%, and 1% level respectively

Table 2 demonstrates that for real estate stocks, both the changes of volatility and idiosyncratic volatility are significantly positive while the change of beta is significantly negative. Therefore, COVID-19 increased the total risk and idiosyncratic risk but decreased the systematic risk. The reduction of systematic risk seems to be against the previous study which drew a conclusion that there is no significant difference of Chinese real estate daily betas between the advancing and declining markets (Deng and Ma, 2008) [10], but that study defined the time with positive market daily excess returns as the advancing market time. Therefore, the two findings are not necessarily conflicted.

5.3 The impacts of important events on real estate stock returns

Table 3 presents average cumulative abnormal returns during various event windows. Figure 1 displays AAR and CAAR for each event.

Table 3 Average cumulative abnormal returns during various event windows

	Event1		**Event2**		**Event3**	
t	Mean	t-statistics	Mean	t-statistics	Mean	t-statistics
[-5:0]	-0.0027	-0.6071	-0.0207	-4.5964***	-0.0007	-0.1609
[-1:0]	-0.0007	-0.2886	-0.0114	-4.4499***	-0.0019	-0.7275
[0:1]	-0.0103	-3.6432***	0.0015	0.5611	0.0037	1.3985
[0:5]	-0.0521	-11.7072***	-0.0108	-2.4463**	-0.0038	-0.8093
[-1:1]	-0.0088	-2.6478***	-0.0016	-0.4972	-0.0017	-0.5217
[-5;5]	-0.0525	-8.1228***	-0.0244	-3.7622***	-0.0076	-1.1920

*, **, and *** denote statistical significance at the 10%, 5%, and 1% level respectively

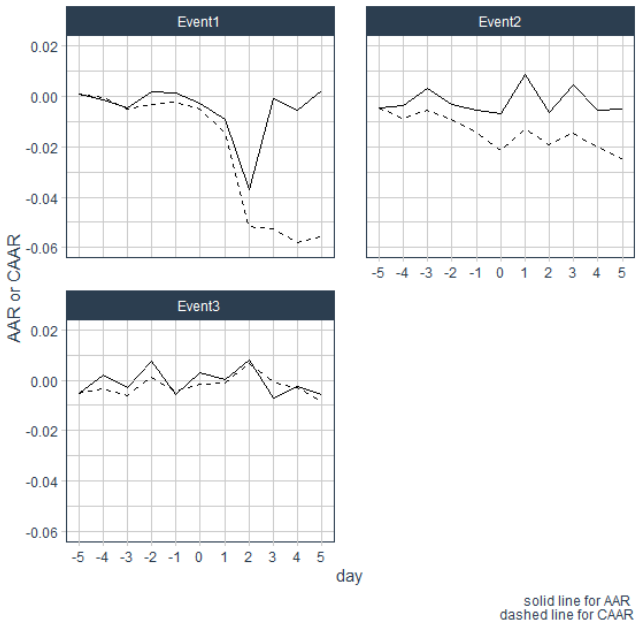

Figure 1. AAR and CAAR for each event

Figure 1 and **Table 3** illustrate that Event 1, the lockdown of Wuhan at January 23, 2020, brought a significant negative impact on the real estate stock returns. Both the AAR and CAAR dropped dramatically after the event, implying that the lockdown brought about anxiety and dread for the investors. Besides, the AAR and CAAR of Event 2 during the event window [0, 1] rose to a small extent, while the average cumulative abnormal return in [-1, 1] and [0, 1] were both insignificant statistically. Therefore, it can be inferred that the announcement of reopen of Wuhan did have a positive but limited effect to the real estate stock market. One possible illustration is that with the decline of confirmed cases and the rise of recoveries, the investors had expected the forthcoming reopen and had little surprise for the announcement. It's necessary to note that the average cumulative abnormal returns before Event 2 were significantly negative, which may result from other events that brought negative reactions of investors. Hence, the significant average cumulative abnormal returns cannot be attributed to Event 2, which proves the essentiality of selecting shorter event windows. The average cumulative returns of Event 3 are insignificant in all event windows, which can deduce that the real estate stock market had digested information related to the reopen well before the formal execution.

6. Conclusions

This study is aimed at evaluating the effects of COVID-19 on the Chinese real estate stocks. Using new cases, new deaths, new recoveries and the proxies of good or bad news of provinces where the headquarters of the sample companies lie as independent variables, daily stock returns as the dependent variable, regressions suggest that good news about COVID-19, represented by the percentage of new recoveries in cumulative confirmed cases, significantly increased daily stock returns. The t-statistics of variables representing the changes of three types of volatilities before and after COVID-19 show that total risk and idiosyncratic risk of real estate stocks have increased significantly since COVID-19, while systematic risk has decreased significantly. Event study finds that the lockdown of Wuhan significantly caused negative abnormal returns for real estate stocks, while the announcement and execution of reopen of Wuhan had no significant effects.

References

1. Wong G. Has SARS infected the property market? Evidence from Hong Kong. Journal of Urban Economics 2008; 63(1): 74–95.
2. Giudice VD, Paola PD, Giudice FPD. COVID-19 infects real estate markets: short and mid-run effects on housing prices in Campania region (Italy). Social Sciences 2020; 9(7): 114.
3. Tanrıvermiş H. Possible impacts of COVID-19 outbreak on real estate sector and possible changes to adopt: A situation analysis and general assessment on Turkish perspective. Journal of Urban Management 2020; 9(3): 263–269.
4. Ling DC, Wang C, Zhou T. Institutional common ownership and firm value: Evidence from real estate investment trusts. Real Estate Economics 2020; 156
5. Baek S, Mohanty SK, Glambosky M. COVID-19 and stock market volatility: An industry level analysis. Finance Research Letters 2020; 37: 101748.
6. Mohanty S, Akhigbe A, Basheikh A, et al. The Dodd-Frank Act and Basel III: Market-based risk implications for global systemically important banks (G-SIBs). Journal of Multinational Financial Management 2018; 47–48+91–109.
7. Mcwilliams A, Siegel DS. Event studies in management research: theoretical and empirical issues. Academy of Management Journal 1997; 40(3): 626–657
8. Nicolau JL. Assessing new hotel openings through an event study. Tourism Management 2002; 23(1): 47–54.
9. Ding L, Lam H, Cheng T, et al. A review of short-term event studies in operations and supply chain management. International Journal of Production Economics, 2002; 23(1): 47–54.
10. Deng CR, Ma YK. Study of Chinese real estate stock daily return under different market condition. The 4th International Conference on Wireless Communications, Networking and Mobile Computing; Dalian, China. 2008. p. 9745–9748.