

Impact of the Covid-19 Outbreak on Stocks in Hong Kong, Macau and North America - An Empirical Analysis Based on the Hospitality Industry

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Abstract. The WHO declared the Covid-19 outbreak a "public health emergency" in early 2020, deeming it a serious threat to the global economy. This study builds industry indices for North America and Hong Kong and Macau using weighted averages of nine well-known listed companies in North America and fourteen companies in Hong Kong and Macau with Asian representation. Based on the event study method, the impact of the Covid-19 epidemic on the stock returns of listed companies in the global hospitality industry was examined. In terms of empirical results, Covid-19 has a significant positive impact on Hong Kong and Macau hospitality industry returns, whereas Covid-19 has a significant negative impact on North American hospitality industry returns. As a consequence, the magnitude of the decline can be attributed primarily to the measures taken to control the Covid-19 pandemic. In the face of emergencies, regulators and investors can make informed decisions by studying the impact of the epidemic on capital markets.

Keywords: Covid-19; hospitality industry; event study.

1. Introduction

As a consequence of globalization and the development of society, public emergencies have become more frequent and detrimental to people's lives and economic development. In 2020, the Covid-19 pandemic is posing significant problems for some industries. Over time, external circumstances frequently have a negative impact on the tourism and hospitality sectors, causing irreversible damage [1]. A tourism crisis, as defined by the World Health Organization, is an unanticipated occurrence that disrupts normal business operations and reduces traveler confidence in a destination [2]. It is possible for unexpected events to take many forms over a long period of time. Since the stock market has historically served as a barometer of the global economy, it is often the first to reflect unexpected events. It is, therefore, worthwhile to examine how the Covid-19 epidemic has affected the stock market.

Several studies have examined the impact of contingencies on stock markets, both domestically and internationally. Emergencies can be caused by both systemic and non-systemic risks. For example, natural disasters and man-made disasters are the most common causes of systemic risk. Michael and Michel [3] use stock market correlation indices to measure that the September 11 terrorist attacks significantly affected the U.S. and French stock markets. As a result of comparing the different types and scopes of emergencies, Broun and Derwall [4] demonstrate that terrorist attacks have a greater impact on global stock markets than natural disasters, and terrorist attacks have a greater impact on stock markets in destination countries. A study by Zhao et al. [5] examines the direction, magnitude, and timing of shocks to stock prices due to natural and man-made disasters, and tests for contagion effects. Based on the event study method, Liu et al. [6] conclude that the 2008 Wenchuan earthquake had varying degrees of shock effects on the returns and risks of various sectors of the Chinese stock market and that these shocks were progressive and persistent. In terms of non-systematic risk, the impact primarily affected related companies or industries. Likewise, the Covid-19 pandemic around the globe has caused public panic as an unexpected event, which affects the functioning of society and impacts the stock market. A sufficient amount of literature has been published on the relationship between emergencies and the stock market. This article utilizes event study to explore both the extent

and mechanism of the impact of emergencies on stock prices. Consequently, this paper consider the event analysis to invstigate the changes in daily returns of the hospitality industry index following the outbreak.

The purpose of this study is to use an event study to quantify the impact of the Covid-19 epidemic on the stock price returns of the hospitality industry in North America, Hong Kong, and Macau through the change in cumulative abnormal returns before and after the epidemic. Besides providing insight into the extent to which the Covid-19 epidemic has affected the hospitality industry, this study also provides insight into how resilient and efficient stock markets are when it comes to absorbing and processing information from different regions when large external shocks occur. By providing reliable evidence, the regulatory system of stock markets and emergency response mechanisms can be improved, as well as traders' investment and financing decisions. According to the findings of this study, Covid-19 had a positive impact on the returns of the Hong Kong and Macau hospitality industries, while Covid-19 had a negative impact on the returns of the North American hospitality industry. A significant part of the difference in magnitude of its impact can be attributed to the measures taken to control the Covid-19 pandemic. The paper also provides some recommendations for regulators and investors to make informed decisions during unexpected emergencies through a study of the effect of the pandemic on the capital market.

The remainder of the paper is organized as follows: Section 2 describes the definition of the event study method, sample selection, and the calculation process; Section 3 performs data and empirical analysis; The last section presents conclusions and suggestions.

2. Methodology

2.1 The event study

The event study methodology was originally developed by finance researchers but has been widely adapted to other social science areas, such as management science [7, 8], accounting [9, 10], and operations systems [11,12]. During the period 1974-2000, over 500 event studies have been published in finance alone, according to a review conducted by Kothari and Warner [13]. Besides, an extensive literature exists analyzing unexpected events using an event study approach. According to Maillet and Michel [14], the stock market correlation index was used to evaluate the impact of the September 11th terrorist attacks on US and French stock markets. Zhao et al. [15] examined the contagion effects of stock price shocks induced by natural disasters and man-made disasters. Through empirical analysis, Liu et al. [16] concluded from the event study method that the 2008 Wenchuan earthquake had varying shock effects on the returns and risks of various sectors of the Chinese stock market, and the shocks were progressive and persistent. To analyze the effects of the Covid-19 pandemic on stock price returns for the hospitality industry in Hong Kong, Macau, and North America, we use the event analysis method, which is primarily based on changes in cumulative excess returns before and after the outbreak. By selecting a specific event, defining the time period during which the event had an impact or the "event window," and calculating abnormal returns during that window, we can measure the impact of the event on the sample stock prices. In calculating the abnormal return, the actual return is subtracted from the estimated normal return assuming no event occurred during the event window.

2.2 Event window

It was announced on April 4, 2020, by the World Health Organization that 1 million cases of Covid-19 had been confirmed worldwide, which means that the disease had spread globally by more than 10 times in less than one month. As a result, this paper records the April 3, 2020 event as time 0 (since April 4 does not correspond to a trading day). Typically, the event window is chosen to be a few days, weeks, or months in advance or after the event. It is important, however, to take into account the interference of other events taking place during the same period, such as the industry's emergency response to an unexpected event (Zhang, 2016). It is also important to keep the duration of the event window as short as possible in this step. Consequently, we define each of the five trading days before

and after the event date as the event window, denoted by the numbers $T=-5, -4, -3, -2, -1$ and $T=1, 2, 3, 4, 5$. In addition, 210 trading days prior to the event window have been selected as an estimation window for the study and analysis of this event.

2.3 Sample selection

To obtain a total of 839 daily closing prices for the North American market, Hong Kong, and Macau markets, we selected the US S&P 500 Index (SPX) and Hang Seng Index (HSI) from January 1, 2019 to April 30, 2022, excluding those that are not traded on holidays. These indices were selected to serve as a benchmark for calculating abnormal returns in the future. In this paper, nine U.S. stocks and fourteen Hong Kong stocks were selected from the top 300 hospitality groups in the world. Among these companies, Shangri-La, Sands, MGM, Wynn, and Melco have branches in North America and Hong Kong and Macau, respectively. By comparing these companies, we can gain a better understanding of the impact of the Covid-19 epidemic in North America and Hong Kong, and Macau. We can understand the impact of the Covid-19 epidemic on the hospitality industry's revenue in a global context by studying Marriott, Wyndham, Hyatt, InterContinental, and Hilton. The remaining hospitality brands (SJM Holdings, Galaxy, Emperor, Hong Kong, and Shanghai Hotels, Regal International, Miramar, Sino, Magnificent, and Asia Standard) are concentrated in Hong Kong and Macau, indicating the extent to which the Covid-19 epidemic has affected the market in these areas. According to the results of the correlation analysis of 14 Hong Kong and Macau companies, as well as nine hotels in North America. Since $p > 0.05$, there is no significant difference between 14 companies in Hong Kong and Macau, and their correlation is high; similarly, 9 companies in North America have no significant difference between their correlation, and their correlation is high. Therefore, it is reasonable to construct the stock index based on the returns of these companies.

2.4 Calculation of abnormal returns

This paper uses an event study to define abnormal return as the difference between the actual return of the stock index and the normal return, which can be calculated as:

$$AR_{it} = R_{it} - E(R_{it}) \quad (t = -5, -4, \dots, 0, \dots, 4, 5) \quad (1)$$

and the market model is used as the measurement model:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad (2)$$

which consists of α_i , β_i are regression coefficients, and ε_{it} is the random error term. For the North American market, the daily return of the S&P 500 Index (SPX) is regressed against the average of the daily returns of nine North American stock indices related to the hospitality industry. The Hong Kong and Macau market normal return is calculated by regressing the estimated window Hang Seng Index daily return on the average of 14 Hong Kong and Macau hospitality industry stock indices daily returns using the following formula:

$$E(R_{it}) = \hat{\alpha}_i + \hat{\beta}_i R_{mt} \quad (3)$$

Based on the relevant data, the normal return of the North American market index is determined

$$E(R_{it}) = -0.0006833 + 1.18998241 R_{mt} \quad (4)$$

normal return for the Hong Kong and Macau market index is determined

$$E(R_{it}) = -0.0005999 + 0.78042711 R_{mt} \quad (5)$$

As shown in Tables 1 and 2, the abnormal return AR_{it} is calculated by using the actual returns R_{it} of North America market index and Hong Kong and Macau market index during the event window. The cumulative abnormal return is as follows:

$$CAR_i(t_1, t_2) = \sum_{t=t_1}^{t_2} AR_{it} \quad (6)$$

3. Results

3.1 Test of significance

This paper conducted a t-test on the cumulative abnormal earnings rate CAR_i to determine whether or not the Covid-19 epidemic will have a significant impact on hospitality earnings across North America, Hong Kong, and Macau. Based on the results of the study, the following hypothesis was established:

H 0: $CAR_i = 0$ indicates that the Covid-19 epidemic has no effect on the earnings of the hospitality industry in North America, Hong Kong, and Macau.

H 1: $CAR_i \neq 0$ indicates that the Covid-19 epidemic has an impact on hospitality earnings in North America, Hong Kong, and Macau.

Tables 1 and 2 provide a summary of the test results. During the event window, the cumulative abnormal return (CAR) of the Hong Kong and Macau hospitality market index reached 0.09%, with a p-value less than 0.01, indicating that the test result is significant at a 1% confidence level. Similarly, with a p-value less than 0.01, the cumulative abnormal return (CAR) for the North American Hospitality Market Index reached -8.8%, which is significant at a 1% confidence level.

Table 1. t-test of Hong Kong and Macau's hospitality markets

t=1.81	p=0.00	CAR_i = 0.0009
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Table 2. t-test of North American hospitality markets

t=1.81	p=0.00	CAR_i = -0.088
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3.2 Empirical analysis

As shown in Figure 1, the abnormal return of the hospitality industry in Hong Kong and Macau hovered around zero during the five trading days preceding the event day. There is a dramatic change in abnormal returns from 3 trading days to 1 trading day before the event. An abnormal return of -0.91% was recorded on the day of the event. A significant fluctuation occurred in the abnormal return in the five trading days following the event day, with positive values occurring more frequently than negative values. Over the first five trading days of the event, the cumulative abnormal return fluctuated sharply and generally trended downward, reaching -5.03% by the event's end. Within two trading days of the incident, the cumulative abnormal yield increased significantly and then leveled off. The cumulative abnormal return grew rapidly from the second to the fifth trading day, peaking at 0.09%. During the event window of [-5, 5], the cumulative abnormal yield of the hospitality industry in Hong Kong and Macau reached a positive value on the fifth day. As can be seen, the Covid-19 epidemic had a positive impact on Hong Kong and Macau's hospitality industries.

According to Figure 2, the North American hospitality industry's abnormal return fluctuated around zero for the five trading days prior to the event but started to decline one trading day before the event. An abnormal return of -3.22% was recorded on the day of the event. Several sharp fluctuations were observed in abnormal returns during the five trading days following the event. By the date of the event, the cumulative abnormal return had declined to -20.4% in the first five trading days following the event. As a result of the spread of panic in the capital markets, the cumulative abnormal return rose significantly on the first trading day following the event and fell on the fourth trading day. The cumulative abnormal return rose rapidly from trading day zero to trading day seven,

reaching a peak of -6.39% after the event date, although it did not exceed the peak of -3.32% reached on the fifth trading day prior to the event. After that, the cumulative abnormal return tends to decline and flatten out. During the event window of $[-5, 5]$, the North American hospitality industry experienced a cumulative abnormal return of -8.76%. It is evident that the Covid-19 outbreak negatively affected the market revenue of the North American hospitality industry.

As compared to the abnormal return for the five trading days prior to the event date, the cumulative abnormal return for the five trading days following the event date increased by 1.6%, while the cumulative abnormal return for the five trading days following the event date decreased by 5.5% compared to the abnormal return for the five trading days prior to the event date. Based on these findings, it can be concluded that the Covid-19 epidemic had a greater and more negative impact on the North American hospitality market.

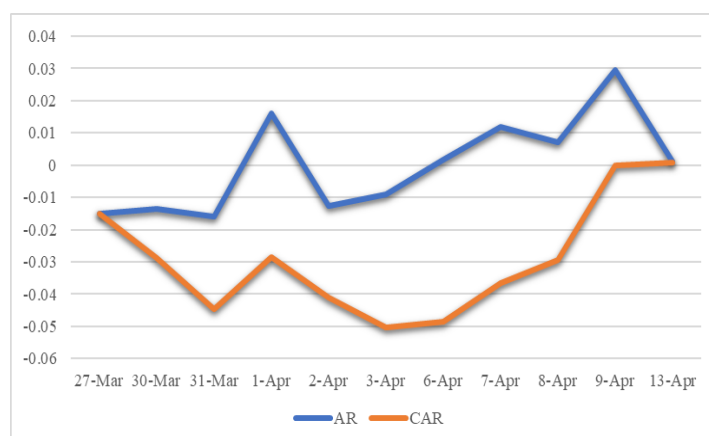


Fig 1. The change curve of AR and CAR in Hong Kong and Macau's hospitality markets

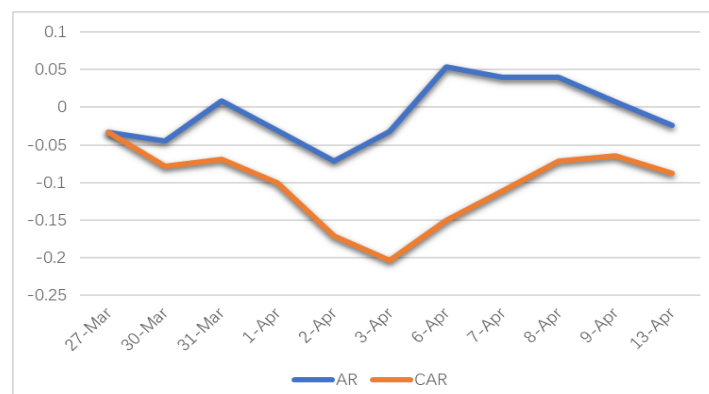


Fig 2. The change curve of AR and CAR in North American's hospitality markets

4. Conclusion

It is the aim of this paper to examine whether the Covid-19 pandemic leads to abnormal returns for companies listed in the global hospitality industry. This study builds industry indices for North America and Hong Kong and Macau using weighted averages of nine well-known listed companies in North America and fourteen companies in Hong Kong and Macau with Asian representation. On the basis of the event study method, an empirical analysis was conducted on the North American hospitality industry and the Hong Kong and Macau hospitality industry indices. Based on the results of the study, it can be concluded that the cumulative abnormal return of the Hong Kong and Macau hospitality industry reached a positive value of 0.09% within the time window $[-5, 5]$ and was statistically significant at the level of 1%. As a consequence, Covid-19 had a significant impact on Hong Kong and Macau's hospitality industry earnings, resulting in a rise in stock prices. Nevertheless, the cumulative abnormal return of the North American hospitality industry during the event window

[-5, 5] is -8.76% and significant at a 1% level of confidence. As a result, the North American hospitality industry has been adversely affected by the Covid-19 outbreak. It is possible that Hong Kong and Macau responded promptly to the epidemic and it was better controlled, and the government supported the hospitality industry by expropriating some hotels for quarantine purposes. North America, however, was slower to respond to this epidemic than Hong Kong and Macau, resulting in a rapid spread, and reducing hotel occupancy rates.

According to the research findings, this paper proposes recommendations for different subjects in order to lessen the impact of emergency events on capital markets and to better protect investors' rights and interests. In the first instance, regulators need to provide timely and accurate information regarding emergencies so that the general public is aware of them. In order to ensure the stability and effectiveness of the stock market, it is critical to use Internet media to release authoritative information at the appropriate time. Additionally, a sound security early warning system and emergency management system should also be established to prevent major emergencies from affecting the stock market. To prevent emergencies from causing huge impacts on the stock market, we need to provide timely warnings of risks before they happen, as well as active responses to them after they occur through various emergency plans. On the one hand, an investor should take precautionary measures against unpredictable contingencies, such as constructing an appropriate portfolio to hedge risks, on the other hand, respond after an event by collecting and analyzing market information, assessing their own risk appetite, and tolerance, and making rational investment decisions.

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