

# The Impact of COVID-19 on the Stock Prices of China's Hotel and Catering Industry

## —Based on Event Analysis

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### ABSTRACT

In 2019, the outbreak of COVID-19 has different influence to different sectors in Chinese stock market especially the hotel, catering industry. Therefore, this study adopts the event analysis method, selects The Chinese hotel and catering industry stock index as the research object, takes the stock index yield as the index, and measures whether COVID-19 has a significant impact on the stock price of China's hotel and catering industry and the degree of impact through the accumulated excess return within the event window. The results show that COVID-19 has a significant negative impact on the stock price return rate of the hotel and catering industry but the impact is short-term.

**Keywords:** COVID-19, China's hotel and catering industry, cumulative excess return rate, stock price return rate

## 1. RESEARCH METHODOLOGY

### 1.1 Research Design

Event analysis method has been used to study, the principle is: when the market is efficient market, The main impact of the crisis will be reflected in stock price fluctuations, often need to calculate the stock excess yield difference before and after the event. so the basic step is to design and select normal income model calculation. A complete event analysis process usually includes the following steps:

#### 1.1.1 Selection of window

A complete event window includes an estimation window, an event window, and an after window. On January 20, 2020, Academician Zhong Nanshan confirmed in an interview with CCTV that "human-to-human transmission" of COVID-19 exists. Therefore, this paper takes January 20, 2020 as the event occurrence date and marks it as time 0 (T=0). The 115 trading days from August 1, 2019 to January 19, 2020 were defined as the estimation window, and the 67 trading days from January 20, 2020 to April 28,

2020 were defined as the event window, denoted as T=-115, -114... -2, -1, T=1 2... 66 67 [1].

#### 1.1.2 Sampling frame and sample

In this paper, samples are selected from the CSI 300 index and daily closing price of the Hotel & Catering Industry Index from August 1, 2019 to April 30, 2020 (data from *Flush*), excluding the data that did not trade during holidays, a total of 364 daily closing prices were obtained as sample data.

## 1.2 Data Analysis

### 1.2.1 Calculated Simple yield

This paper adopts the simple yield method, using the index's closing price relative to the previous day's closing price to express. Suppose is the daily closing price of stock index J, then the formula of daily return rate of stock index is:

$$R_{jt} = [P_{jt} - P_{j(t-1)}] / P_{j(t-1)} \quad (1)$$

**1.2.2 Normal rate of return (expected rate of return)**

In this paper, the market model is used as the measurement model, and the daily return rate of CSI300 index is selected as the estimation window to regression the daily return rate of hotel and catering industry index to obtain the expected return rate:

$$E(R_{jt}) = \alpha_j + \beta_j R_{mt} + \epsilon_{jt} \quad (2)$$

Where,  $E(R_{jt})$  represents the expected return rate of index J on the t day of the estimated period,  $\alpha_j$  represents the actual return rate of index J on the t-th day of the estimation period,  $\beta_j$  is the constant of index j independent of the market,  $R_{mt}$  represents the actual return rate of market M on the t-th day of the estimation period, and  $\epsilon_{jt}$  is the random error term of period T.

**1.2.3 Excess return (abnormal return) and cumulative excess return**

Excess return is defined as the difference between the actual return rate of the index and the expected return rate, which can be expressed as:

$$AR_{jt} = R_{jt} - E(R_{jt}) \quad (3)$$

Where,  $AR_{jt}$  represents the excess return rate of index J on the t day of the estimated period,  $R_{jt}$  represents the actual return rate of index J on the t day of the estimated period.

The cumulative excess return rate is the sum of excess return rates, and the formula is as follows:

$$CAR_{jt(t1,t2)} = \sum_{t2}^{t1} AR_{jt} \quad (4)$$

The regression calculation process of expected return rate:

Where,  $CAR_{jt}$  represents the cumulative excess return rate of index J on the t day of the estimated period.

**1.2.4 Significance test**

In order to analyze whether the impact of COVID-19 on the revenue of the hotel and catering industry is significant, this paper uses T test to conduct significance test on  $CAR_j$ , and determines whether the excess return rate is significantly different from 0, and establishes the following hypothesis:

*H0*:  $CAR_j$  is zero, that is, COVID-19 has no impact on the stock price return rate of the hotel and catering industry.

*H1*:  $CAR_j$  is not equal to zero, that is, COVID-19 has an impact on the stock price return rate of the hotel and catering industry.

**2. EMPIRICAL RESULTS AND ANALYSIS**

**2.1 Data Processing**

The first step is to use Least square linear regression analysis(OLS) to analyzing the relationship between the historical rate of return on industry and market;

The second step adopts CAPM asset pricing model, selects the estimated window CSI 300 daily return rate to regression the daily return rate of hotel and catering industry index to obtain the expected return rate:

$$E(R_{jt}) = 0.9234R_{mt} - 0.0004 \quad (5)$$

**Table 1.** The return of industry yield and market yield

Dependent Variable: R1				
Method: Least Squares				
Date: 12/01/21 Time: 11:57				
Sample (adjusted): 8/01/2019 1/08/2020				
Included observations: 115 after adjustments				
Variable	Coefficient	Std . Error	t-Statistic	Prob .
RM	0 . 923406	0 . 096729	9 . 546301	0
C	-0 . 000424	0 . 000798	-0 . 531972	0 . 5958
R-squared	0 . 446436	Mean dependent var	0 . 000249	
Adjusted R-squared	0 . 441537	S . D . dependent var	0 . 011402	
S . E . of regression	0 . 008521	Akaike info criterion	-6 . 675315	
Sum squared resid	0 . 008205	Schwarz criterion	-6 . 627577	
Log likelihood	385 . 8306	Hannan-Quinn criter	-6 . 655938	
F-statistic	91 . 13186	Durbin-Watson stat	1 . 766611	
Prob(F-statistic)	0			

Then using the hotel catering industry index real return  $R_{jt}$  (in event window) calculation of excess return  $AR_{jt}$  (Due to space constraints, the calculation process is not shown here) .

Thirdly, in order to analyze whether the impact of COVID-19 on the revenue of the hotel and catering

industry is significant, this paper uses T test to conduct significance test on  $CAR_j$  of cumulative excess return rate, and determines whether the excess return rate is significantly different from 0, the following results are obtained through the test:

**Table 2.** Test results of significance of accumulated excess return rate in catering industry

CAR <sub>j</sub>	sd	n	t-statistic	p-value	star
0.166846	0.157104	67	8.692919	0.0000	***

It can be seen from the table that, in the event window period,  $CAR_j$  of accumulated excess return of hotel and catering industry finally reaches 16.7%, SD of standard deviation is 0.16, P value is less than 0.01, "\*\*\*\*" means that the test result is significant at 1%

confidence level, and the accumulated excess return is not equal to 0, so the null hypothesis  $H_0$  is rejected. The COVID-19 pandemic has had an impact on the share price returns of the hotel and restaurant industry.

**2.2 Analysis of empirical results**



**Figure 1** Change curves of  $AR_j$  and  $CAR_j$

As can be seen from Figure 1, the impact of the epidemic on the hotel and catering industry can be divided into three stages:

**Phase I:** In the phase of the COVID-19 outbreak (on January 20, 2020 - February 20) or the spread stage, The excess return rate of the hotel and catering industry fluctuated around zero from the event occurrence date (January 20) to the first day of the Spring Festival holiday (February 4) and reached the lowest point on February 4, with the frequency of negative value higher than the frequency of positive value. The excess return rate on the day of the event was -0.8%, and the excess return rate on the first day of the holiday on February 4 was -6.5%, reflecting the severe impact on the hotel and catering industry after the event. During the whole month of the event (From January 20 to February 20), the cumulative excess return rate was significantly lower than the excess return rate, indicating that the occurrence of COVID-19 brought negative returns to the overall hotel and catering industry at this stage. This indicates that the occurrence of COVID-19 has brought negative benefits to the overall revenue of the hotel and catering industry. The reason may be that the population

travel is affected by strict movement control, the hotel and catering industry passenger flow sharply decreased, income sharply reduced. In an efficient market, this phenomenon is immediately reflected in the capital market, as investors spread panic and sell the stocks held in the industry.

**Phase II:** In the phase stage of COVID-19 (From February 21 to March 17, 2020), namely the outbreak stage, the excess return rate rose rapidly, reaching 4.9% on February 27, then fluctuated around zero. However, the positive frequency was far greater than the negative frequency, and reached the maximum 5.4% on March 19. At this stage, the impact of the epidemic on the hotel and catering industry changed from negative to positive, which may be related to the following reasons: First, after the outbreak of the epidemic, part of offline consumption in the catering industry began to shift to online and retaliatory consumption; Second, investors' adaptation to the epidemic and the effective prevention and control of the epidemic in China have led to the resumption of work and production in all industries, thus driving the recovery of the hotel and catering industry.

**Phase III:** In the phase stage of COVID-19 (March 18, 2020 to April 28, 2020), namely the decisive stage of epidemic prevention and control, the excess return rate showed a correction, and then fluctuated around zero steadily. The cumulative excess return rate also rose slowly. In the second and third stages, the cumulative excess return rate was much higher than the excess return rate. This indicates that the outbreak of COVID-19 has a significant positive impact on the hotel and catering industry in these two stages. In the first stage of the event window [0,18], the cumulative excess return rate was significantly lower than the excess return rate, indicating that the outbreak evens caused investors to lower their expectations for the hotel and catering industry, the epidemic has a significant negative impact on the revenue of the hotel and catering industry, causing the decline of stock prices. In the second stage of the event window [19,37], the cumulative excess return began to rebound and gradually rose, reaching a peak of 32.42% on March 19. In the third stage of the event window [38,67], it firstly recovered to 26.32%, and then gradually increased gently, indicating that the impact of COVID-19 on the revenue of the hotel and catering industry is short-term.

### 3. CONCLUSION

The events of the outbreak of COVID-19 would have a significant impact to hotel food and beverage industry, but the impact is divided into different stages, after the outbreak of COVID-19 in the short term has a significant negative impact on hotel food and beverage industry, but as the whole country for the new crown strict control and prevention of epidemics and gradual return to work and production. Due to the adjustment of investors' expectations of the epidemic event, the panic in the capital market gradually dissipated, and the impact of the event on the industry gradually turned from negative to positive.

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