

Impact of COVID-19 on Expected Return and Risks in “China Concept” Stocks Using CAPM Model: A Case Study of Alibaba and Haidilao

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ABSTRACT

The COVID-19 has a great impact on the financial market, which has made the financial market more unpredictable. In order to measure the expected return and the risks of “China concept” stocks during this special period, Alibaba and Haidilao are selected as research objective in this case study. Based on CAPM model the expected return and standard deviation for the risks are measured, i.e., the effects of COVID-19 on Chinese stock market can be predicted. According to the results, a fall in the expected return was witnessed in the two firms due to the outbreak of COVID-19 with a rise in the risk of each firm. These results offer a guideline for investors to be aware of COVID-19 effects on “China Concept” stock.

Keywords: COVID-19, Alibaba, Haidilao, CAPM, Index analysis

1. INTRODUCTION

The ongoing process of COVID-19 has significantly affected global economy from the beginning of 2020. As the pandemic affects investors' decisions in a great extent on the stock market at a global level, the economic activity has been influenced. For China, the epidemic has led to a dramatic effect on the economy in the start-up. China was one of the first countries to see the outbreak of COVID-19 at the beginning of 2020. There were 102,333 cases in China and 4,845 death cases in total until April 23, 2021[1]. The impact of the epidemic on China's economy is mainly reflected in consumption, investment, and exports. First, consumption in China has dropped significantly to meet the needs and necessity of epidemic prevention. As for investment, monthly growth of investment in fixed assets experienced a sharp decline from January to February in 2020. In terms of exports, the worsening of the epidemic in foreign countries influenced the foreign trade relations of various countries, i.e., China's export businesses were affected in the first three quarters of 2020. Overall, the epidemic has a negative impact on China's economic activities in the three perspectives as the analysis above.

Meanwhile, the epidemic has influenced the financial stock market significantly. By reviewing the results of previous literature, we can better analyze the impacts of epidemic in the aspect of expected return and risks in the “China concept” stock.

1.1. Impact of COVID-19 on expected stock return

The effects of the epidemic have contributed to a decreased expected return in the stock market. Overall, researches focus on discovering the effects of new confirmed cases, total confirmed cases, death cases, public attention and other policies during the epidemic on the stock return in different countries to illustrate the correlation of COVID-19 and expected return.

For the relationship between accumulated confirmed cases and expected return, foreign scholars carry out some researches. Abdullah finds the expected Chinese stock return is negatively related to the daily growth in total newly confirmed cases and deaths[2]. Khan examines the return in the stock markets in 16 countries and finds a negative relationship between the return and the new infections of the COVID-19 using OLS

regressions and t-test[3]. Similar result is found by O'Donnell, who studies the negative impacts of the number of confirmed cases on the stock index of five countries by controlling variables[4]. Later, Xu, applying the GARCH model, finds the expected return in stock market is negatively related to the growth rate of total new cases based on the daily data in the US and Canada[5].

For other aspects including news of firms, public attention, oversee response, and policy intervention, foreign studies have drawn some conclusions. Chowdhury uses ESM and PVAR to state that COVID-19 variables (e.g., the number of lock down days, the restriction of domestic and overseas movements, fiscal policies and infections) are all negatively related to the stock market[6]. Similarly, Chien et al. argue that the epidemic has negatively affected the economy including the US, Europe and China [7].

1.2. Impact of COVID-19 on stock market risks

Besides the influence of COVID-19 on expected return, the outbreak of COVID-19 has led to an unprecedented level of stock market risks. Previous studies mainly examine relationships among market volatility, the implementation of government macro policies and the investors' fears caused by the lock down policies and infection cases.

First, many researchers have summarized that the COVID-19 epidemic itself has increased the risk and volatility in many representative economies. Zhang illustrates that the epidemic has created a higher level of global financial market risks and the rise in the uncertainty of COVID-19 leads to more unpredictability in the stock market[8]. Yousfi finds a long-term negative relationship between the US stock market and global confirmed cases and deaths of COVID-19 applying wavelet coherence graphs[9].

As for the specific factors leading to higher risks during the COVID-19, one major factor is the macro policies carried out by the governments. Rout demonstrates that due to the lockdown policies, rising unemployment, reduced production, the risk is high in the market[10]. Later, Ftiti narrows down his research to China stock market and finds the non-fundamental news including health news announcing the matters of the sanitation system and the lockdown policies have increased the volatility in the market[11]. Chundakkadan concludes that investors' attention during COVID-19 negatively affects the returns and leads to high volatility in the markets, which are greater in developed countries and during the first week of the pandemic breakout[12].

However, these researches are limited to investigate the static macro impact made by the COVID-19 on global markets. Besides, only a few papers have looked

at the specific impact on China stock market. In the long run, these results maybe slightly skewed due to the change of the epidemic, i.e., need to be addressed and corrected. This essay mainly focuses on China's economic and financial situation during the COVID-19. This essay examines the effect of COVID-19 on expected return and risks in the "China concept" stock based on the capital asset pricing model (CAPM) and Standard Deviation.

The rest part of paper is organized as follow: the Second part introduces the data and method of our study including the sources of data and models applied to analyze return and risks; the Third part presents the results and discussion of the relative trends on figures; the Forth part makes a general conclusion about our research.

2. DATA AND METHOD

2.1. Data

The ongoing process of COVID-19 has significantly affected global economy from the beginning of 2020. Until April 23, 2021, there were 144,804,485 infected people worldwide and among them with 3,073,851 death during the epidemic. To analyze the effect of COVID-19 on the "Chinese concept" stock in terms of expected return and stock market risks, we select 2 companies as research objectives. We compare the relative trend of expected return and risks of two Chinese companies with the number of accumulated total cases confirmed during COVID-19 collected from (from John Hopkins Coronavirus Resource Center from December 2019 to December 2020).

The two firms chosen are Alibaba and Haidilao. They are both well-known public companies in China and IPO in U.S. During the COVID-19, the lock down policies have made great negative effect on e-commerce industry and catering industry. As the companies whose main business are online retail and catering, they were all hit by the epidemic. Alibaba is an iconic business conglomerate in China that has business including online commerce platforms, cloud computing, digital media. Capturing 55.9% of all online retail sales in China in 2019 according to Gupta, it has become the leading online commercial company in China. Haidilao is a well-known restaurant brand in China and Haidilao International Holding Company has become an internationally renowned chain enterprise[13].

2.2. Method

The expected returns of the two firms are acquired by the Capital Asset Pricing Model (CAPM). Return of risk free asset, expected return of the market portfolio and the systemic risk index are the key inputs of the CAPM. The return of risk free asset is calculated by taking the

average value of all one-year treasury bonds in the standard term information of ChinaBond Treasury Bond Yield Curve from ChinaBond Information Network between 2019 to 2020[14]. We choose two representative cases: Haidilao and Alibaba and Shanghai Composite Index(SCI) as panel data to carry out our research, so the classification of stocks is not restricted by country boundaries. Therefore, we use the monthly rate of return of SCI to be the expected return of the market portfolio and the data is obtained from investing.com, from December 2019 to December 2020. The rate of return is calculated by the equation:

$$RoR = \frac{P_t - P_{t-1}}{P_{t-1}} \times 100\% \quad (1)$$

where, RoR is the rate of return and P_t is the closing price of month t, P_{t-1} is the closing price of month t-1.

2.2.1. CAPM

To estimate the expected return, Capital Asset Pricing Model (CAPM), which was first proposed by Sharpe et al.[15] is utilized. CAPM mainly measures the relationship between the expected return and systematic risk in the stock market. Based on the assumptions, CAPM is widely used in pricing the stocks and analyzing the expected return according to the risk and cost of capital. However, there are some assumptions and application conditions for this model. Firstly, all the investors are rational enough expecting higher return and lower risk. They have the same perception of the distribution of the return probability and the same expectation of expected return, standard deviation and co-variance between stocks. Secondly, the stock market should be perfect means that only the risk and return are the determinants of investors' decisions and investors can borrow or lend money at the cost of fixed interest without any other limitation. The price of the stocks will not be affected by one particular investor. The formula of CAPM is listed below:

$$E(r_i) = r_f + \beta_{im}[E(r_m) - r_f] \quad (2)$$

where, $E(r_i)$ is the rate of the expected return of asset i and the r_f is the return of the risk free asset, $E(r_m)$ is the expected return of the market portfolio and β_{im} is the systemic risk index which can be estimated[16].

2.2.2. Standard Deviation

To analyze the risks of the two firms, the standard deviation can be a good measure. Standard deviation is a mathematical approach to measure volatility and dispersion relative to its mean in finance[17]. Normally, the greater the standard deviation of assets, the greater the volatility will be. It means the price movement is more unpredictable with a wider range of fluctuation. It can be calculated with the following equation:

$$\text{Standard deviation} = \sqrt{\frac{\sum_{i=1}^n (x_i - x_{\text{mean}})^2}{n-1}} \quad (3)$$

where x_i is the value of the stock in i period, x_{mean} is the average value of the stock and n is the number of data point that are involved in calculation. The mean price X is calculated by adding all the values of stock up and dividing by the number of data points n. To calculate standard deviation, we can first obtain the variance because standard deviation is the square root of it. Therefore, we can identify the formula inside the square root to obtain variance. It assumes that the distribution of investment risks is normal distribution, i.e., it counts all the uncertainties as risks.

3. RESULTS AND DISCUSSION

3.1. Empirical results from CAPM

Based on the results of expected return of Alibaba and Haidilao from CAPM, we analyze the influence of COVID-19 to stock market return in Fig. 1 from December 2019 to December 2020. The descriptive data including expected market return, return of the risk free asset, β of Alibaba, β of Haidilao and the results of expected return of Alibaba and Haidilao are listed in Table. 1.

Seen from Figure 1, the relative trend of expected return and accumulated cases in China are compared. The left axis demonstrates the expected return of Alibaba and Haidilao in percentage and the right axis demonstrates the accumulated total confirmed cases in China. By comparing the trend in the three variables, we find the relationship between Chinese stock market return and the COVID-19 situation. In addition, comparison can be made between the effects of COVID-19 to the catering industry and the e-commerce industry.



Figure 1 Return of Alibaba- Return of Haidilao- COVID-19

As shown in the Fig. 1, there was sharp rise in number of confirmed cases in China from January 2020 to February 2020 with a total increase of 69,554 cases. After February 2020, the total confirmed cases

continued to grow but began to increase at a slower rate. than that of Alibaba during the epidemic.
The expected return of Haidilao was generally higher

Table 1. Expected return of Alibaba and Haidilao

Date	Market Return (%)	Risk Free rate(%)	β Alibaba	β Haidilao	Return Alibaba(%)	Return Haidilao(%)
Dec-2019	6.20%	2.903923606	0.82	0.64	57.36%	108.51%
Jan-2020	-2.41%	2.613774392	0.82	0.64	45.07%	92.55%
Feb-2020	-3.23%	2.613774392	0.82	0.64	44.40%	92.03%
Mar-2020	-4.51%	2.613774392	0.82	0.64	43.35%	91.21%
Apr-2020	3.99%	2.613774392	0.82	0.64	50.32%	96.65%
May-2020	-0.27%	2.613774392	0.82	0.64	46.83%	93.92%
Jun-2020	4.64%	2.613774392	0.82	0.64	50.85%	97.06%
Jul-2020	10.90%	2.613774392	0.82	0.64	55.99%	101.07%
Aug-2020	2.59%	2.613774392	0.82	0.64	49.17%	95.75%
Sep-2020	-5.23%	2.613774392	0.82	0.64	42.76%	90.75%
Oct-2020	0.20%	2.613774392	0.82	0.64	47.21%	94.22%
Nov-2020	5.19%	2.613774392	0.82	0.64	51.30%	97.42%
Dec-2020	2.40%	2.613774392	0.82	0.64	49.01%	95.63%

Similar trends can be found in the expected return of the two firms. The expected return both experienced a fall during the outbreak of COVID-19 with the return of Alibaba decreased from 57.36% to the minimum 43.35 and that of Haidilao fell from 108.51% to 92.21% in March 2020. Subsequently, as the growth of infections slowed down after April 2020, the expected return started to go up and keep relatively stable. The expected return of Alibaba remained above 49.33% in the following four months and that of Haidilao kept over 93.9% during this period. Therefore, the outbreak of COVID-19 contributed to a decrease in expected return of Alibaba and Haidilao. As the rate of spread of the epidemic decreased, there was a growth in the expected return gradually.

3.2. Discussion of expected return

To interpret the difference in the expected return of Alibaba and Haidilao. The gap between the expected return of the two firms reached almost 50%. The relatively lower expected return of Alibaba can be ascribed to the increasing rivals and competition in the e-commerce industry. With the spread of COVID-19, China's top e-commerce stocks have performed much better than other industries as people all stay at home and do online shopping. Despite the significant increase in other firms in e-commerce industry, Alibaba's increase in stock price was only 1.05% due to the strong competitive force in the industry. Many customers switched from Alibaba to other firms in e-commerce industry. Therefore, the strong competition has led to a relative lower expected return of Alibaba.

As for the high expected return of Haidilao, the catering industry was one of the most severe industries suffered from COVID-19. However, as small businesses were driven out of the market, Haidilao took turn to expand. In the first half year of 2020, Haidilao opened 173 new stores, and the total number of global stores increased to 935 in June. Thus, the expansion of Haidilao helped stabilize investors' confidence during the epidemic. Besides, the low cost involved in the production process has generated advantages for Haidilao. According to the Interim Financial Report of Haidilao 2020 from HKEX news, the property rentals expenses only cost 88.1 million RMB for the six months of 2020. In 2019, the rental cost was 1.1 billion RMB, accounting for only 4% of total revenue[18]. Therefore, the rental costs only take up a small proportion of the total revenue, which allows Haidilao to minimize their costs of production, increasing Haidilao's competitiveness.

To conclude, the outbreak of COVID-19 has led to increasing uncertainty in the stock market and contributed to a general fall in the expected return. In the cases of Alibaba and Haidilao, Alibaba always have a lower expected return compared with Haidilao.

3.3. Empirical Results from Standard Deviation

We apply standard deviation to measure the risks of Alibaba and Haidilao between December 2019 and November 2020. We obtain the Alibaba's and Haidilao's prices from Yahoo Finance. In order to better identify the influence of COVID-19 to the market risks, we calculate the standard deviation for every 3-months listed in Table 2.

The Table 2 is the combination of risks with COVID-19 situation. The left axis demonstrates the standard deviation of Alibaba and Haidilao and the right axis shows the accumulated total confirmed cases in China. We can find the relationship between risks and COVID-19 situation by comparing the trends of the three variables.

As shown in Figure 2, as the number of accumulated confirmed cases increased, the standard deviation rose as well. Initially, the outbreak of COVID-19 led to a gentle rise in standard deviation in the two firms, with Alibaba reached 7.2 and Haidilao reached 3.63. From June 2020 to August 2020, the number of accumulated confirmed cases continued to increase at a steady rate. Meanwhile, a sharp rise in the standard deviation of the two firms was witnessed. For Alibaba, its standard deviation peaked at 36.3 which was approximately five times as much as the last period. For Haidilao, the standard deviation reached its maximum

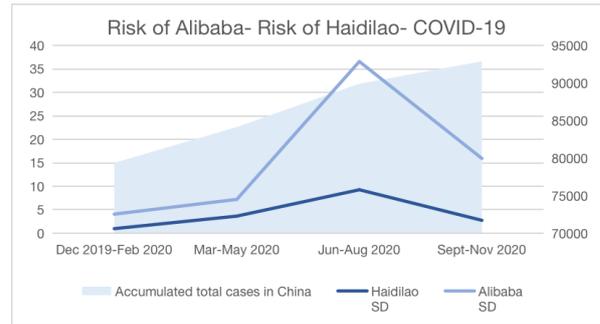


Figure 2 Risk of Alibaba- Risk of Haidilao- COVID-19

of 9.25. In the last period, from September 2020 to November 2020, the growth in accumulated cases in China became gentler, and there was a fall in standard deviation of each firm. Therefore, the outbreak of COVID-19 contributed to a rise in stock market risks in both catering industry and e-commerce industry. In addition, there was a time delay of a three-month period in the impact of the outbreak on stock market risk. Notably, the standard deviation of Alibaba always exceeded that of Haidilao, indicating a higher level of risks in Alibaba's stock.

3.4. Discussion of stock market risks

At the early stage of the COVID-19, nobody is able to estimate the seriousness of it. Hence, with the dramatic increase of uncertainty, the stock market risks have become higher. As shown in Fig. 2, both Haidilao's and Alibaba's risks reached their peak between June to August which is about five months after the outbreak of the epidemic. It indicates that there is a lag time for the risks to appear in the stock market.

It is obvious that a gap exists between Alibaba's and Haidilao's risks throughout the whole period. As same as the expected return, this phenomenon can be explained by the increase of e-commerce rivals. The COVID-19 forces people to work online and led the original offline business demand to shrink. Hence, due to the intense market competition, Alibaba experience higher risks than Haidilao. Haidilao remains low risks relative compare to Alibaba although it didn't stop rising until August. First, Haidilao's rate of turning over the seat is very high. This rate refers to the times per desk, which is used every day. Normally, reaching a usage of 3 times per day would help to make considerable profits for a hotpot restaurant. Haidilao surprisingly achieves the usage of 4.8 times per day in 2019, which illustrates a table serves about five groups of consumers in a day. As a consequence, Haidilao's performance remains positive these years in the catering industry.

Table 2. Risks of Alibaba and Haidilao

Date	Haidilao's 3-period average price	Haidilao SD	Alibaba's 3-period average price	Alibaba SD	Accumula ted cases in China
Dec 2019- Feb 2020	31.05	0.95	202.53	4.05	79356
Mar-May 2020	33.8	3.63	191.57	7.2	84146
Jun-Aug 2020	39.45	9.25	246.13	36.6	89914
Sept-Nov 2020	52.6	2.73	276.73	15.93	92902

To conclude, the COVID-19 has resulted in constant growth in stock market risks, which can be reflected by Alibaba's and Haidilao's. Alibaba's risks remained higher than Haidilao's during the whole year due to the arises of e-commerce competitors. Haidilao had low risks compare to Alibaba because of its outstanding performance in the catering industry.

4. CONCLUSION

In summary, this study examines the effects of COVID-19 on "Chinese concept" stock market particularly on two well-known companies, Alibaba and Haidilao. Based on CPAM model and standard deviation, the expected return and risks are estimated for these two companies. It is found that the expected return falls and the volatility increases in two companies during COVID-19. Haidilao's expected return was generally higher than Alibaba's during the time range for the study. Alibaba's risk was generally higher than that of Haidilao. Decreased expected return and increased risk may due to the increasing uncertainty caused by the epidemic and the low productivity of companies that weaken investors' confidence. The huge gap of the expected return and the risk between two companies may result from more fierce competition in e-commerce industry than the catering industry. In addition, the low cost and expansion of Haidilao also contributed to the gap.

To address the economic crisis caused by COVID-19, reconstruction of investor's confidence of investing is the most underlyingly measure. Definitely, the

government's control and cure for the epidemic is the fundamental way to control the uncertainty of the market and to raise investors' confidence. For the companies, actively seeking self-help measures, which provide investors with positive operating impressions, can be an efficient way to raise the expected returns and decrease the risks.

The study demonstrates the downward trend of "China concept" stock during the epidemic in terms of the expected return and risk with two representative company examples. All these findings can be widely used for the investment and corporation strategy decisions to gain higher return and avoid risk under the effect of COVID-19. In the future, we should try to estimate the longer-term effects caused by the COVID-19 and manage to explore and apply more practical and accurate methods.

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