

Analysis of Investment Value of the Aviation Industry

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Abstract. COVID-19 claimed thousands of lives worldwide and put food systems, public health, and the workplace in grave danger. Airline stock losses indicate industry-wide damage. We compared two large government-owned airlines to two smaller for-profit airlines over five years. A case study examined how online reviews have affected Chinese tourism. Investors in the hotel industry made losses during the pandemic. This study analyzed the operational status of Air China, China Eastern Airlines, China Southern Airlines, Juneyao Airlines, and Spring Airlines. This was done to assess COVID 19's impact on the Chinese airline industry. The results show that the pandemic affected aviation.

Keywords: Aviation industry, Investment, Existing problems, Solution strategy.

1. Introduction

The outbreak of COVID-19 has disrupted people's lives, and the development of every industry has also been hindered to varying degrees. As an important industry for a country, has the aviation industry been affected in the era of the epidemic? To what extent are different categories of airlines affected? In this essay, we used the stock prices of various airlines as a basis to evaluate the extent to which airlines are affected by the epidemic through the analysis of these data.

This paper selected the stock prices of two large state-owned airlines and two small private airlines over the past five years. It just includes the operating conditions before and after the epidemic. Through the vertical comparison of the timeline and the horizontal comparison of different types of companies, this paper will show the conclusion.

With the development of tourism, the current hotel industry is also developing very fast. Now many people choose to book online, and those online reviews have a certain impact on hotel sales, but the specific impact is not very clear [1]. Because of the outbreak around the world, and it's been going back and forth it's had a big impact on investors, and they don't know if they can beat the market by applying technical trading rules [2]. Customer loyalty will have a great impact on the service industry, however, room management performance was found to be one of the most important considerations for hotel chain customers [3]. In addition, Porta et al. studied the hypothesis that the high returns of value stocks are the result of investors' incorrect expectations [4]. In Taiwan, changes in monetary policy are effectively measured by using changes in the discount rate, and monetary conditions are classified as restrictive or expansionary. The empirical results show that hotel stocks exhibit higher average returns and return-to-risk ratios during the expansionary monetary period [5].

Therefore, this paper will determine the operating status of Chinese major airlines in the past five years, including some airline companies, which can reflect the current situation of China's aviation industry. This paper will also analyze the impact of Covid-19 on the Chinese airlines by analyzing the historical data of the stock price of the Chinese airlines and the financial statements of Chinese airlines. In addition, to give some suggestions to the Chinese aviation industry under the impact of Covid-19.

2. Method

First of all, it needs to get accurate raw data and collect them from reliable resources. After that it is important to use the raw data to collect the monthly data, otherwise, there are thousands of data for you. And before this, the notional risk-free rate is also needed [6].

$$\text{nominal risk free rate} = (1 + \text{Real Risk Free Rate}) / (1 + \text{Inflation Rate}) \quad (1)$$

It can adopt $(\text{price}_n / (\text{price}_{n+1}) - 1)$. Then it would be easier to collect the monthly data. According to the data in front of each list, there are dates, and if the date is not equal to the month of tomorrow then 1, otherwise 0. Then monthly data is got. After that, it is going to calculate the rate of the return, which is today's price divided by the last day's and minus 1. and the excess return rate has used the rate of the return to minus the risk-free rate return.

Calculating the annualized average return, annualized standard deviation, beta, alpha, and residual standard deviation is also related to the research closely [7].

$$\text{annualized average return} = \text{average of the excess return} * 12 \quad (2)$$

The annualized standard deviation means all the standard deviation of the data of the standard deviation then multiply the square root [8].

$$r_i = \alpha_i + \beta_i * r_M + \text{residual}_i \quad (3)$$

Beta is just the slope of the linear regression line through the given point, beta here is the gradient of each stock to SPX and it can use intercept in excel to help us calculate the results [9]. There is a formula of

$$\text{residual}_i = r_i - \alpha_i - \beta_i * r_M \quad (4)$$

It can use the annualized average return, annualized standard deviation, and residual return to get the annualized residual standard deviation.

There is formula of $\text{residual}_i = r_i - \alpha_i - \beta_i * r_M$ And can use the annualized average return, annualized standard deviation and residual return to get the annualized residual standard deviation. Alpha would also be used in the data processing, it represents excess returns that have nothing to do with the broader market, this can help to analysis the stocks market during the Covid-19. Sharp ratio is also very important, this can determine the relationship of the risk. This can help to learn about the situation in different companies and analysis them.

3. Results

3.1 The analysis of the impact of Covid-19 on China's aviation industry

3.1.1 Using the historical data of the stock market of the airlines

Using the raw data collected from A shares in the Chinese market and adopting the methods given above, we came up with the results of several values. Here are the comparative graphs.

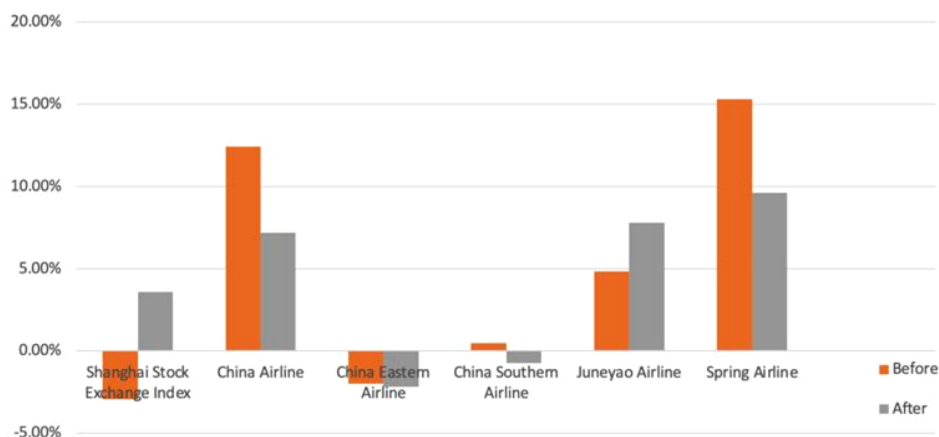


Fig. 1 Comparison of Annual Return before and after the epidemic

Judging from the annual return, although the return of the broader Shanghai Composite Index has recovered from negative to positive after the epidemic, the yield of almost all airlines has declined, except Juneyao Airlines. This shows that the impact of the epidemic on the aviation industry is very large.

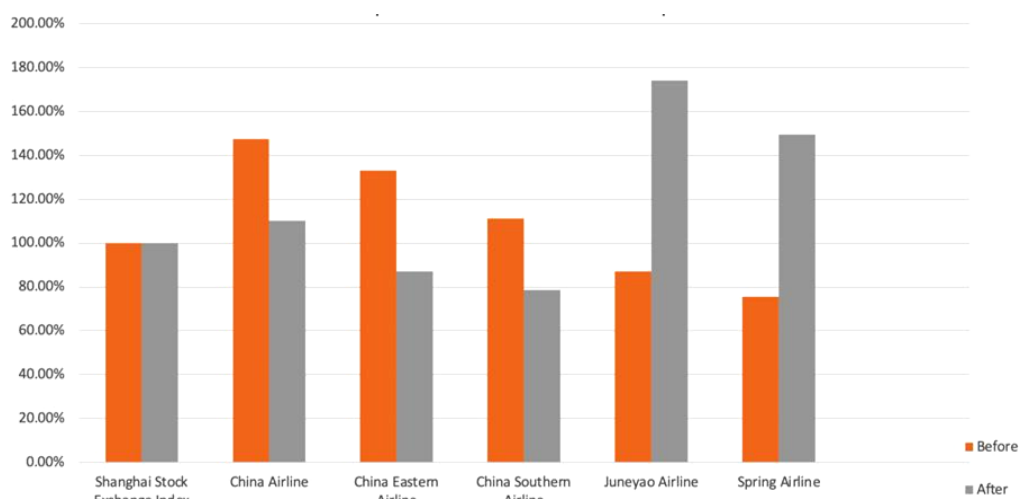


Fig. 2 Beta comparison before and after the epidemic

The beta value indicates how the stock fluctuates with the broader market index. From the beta value, changes in the epidemic have different impacts on each airline. The top 3 large state-owned airlines experienced less volatility following the epidemic, while the two private airlines experienced increased volatility after the epidemic. This aspect shows that large state-owned airlines have strong anti-risk capabilities and relatively stable operations. On the other hand, although the two private enterprises are highly volatile, they can take advantage of their flexible operation and have the opportunity to independently walk out of the market situation different from the industry sector, which can be proved from the data of annual return.

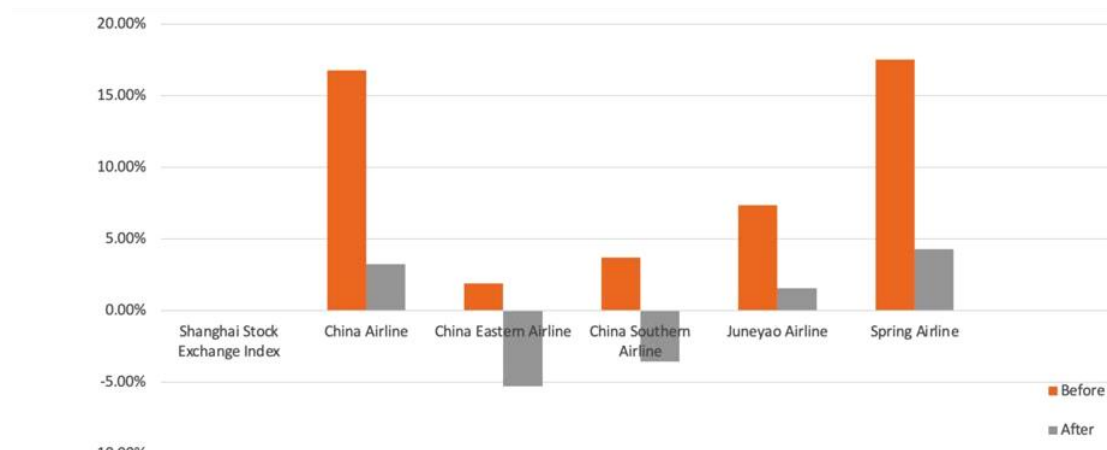


Fig. 3 Alpha comparison before and after the epidemic

The Alpha value represents excess returns that have nothing to do with the market trend. Obviously, due to the epidemic, the excess returns of all airlines are far less than before the epidemic. However, there is also differentiation. The excess returns of the two private enterprises with flexible management are better, and the decline of the three large state-owned companies is not significant.

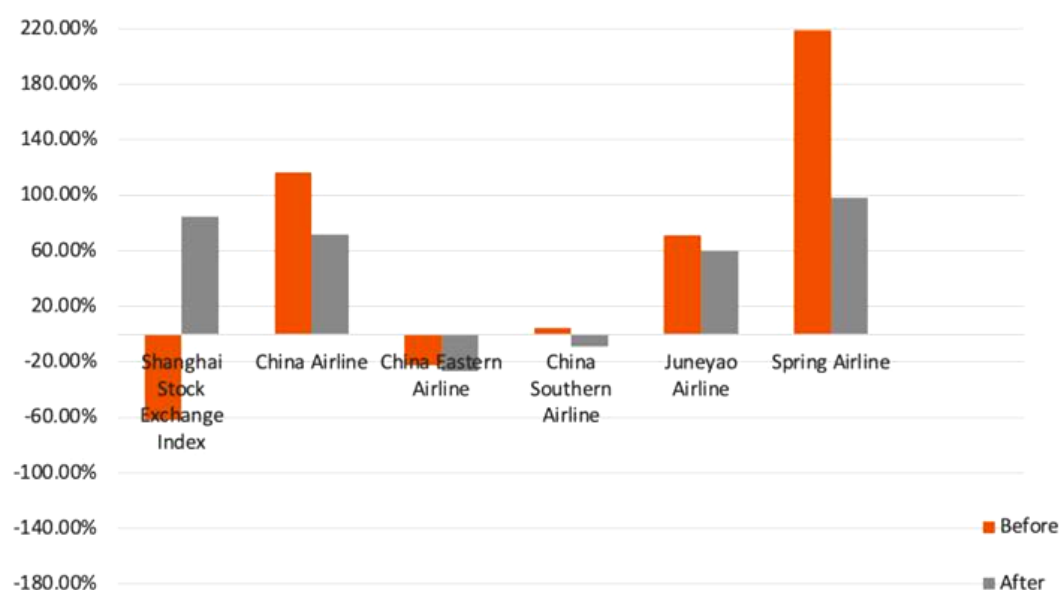


Fig. 4 Comparison of Sharp before and after the epidemic

The Sharp value represents risk-benefit, and the epidemic has also reduced the risk-benefit of all airlines. In short, from the above indicators, the impact of the epidemic on airlines is indeed very large. The three large state-owned airlines are less affected by the epidemic because of their large size, abundant resources, and stronger anti-risk capabilities. The income of the two private enterprises has also been affected by the epidemic, but on the whole, they are more competitive than state-owned airlines, and all indicators are better than those of state-owned airlines, reflecting the characteristics of enterprises that can adjust their business strategies promptly according to market changes.

3.1.2 Using the financial statements

Net profit: by considering the net profit, as shown in the table from the end of 2019 to the end of 2020, the net income of all airlines was in a sharp downward trend. China Eastern Airlines and China Southern Airlines suffered the most serious decline, with a drop of 460.44% and 481.91% respectively. At the same time, from the end of 2019 to the end of 2020, the net income of China Eastern Airlines dropped from 3.483 billion yuan to - 12.554 billion yuan, and the net profit dropped

as high as 16.037 billion yuan. Meanwhile, the net income of China Southern Airlines also dropped from 3.095 billion yuan to - 11.82 billion yuan, reduced by 14.915 billion yuan. In addition, the net profit of the remaining three airlines fell by 119.48% (Air China), 147.97% (Juneyao Airlines), and 132,16% (Spring Airlines). Overall, The net profit during Covid-19 shows a similar trend. The change in net profits of these airlines after the year 2019 shows that Covid-19 has had a great impact on the aviation industry as a whole. The airlines still suffered losses even before the Covid-19, but the decline generally remained below - 100%. After the outbreak, it fluctuated greatly, which may also be related to the capricious prevention and control during the outbreak.

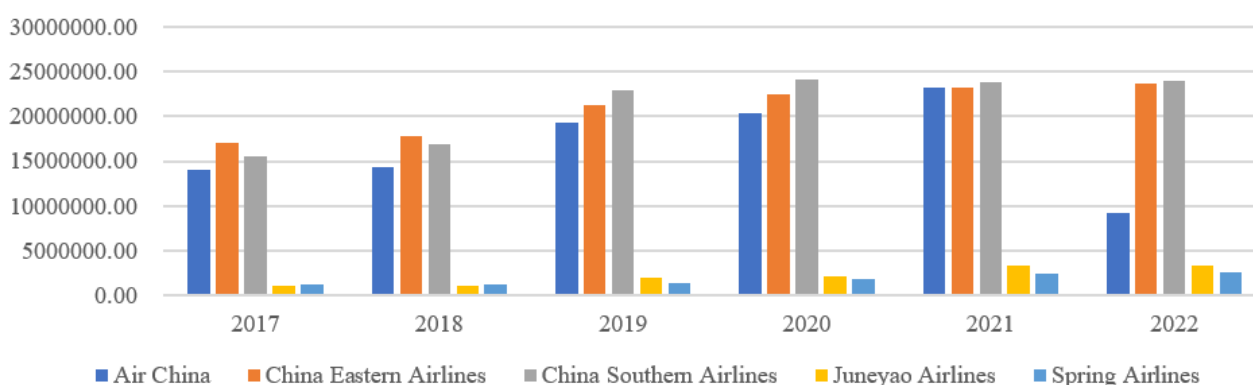
Table 1. Results of net profit

Net Profit(Million)	2022/3/ 31	2021/1/ 31	2020/12/ 31	2019/12/ 31	2018/12/ 31	2017/12/ 31
Air China	-98.72	-188.29	-14.13	72.52	82.01	86.37
China Eastern Airlines	-82.69	-132.84	-125.54	34.83	29.41	68.20
China Southern Airlines	-45.39	-110.11	-118.20	30.95	34.56	68.33
Juneyao Airlines	-5.44	-4.98	-4.85	10.12	12.40	13.52
Spring Airlines	-4.37	0.37	-5.91	18.38	15.03	12.62

Liabilities: As shown in the table. on the whole, the debts of all airlines showed an upward trend during the epidemic period.

Table 2. Results of liability

Liabilities(Million)	2022/3/ 31	2021/1/ 31	2020/12/ 31	2019/12/ 31	2018/12/ 31	2017/12/ 31
Air China	929.30	2325.50	2031.63	1928.77	1431.59	1407.86
China Eastern Airlines	2371.23	2316.38	2254.96	2125.39	1774.13	1709.46
China Southern Airlines	2401.14	2387.03	2412.52	2295.92	1684.72	1561.64
Juneyao Airlines	339.88	337.59	214.24	201.94	118.55	114.53
Spring Airlines	258.78	245.73	182.49	143.25	132.51	121.39

**Fig 5.** Results of the Liability (unit:10 thousands)

Debt to Equity ratio: During Covid-19, which is a social event that has a large negative impact on the whole market, the higher Debt to Equity ratio can mean that the company suggests more risk. As shown in the Debt to Equity ratio calculate below, except for Spring Airlines, the value of other companies increased significantly. In contrast, the Debt to Equity ratio of ratio Spring Airlines remained below 2 with small increases through the years after Covid-19. Overall, the calculation of the debt to equity ratio reflects that even under the impact of Covid-19, Spring Airlines maintains a good repayment ability, which means that the airline can still maintain a stable and good operating condition in the face of the outbreak.

Table 3. Results of Debt to Equity ratio

Debt-Equity ratio	2022.3	2021	2020	2019	2018	2017
Air China	4.25	3.53	2.39	1.90	1.42	1.48
China Eastern Airlines	5.08	4.22	3.96	3.02	2.99	3.02
China Southern Airlines	3.01	2.83	2.84	2.98	2.15	2.51
Juneyao Airlines	3.77	3.34	1.97	1.56	1.23	1.30
Spring Airlines	1.97	1.79	1.29	0.96	0.99	1.43

Current ratio & Quick ratio: The performance of Spring Airlines remains the best. The quick ratio and the current ratio are the highest even after 2019, basically three to four times as much as other companies. This means that Spring Airlines has a much higher ability for the repayment of liabilities. From this point of view, although the investment risk of Spring Airlines is relatively high, it still maintains a good financial situation because of its strong business ability, timely adjustment of business strategy, and correct decision-making, which reduces the business risk of the company. As a result, the financial risk can be reduced.

Table 4. Results of current ratio

Current ratio	2022.3	2021	2020	2019	2018	2017
Air China	0.28	0.33	0.25	0.32	0.33	0.29
China Eastern Airlines	0.28	0.32	0.23	0.25	0.22	0.23
China Southern Airlines	0.30	0.34	0.41	0.18	0.29	0.26
Juneyao Airlines	0.23	0.25	0.38	0.47	0.62	0.70
Spring Airlines	0.85	0.90	0.95	1.12	1.32	1.22

Table 5. Results of the quick ratio

Quick ratio	2022.3	2021	2020	2019	2018	2017
Air China	0.25	0.31	0.22	0.29	0.30	0.27
China Eastern Airlines	0.26	0.30	0.20	0.22	0.19	0.20
China Southern Airlines	0.29	0.33	0.39	0.16	0.27	0.23
Juneyao Airlines	0.21	0.23	0.36	0.45	0.60	0.68
Spring Airlines	0.83	0.88	0.93	1.10	1.30	1.20

3.2 Suggestions

3.2.1 Increase the ability for repayment and the liquidity

From the results of the current ratio and quick ratio, all airlines involved in this study have weak solvency and liquidity. This will lead to the situation where these airlines have to face a series of problems caused by weak liquidity when they are facing the emergencies such as Covid-19, which will increase the investment risks and further affect the overall operation of airlines.

3.2.2 Control the costs

For airlines, they can reduce operating costs by continuously adjusting the transportation capacity and flight arrangement, using the scale advantage to save various costs, strictly enforcing the cost control system, and reducing unnecessary air material loss. They can also refer to the practice of low-cost airlines, and reducing operating costs by simplifying unnecessary services and improving the passenger capacity [7]. For example, many budget airlines chose to simplify unnecessary services, such as not providing airplane meals, to reduce costs. Lower costs can enable airlines to lower the price of air tickets, which is very important in the general economic downturn caused by the epidemic. Due to the air tickets are expensive for most people, it's the price elasticity of demand will be relatively elastic. In addition, many people can no longer afford many high-priced air tickets. Therefore, lowering the price can enable the airline to gain greater competitive advantages in the

industry competition. When a greater competitive advantage is obtained, the passenger flow of the aircraft is likely to be increased, which might also equally shares the cost increase caused by the rise in oil prices, which might improve the profit of airlines as a whole.

3.2.3 Make rational use of policies to obtain more subsidies

Chinese airlines can make more rational use of policies to obtain more subsidies. For example, Spring Airlines chose to carry out differentiated air routes, which took great advantage of the policy that the government would subsidize noncore city routes.

4. Conclusion

In general, all airlines have been greatly affected by the epidemic. Although state-owned airlines can get a lot of support from the government, they should still actively find ways to reduce losses. Learning from the impact of the epidemic and building measures to prevent similar incidents. For private airlines, it is even more necessary to find solutions to release the impact of the epidemic and tide over the difficulties.

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