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What Was the Effect of the Shanghai Lockdown on the Chinese Stock Market, Chinese Airline Stocks and Chinese Healthcare Stocks?

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Abstract. With the COVID-19 pandemic affecting global economies and financial systems, examining how lockdown policies impact stock markets becomes crucial. This research examines the Chinese stock market's performance amid the 2022 Shanghai lockdown, concentrating on three primary sectors: the general market, aviation, and healthcare. Through event study and regression analysis, the impact of cumulative confirmed cases and deaths on the share prices of various industries at different stages was explored. The results show that the aviation and healthcare industries are more volatile when the epidemic worsens, while the overall market performance is relatively stable. This study highlights how lockdown policies affect different industries and offer valuable insights for future investors to better understand the effects of similar public health events on financial markets.

Keywords: Shanghai lockdown, Chinese Stock Market, Event Study, Aviation Industry, Healthcare Stocks

1. Introduction

The COVID-19 pandemic has had a profound and unprecedented effect on global financial markets and economic activities. The epidemic prevention measures taken by various countries have not only suppressed the spread of the virus, but also triggered an economic recession. As part of the global economy, China's stock market has also experienced dramatic turbulence and adjustments in this process. The lockdown policy in Shanghai in 2022 has profoundly impacted investor sentiment, market confidence, and the performance of stocks in various industries.

As China's economic center, Shanghai implemented strict lockdown measures from March 28, 2022 to June 1, 2022, which greatly impacted China's overall economic activities. Due to the different risk tolerance and market expectations of various industries, there are significant differences in the performance of different industries under the impact of the epidemic.

Therefore, this study explores the impact of Shanghai's lockdown policy on different industries by analyzing the stock price performance of the Shanghai Composite Index, which represents the overall market, China Southern Airlines, which represents Chinese aviation stocks, and China Ping An Insurance, which represents the healthcare sector. In the research process, it will be divided into

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the early, middle and late stages of the lockdown, and the event study method and regression analysis method will be used to analyze the impact of the cumulative number of confirmed cases and deaths during the lockdown on the stock prices of various industries. The results of this study can not only reveal the patterns of market fluctuations during the epidemic and reduce risks for investors, but also provide a reference for the formulation of future public policies.

2. Literature review

Li et al applied quantile regression and dynamic least squares to examine COVID-19's impact on SSX, using frequency domain causality tests to explore the causal link between COVID-19 and SSX. The study observed that active cases and COVID-19 deaths notably lowered the SSX closing index and identified a one-way causal relationship between COVID-19 cases, deaths, and the SSX closing index [1].

Weiyou Li adopted the ARIMA model to predict the performance of the Shanghai Composite Index without the impact of COVID-19. The actual impact of the epidemic is then analyzed by comparing the predicted values with the actual values. The study revealed that COVID-19 led to a notable decrease in the Shanghai Composite Index. Without the epidemic, the index would have shown a more stable or slightly upward trend, but a downward trend was actually observed. The study also found that some industries, such as the pharmaceutical industry, performed better, while traditional industries were more affected. Investors can use these findings to understand the stock market situation during the epidemic and make precise investments to reduce risks [2] .

Huo and Qiu used an event study method to examine the Chinese stock market's response to the COVID-19 epidemic lockdown announcement during the 2020 Spring Festival. The study found that investors overreacted to the epidemic lockdowns, causing the stock market to experience significant reversals. Additionally, stocks with less institutional ownership, greater idiosyncratic volatility, and lower book-to-market ratios showed poorer performance, suggesting that retail investors reacted more strongly to the blockade [3].

Dong et al examined how two major lockdowns in China affected the Chinese stock market. This research employed an event study to assess the impact of the Wuhan and Shanghai lockdowns on the Shanghai Stock Exchange 180 Index. The study assessed industry performance during the epidemic by introducing the Run-up Index and calculating standardized abnormal returns along with cumulative standardized abnormal returns. Findings indicated that most industries experienced substantial negative impacts during the Wuhan lockdown, especially in sectors like transportation, materials, infrastructure, and energy. However, the information technology and healthcare industries showed a positive impact. In contrast, the impact of the Shanghai blockade on these industries has been significantly weakened, so as time goes by, the impact of the epidemic blockade has also gradually weakened [4].

Chen and Dong applied ordinary least squares regression to examine the link between daily new COVID-19 cases and the market performance of the Shanghai Stock Exchange, Shenzhen Stock Exchange, and GEM. Additionally, GDP and CCI data were integrated to assess the pandemic’s impact on China’s economy. The study revealed that COVID-19 negatively affected China's GDP and CCI, showing a negative correlation between daily closing and lowest stock prices and new case numbers. It was also found that stock trading volume rose during the pandemic due to price instability, prompting frequent transactions by investors. Overall, the epidemic led to a downturn in the stock market and economy, with some recovery signs emerging by late 2020 [5].

Cao used regression analysis and support vector machine methods to analyze the stock price changes of six airlines from 2018 to 2021. Using both vertical and horizontal comparisons, the study

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explored COVID-19's impact on the airline stock market, finding that the pandemic significantly harmed the Chinese airline sector. Large airlines saw slight decreases in share prices from 2019 to 2020, while small and medium-sized airlines faced steep declines [6].

Liu et al used a generalized autoregressive conditional heteroskedasticity model to estimate the volatility of China's airport shipping index, and combined text mining methods to analyze the impact of corporate behavior on volatility. The study focused on comparing the performance and response strategies of Shenzhen Airport and Shanghai Airport during the epidemic. The study found that the overall volatility of ASSI increased significantly during the epidemic compared with before the epidemic. There are significant differences in the volatility of different airport stocks, while the volatility of airline stocks is relatively similar. Shenzhen Airport has taken active measures to deal with the epidemic, and its risk management effect is better, so the volatility is lower. However, the performance of Shanghai Airport is relatively conservative, so the volatility is high [7].

Wu applied an event study approach to assess COVID-19's impact on stock prices within China's tourism sector and utilized quantile regression to examine the link between government response measures and abnormal stock returns. The study reached four key conclusions: First, COVID-19 negatively affected the stock returns of Chinese tourism companies. Second, there exists a non-linear relationship between tourism stock returns and government policies. Third, high-quantile abnormal returns indicate that government measures help reduce the pandemic's adverse effects on tourism stocks. Finally, the resurgence of COVID-19 cases in Beijing also caused a short-term negative impact on the tourism industry [8].

Warnock-Smith et al used quantitative analysis methods and data from January 2017 to December 2020 to study COVID-19's impact on China's air passenger transport market. The results show that the seating capacity of China's domestic aviation market had rebounded to 93% of 2019 levels in 2020, while the international market shrank significantly to 7% of the European market and 8% of the rest of Asia. The domestic market recovered quickly, but the international market recovered slowly. In terms of ticket prices, there was a slight increase in the domestic market, but a significant decrease in the international market. Overall, COVID-19 greatly impacted China's aviation sector [9].

Graham applied quantitative analysis, using data from January 2019 to June 2021 to evaluate the "Five Ones" policy's effect on seating capacity for China's international routes following the COVID-19 outbreak. The study found that this policy substantially reduced seating capacity on China's international flights. After the implementation of the policy, the seating capacity from China to Europe decreased by approximately 1.14 million, the seating capacity from China to Asia decreased by approximately 11.3 million, and the seating capacity from China to North America decreased by approximately 470,000. In addition, although the capacity of the international market is restricted, the domestic market has shown strong recovery capabilities, and the fares of some domestic routes have increased significantly during the pandemic [10].

Ye et al used a variety of time series forecasting models to analyze and predict stock performance for three health insurance companies. By comparing model accuracy, the study identified the LSTM neural network as the most effective for forecasting stock prices. Although the companies' stock prices dropped sharply at the start of the epidemic, they quickly rebounded beyond pre-pandemic levels due to China's control measures. The study shows that the health insurance industry has a certain degree of resilience during the epidemic, and the LSTM model has advantages in processing long-term data, which is suitable for predicting health insurance company stock prices [11].

Ho et al used the event study method to analyze the impact of China's medical reform and COVID-19 vaccine approval on stock returns. At the same time, the Fama-French five-factor model

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was used to calculate the abnormal and cumulative abnormal returns during the event. The study also grouped the sample companies according to variables such as company size, age, liquidity and solvency to evaluate the differences in market reactions of companies with different characteristics when facing major medical events. The study concluded that medical reform had a limited effect on overall stock returns but negatively impacted younger and smaller companies. Next, COVID-19 vaccine approval boosted overall stock returns, but not on young, small companies. Investors tend to invest more in older and larger companies when there is major medical news. In addition, companies with higher liquidity or solvency do not necessarily achieve higher returns [12].

3. Data analysis

3.1. Period selection

This study aims to explore the impact of Shanghai's lockdown policy on China's stock market in 2022. To better conduct a comparative analysis, three different periods were selected. The first period is the early stage of the lockdown: March 28, 2022 to April 6, 2022. The second period is the middle stage of the lockdown: April 7, 2022 to April 20, 2022. The third is the late stage of the lockdown: April 21, 2022 to June 1, 2022.

3.2. Variables

This study utilizes several datasets, including the cumulative counts of confirmed cases and deaths from the COVID-19 outbreak. It also incorporates daily closing prices for the Shanghai Composite Index, China Southern Airlines, and Ping An Insurance. The goal is to assess the impact of the Shanghai lockdown on China's stock market, aviation stocks and health stocks, so the Shanghai Composite Index, China Southern Airlines and Ping An Insurance are selected as representatives. At the same time, the data of the entire period of Shanghai's lockdown are screened and merged to generate an accurate dataset finally. In addition, the Cumulative Cases mentioned in this article represent the cumulative number of new cases of COVID-19, and the Cumulative Deaths represent the cumulative number of deaths of COVID-19.

3.3. Cleaning data

During the data cleaning process, the data of non-trading days and missing values were deleted to ensure the completeness and accuracy of the data. Before the regression analysis, descriptive statistical analysis was first performed.

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3.4. Descriptive analysis

3.4.1. Early lockdown

Table 1. Early lockdown descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
Cumulative Cases	6	894914	932165	909372.33	13198.225	1.045	1.208
Cumulative Deaths	6	12911	13951	13312.17	363.384	1.131	1.650
Shanghai Composite Index Closing Price	6	3203.94	3283.43	3250.5650	34.20065	-0.565	-1.789
China Southern Airline Closing Price	6	6.18	6.58	6.3433	0.16896	0.441	-1.926
Ping An Insurance of China Closing Price	6	47.21	49.54	48.4517	0.82563	-0.037	-0.252

In the early stage of the blockade, the epidemic began to gradually spread in Shanghai. The mean of cumulative cases was 909,372.33, and the standard deviation was 13,198.23. The skewness is 1.045 and the kurtosis is 1.208, indicating that the daily new cases show a significant right-skewed distribution and peak characteristics, and the cumulative deaths also show the same trend.

At the same time, the Shanghai Composite Index has a mean of 3,250.57 and a standard deviation of 34.20. The negative skewness and low kurtosis indicate that the market did not react to extremes in the early stages of the lockdown. In contrast, China Southern Airlines has a mean of 6.3433 and a standard deviation of 0.16896. The slightly higher positive skewness and low kurtosis show that the market still maintains a certain degree of confidence in the aviation industry. As a representative of medical stocks, Ping An Insurance has a mean of 48.4517, a standard deviation of 0.82563, and a skewness and kurtosis of -0.037 and -0.252 respectively, indicating that the distribution is close to a normal distribution and the volatility is small. Investors believe that the initial blockade measures are short-term, so the overall economy will not be severely affected.

3.4.2. Mid-lockdown

Table 2. Mid-lockdown descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
Cumulative Cases	10	935640	990420	960474.20	19208.603	0.373	-1.210
Cumulative Deaths	10	14048	14705	14442.70	226.898	-0.574	-0.685
Shanghai Composite Index Closing Price	10	3151.05	3251.85	3203.3310	30.89724	-0.151	-0.432
China Southern Airline Closing Price	10	6.46	7.07	6.8180	0.18116	-0.801	0.452
Ping An Insurance of China Closing Price	10	45.91	49.24	47.7470	1.02488	-0.580	-0.327

In the middle of the lockdown, the epidemic data continued to worsen. The mean of the cumulative cases rose to 960,474.20, the standard deviation increased to 19,208.60, the skewness dropped to 0.373, and the kurtosis was -1.210. The volatility of the cumulative cases increased significantly, but the distribution began to symmetry trend. The mean of the cumulative deaths rose to 14,442.70, with a standard deviation of 226.90, a skewness of -0.574, and a kurtosis of -0.685, reflecting the gradual slowdown in the upward trend in new deaths, which coincides with the government's intensification of lockdowns and the implementation of more stringent measures.

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At the same time, the mean of the Shanghai Composite Index dropped to 3,203.33, the standard deviation decreased slightly to 30.90, and negative skewness and low kurtosis showed relatively stable volatility. The mean value of China Southern Airlines rose to 6.8180, with a standard deviation of 0.18116. The negative skewness indicates that market sentiment is gradually becoming pessimistic, and investors are beginning to expect that the extension of the blockade period will intensify the negative impact on the aviation industry. The mean value of Ping An Insurance in the middle of the blockade was 47.7470, and the standard deviation was 1.02488. The negative skewness and slightly lower kurtosis indicate that medical stocks are also affected by the continued deterioration of the epidemic and their volatility increases. Although increased medical demand is theoretically beneficial to the short-term performance of medical stocks, investors are concerned that long-term blockades may lead to strains on medical resources and increased service costs, thereby reducing corporate profits. Therefore, market expectations for medical stocks tend to be pessimistic.

3.4.3. Late lockdown

Table 3. Late lockdown descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
Cumulative Cases	27	995928	3107768	1806952.85	702207.453	0.459	-1.145
Cumulative Deaths	27	14742	17127	15691.63	620.404	0.607	-0.019
Shanghai Composite Index Closing Price	27	2886.43	3186.43	3068.9989	73.46720	-0.696	0.382
China Southern Airline Closing Price	27	5.78	6.81	6.2037	0.28388	0.416	-0.745
Ping An Insurance of China Closing Price	27	43.14	44.46	44.1374	0.81520	1.416	2.415

In the late stage of the lockdown, the epidemic reached its peak, with the mean of the cumulative cases rising to 1,806,952.85, the standard deviation increasing significantly to 702,207.45, the skewness being 0.459, and the kurtosis being -1.145, indicating that the distribution of the number of confirmed cases was slightly to the right under high volatility. The mean of the cumulative number of deaths was 15,691.63, the standard deviation increased to 620.40, the skewness was 0.607, and the kurtosis was close to 0, indicating that the mortality rate of the epidemic was still high in the late stage of the lockdown.

The mean of the Shanghai Composite Index dropped to 3,068.99, and the standard deviation increased to 73.47. The negative skewness and low kurtosis indicate that the market experienced violent fluctuations in the late lockdown stage, and investors lacked confidence in the overall economic recovery. The mean of China Southern Airlines in this period was 6.2037, the standard deviation was 0.28388, and the positive skewness and low kurtosis showed that the volatility of airline stocks further increased, but the market sentiment improved slightly, indicating that investors were gradually optimistic about the recovery of the aviation industry. The mean of Ping An Insurance dropped to 44.1374, and the standard deviation was 0.81520, but the skewness rose to 1.416. The kurtosis rose to 2.415, indicating that the volatility of medical stocks increased in the later period of the blockade. The stock price showed obvious extreme fluctuations due to policy intervention or shortage of medical resources.

In summary, in the early stage of the lockdown, market sentiment was stable, and volatility was low, China Southern Airlines performed relatively optimistically, while the Shanghai Composite Index and medical stocks remained neutral. In the middle stage of the lockdown, the worsening of the epidemic increased the volatility of airline stocks and medical stocks, and investors began to

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worry about the consequences of the ongoing lockdown policy. In the late stage of the lockdown, market sentiment became more complicated, the volatility of the Shanghai Composite Index and China Southern Airlines further increased, and the extreme volatility of Ping An Insurance indicated different views of investors on the confidence of epidemic control and economic recovery prospects.

4. Regression analysis

4.1. Early lockdown

In the early stages of the Shanghai blockade, scatter plots and correlation analysis were used to examine the effects of cumulative cases and deaths on the closing prices of the Shanghai Composite Index, China Southern Airlines, and Ping An Insurance. The results indicate no clear linear relationship between the independent and dependent variables.

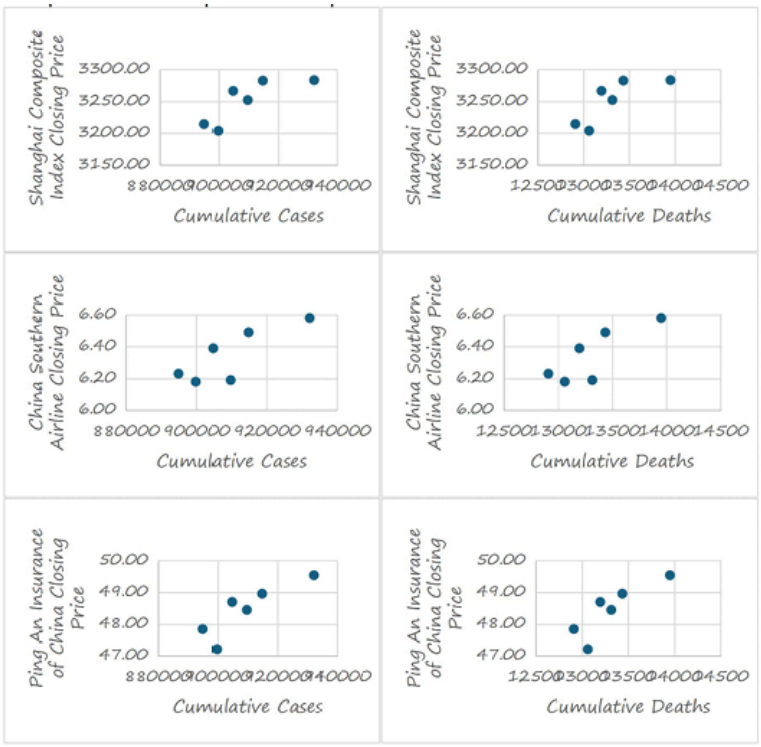


Figure 1. Early lockdown three stocks scatter plots

The scatter plot shows a dispersed distribution for the stock prices of the three companies relative to cumulative confirmed cases and deaths, with regression lines nearly horizontal, suggesting these variables have minimal impact on stock closing prices.

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Table 4. Early lockdown Shanghai composite index correlations

		Shanghai Composite Index Closing Price
Cumulative Cases	Pearson Correlation	0.806
	Sig. (2-tailed)	0.053
	N	6
Cumulative Deaths	Pearson Correlation	0.793
	Sig. (2-tailed)	0.060
	N	6
**. Correlation is significant at the 0.01 level (2-tailed).		

Table 5. Early lockdown China Southern Airline correlations

		China Southern Airline Closing Price
Cumulative Cases	Pearson Correlation	0.819*
	Sig. (2-tailed)	0.046
	N	6
Cumulative Deaths	Pearson Correlation	0.813*
	Sig. (2-tailed)	0.049
	N	6
*. Correlation is significant at the 0.05 level (2-tailed).		

Table 6. Early lockdown ping an insurance of China correlations

		Ping An Insurance of China Closing Price
Cumulative Cases	Pearson Correlation	0.863*
	Sig. (2-tailed)	0.027
	N	6
Cumulative Deaths	Pearson Correlation	0.854*
	Sig. (2-tailed)	0.030
	N	6
*. Correlation is significant at the 0.05 level (2-tailed).		

At the same time, in terms of correlation, although the Pearson correlation coefficients for the three stocks are around 0.8, with most above 0.8, the p-value for the Shanghai Composite Index's coefficient exceeds 0.05, indicating it is not statistically significant. It is suggested that these correlations may be spurious due to short-term fluctuations.

These results indicate that investor behavior was more affected by macroeconomic policies and other factors in the early stages of the lockdown than by single epidemic data. Therefore, the cumulative cases and deaths had a relatively limited impact on the stock market in the early stages of the lockdown.

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4.2. Mid-lockdown

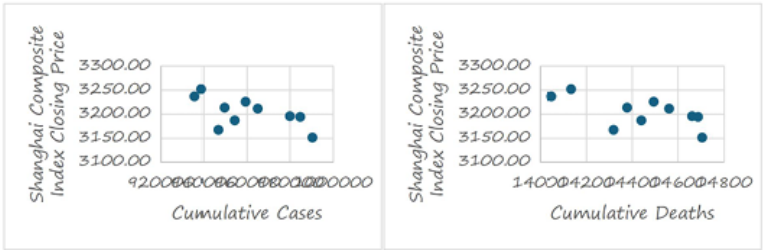


Figure 2. Mid-lockdown Shanghai composite index scatter plots

4.2.1. Performance of the Shanghai composite index

In the middle stage of the Shanghai lockdown, the scatter plot of the Shanghai Composite Index shows that both the cumulative cases and the cumulative deaths have a negative relationship with the closing price. As the number of confirmed cases increased from 930,000 to around 990,000, the closing price gradually decreased from close to 3,240 points to 3,140 points. Similarly, as the number of deaths increased from 14,000 to 14,800, the stock price also showed a downward trend. Therefore, as the epidemic worsened, the Shanghai Composite Index showed an overall downward trend.

Table 7. Mid-lockdown Shanghai composite index correlations

		Shanghai Composite Index Closing Price
Cumulative Cases	Pearson Correlation	-0.623
	Sig. (2-tailed)	0.054
	N	10
Cumulative Deaths	Pearson Correlation	-0.632*
	Sig. (2-tailed)	0.050
	N	10

*. Correlation is significant at the 0.05 level (2-tailed).

The correlation analysis shows a Pearson coefficient of -0.623 between cumulative cases and the Shanghai Composite Index, with a p-value of 0.054, slightly above 0.05, which is close to the significant level, suggesting a near-significant negative relationship between confirmed cases and stock price declines, though not fully significant. The Pearson correlation coefficient between the cumulative death and the Shanghai Composite Index is -0.632, with a p-value is 0.050, which just reaches the significance level, indicating that the stock price drops significantly when the death increases. Investors are more sensitive to rising death numbers.

Now start the linear regression model analysis:

$$\text{Shanghai Composite Index Closing Price} = \beta_0 + (\beta_1 \times \text{Cumulative Cases}) + (\beta_2 \times \text{Cumulative Deaths}) + \varepsilon$$

where ε represents a random error term with zero mean and constant variance.

From SPSS 29, it shows that:

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Table 8. Mid-lockdown Shanghai composite index model summary

Model	R	R Square
1	0.635[a]	0.404

a. Predictors: (Constant), Cumulative Deaths, Cumulative Cases

The model's R-squared value is 0.404, meaning it accounts for 40.4% of the fluctuations in the Shanghai Composite Index's stock price. This relatively low value suggests limited explanatory power.

Table 9. Mid-lockdown Shanghai composite index coefficients[a]

Model		Unstandardized B	Sig.
1	(Constant)	4373.308	<0.001
	Cumulative Cases	0.000	0.829
	cumulative Deaths	-0.057	0.680

a. Dependent Variable: Shanghai Composite Index Closing Price

For the regression coefficients, the p-value for cumulative cases is 0.829, exceeding 0.05 and not reaching significance. Similarly, the p-value for cumulative deaths is 0.680, also above 0.05, indicating that increases in cases and deaths do not have a significant impact on stock prices within this regression model.

Overall, although the correlation analysis shows a significant negative correlation between the cumulative deaths and the Shanghai Composite Index, the linear regression model fails to demonstrate significant explanatory power. This may be because, in the mid-term stage, there are interferences from other factors, such as some policy adjustments.

4.2.2. Performance of China Southern Airlines

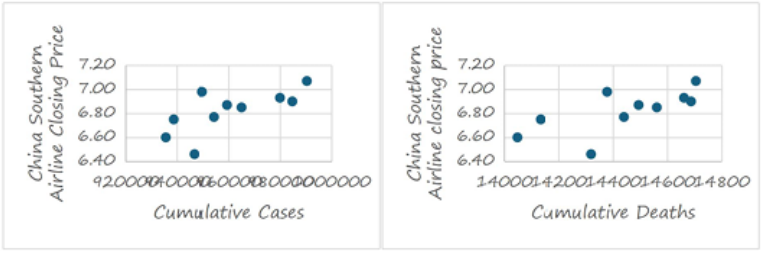


Figure 3. Mid-lockdown China Southern Airlines scatter plots

In the mid-term stage of Shanghai's blockade, judging from the scatter chart of China Southern Airlines, the relationship between the number of cases and the stock price showed an upward trend. In contrast, the relationship between the number of deaths and the stock price showed a downward trend.

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Table 10. Mid-lockdown China Southern Airlines correlations

		China Southern Airline Closing Price
Cumulative Cases	Pearson Correlation	0.707*
	Sig. (2-tailed)	0.022
	N	10
Cumulative Deaths	Pearson Correlation	-0.697*
	Sig. (2-tailed)	0.025
	N	10

*. Correlation is significant at the 0.05 level (2-tailed).

Further analysis shows a Pearson correlation coefficient of 0.707 for cumulative cases, with a p-value of 0.022, below 0.05, confirming a statistically significant positive correlation. For cumulative deaths, the Pearson coefficient is -0.697, with a p-value of 0.025, also reaching significance, indicating a negative correlation.

Now build the linear regression model:

$$\text{China Southern Airline Closing Price} = \beta_0 + (\beta_1 \times \text{Cumulative Cases}) + (\beta_2 \times \text{Cumulative Deaths}) + \varepsilon$$

where ε represents a random error term with zero mean and constant variance.

From SPSS 29, it shows that:

Table 11. Mid-lockdown China Southern Airlines model summary

Model	R	R Square
1	0.711[a]	0.506

a. Predictors: (Constant), Cumulative Deaths, Cumulative Cases

The model's R-squared value is 0.506, suggesting it explains 50.6% of the stock price fluctuations of China Southern Airlines, but the specific regression coefficient does not reach the significance level.

Table 12. Mid-lockdown China Southern Airlines coefficients[a]

Model		Unstandardized B	Sig.
1	(Constant)	-0.313	0.932
	Cumulative Cases	4.401E-6	0.618
	Cumulative Deaths	0.000	0.787

a. Dependent Variable: China Southern Airline Closing Price

From SPSS 29, it can be calculated that the p-value of the regression coefficient of the cumulative cases is 0.618, while that for cumulative deaths is 0.787. Both p-values exceed 0.05, indicating a lack of statistical significance.

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Therefore, these two variables do not have enough explanatory power in the regression model to become the dominant factor affecting China Southern Airlines' stock closing price.

4.2.3. Performance of Ping An Insurance of China

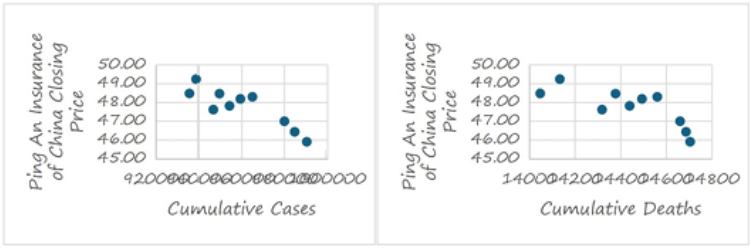


Figure 4. Mid-lockdown Ping An Insurance of China scatter plots

The scatter chart for Ping An Insurance shows a clear downward trend between cumulative cases and deaths and the company's stock price, suggesting that as cases and deaths rise, Ping An Insurance's stock price gradually declines.

Table 13. Mid-lockdown Ping An Insurance of China correlations

		Ping An Insurance of China Closing Price
Cumulative Cases	Pearson Correlation	-0.883**
	Sig. (2-tailed)	<.001
	N	10
Cumulative Deaths	Pearson Correlation	-0.792**
	Sig. (2-tailed)	0.006
	N	10

**. Correlation is significant at the 0.01 level (2-tailed).

The correlation coefficient between cumulative cases and Ping An Insurance's stock price is -0.883, with a p-value below 0.001, indicating a highly significant and strong negative correlation between rising cases and falling stock prices. For cumulative deaths, the correlation coefficient is -0.792 with a p-value of 0.006, below 0.01, also showing significance, indicating that increased deaths further pressured Ping An Insurance's stock price. These findings suggest that both cumulative cases and deaths negatively affected Ping An Insurance's closing price during the mid-epidemic stage.

Now start building the linear regression model:

$$\text{Ping An Insurance of China Closing Price} = \beta_0 + (\beta_1 \times \text{Cumulative Cases}) + (\beta_2 \times \text{Cumulative Deaths}) + \varepsilon$$

where ε represents a random error term with zero mean and constant variance.

From SPSS 29, it shows that:

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Table 14. Mid-lockdown Ping An Insurance of China model summary

Model	R	R Square
1	0.900[a]	0.810

a. Predictors: (Constant), Cumulative Deaths, Cumulative Cases

SPSS 29 shows an R-squared value of 0.810 for this model, which can explain 81.0% of the stock price fluctuations for Ping An Insurance, and the fitting effect is very good.

Table 15. Mid-lockdown Ping An Insurance of China coefficients[a]

	Model	Unstandardized B	Sig.
1	(Constant)	83.501	<0.001
	Cumulative Cases	-7.684E-5	0.036
	Cumulative Deaths	0.003	0.328

a. Dependent Variable: Ping An Insurance of China Closing Price

SPSS 29 results show a p-value of 0.036 for the regression coefficient of cumulative cases, below 0.05, confirming that rising case numbers negatively impact the stock price. The regression coefficient for cumulative deaths has a p-value of 0.328, above 0.05, indicating that changes in death numbers have a minimal effect on the stock price.

4.3. Late lockdown

4.3.1. Performance of the Shanghai composite index

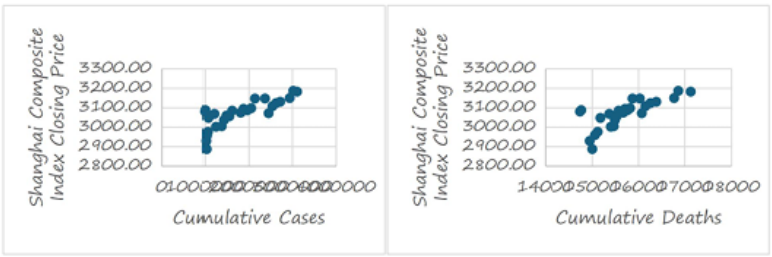


Figure 5. Late lockdown Shanghai composite index scatter plots

In the later stages of the Shanghai lockdown, by observing the scatter plot of the Shanghai Composite Index, it can be found that as the cumulative cases and deaths increased, the closing prices of the Shanghai Composite Index showed a clear upward trend. When the cumulative cases increased from 1,000,000 to 3,000,000, the closing price rose from around 2,900 to over 3,200. Similarly, when the cumulative deaths increased from 14,500 to 17,000, the closing price also rose from nearly 2,850 to 3,200.

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Table 16. Late lockdown Shanghai composite index correlations

		Shanghai Composite Index Closing Price
Cumulative Cases	Pearson Correlation	0.800**
	Sig. (2-tailed)	<.001
	N	27
Cumulative Deaths	Pearson Correlation	0.761**
	Sig. (2-tailed)	<.001
	N	27

**. Correlation is significant at the 0.01 level (2-tailed).

From the perspective of correlation, the Pearson coefficient between cumulative cases and closing price is 0.800, with a p-value below 0.001, showing a significant positive correlation. The Pearson coefficient between cumulative deaths and closing price is 0.761, also with a p-value below 0.001, which also reaches the significance level. This positive relationship is in sharp contrast to the early and mid-term periods when the previous negative attitude towards the economy changed to a positive attitude towards economic recovery and the imminent lifting of the blockade.

Now start building the linear regression model:

$$\text{Shanghai Composite Index Closing Price} = \beta_0 + (\beta_1 \times \text{Cumulative Cases}) + (\beta_2 \times \text{Cumulative Deaths}) + \varepsilon$$

where ε represents a random error term with zero mean and constant variance.

Table 17. Late lockdown Shanghai composite index model summary

Model	R	R Square
1	0.803[a]	0.644

a. Predictors: (Constant), Cumulative Deaths, Cumulative Cases

According to the results of SPSS 29, the R-squared value of this model is 0.644, which can explain 64.4% of the Shanghai Composite Index fluctuations.

Table 18. Late lockdown Shanghai composite index coefficients[a]

Model		Unstandardized B	Sig.
1	(Constant)	3440.383	<0.001
	Cumulative Cases	0.000	0.047
	Cumulative Deaths	-0.037	0.560

a. Dependent Variable: Shanghai Composite Index Closing Price

For the regression coefficients, the p-value for cumulative cases is 0.047, below 0.05, indicating a significant positive relationship with the closing price. This suggests that as case numbers rise, investors may perceive the epidemic's peak as nearing an end, anticipating economic improvement and driving up market prices. However, the p-value for cumulative deaths is 0.560, well above 0.05,

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showing no significant impact on stock prices in the later stages of the lockdown, although the number of deaths is still rising, it has a smaller impact on the stock price.

4.3.2. Performance of China Southern Airlines

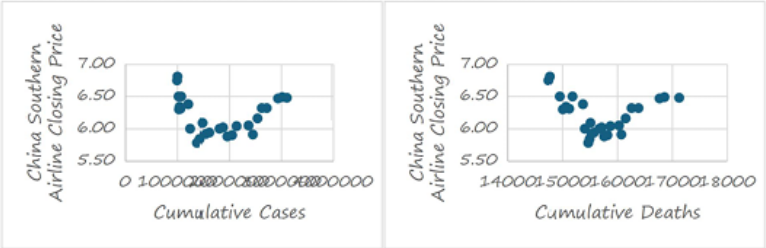


Figure 6. Late lockdown China Southern Airlines scatter plots

In the later stages of the blockade, it can be seen from the scatter chart of China Southern Airlines that neither the cumulative cases nor the cumulative deaths have an obvious linear trend with the stock price.

Table 19. Late lockdown China Southern Airlines correlations

		China Southern Airline Closing Price
Cumulative Cases	Pearson Correlation	-0.086
	Sig. (2-tailed)	0.670
	N	27
Cumulative Deaths	Pearson Correlation	-0.110
	Sig. (2-tailed)	0.585
	N	27

In the correlation analysis, this irregular relationship was further verified. The Pearson correlation coefficient between cumulative cases and the stock price of China Southern Airlines is -0.086, with a p-value of 0.670, while for cumulative deaths, the coefficient is -0.110 with a p-value of 0.585. Both coefficients are near zero, and the high p-values well above 0.05, indicate no statistical significance. This suggests that China Southern Airlines' stock price was largely unaffected by the epidemic in the later stages of the lockdown.

Therefore, whether through visual observation of scatter plots or correlation analysis, it can be concluded that China Southern Airlines' stock closing price was almost unaffected by the epidemic in the late stages of the blockade.

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4.3.3. Performance of Ping An Insurance of China

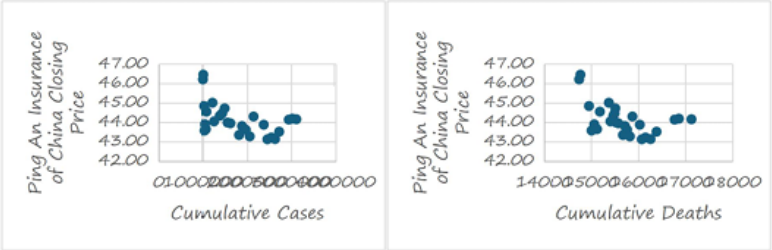


Figure 7. Late lockdown Ping An Insurance of China scatter plots

In the later stages of Shanghai's blockade, judging from the scatter chart of China's Ping An Insurance, the stock price and the cumulative cases and deaths showed a clear downward trend.

Table 20. Late lockdown Ping An Insurance of China correlations

		Ping An Insurance of China Closing Price
Cumulative Cases	Pearson Correlation	-0.486*
	Sig. (2-tailed)	0.010
	N	27
Cumulative Deaths	Pearson Correlation	-0.482*
	Sig. (2-tailed)	0.011
	N	27

*. Correlation is significant at the 0.05 level (2-tailed).

Additionally, in the correlation analysis for Ping An Insurance, the Pearson correlation coefficients for cumulative cases and deaths with the closing price were -0.486 and -0.482, with p-values of 0.010 and 0.011, both below 0.05. This shows that there is a significant negative relationship with the stock closing price at a 95% confidence level. Therefore, the rising cumulative cases and deaths has harmed Ping An Insurance's stock closing price.

Now build the linear regression model:

$$\text{Ping An Insurance of China Closing Price} = \beta_0 + (\beta_1 \times \text{Cumulative Cases}) + (\beta_2 \times \text{Cumulative Deaths}) + \varepsilon$$

where ε represents a random error term with zero mean and constant variance.

Table 21. Late lockdown Ping An Insurance of China model summary

Model	R	R Square
1	0.488[a]	0.238

a. Predictors: (Constant), Cumulative Deaths, Cumulative Cases

According to SPSS 29, the R-squared value of this model is 0.238, indicating that the two variables of cumulative cases and deaths can only explain 23.8% of the changes in Ping An Insurance's stock price, and the overall fit of the model is relatively low.

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Table 22. Late lockdown Ping An Insurance of China coefficients[a]

	Model	Unstandardized B	Sig.
1	(Constant)	48.386	0.003
	Cumulative Cases	-3.680E-7	0.685
	Cumulative Deaths	0.000	0.824

a. Dependent Variable: Ping An Insurance of China Closing Price

In addition, it can be seen from the coefficient table that the p-values of the regression coefficients of the cumulative cases and deaths are 0.685 and 0.824, both much greater than 0.05, which means that the impact of the two variables on Ping An Insurance's stock price is in the linear regression model is not significant.

Therefore, in the later stages of the lockdown, although there was a significant negative correlation between the two variables and Ping An Insurance's stock closing price, the linear prediction ability of the stock price was weak, suggesting that there may be other factors in the market that affect Ping An Insurance's stock price.

5. Conclusion

This study analyzes the impact of the 2022 Shanghai lockdown on the Chinese stock market, focusing on the price volatility of three stocks: the Shanghai Composite Index, China Southern Airlines, and Ping An Insurance. In the lockdown's early phase, the overall market and medical sector performed relatively stable, while the aviation industry showed a slight optimism, and investors largely expected the lockdown's impact to be short-term. However, in the mid-lockdown period, the worsening epidemic situation led to pessimistic market sentiment, especially the volatility of the aviation and medical sectors increased significantly, reflecting investors' concerns about long-term economic uncertainty. In the late stage of the lockdown, the overall market and the aviation sector slowly recovered, but the volatility of the medical industry was still large, reflecting investors' concerns about the long-term rising operating costs and resource shortages in the medical industry. Therefore, the impact of the Shanghai lockdown on various industries has obvious stage characteristics and differences, reflecting the risk resistance of different industries in the face of the impact of the epidemic and the changes in investor sentiment.

However, this study has some limitations. First, the sample data used in the study only covers the number of daily confirmed cases and deaths, without considering other important macroeconomic variables, such as fiscal policy and monetary policy, which may have an important impact on stock market fluctuations. Secondly, this study only selected three representative industries and failed to fully cover the performance of other industries, so the research results may not be applicable to all industries. In addition, the model assumes that the relationship between variables is linear and fails to cover more complex nonlinear relationships.

Future research can introduce more economic factors and variables and use nonlinear models to reveal the impact of the epidemic on the stock market. At the same time, the scope of research can be expanded to analyze the response of other industries, such as the technology and energy industries in similar public health events, to provide a more comprehensive reference for potential emergencies in the future.

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