The Impact of the Lifting of Pandemic Control on the Shanghai and Shenzhen Stock Indexes

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Abstract: Many previous studies have analyzed the pandemic effect to the different fields of economic. This essay analyzes the effect of lifting of global pandemic control to SZSE and SSEC stock market by mainly using ARIMA model and Stata. The essay finds that the lifting the global pandemic has indeed affect both SZSE and SSEC market by accelerating the return rate trend of stocks. The wired point is the sharp decreasing trend initially after the lifting of control. This phenomenon has related to financial theory to find out the reasons. The first reason is because the news is within the market expectation and thus did not stimulate stock price. The second reason is because the overall worse economic situation and market expectation outweigh the effect of this good news effect. The last reason is because many people got sick after the lifting of pandemic control and thus affect economic activity. Finding these reasons, the policymaker can have better way to stimulate the stock market in the next time. Policymaker can be also aware of the significance of building a more efficient market. Investors can have more understanding toward SZSE and SSEC market and be cautious to good news in the next time. Better strategy can be adopted to catch stock return in the similar strategy.

Keywords: SZSE, SSEC, pandemic, control, effect

1. Introduction

In early year 2020, the global pandemic, COVID-19, swept the world. This pandemic has seriously affected people's daily life and the economy globally [1]. China, as one of the largest economies, had implemented a strict city-lockdown policy and regular testing policy at the beginning year of the pandemic. In the later period, the regular testing of all people and in the city, scope remains for a long period. These policies, although aiming at preventing the pandemic, seriously affect the daily operation of companies and add operating costs [1]. Many companies are forced to stop business to cooperate with these policies and thus negatively affect profit. With the decreasing trend of profit, companies start to lay off employees, and the unemployment rate increases. All these effects brought to the economy are also shown in the stock market. Many past studies had analyzed the effect of the pandemic bringing to the economy. For example, how does the global pandemic affect the Chinese stock market in different industries and what difference between each industry's effect [1], how global pandemic transmit financial risk in the stock market based on complex network theory [2], how global

pandemic affect the stock market by affecting investors' view and emotion [3], how global pandemic affect the stock market by affecting information transmission efficiency [4].

However, the effect on the Shanghai stock index (SSEC) and Shenzhen stock index (SZSE) solely caused by pandemic control is still unclear. What's more, how to explain this finding and what conclusion can be got from this is also a meaningful topic. This essay is helpful to both policy maker and investors. Investors can have more understanding of SSEC and SZSE. Investors can also prepare better and avoid loss if a similar global pandemic happens the next time. Besides, the policymaker can also get some inspiration from the result and can choose a more suitable monetary and fiscal policy to adjust the stock market the next time. Overall, it is beneficial to both investors and policymakers and finally helps economy grows better.

This essay has five sections. The first section is introduction about overall pandemic effect to the world and to SZSE SSEC market. In the section two, the data will be prepared to further analyze, and the suitable model with necessary tests will also be constructed by Stata, drawing the statistic result. In the section three, the statistic results will relate to financial and economic theory to explain some of the reasons behind this phenomenon. In the section four, the implication of the data results and explanation to policymakers and investors will be drew. Final part is the conclusion of this essay.

2. Model Specification

2.1. Raw Data Preparation

The return rate and close price data of SSEC SZSE from investors between January 24, 2020, and June 11, 2023, are chosen to analyze [5]. According to the announcement by National Health Commission, China began to lift most of the epidemic controls on December 7 2022 after the release of an official document naming '20 instructions to optimize epidemic prevention and control'[6]. Thus, those data before December 7, 2022, are under the influence of epidemic control, while those data after this date are free of epidemic control. The basic idea is to draw a predictive model and then the return data after this date can be predicted. By comparing these predictive influenced data with the actual data after this date (free of influence), the difference can be found and finally conclude.

The data, after downloading, needs to first sort by date from oldest to newest. Then, the new variable n is given in each group of data to represent its date order. For example, the first data has n=1 and the second data have n=2 and until the last data. Only the data before December 7, 2022, are with the influence of pandemic control and will be used to build the model. Thus, the dummy variable is introduced. Specifically, the data before December 6, 2022 (inclusive) has dummy=1 while the rest of the data have dummy=0. Lastly, the data group can be viewed as time series data by input 'tsset time' oreder in Stata.

2.2. Stationery Test

First of all, the raw return rate data and close price data will first take the log value and then conduct a unit-root test to log value (1st difference), which are ln (endprice+1) and ln (returnrate+1). The original value is plus one to avoid the negative value of the log return rate. After that, take the difference to ln (endprice+1) and get d.lnp, which is 2nd difference.

Then, the unit-root test is introduced to these three variables in four groups to test the stationery situation by using 'defuller' order with trend lag 1. The t-value and p-value are shown in the table1. Noticed that for the stationery test, the null hypothesis (H0) is that there exists a random walk (no stationery). By comparing each t value with the critical value under the 95% confidence interval, it can be found that all raw data are not stationary since the H0 cannot be rejected. However, for 1st and 2nd difference data, the H0 is rejected and thus is all stationery. In that case, only the 1st or 2nd difference data can be used to develop the model.

Table 1:Weak stationarity test.

	t	p
SSEC, weekly		
Raw	-2.700	0.2359
1st order difference	-19.944	0
2nd order difference	-33.946	0
SZSE, weekly		
Raw	-2.040	0.5793
1st order difference	-9.851	0
2nd order difference	-17.353	0
SSEC, daily		
Raw	-2.700	0.2359
1st order difference	-19.944	0
2nd order difference	-33.946	0
SZSE, daily		
Raw	-2.529	0.3135
1st order difference	-19.852	0
2nd order difference	-33.511	0

2.3. ARIMA Model

After finishing the stationery test, the model can be structured by those stationary data. Here, the ARIMA model is picked since this model can predict the future value by finding the relations between historical data. Thus, by this model, the second difference in return rate without pandemic control after December 7, 2022, can be predicted, which can be further compared with actual data after this date.

Before setting the ARIMA model, the order needs to be decided. The PACF and ACF will then be used. After conducting the PACF and ACF test for the 2nd difference of data if dummy=1, the outcomes are shown in the figure 1.

PACF   ACF

SSEC, weekly

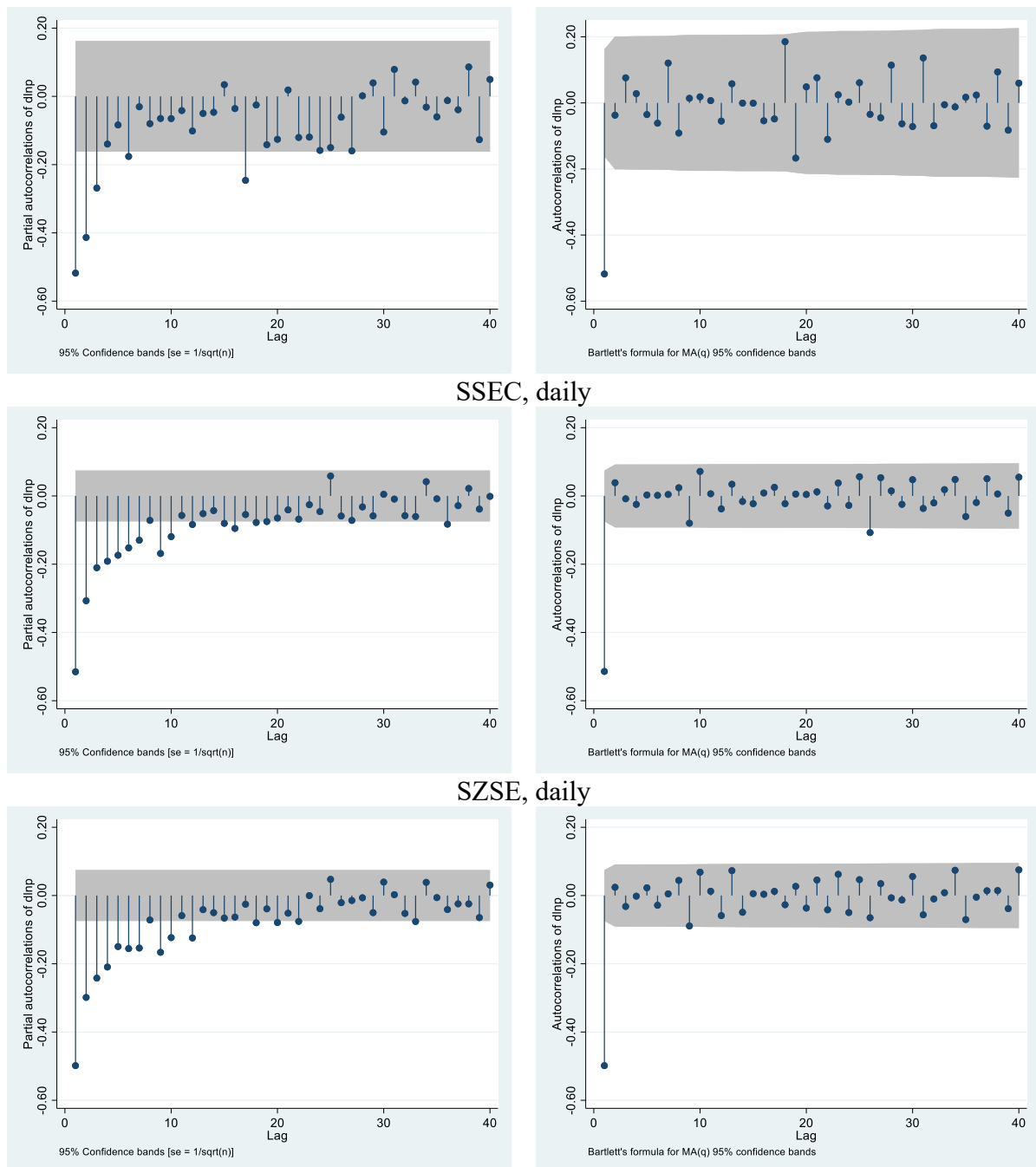SZSE, weekly

SSEC, daily
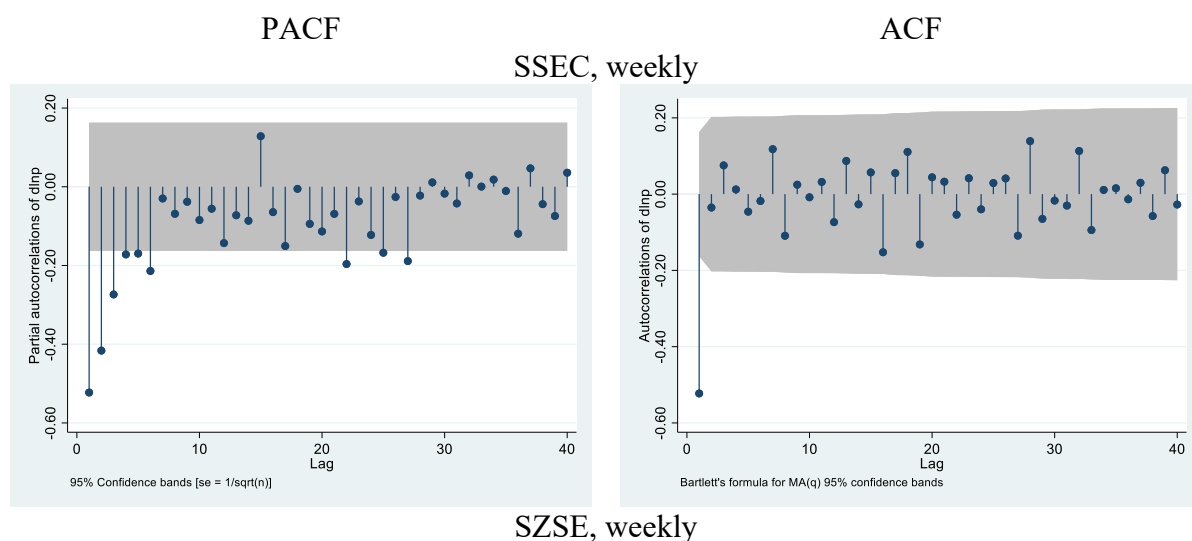
SZSE, daily

Figure 1: ARMA (p, q) identification for SSEC, SZSE and GEM.

Thus, the order of the ARIMA model for each group of data is SSEC-Weekly-ARIMA (6,2,1), SZSE-weekly-ARIMA (6,2,1), SSEC-Daily-ARIMA (10,2,1) and SZSE-Daily-ARIMA (12,2,1). Since this is the last order that is statistically significant and usually the order should not be too large to maintain the accuracy of the predictive outcome.

Finally, the ARIMA model for each group of data can be built and the statistical outcome of the residual test is shown in the table 2. The null hypothesis of it is that the residual data after building the model are white noise sequences. For the last three groups of data in the table, the null hypothesis cannot be rejected and thus the regularity of data has been found. However, for the first group of data,

the null hypothesis is rejected, indicating that this model does not find its regularity. Although it is true, the ARIMA model is still the best model to predict SSEC weekly data.

Table 2: Residual test.

Model	Portmanteau (Q) statistic	Prob > chi2
SSEC-Weekly-ARIMA(6,2,1)	66.9038	0.0048
SZSE-weekly-ARIMA(6,2,1)	24.9918	0.9695
SSEC-Daily-ARIMA(10,2,1)	27.2236	0.9383
SZSE-Daily-ARIMA(12,2,1)	27.0547	0.9412

3. Model Results Analysis

After finishing the model and residual test, the predictive return data with the pandemic control after Dec 7, 2022, has been drew in the figure 2,3,4 and 5. These predictive data are put together with actual data after this date Noticed that the actual return data is free of the influence of pandemic control. By analyzing the difference, the influence of the lift of pandemic control on the SZSE and SSEC stock markets can be found.
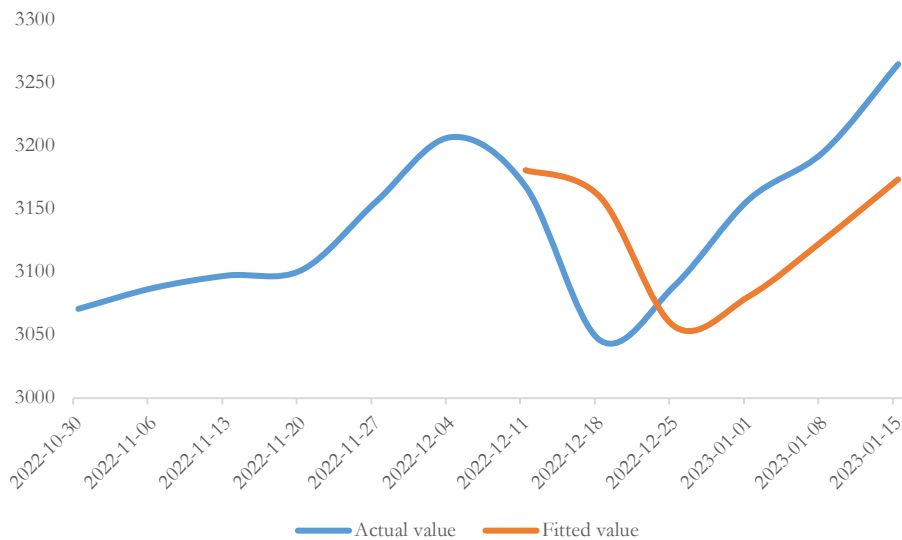

Figure 2: Actual value and fitted value, SSEC-weekly.

In the Figure 2 and 4, for weekly data of SZSE and SSEC, it can be found that if there is no lifting of the pandemic control, the return rate will first slightly decrease and then drop sharply. Finally, it will increase back and be higher. Noticed that the order of the ARIMA model of two weekly data are both six, indicating that the latest period that can be predicted is 6 weeks. Comparing this with the actual data, this trend is largely consistent with the actual data with some time lag. The actual return data drop and increase back earlier. In the figure 3 and 5, for the daily return data of SZSE and SSEC, the fitted value trend also has some lag and is similar if compared with actual value trend. Noticed that the order of ARMIA limits the predictive date to 10 days for the SSEC market and 12 days for the SZSE market.
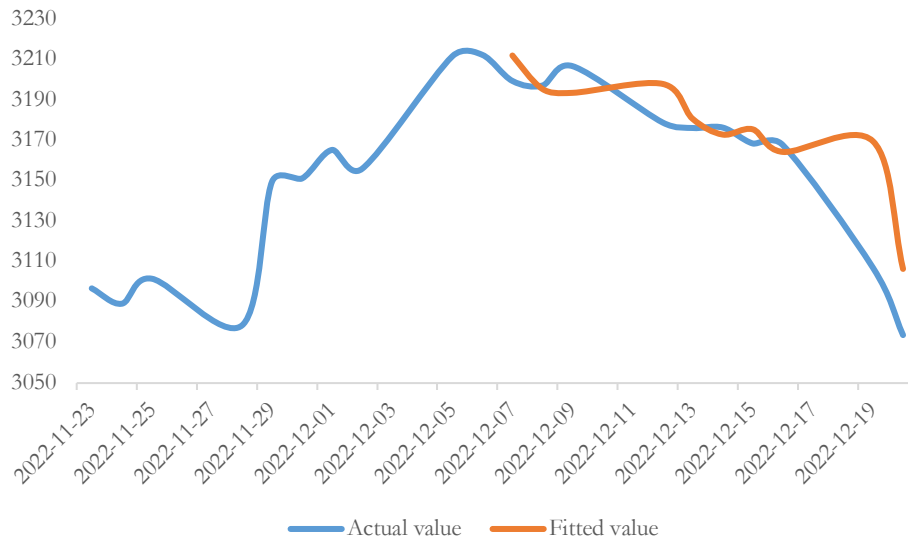
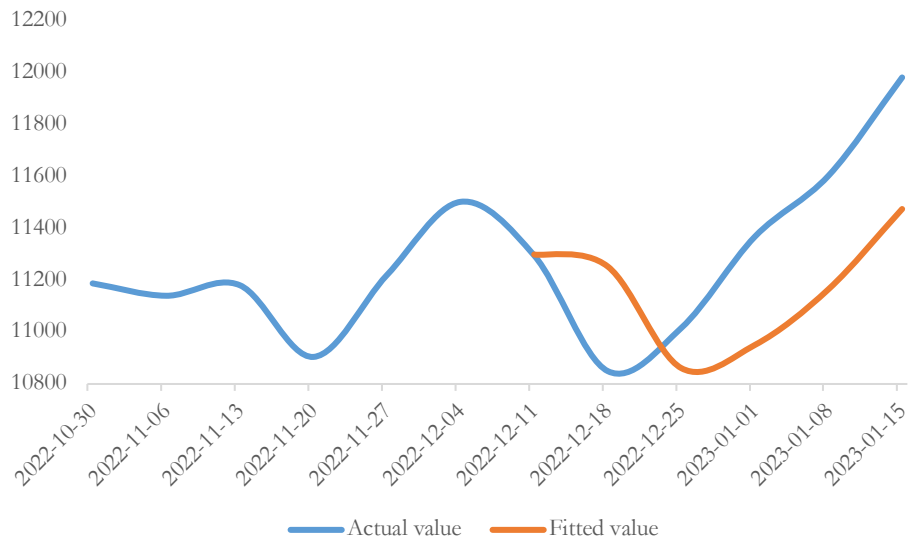Figure 3: Actual value and fitted value, SSEC-daily.

Figure 4: Actual value and fitted value, SZSE-weekly.

It is weird that the weekly return rate data first dropped sharply after the release of pandemic control since less pandemic control improved the mobility of the economy. This positive signal should have enhanced the return rate of the stock market. The following reasons listed can explain part of it.

Figure 5: Actual value and fitted value, SZSE-daily.

The first reason may be the market reaction is insufficient to this good news, which can be explained by behavior finance. That is, the stock price cannot react immediately to this new information. In that case, the price trend of each stock will go as before. Since the SZSE and SSEC market are still not reach weak-from efficient market, it is normal that both markets cannot react to this change immediately, and thus exhibits a decreasing trend from before.[7] One reason for insufficient market response may because of the conservative bias. Conservative bias leads investors to think that changes in stock returns are only temporary phenomena, and do not adjust future expectations according to changes in returns. Only when the subsequent actual returns do not match previous expectations, investors will adjust, resulting in under-reaction. The other reason causing this may be because the positive extent of the news is not enough. It is possible that the lifting of pandemic control is more concerned with policy action and not so much related to the economy. It is also possible that most people expect a larger extent of the lifting of the control and more economic stimulation policies. If it was true, then investors may be reluctant to respond to this news and thus causing this initial decreasing trend.

The second reason may be the worse expectation for the future economy after going through the pandemic. The Chinese government has indeed proposed many policies to prevent the pandemic, and these policies also seriously influence many industries' daily work. For example, the Chinese government requires Nucleic acid amplification testing of the worker for the whole company if there is a Covid-19 patient in this company. [8] If there are too many Covid-19 patients in one city, the lockdown policy will be implemented and force the company to shut down [8]. All these policies add cost to the company and people's daily life. Due to these policies, many companies lay off employees and many people lose jobs. Thus, it is understandable that people are more cautious about the future economy and would like to save more rather than consume or doing investments. According to the data, Chinese GDP growth in the 2020 has decreased to 2.2% [9]. Thus, with the pessimistic expectation for the future economy, people put less money into investing in stocks, which may be a factor leading to the decreasing trend of stock return rate data. As times go by, the economy starts to recover and people's expectation of the future economy is less pessimistic, they start to put more money into stock, and thus the return rate data increase in the later period.

The last reason is that many people catch Covid-19 in the beginning period of lifting the pandemic control [10]. In that case, labor force on the market would decrease, which negatively influenced

companies' production. Besides, this would also reduce the people's willingness and ability to consume and invest in the market. Both factors cause the economic situation being worse initially, resulting in the decreasing trend of the stock return initially. After many people got Covid-19 in the first round and reached herd immunity, people get recover and then start to do the investment, increasing the stock return rate. Economy is then recovered.

4. Implication

4.1. Policymaker

First of all, if policymakers would like to release good news to improve the performance of the stock market, the market expectation should be considered. Only the policy that exceeds the market expectation can significantly improve stock performance. Before implementing the policy, an official interview will be held. At the time that the new is released, the market expectation will start to form based on the announcement and speculation. The stock market will then respond first on this announcement. The market will still response to this policy when it is implemented. If the implemented content is nearly the same as the announcement before, the stock market will not response again as it exactly meets the expectation. On the contrary, if the implementation policy is different from the announcement, the stock market will react to this positively or negatively on whether the implement content exceeds or below the market's original expectation. In that case, policy makers can choose to hide some part of the good news on announcement day while implementing full content. In this way, the stock market can be stimulated twice by manipulating market expectation forming.

Secondly, if policymakers want to reduce the time lag of stock market reaction to the news, improving the efficiency extent of the market can be a way. From the market efficient hypothesis, the more efficient the market, the quicker that the stock can react to the new information. Furthermore, policy maker can also educate investors to avoid conservative bias and thus reduce the time lag of market reaction.

4.2. Investors

Investors should be cautious about the sharply decreasing trend initially, which is due to insufficient market response. This initial decreasing trend may exist in all cases after the release of good news as market reaction lag may exist. The best way to avoid this trend is to wait for a period after releasing good news. The time lag of the response is also connected to market efficiency. Besides, the less efficient the market, the more serious of time lag.

Secondly, investors should also be cautious about good news since not all good news may bring stock price go up. For this example, the lifting of pandemic control is good news while the overall economic situation is bad, and people are pessimistic. Thus, the latter effect outweighs the positive news effect and thus causes the stock price sharply to decrease initially. In that case, investors, when hearing the good news, should also consider the overall economic situation, which is a more important factor in stock market.

Lastly, investors should judge the extent of good news. Although good news should be helpful to the performance of the stock market, the positivity extent may be less than the market expectation. Then, it will cause the stock price to drop initially. The market expectation is usually formed before the release of good news.

5. Conclusion

Many studies have analyzed effect of pandemic control and lifting of control to both the economy and stock market. Some of them mainly conduct the effect research on the relevance between stock market and economy. Some of them conduct research on different specific industries to find out the differences. Some of them conduct effect research to see how this effect is transmitted to the stock market.

The main purpose of this essay is to find out what effect of lifting the pandemic control has brought to the SZSE SSEC stock market. By building the proper model, the data under the pandemic control can be predicted and be compared with actual data. By comparing, it can be found that the lifting of pandemic control does not immediately boost the stock return in these two markets. On the contrary, it accelerates the trends of initial drop and then get recover back earlier. The main reason for this phenomenon might be related to the market expectation, overall economic situation and time lag of market reaction. Policymaker can have better way to stimulate stock market and improve the market efficiency. As for investors, they can have better understanding toward this phenomenon. Next time when government giving the good news to the market, investors can remind this experience and have better strategy to earn return.

The disadvantage of this essay is that the ARIMA model's order is too limited can the predictive data is too less. Besides, whether other stock index in China has similar effect is still unknown. In that case, further analysis can consider the more suitable model that can predict more data. Besides, other stock index in China can also be employed in analysis to see whether there exist some other new phenomenon and reasons.

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