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Study the Influencing Factors of Price Fluctuations in the Financial Industry Based on the Arbitrage Pricing Model

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ABSTRACT

Since the outbreak of the new coronavirus pneumonia epidemic worldwide in early 2020, global stock prices have begun to decline. This situation is very similar to the global financial crisis caused by the subprime mortgage crisis in 2008, which also caused huge losses to most investors. Therefore, it is of great significance to study the factors affecting stock price fluctuations. This article selects Bank of America in the financial industry as the main research object, collects the stock price fluctuation data of Bank of America from January 2015 to March 2020, and adopts the S & P 500 index, Dow Jones index, CPI and interest rate as independent variables to conduct analysis. At the same time, this paper also compares Bank of America with Taibang Bio, a representative company in the bio industry. Through research, this paper concludes that the S & P 500 index has a greater impact on the fluctuation of stock prices in the two industries, but the impact is not the same.

Keywords: *Arbitrage Pricing Model, Standard & Poor 500 Index, CIP Bank of America*

1. INTRODUCTION

1.1. Research background

At present, the new coronaviruses spreading all over the world not only threaten the health of people of all countries, but also affect the economic forms of various countries. The most direct manifestation of world economic turmoil is the volatility of global stock markets: the Dow Jones index plunged nearly 20,000 points, the S & P index fell by more than 7%, and the stock markets of many countries have melted. In this case, how to determine the trend of stock prices is what investors are most eager to know, because they need to make timely adjustments to their investment decisions based on the fluctuations of these influencing factors.

The source of the outbreak of the global financial crisis in 2008 was only the subprime mortgage crisis in the US housing mortgage market. At that time, due to the collapse of the real estate market bubble, the price of houses fell sharply. However, the majority of American people relied on loan to make payment, when the house depreciated significantly, people chose to give up the original remaining high loans and purchase new houses at a low price. In this way, a large number of mortgage financial institutions have been unable to withdraw funds, companies have insufficient liquidity, and the company's stock price has fallen sharply. Fannie Mae and Freddie Mac, the two mortgage lenders, had the most serious impact. However, the crisis did not stop at the financial industry. After a short period of time, there was a panic in the banking industry. The global stock markets also fluctuated significantly. The S & P 500 index fell by 45%, and a large number of investors suffered heavy losses. After this, people began to pay attention to how to understand the trend of the stock market, so as to conduct favorable stock trading in advance.

From the perspective of behavioral finance, people's disposable income has become more and more. How to increase the value of these disposable incomes is a common concern. Most people are not satisfied with just investing in bank deposits and earning a small amount of deposit interest, but seeking higher returns, which makes stocks their first choice. Although investment in the stock market is high-risk, it is also accompanied by high returns. Therefore, the volatility of the stock market affects more and more people. How to gain insight into the volatility of the stock market, find out indicators that affect the stock market, and provide investors with a basis to help them make decisions is of great research significance.

1.2. Literature review

At present, many scholars have conducted in-depth research and analysis on the influencing factors of stock price fluctuations. Chih-Chien Wang, Cheng-Yu Chiang [1] proposed that in the Internet era, news will also have an impact on the fluctuation of the stock price. In addition, after analyzing the collected real cases, it has been concluded that the negative impact of published false business news on stock prices can't be ignored. Wang Xiaoyan and Jiang Yajuan [2] believe that the interest rate is the most obvious and direct factors affecting stock prices, and the marketization of interest rates is conducive to improving the construction of the stock market. Dai Wenjin [3] stated that exchange rate reform has an impact on stock price volatility. The two theoretically show a negative correlation, and the exchange rate reform strengthens the equilibrium relationship between exchange rate, stock price and interest rate, making the effectiveness of China's marketization fully improved. Si Dengkui et al. [4] analyzed by using the TVR-SV-BVAR model and concluded that there is a non-linear linkage effect among investor sentiment, stock price and exchange rate. Changes in stock prices will have a direct impact on the exchange rate, and will also have an indirect impact on the exchange rate due to investor sentiment in the meanwhile, which will further promote the impact of exchange rates on stock price fluctuations.

2. INFLUENCING FACTORS

2.1. Standard&Poor 500 Index

When selecting factors that affect stock prices, the S&P500 index is an indispensable reference element, mainly due to two important reasons: First, the 500 companies selected by the S&P500 index are all the top ranked companies among listed companies, and they are very influential. There is a strong correlation between these companies, so the fluctuations of one company will often involve other companies, which may cause changes in the entire stock market. For example, in the 2008 financial crisis, while the global stock market plummeted, the S&P500 index fell by 40% over the same period, which reflects the sensitivity of the index, demonstrating that the index is closely related to the volatility of the stock market. Second, the companies covered by the S&P500 Index involve industries such as industry, railways, and public utilities. Among the current US $ 4 trillion in assets, the assets tracked by the index exceed US $ 1 trillion, which shows that its coverage is very extensive. At the same time, this index has been considered for calculation since 1923 and was officially launched in 1957. So far, it has more than 50 years of history than other indexes. Therefore, it is a market-weighted index that is widely recognized as a reference value in the market [5].

The S & P 500 index severely affects stock price volatility. First, the changes in the S & P 500 index have played an important role in investors' psychology. When the index goes up, investors think that the stock market will move in a good direction and they will buy stocks. Conversely, when the index falls, investors will sell stocks to avoid losses. However, in fact, when investors buy or sell stocks according to the changes in the index, it will intensify the changes in the stock market and the S & P 500 index in the same trend, thus showing a circular process. In addition, the S & P 500 index is a comprehensive stock index that covers many factors that affect stock changes, because it represents changes in the entire stock market. Therefore, it is necessary to further analyze individual factors to observe their respective impacts on the stock market.

2.2 CPI

The consumer price index (CPI) can reflect the current price level of a country, and it is an index that people of all countries pay close attention. Not only can the CPI reflect the current price level of a country, the growth rate of the CPI will also be used to reflect the inflation rate of a country. This is what people are concerned about, because the inflation rate determines whether the actual value of money held by people has changed. A high inflation rate means a depreciation of the currency [6].

CPI affects the stock market in two ways. On the one hand, a rise in CPI will result in an increase in nominal wages, but real wages actually fall, because the rise in wages lags behind the increase rate of commodity price. Therefore, people's actual purchasing power falls, which will cause people to invest less in the stock market. According to the supply and demand relationship, it can be known that when the demand on the stock market decreases, the price of the stock market will fall. From 1995 to 1996, the increase in CPI was maintained at 10% in China, causing the stock market to plummet from 1500 points to about 300 points, presenting a drop of 80%.

Another way of influencing is that the rise of CPI will also lead to the rise of stock market, because the rise of CPI means the increase of inflation rate and the depreciation of currency. In the case that the behavior of the listed company has not changed, in order to maintain the original value of the enterprise, it can only be achieved through the rise of the stock price. In July 2010, when the CPI in China rose to 4.4%, the stock index also began to rise sharply from 2319.74 points to 3100 points, a rise of more than 30% in 4 months.

It can be seen that the impact of CPI on stock prices can be either positive or negative, and the specific impact of each time needs to be analyzed based on actual data.

3. ARBITRAGE PRICING MODEL

Arbitrage pricing model is a factor model. Specifically, factor models can be divided into two types, one is a single factor model and the other is a multi-factor model.

In the single-factor model, the return rate of the security depends only on the influence of one factor. The specific expression is as follows:

Rit = ai + biFt + ett

When setting the factors in this model as the S & P 500 index, this model is the capital asset pricing model.

In a multi-factor model, the return rate of a security depends on multiple factors. The specific expression is:

Rit = αi + βi1F1t + βi2F2t + ... + εit

This model is the arbitrage pricing model [7]. In this model, the factors that affect the rate of return of securities include not only the market mix, but also a series of factors such as interest rates and exchange rates. These will be counted and used to calculate the yield of securities.

4. EMPIRICAL RESEARCH

4.1. Data collection

In order to study the influencing factors of the stock market, this paper collects the stock closing price data of Bank of America from January 2015 to March 2020, and also selected the S & P 500 index, Dow Jones index, CPI and interest rate data in the same period to study the influencing factors. All the above data comes from Investing.com.

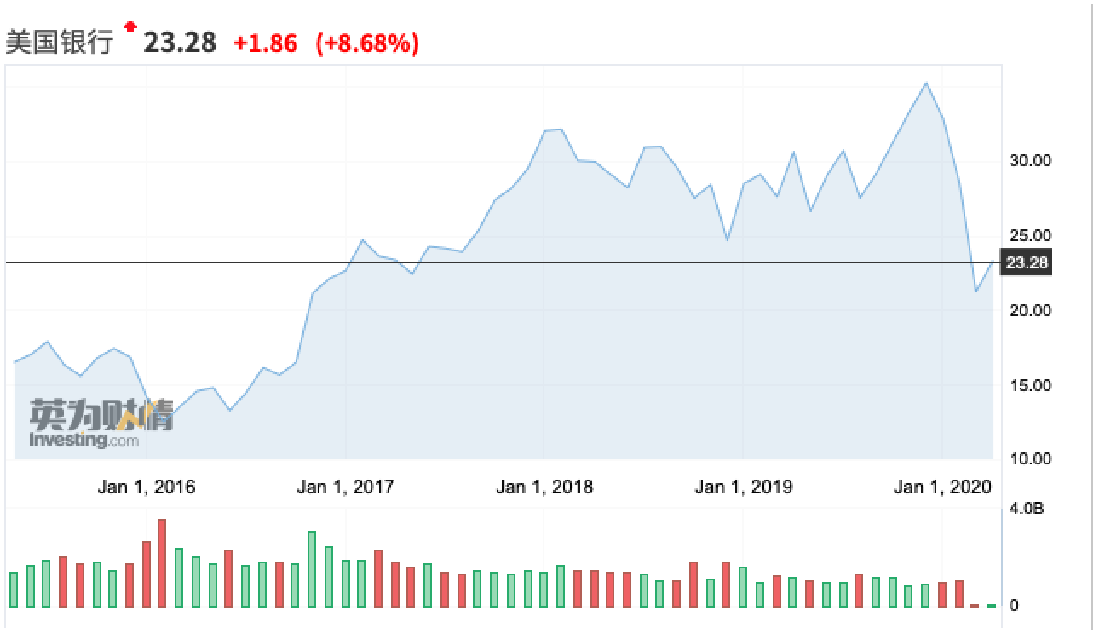

Figure 1: 5-year stock price trend in Bank of America (figure source: Investing.com).

Since the end of February 2020, the stock price of Bank of America has begun to fall sharply, which is inseparable from the recent spread of the new coronavirus pneumonia epidemic worldwide. The outbreak of the epidemic also caused large fluctuations in the global stock market. The real economy is the first to be hit. Affected by the epidemic, the business of these companies began to decline, making the company's profitability seriously damaged. As a result, companies began to be unable to repay loans to banks and could only mortgage assets to banks, and the value of these assets fell. This situation makes the funds of the bank continue to decrease. Even if the bank receives the asset, it still has the problem of turning into cash. In addition, due to the various degrees of crisis in various industries, the investment and loan business that banks can carry out is also declining, but in fact these are the main sources of bank income. Affected by the epidemic, people will feel distrust of banks. Therefore, they will withdraw part of the funds from the bank, which has exacerbated the liquidity problem of the bank. The combination of these reasons has caused a sharp decline in the share price of Bank of America.

4.2 Result analysis

In order to find out the specific factors affecting stock price volatility, we use SPSS software to analyze a large amount of data and obtain the following analysis values, of which the specific values of Bank of America are as follows:

Table 1: Results of spss analysis of influencing factors of Bank of America stock price.

Independent variable	Standard coefficient Beta
Standard&Poor 500 Index	-0.996
Dow Jones Index	2.225
CPI	0.039
Interest rate	-0.308

From Table 1, it can be found that the Beta value of interest rates for stock price fluctuations is -0.308, indicating that changes in interest rates are negatively related to stock price fluctuations. This is because when interest rates rise, people are willing to deposit a large amount of money in the bank to obtain high interest, which makes the bank increase the borrowing rate. For enterprises, this will increase the cost of loans, so the amount of bank loan business will be reduced, meaning that the bank's income will be reduced. In addition, the Beta value of DJI to stock price fluctuation is 2.225, indicating that the index variation is positively correlated to the stock price change. This is because the companies included in the Dow Jones Index are mostly emerging industries. For these companies, the development of the company requires a lot of financial support, so they will make a lot of loans from the bank, which greatly increases the business volume of the bank and makes the stock price rise.

In addition, in this epidemic, the stock market of the biopharmaceutical industry has also received much attention. Therefore, in order to compare the volatility of stock prices, we selected Taibang Bio as a representative of the industry for analysis. The specific values are as follows:

Table 2: comparison of the results of SPSS analysis on the factors influencing the stock prices of Bank of America and Taibang Bio.

Independent variable	Standard coefficient Beta	Independent variable	Standard coefficient Beta
S&P500 Index	-0.996	S&P500 Index	4.978
DJI	2.225	DJI	-5.526
CPI	0.039	CPI	0.116
Interest rate	-0.308	Exchange rate (USD/RMB)	0.280

Comprehensive analysis of Table 1 and Table 2 shows that CPI is positively related to the stock prices of the two companies, indicating that these two companies are in line with the introduction mentioned above, that is, while the inflation rate rises, in order to maintain its original value, the company's stock price will rise accordingly. The impact of the S & P 500 index and Dow Jones index on the shares of Taibang Biotechnology and Bank of America is negative. Among them, the change in the S & P 500 index is positively correlated with the fluctuation of Taibang Biotechnology, mainly because when the S & P 500 index rises, investors will think that the overall stock market is better and they will be more willing to invest. As a result, the corresponding stock price of Taibang Bio will rise. However, when these funds flow into the stock market, the amount of funds that investors can deposit in the bank will decrease, and the decline in banking business will affect the decline in stock prices. Therefore, the S & P 500 index has a negative correlation with the stock price volatility of Bank of America. From this, it is visible that the same factors have different effects on stock price fluctuations in different industries.

5. CONCLUSION AND EXPECTATION

5.1. Conclusion

By studying the factors that affect the volatility trend of the stock price of the Bank of America within 5 years, it has been found that the stock price is most sensitive to changes in the Dow Jones index and least sensitive to CPI fluctuations among the four factors. Through comparison and analysis with Taibang Bio, a representative company in the biological industry, it can be seen that except for the influence of the CPI factor on the two industries in the same direction, the other effects are opposite. The impact of the Dow Jones Index varies the most, but the share price of Taibang Biotech is also the most sensitive to changes in the Dow Jones Index.

5.2. Expectation

It can be seen from the research that there are many factors that affect the stock price fluctuation, and the degree of impact is diverse from each other. If it is able to conduct a more comprehensive factor analysis of stock price fluctuations and establish an accurate model, accurate predictions of stock price movements can be realized, which is conducive to guiding investors to make correct investments, avoiding risks, and reducinglosses.

In this study, the author selected stock price data that lasted 5 years for a specific analysis. The number of samples is sufficient to improve the accuracy of the results. Moreover, this paper selects two industries for analysis, thus covering more possibilities. However, in practice, there are many factors that affect stock price fluctuations, and the sensitivity of various industries to these factors varies. Therefore, in future research, the author hopes to find out more factors affecting stock price changes and establish more accurate models to avoid investment risks. In addition, future research also needs to further explore the reasons for the impact of the Dow Jones Index on stock price fluctuations, so that the research results would become more convincing.

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