Proceedings of the 2nd International Conference on Business and Policy Studies
DOI: 10.54254/2754-1169/11/20230564

Compare the Influence of the Shanghai Stock Index and Shenzhen Component Index on Stock Returns of Ningde Times

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Abstract: Since the establishment of the Shanghai Stock Exchange and Shenzhen Stock, stock investment in China has gradually flourished in the past 20 years. When the figure of the stock market rises or falls, it has always affected the state of mind of every investor. For the Chinese stock market, the Shanghai Composite Index and the Shenzhen Component Index are equally important, which is helpful for us to understand the trend of the stock market in depth. However, most studies nowadays only focus on the influence of one index and ignore the essentials of the other, which could lead to a misjudgment by investors. because both indexes have a close correlation with the stock return. so it is necessary to compare the influence of the two indexes on stock returns at the same time. and base on this, I will compare the degree of correlation between the Shanghai index as well as the Shenzhen index on Ningde Times stock returns.

Keywords: Shanghai index, Shenzhen index, Ningde Times stock, correlation first section

1. Introduction

In the 1960s, William Sharper [1], John Lintner [2], and Jan Mossin developed a Capital and Pricing Model, called CPAM, based on the Markowitz [3] theory. the Markowitz model provides a relatively straightforward solution for the two-asset case, disregarding some risk factors in Fama and French [4] but it is not suitable to solve for the case when there are more than two assets since it would be more complicated. This is why CPAM came into being. CAPM uses the ratio between covariance of assets' profitability and market portfolio profitability and market portfolio' profitability. In CPAM, there are some supposes should be followed. First, the securities market is completely efficient, which means that the information is totally fair to each investor. Second, it is able for investors to have non-risk securities, they can borrow or land capital at a risk-free rate [5-7]. The last is the total investment risk can be expressed by variance or standard deviation, and the systematic risk can be expressed by the β coefficient. The core assumption of CAPM is that all investors in the security market are regarded as individuals who are identical except for their initial preferences, and the capital asset pricing model is developed on the basis of the Markowitz mean-variance model, and it also inherits the assumptions of security portfolio theory. The model accurately predicts the relationship between asset risk and expected return [8-10]. This relationship indicates two important functions. It not only provides a benchmark for valuing assets

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But also helps us to make reasonable estimates of expected returns on assets that do not appear on the market.

The theme of this article is to Compare the influence of the Shanghai Composite Index and Shenzhen Composite Index on the Stock returns of Ningde Times, The CAPM model is used to analyze the data. And the correlation between the return rate of the Shenzhen Composite index and the return rate of Ningde Times is closer than that of the Shanghai Composite Index and the return rate of Ningde Times

This paper first introduces the origin and formula of CAPM, then analyzes the stock prices and recovery rates of the Shanghai Stock Index, Shenzhen component index, and Ningde Times, and then uses CAPM to calculate the correlation difference between different index returns and Ningde Times returns, and draws a conclusion.

2. Firm Description

CATL founded in 2011, is the first to have one of the international competitive power battery manufacturers in China, focusing on new energy vehicle power battery systems, energy storage system research and development, production and sales, be willing to provide excellent solutions for global new energy application, the core technology including in the field of power and energy storage battery, Material, cell, battery system, battery recycling and so on. These set up the whole industrial research and development and manufacturing capacity. And also, these are the company's main businesses. In 2017, the company led the world in shipments of power lithium batteries, reaching 11.84GWh. It has established cooperative relations with many domestic mainstream car companies and successfully occupies a place in the global market. It has also become the first domestic lithium-ion power battery manufacturer to enter the supply chain of the international top car companies. the successful experiences are crediting some social background factors. The first factors are domestic oil consumption. Economic development is inseparable from energy, oil is energy for economic development, and they have a close relationship. The second factors are world consensus on environmental protection. The global impact of the greenhouse effect will threaten human life. The third one is the general trend. Countries have announced the timetable for the ban on fuel vehicles. And what we can learn from that is fuel car is gradually replaced by new energy car in the future. Last but not the least, is domestic planning. The new energy and automobile industry development plan (2021-2035) [General Office of the State Council, Notice of The General Office of the State Council on Printing and Distributing the Development Plan for the New Energy Vehicle Industry (2021-2035),2020-11-02] has been issued in China. It is proposed that the average electric consumption of new electric passenger cars will be reduced to 12.0 kilowatt-hour / 100km by 2025, and the sales of new energy cars will reach about 20% of the total sales of new car cars. By 2035, pure electric vehicles have become the mainstream of new sales vehicles. The public sector is fully electric and fuel cell vehicles are commercialized (Table 1).

Table 1: Financial data.

	Jun-21	Jun-22
EPS	2.2864	3.9621
WEPS	1.9337	3.5047
EPSadj	1.9416	3.5233
EPScut	1.6918	3.0416
Netassps	32.4121	61.3332
return on total assets	2.5628	2.0094

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Table 1: (continued).

net profit hole ratio of total assets	2.9227	2.4515
cost expense margin	18.1491	11.9537
operating margin	14.3322	10.3416
main business cost rate	72.7443	81.3245
net profit margin on sales	12.082	8.5597
return on equity	838.5189	1292.294

Through the analysis of the financial data of Ningde Times, it can be seen that the cash flow of Ningde Times is very well, the main business has a strong ability to create more cash, and the monetary fund is abundant (accounting for 32% of the total assets). Net investment increased significantly in 2020 and 2021, mainly due to the substantial expansion of production. In the cost composition, the operating cost accounted for 72% in 2020 and increased slowly year by year, mainly because of the price increase of raw materials. And the operating profit accounted for 14.7% and increased year by year, too. Thanks to the rapid growth of revenue, the proportion of marketing expenses, administrative expenses, and Research and Development expenses gradually decreased.

The cash retention capacity of Ningde Times increased significantly to 24.9% in 2021, which was the highest value in previous years, showing that the bargaining power of Ningde Times in the upstream and downstream of the industrial chain was gradually improved

Figure 1: Ningde's stock price.

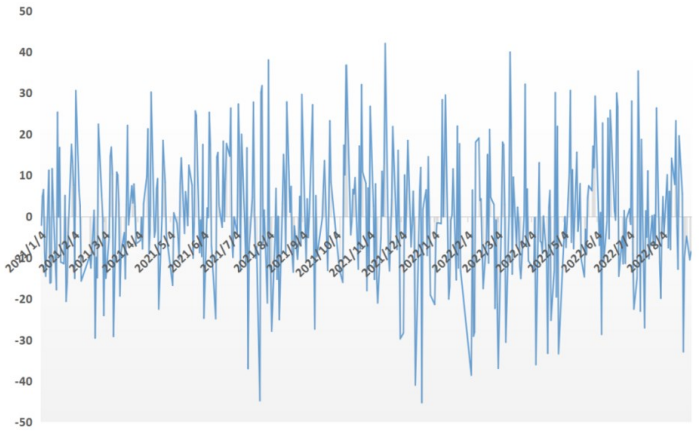

Figure 2: Ningde's return.

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As we can see from the graph, Ningde Times stock had a steady and increasing trend in 2021, but a downward trend in 2022.And we can also learn that on 3rd December, the company set a record high of 692 for its share price. That's nine times higher than in 2019 in the share price, the market value of the peak reached 1.6 trillion yuan, the valuation is obviously rapidly inflated; And from the current point of view, in the recent correction has been more than 30% of the premise, Ningde Times P/E is still more than 100 times, although Ningde Times in last year's performance growth of more than 100%, but such a P/E is not low. After that, Ningde era began a continuous correction; As of the close of April 13, the share price of Ningde Time closed at 466 yuan per share, which has dropped 32.66% from the peak, and the market value has been wiped out by 526.8 billion yuan (Fig 1-2).

Figure 3: SSE index price.

At the beginning of 2021, the price of the Shanghai Composite Index is 3474, and then, it continue to rise to 3731 in February, which was also the highest index in 2021. After that, the market encountered turbulence fell. It reached a low of 3350 in March, July, and November, which was also the lowest index in 2021. At the end of July and November, the price was going up again, it return to its high of 3700 in September and December. Because of this, it rose only 4.8% in 2021. When it comes to 2022, it reached the lowest index 2863 on April 27th. Afterward, the price bottomed out and rose. It's up 17% since that date (Fig 3).

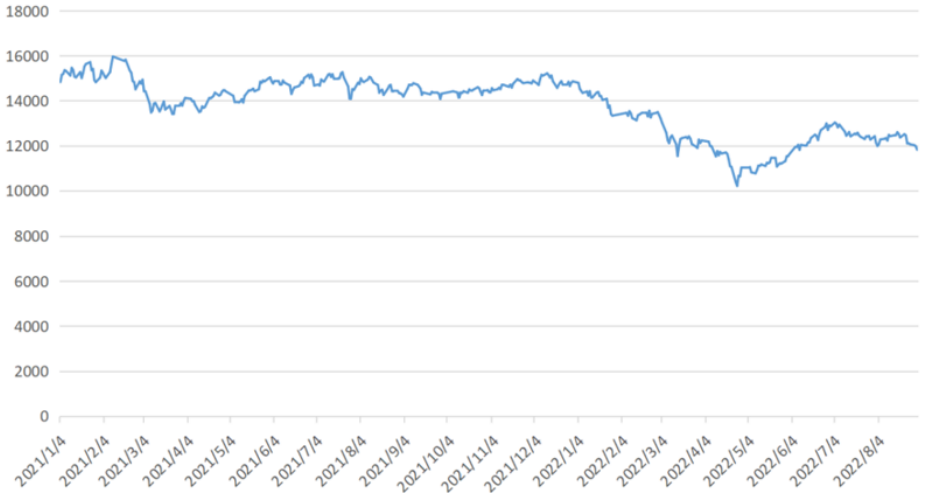

Figure 4: SZI price.

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At the beginning of 2021, the price of Shenzhen Composite Index is 14827, and then, it continues to rise to 15962 in early February, which was also the highest index in 2021. After that, the market encountered turbulence fell. It reached a low of 13421 at the end of March, which was also the lowest index in 2021. After that, the price remain stable until 2022. It decreased by only 0.71% in 2021. And from January to April 2022, it continue to fall to10206 on April 26th. Afterward, the price bottomed out and rose, too. It's up 26% since that date. But the first half of the Shenzhen Composite Index has fallen by 13.2% (Fig 4).

3. Regression Analysis

3.1. Introduce the CAPM Model

CAPM is needed. In the N securities case, it is necessary to calculate (N^2-N)/2 co variances. This means with 100 securities one would need to calculate 4,950 co variances, and with 500 securities this increases to 124,750 co variances [5] because of these terrible computations, there is an urgent need for people to set up a new formula to solve it.

The equation is:

$$E(R_i) = F_f + \beta[E(R_m) - R_f] \tag{1}$$

E(Ri) is the expected rate of return of asset i,Rf refers to the non-risk interest rate,E(Rm) is the expected rate of return of market portfolio,which refers to the portfolio of all risky assets ,β represents the systematic risk,and is the covariance between asset i and the return of market portfolio,When β is equal to 1,it indicates the systematic risk of the securities asset and the risk of the market portfolio. When β is greater than 1 or less than 1, it indicates that the systematic risk of the securities asset is greater than or less than the risk of the market portfolio

When we calculate the expected return of the asset through CAPM , we can compare the return of the asset in a period of time with the calculation result of CAPM, so as to evaluate whether the asset is a suitable investment or not. We can also compare the CAPM result with the result estimated by fundamental analysis and technical analysis. By comparison, we can infer whether an asset is undervalued or overvalued. The pricing formula of CAPM is:

$$P_0 = \frac{1}{1+R_f}\left[E(P_T) - \frac{Cov(P_T, P_M)(E(R_M) - R_f)}{Var(R_M)}\right] \tag{2}$$

In the formula, P0 represents the price at the time to start and PT represents the price at the specified time . This formula means that the price of an asset at the time start is its estimated price at a specified time minus its estimated CAPM return discounted at the risk-free interest rate.

3.2. Regression Analysis

The explanatory variable X is the return of Shanghai Composite Index or Shenzhen Composite index, and the explained variable is the return of Ningde Times. The underlying assumption of CAPM is that the return rate follows a normal distribution, and the data obtained are listed as follows:

The regression model of Shanghai Composite Index:

$$E(R_i) = 0.357 + 0.215[E(R_m) - R_f] \tag{3}$$

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The regression model of Shenzhen Composite Index:

$$E(R_i) = 0.613 + 0.056[E(R_m) - R_f] \quad (4)$$

The regression equation shows that for every unit change in the return rate of Shanghai Composite Index, the return rate of Ningde Times changes 0.215 units in the same direction, the correlation coefficient R=0.4717181, the determination coefficient R2=0.222517979, and the corresponding T statistical measurement value of the regression coefficient before the corresponding independent variable is 0.519, the P value is very small. It shows that the return rate of Shanghai Composite Index has a significant impact on the return rate of Ningde Times. When the return rate of Shenzhen Composite Index changes by one unit, the return rate of Ningde Times changes by 0.056 units in the same direction. The regression correlation coefficient R=0.6606152 and the determination coefficient R2=0436412411, while the regression coefficient before the corresponding independent variable corresponds to the T-statistical measurement value of 1.045, the P value is very small. It shows that the return rate of Shenzhen index has a significant impact on the return rate of Ningde Times,too (Table 2).

Both β values are positive, indicating that the return of Shanghai Composite Index and Shenzhen Composite Index is positively correlated with the return of Ningde Times.

Compare both of these,The β value of Shanghai Composite Index regression is smaller than that of Shenzhen Composite Index regression, indicating that the correlation between Shenzhen Composite Index and Ningde Times is stronger than that between Shanghai Composite Index and Ningde Times.

When the yield impact of Shanghai Composite Index is 0, the return of Ningde Times is 0.357; When the return impact of Shenzhen Composite Index is 0, the return of Ningde Times is 0.613.

Table 2: Regression result.

	Shanghai Composite Index	Shenzhen Composite Index
constant	0.357	0.613
	0.519	1.045
Effect	0.215***	0.056***
	10.713	17.621

4. Discussion

4.1. Disadvantage

Disadvantage 1: Unreasonable investor structure, the investment concept is not mature enough.

One of the assumptions of the CAPM model is that all investors are rational, pursue utility maximization, and can analyze and process information according to Markowitz's portfolio theory. However, the stock market in our country is based on individual investors as the main participants, and the quality is generally low, to the lack of the corresponding professional knowledge. And most investors lack experience, are more in the stage of blind investment, more inclined to speculate.

Disadvantage 2: The degree of information openness and timeliness of information announcements are low.

Another important assumption of the CAPM model makes the market efficient, and one of the important characteristics of an efficient market is that the information is completely open, and all the information can be understood equally and quickly by all the participants in the market and immediately reflected in the market price. Although from the perspective of reality, any country can

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not achieve full disclosure of information, the problem of information disclosure, whether the degree of openness or timeliness, is more serious than the other countries.

Disadvantage 3: Insufficient data.

Efficient markets are based on certain market sizes, and China's stock market is an emerging market, itself less than 30 years old. Small scale not only limits the function of the market to play its role but also facilitates large institutions to manipulate stock prices, which further deviates from the effectiveness of stock prices. All the laws and regulations of our securities market are under continuous improvement, and the market fluctuation is great, which affects the accuracy of the extreme results.

4.2. Advantage

4.2.1. Advantages 1

Simple and clear, only systemic risk is considered. In the real capital market, most investors will try their best to diversify their investment portfolios and to a large extent exclude unsystematic risk.

4.2.2. Advantage 2

CAPM model reveals the relationship between the investor's expected return and systemic risk, the relationship derived from this theory is concluded through a lot of empirical research and experiment, can well explain asset pricing problems, determine share price is reasonable, know the investors' investment behavior, can be used as investors choose the portfolio tools.

4.2.3. Advantage 3

The CAPM model considers in detail the level of systemic risk of a company relative to the level of systemic risk of the entire stock market.

4.3. Application

CAPM theory is the core content of the modern financial theory. Its function is to consider the "rationality" of the listed price by predicting the quantitative relationship between the expected rate of return and the standard deviation of the bond. Can help determine the price of securities ready for listing; Ability to estimate the impact of various macro and macroeconomic changes on security prices.

5. Conclusion

With the development of the shanghai stock exchange and Shenzhen stock investment, more and more people begin to take part in the stock market. In the stock market, the Shanghai Composite Index and Shenzhen Composite Index have a close relationship with the stocks' prices. So, in this paper, the author uses the CAPM model to calculate the correlation between the returns of two indices and the Ningde Times.

The results demonstrate that the correlation between the return of the Shenzhen Composite Index and the return of the Ningde Times is closer than the correlation between the return of the Shanghai Composite Index and the return of the Ningde Times.

The assumption of the CAPM model is too complex, the securities market is not satisfied, and it is difficult to get a full effective conclusion. With the regulation and control measures of the Chinese government on the stock market, such as the adjustment of interest rate and monetary policy, investors often make excessive reactions due to these policies, leading to the large

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fluctuations of the stock market and the lack of accuracy of data. Future CAPM models can be integrated into psychology, oriented by behavioral finance, and fully consider the cognitive differences and differences in the degree of rationality of investors, so as to make the calculation of the model more accurate.

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