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The Research on the Application of CAPM Model in Chinese Stock Market

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Abstract: With the improvement of living standards, more and more people tend to use their savings to make stock investment, and how to make good use of precious capital for project investment, industrial support policy of the government how to develop practical, make the flow of resources efficiently has the development potential and competitive enterprise project, which requires us to make accurate judgment and the correct decision. By adopting the method of regression analysis, carries on the empirical analysis of China's securities market sampling, shows that, by using statistical analysis methods, this study can select a relatively appropriate market portfolio yield, improve the accuracy of asset value and asset allocation, which is an effective and analytical obstacle to the use of Capital Asset Pricing Model (CAPM) to the China's capital market. And then put forward some model to analyze the enlightenment of capital and asset pricing for the stock market. The study draws a conclusion that the beta of a stock plays a decisive role in investing. Stocks with different beta values are selected according to different stock market conditions in order to achieve the best expected annualized return.

Keywords: CAPM model, analysis of data, stock beta

1. Introduction

The stock market is an important part of the capital market, a barometer of a country's economy, and the most attractive investment and financing channels, so it has become a gathering place for listed companies, securities and futures operation institutions, securities and futures investment consulting institutions, domestic and foreign professional institutional investors and individual investors. Since 1980s, the Chinese capital market has grown from nothing to existence, and the rapid development of the capital market has been interpreted and continued to explore the front on the road of reform and opening up. By December 2021, the A-stock market has climbed to A record high of more than 91 trillion yuan (about 14 trillion U.S. dollars), and the annual total turnover exceeded 257 trillion yuan. It has become the stock market with the largest number of participants and ranked the second largest in the world. This study will inject strong financial strength into the high-quality economic and social development of China [1][2].

Stock investment has also become more and more popular in the contemporary public investment. With the popularity of smart devices and the launch of various related applications, the threshold for stock query investment is becoming lower and lower.

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However, due to the relatively short research time of asset pricing in China, there is no effective theoretical analysis model at present. Therefore, most asset pricing models are based on the famous model named capital asset pricing model (CAPM model), which has also received high attention abroad [3].

At present, A-share is the main body of China's stock market and the main place for domestic enterprises to carry out equity financing and domestic investors' equity investment. As early as the 1990s, domestic scholars began to try to study the applicability and suitable of CAPM model for China's stock market. However, because the trading environment of domestic and foreign stock markets is greatly different, and there are many differences in market operation and mechanism. With the continuous improvement of the openness of Chinese capital market and the supervision degree of stock market, this study can try to use more and updated sample stock data to re-study and explore the applicability of this model in the A-share market. This article has selected 50 stocks in the Shanghai A-share market, basically covering the various industries of China's economy and people's livelihood, which enables to analyze the CAPM model in investment decision [4].

2. Research Model

2.1. Basic Introduction of CAPM

CAPM is short for Capital Asset Pricing Model. It was originally the model used to assess the relationship between expected return and risk. It was first put forward by the American economists Sharpe, Linter, Trino and Mosin in 1964 based on the portfolio theory and the capital market theory [5].

The model divides the risks faced by investors into Systematic and Unsystematic risks. Systematic risk refers to risks that cannot be eliminated by investors through investment portfolios, such as macro policies, interest rate changes, wars or natural disasters. Nonsystematic risk is a unique risk of stocks, which can be eliminated through diversification or portfolio change.

The biggest advantage of CAPM method is clear concept and easy modeling. It divides the factors that affect the price of risky securities into three components: risk-free return rate, risk measurement and risk price. The model organically combines these three parts into one. The other advantage of this model is its ease of use. It can help investors to evaluate and select competitive financial assets based on absolute risk parameters. This method can be widely applied by financial market investors to resolve some problems encountered in investment.

2.2. Assumptions of CAPM

Since the model is developed based on the Markowitz model, we should also refer to the assumptions proposed by the Markowits model [6].

1. All the investors should follow the dominant principle (That is, When the investors are faced with the choice of two stocks with the equal risk level, they tend to choose the one with high return on investment; When the two stocks selected have the same rate of return, they will tend to choose the one with lower risk level).
2. The more assets the investors own, the better.
3. The normal distribution function can be used to describe the probability distribution of the rate of return on investment.
4. When estimating the risk of investment, choose to express it by the variance (or standard deviation) of return rate.
5. Expected return rate and investment risk are two indexes that should be given priority in investment strategy.
6. The inflation in the capital market is not considered, and the discount rate is easy to achieve

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7. The borrowing costs incurred are calculated at the risk-free discount rate.
8. The other expenses (including the tax expenses) incurred in the investment are ignored.
9. The information of the capital market can be quickly and accurately shared with each participant.
10. Investors have the same investment expectation;
11. Investors have the same investment period.

2.3. CAPM Model Calculation Formula

The equation of the model can be written as follows:

$$E[R_i] = R_f + \beta_i(E[R_m] - R_f) \quad (1)$$

Where: R_i is the i-th asset expected investment return rate; R_f is the risk free rate of interest, which can be calculated by the interest rate on Treasury bonds with a maturity of one year. β_i is the the i-th asset β coefficient. The coefficient β indicates the systematic investing risk in a certain asset. In the CAPM model, it can be used to describe the relationship between the return on investment of an asset and the return on the market portfolio. R_m is the expected rate of return of the portfolio; $E[R_m]-R_f$ is the D-value of the desired return rate and the risk free rate [7].

2.4. A Description of the β Coefficient

The relationship between the β parameter in the risk model of an asset investment system and variety in the market portfolio yield are listed:

① If $\beta = 0$, this signifies that there is no relationship between the change of asset investment return and the change of portfolio return in the market.

② If $\beta = 1$, This signifies that the change in the rate of return of investment assets is showing no difference with the change in the rate of return of investment portfolio in the market, and the average rate of return can be obtained through investment assets.

③ If $0 < \beta < 1$, this signifies that the change of the return on investment assets is less than the change of the return on investment portfolio in the market, and the expected return on assets is lower than the average return on the market. Such assets are called defensive assets.

④ If $\beta > 1$, this signifies that the change in the return on investment of such assets is higher than the expected change in the return on investment portfolio on the market, and the desired return of such investment is higher than the average return on the market. This type of asset is called an aggressive asset.

Based on the mathematical analysis of the selected stock return rate and the investment portfolio return rate in the same period, the stock β parameter is calculated by selecting a certain period of time [8]. For example, if the β parameter of the selected stock is equal to 1, it means that the yield change is consistent with that of the market portfolio. That is, when the rate of return of the market portfolio increases by 5%, the stock price will increase by 5%, and when the return rate of the market investment decreases by 5%, the stock price will decrease by 5%.

3. Analysis

From the above equation, it can be concluded that the return rate of stocks is proportional to the beta coefficient. Beta coefficient defines as the ratio between the covariance of securities return rate and the market portfolio return rate variance. It can be seen as a sensitive indicator parameter of stock return rate change to market portfolio return rate change. Through the beta parameter analysis, it can be concluded that in the pricing of risk assets, those factors that only affect the stock variance but not

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the stock covariance have no effect on the pricing of the stock market organization, and the only factor that affects the pricing is the stock beta coefficient. Since return variance is a risk measure, we can say that individual risks unrelated to market risk do not play a role in stock pricing, but conventional market risk will play a significant role, which is the core view of CAPM [9].

Among the 50 sample stocks listed in Shanghai Stock Exchange A-share market selected in this paper, there are 24 companies whose β coefficient is greater than 1, among which MCC stock has the highest β coefficient (β coefficient is 1.8084). There are 26 sample stocks with β coefficient less than 1, and Miaoke blue many stocks with β coefficient is the smallest, β coefficient is only 0.3051. In addition, among the 50 sample stocks, the β coefficient of 26 sample stocks is between 0.8 and 1.2, indicating that the stock price changes of more than half of the selected sample stocks are easily affected by market index changes, and they are sensitive stocks [10].

4. Conclusion

The capital asset pricing model (CAPM) points out that the efficient frontier of risky assets can be combined with risk-free assets to produce efficient portfolios. According to the CAPM model, β value is the main indicator of stock return rate. Through the calculation and test of β, the data of Chinese stock market show that the relationship between the return rate and the β value of the investment stock is not a linear function. The results show that the coefficient of regression equation β value is greater than 0, indicating that there is a certain positive correlation between stock market risk and the stock return rate. However, the fitting effect of the equation is poor, and the result cannot pass the significance test of 10%, which means that the fitting result is not ideal [11]. It can be considered that the positive relationship between the stock return rate and systematic risk is not very significant, and it can be drawn the conclusion that the traditional CAPM method is weakly suitable to the Chinese stock market.

References

[1] *Yang Shuanghui, Zheng Zhikai. CAPM model in the a-share market applicability of empirical test [J]. Journal of financial theory and the teaching, 2021 (6) : 39-44. DOI: 10.13298 / j.carol carroll nki ftat. 2021.06.010*

[2] *Author, F., Author, S.: Title of a proceedings paper. In: Editor, F CONFERENCE 2016, LNCS, vol. 9999, pp. 1–13. (2016).*

[3] *LI K X. The applicability of Capital Asset Pricing Model (CAPM) in Chinese stock market [J]. Bohai sea economic outlook, 2022 (4): 157-160.*

[4] *Liu Yiwen, Deng Nan, Ding Pan. Research on the Efficiency of Shanghai Stock Market Based on Bayesian CAPM Model [J]. Financial Economy, 2022 (04): 15-28.*

[5] *FAN D N. An empirical study on optimal selection of asset portfolio and market portfolio based on CAPM model [J]. Investment and Entrepreneurship, 222,33(05):11-13.*

[6] *ZHANG M M. The ineffectiveness of CAMP Theory in Chinese stock market [J]. Fortune Times,2021(11):182-183.*

[7] *FAMA E F.; The behavior of stock-market prices[J]. The Journal of Business, 1965, 38(01):34-105.*

[8] *CHATTERJEE P, RAKSHIT D. Measurement of Indian stock market efficiency through random walk model[J]. National Journal of Multidisciplinary Research and Development, 2018,3(01):34-37.*

[9] *Wang Weijie, Tao Sha, Li Jiangyue, Hou Weibo. An empirical test of the effectiveness of capital asset pricing model based on Chinese enterprises [J]. Journal of huaibei normal university (natural science edition),2021,42(04):23-31.*

[10] *Lin S Y. The relationship between corporate capital structure and corporate value: Based on CAPM model and WACC analysis [J]. China Collective Economy, 2022(12): 108-110.*

[11] *Yang Deming. An empirical study on China's stock market using conditional CAPM model with macroeconomic variables [D]. 2021. DOI: 10.27412 /, dcnki. Gxncu. 2021.001915.*