



Investigation of Asset Pricing Model on Stock Market

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Abstract. And after 1980, static asset pricing models were not very stable. There are also a number of factors that make the capital-asset pricing models used less useful. Inflation, rising interest rates, and Russia's war in Ukraine are all clear factors for stock market falls. These elements are intertwined and appear to exacerbate each other. Investors were coping with the effects of increased interest rates earlier this year, which were needed to help with growing inflation but damaged the returns of highly valued bonds and leading corporations in the stock market. This article summarizes much literature about asset pricing to present the development of the factor model and Markowitz model. The theory and assumptions of Markowitz's market model and the factor model are thoroughly examined in this article. The paper finds that the CAPM model then has a considerable impact on value evaluation and risk management, with its primary purpose being to establish the relationship between capital risk and return.

Keywords: Factor model · asset pricing · stock market

1 Introduction

The stock market has had a rough six months of recession. Last week, the S&P 500, which represents the massive US stock market, sank 7.6%, while the FTSE 100 in the United Kingdom fell 4.1 percent. These losses come on top of more losses, the global markets down 18% till now, according to the MSCI World Index. A 20% drop indicates that investors have entered a bear market.

Inflation, rising interest rates, and Russia's war in Ukraine are all clear factors for stock market falls. These elements are intertwined and appear to exacerbate each other. Investors were coping with the effects of increased interest rates earlier this year, which were needed to help with growing inflation but damaged the returns of highly valued bonds and leading corporations in the stock market. Then conflict came out, driving up already high energy prices even higher. As a result, overall inflation increased, forcing the Fed to hasten interest rate hikes. And now, the combination of rising interest rates and inflation is hurting overall economic growth, leading to recession fears, which is affecting stock market investors' income and morale [1].

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Therefore, the financial question of the best allocation of financial assets in the stock market available in order to sustain consumption and bequests has become a popular topic, from both an institutional and individual standpoint, the answer to this issue is critical [2]. Quantitative portfolio modeling could aid in addressing the many challenges that arise from the various parties involved, which is the process of identifying the most appealing stocks and selecting their allocation in a portfolio, which is essentially a risk-reward trade-off [3]. There are two models consist of Markowitz's market theory model and the factor model. The goal of this paper has developed a comprehensive investigation of this portfolio selection topic through these two main models of portfolio selection, and to construct a comparison of their benefits and drawbacks of them.

The article begins with a basic explanation and allusions to Markowitz's risk-planning portfolio theory formulation. The CAPM model's essential value in determining the link between capital risk and return is next discussed. Then, due to its potential to mitigate the limitations of the CAPM model, the three-factor model is discussed in depth as a superior and more popular option. Fourth, various modifications to the three-factor model are discussed, such as the development of the five-factor model. The conclusions are offered at the end.

2 Theoretical of Asset Pricing Model

Markowitz postulates that all investors are rational economic men, that they hate risk, and that they seek utility maximization. Not only that, they have homogeneous expectations and they have the same judgment of expected return and risk, and they invest and hold on to it for a period of time. At the same time, it is assumed that the capital market is efficient, that prices do not affect asset prices, that information is complete, and that the market is resilient to supply. We can see from Markowitz's portfolio theory formula that portfolio risk is determined not only by the risk and investment proportion of individual securities but also by the covariance or correlation coefficient of returns of each security. In the portfolio theory of Markowitz theory, we adjust the portfolio according to the mean-variance behavior. Given the same risk, we choose the maximum expected return. Given the same expected return, we choose the least risk. In this way, the non-system risk of a single asset can be spread across a portfolio. Diversification does not affect portfolio yield, but it can reduce the volatility of yield change. The weaker the root relationship between the yield changes of various securities, the more obvious the effect of diversification on reducing risk. It can eliminate the non-systemic risk of the portfolio, but it can't eliminate the systemic risk. In the real securities market, in most cases, there is a certain positive correlation coefficient between the returns of various securities. The task of an effective securities portfolio is to find out the securities portfolio with a weak correlation, so as to ensure that the risk can be reduced as much as possible under a certain expected return. The modern capital asset pricing model is the first model of financial capital pricing. Its primary significance is to establish the relationship between capital risk and return. Compared with securities, it indicates that its expected rate of return is the sum of the risk-free rate of return and risk compensation. Individual investors form the optimal portfolio of risky securities by evaluating the future prospects of different securities. The quantitative method is introduced into the financial field to form a modern

asset pricing theory. Money pricing model the time value of money, value evaluation, and risk management are extremely important components in modern finance. The 1960s and 1970s were the climaxes of the development of asset pricing theory, in which the CAPM model played a core role and significance. With the continuous disconnection between demonstration and theory, people try to explore the reasons for the failure of traditional asset pricing. With people's in-depth discussion, people believe that this is due to people's overconfidence or conservatism when investing. In order to continuously enrich the asset pricing model, actor finance will continue to correctly expand CAPM. CAPM model is still in its infancy in China. It has been greatly improved from verifying single-factor CAPM model to multi-factor application. Because the field of asset pricing has high practicability and the results created are directly related to the real economy, our academic circles still have high and long-term enthusiasm for it.

There are also anomalies in the asset model. He would give some irrational answers, and many times the results were incomplete. The asset pricing model will produce a better interpretation effect when it has limitations in the relevant special environment. According to the speculation of this paper, we will get better returns when our assumptions are more cautious based on the environment. In addition to changing his assumptions, we should also choose the best portfolio. We should also consider some restrictive factors in the environment from a prior perspective. Our asset pricing model not only has the resulting effect but also has certain framework effectiveness [1].

Static asset pricing models also fail to account for cross-sectional returns on portfolios ordered by asset size, book/p ratio, and momentum. The conclusion of this paper shows that the static capital asset pricing model can not explain the value premium or momentum premium, but does not show the choice made by its conditional version. However, this change makes many factors have more advantages than using the three-factor model [2].

And after 1980, static asset pricing models were not very stable. There are also a number of factors that make the capital-asset pricing models used in India less useful. For example, some insider trading can lead to diversified market flows in India, and model coefficients are inaccurate over time due to inadequate infrastructure [3]. At present, the most representative and developmental data in the world can better reflect the effectiveness of some CAPM models. Especially in the inspection of models in India, it is found that some modified CAPM models do not particularly highlight their unique and obvious advantages. However, it needs to be further improved in the test of new and slightly modified models. It can be seen that the CAPM model still has certain irreplaceable advantages, especially in the data processing of India at this stage. Companies with high equity costs invest more than companies with low equity costs when using the capital asset pricing model instead of implicit capital cost. At this time, CAPM is more powerful [4].

After the CAPM asset pricing model was put forward, some scholars gradually found that beta could not fully explain the expected return of assets. Empirical research shows that stock market value, the book to market ratio, financial leverage, and the reciprocal of P/E ratio can well explain stock returns. CAPM cannot explain these anomalies. When studying the relationship between the average return of various stocks and these factors over time, we conducted a multivariable regression on them and found that the market

value and book to market value ratio absorbed the explanatory power of the other two factors and became the decisive variable. The results after regression tell us that the three factors better explain the stock return than the single factor.

During the experiment, we found that as the market value becomes smaller and smaller, the stock return becomes higher and higher. For the same group of beta, the stock return of small market value is better than that of large market value. For the book to market ratio factor, when there is no significant difference in beta, the higher the book to market ratio, the higher the stock return. This conclusion is inconsistent with the conclusion of CAPM. From the statistical data, at least it can be considered that it is not enough to explain the difference between stock returns, and the market value, the book value ratio has a stronger explanatory ability. From the early 1990s to the recent three-factor model has become one of the most mainstream financial achievements. There are two hypotheses for the three-factor model, one is the theoretical hypothesis, and the other is the statistical hypothesis.

The application of factors in theoretical assumptions is based on the theoretical assumption of limited rationality, on which some basic assumptions are obtained. For example, we assume that there are a large number of investors, and the scope of investment is limited to assets traded on the open financial market. All investors plan their investment portfolio in the same securities holding period. There is no securities transaction cost, and investors have the same expectations for the mean, variance, and skew difference of securities returns. All investors have the same evaluation of securities and economic situations. In the statistical hypothesis, it can be seen from the expression of the model that our three-factor model belongs to the multiple regression model, and the three factors are not related to the random error term U . And assume that the mean is zero, there is no linear correlation between explanatory variables. There is no exact linear relationship between the two explanatory variables.

Among the three factors, there is the difference between market portfolio return and risk-free return, which we call market risk, as well as scale and book to market value ratio, which constitutes three factors. The scale factor and value factor are often used in academic research. Because the three-factor model has a far-reaching impact on the investment community, for example, the division of stocks according to the characteristics of market value and book to market value ratio is one of them. Stocks are divided into small-cap stocks, medium-cap stocks and large-cap stocks according to the market value. It is divided into value type, balanced type and growth type according to the book to market value ratio. The compilation method of derivative stock index and the division of fund shareholding style are also affected by this article. The momentum factor was proposed in 1997 and a four-factor model was obtained. In 2015, two factors will be added on the basis of the three factors.

They are profit factor and investment factor respectively. People's research on factors continues to expand. In addition to style factors, there are also various factors such as strategy factors. Griffin's research proves that the three-factor model is a national model, and the global economic variables have a less significant impact on the return level of stock markets than the internal economic variables of various countries. Therefore, some empirical studies based on domestic stock markets in various countries have also made relevant progress, such as Britain, Germany and Switzerland. In fact, as an application

of arbitrage pricing theory, the improved three-factor model can also be used to explain GDP growth rate and bond market yield.

The three-factor model can have many advantages. It can improve the return on investment in the U.S. stock industry and global and portfolio industries and plays a key role in the U.S. stock industry. At present, Fama-French data is also often used in testing and can be put into the use of the momentum model. Fama-French also embodies its advantages in solving the shortcomings of the relative strength system. For example, we can increase irrelevant asset classes or solve the problems encountered by using three factors through hedging [5].

The advantage of the three-factor model is that it can test the index performance of the portfolio [6]. After the development of three factors, there are five factors. Five factors highlight its advantages in explaining the low average stock return related to high beta, a large number of stock issuance, and highly volatile returns. Some results illustrate that the explanatory power of factor models varies from market to market. The use effect of five factors in different countries is more significant. In some cases, the five factors can not explain some anomalies in the market. However, it is worth mentioning that the prediction ability of the factor model is developing more and more perfectly. However, the construction of the model also needs to be analyzed according to the actual situation [7].

Two new factors added in the process of three factors evolving into five factors make his explanation more convincing. It can not only prove that the existence of three factors is more convincing, but also connect the original asset model and three-factor model more firmly. The concern about the five-factor model is not unworthy to study. Due to product differences, barriers to entry of competitors, and instability in the market, these changing factors are easy become the reasons for the small errors in the five-factor explanation. However, we can avoid these errors. When we use the data of each factor, we must consider the current environment and ensure whether there is volatility in the selection of more test data in the process of the experiment. The conclusion will be more accurate [8–10].

3 Conclusion

With the global stock market in a slump, portfolio selection has never been more important. The academic community is particularly interested in two key models: Markowitz's market model and the Factor model. These two models have been thoroughly examined and compared in this passage. To begin, the Markowitz market model proposes the main idea of removing the portfolio's unsystematic risk and adjusting the portfolio using mean-variance behavior. For example, for the same risk, the greatest predicted return is picked. For the same predicted return, choose the riskiest option. Allowing the portfolio to diversify the unsystematic risk of a particular item.

The CAPM model then has a considerable impact on value evaluation and risk management, with its primary purpose being to establish the relationship between capital risk and return. The CAPM model has a big influence on the model we talked about earlier. It shows that, unlike securities, their projected return is equal to the sum of the risk-free rate of return and the risk compensation. Individual investors assess the future

prospects of various securities in order to construct an ideal risky securities portfolio. This quantitative method is widely respected in a number of nations, including China, where the government is a big promoter of future development and has made tremendous progress from validating single-factor CAPM models to multi-factor applications.

However, the CAPM model has flaws, such as the beta failing to completely explain the asset's predicted to return. The three-factor approach was born when researchers discovered that market risk, size, and book-to-market ratios could better explain disparities in stock returns. Other advantages of the three-factor model include the capacity to mix investment returns from different sectors, overcome the inadequacies of the relative strength system, and test the portfolio's index performance. Later, the five-factor model was created, and the factor model's predictive power is becoming increasingly advanced and perfect. However, its construction must be examined separately in light of the circumstances.

Practical references will receive more emphasis in future studies. The theory and assumptions of Markowitz's market model and the factor model are thoroughly examined in this article. Afterward when one can examine the theoretical real-life instances and their references in order to conduct a more careful inspection and comparison.

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