

Application Analysis of Portfolio Theory in Financial Markets

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Abstract. Based on portfolio theory, this paper reviews and summarizes the role of investors and examines two aspects of portfolio theory: the mean variance analysis method and the efficient limit model of the portfolio. And its limitations are analyzed. So that investors can invest better. Indifference curves vary from person to person, and deviations will likely affect the resulting final maximum utility point. Although the research on financial market risk has been relatively mature, there are still some puzzles to be solved in the effective measurement of risk. Markowitz takes the ROI as a representation of ROI and the variance as a representation of ROI, which solves the problem of measurement of asset risk. He thinks that most investors are risk-averse; they will try to avoid risk at the same time as they seek high returns. Therefore, Markowitz has proposed a portfolio investment theory based on the analysis of the mean variance.

Keywords: Portfolio theory; Investor; Profit; Financial market.

1. Introduction

1.1 Research Background

Portfolio theory is very useful in choosing the appropriate combination of yield and risk for investors. The most effective verification of portfolio theory is in Markowitz's theory, which elaborates how to select and allocate assets in the market. Whether investors, investment institutions or market regulators, effective measurement of financial market risk, management and risk avoidance are very critical. For investors with different risk preferences, measuring risk is a key step in the process of market participation. Compared with western developed countries, China's financial market is not perfect, and financial risks, especially systemic risks, are very troublesome. However, the issue of the applicability of this theory to the stock market in China is still in dispute. Based on this, this paper will focus on the analysis of the application of portfolio in the financial market, which has important theoretical and practical significance for enriching the research results of portfolio.

1.2 Research Significance

Portfolio risk can be effectively reduced after Markowitz considers the very real problem that when we set up a portfolio, we should determine how much capital to invest in which securities to get higher returns and take less risk. Economically, this model provides a set of scientific quantitative frameworks, as long as there is optimal information, the optimal portfolio can be found. Thus, this article seeks an optimal portfolio that minimizes investment risk with the same return.

1.3 Paper Organization

This article has been written about the risk and return choices of portfolio theory and the risks and limitations of portfolio theory. The section is introduction, which including research background and significance. Section 2 and 3 describe the relevant studies and limitations of the portfolio. Section 4 is conclusion.

2. Manuscript Preparation

The Markowitz Model requires Expectation Two main components are the Portfolio High Efficiency Frontier Model and Mean Variance Analysis. The effectiveness of Markowitz Portfolio Theory has been demonstrated, and it has been widely used in portfolio and asset allocation. But the

question of whether this theory can be applied to China's stock markets is still an open question. Strictly speaking, a portfolio is a set of securities with a certain amount of investment. Of course, individual securities may also be considered as a separate portfolio. The relevant portfolio is limited to a portfolio of capital and risk-free assets. In the investment process, one can make a choice between an uncertain return and a risk. The two characteristic values of variables, namely mean value and variance are the two key factors for investment portfolio in the financial market. Weight is the ratio of the investment. The return on equity is, of course, made up of dividends, dividends, and capital appreciation. Variance is the change in the return rate of the portfolio. This is known as the Return Volatility Standard Deviation, which is used to measure the risk of a portfolio. How to choose the combination of return and risk in portfolio investment decision-making? This is one of the key problems in portfolio theory. Portfolio theory is concerned with how "rational investors" choose the best portfolio. For rational investors, the principle of maximizing returns from a certain degree of risk will be followed in the investment process, which is consistent with the rational man or economic man assumption in economics [1]. Therefore, the above optimum investment combination is represented as a 2D plane, where the horizontal and vertical axes fluctuate to form a curve. There is one point on this curve that has the smallest change, known as the least squares error (or MVP). The part above the least square of this curve is the known (Markowitz) effective limit of the portfolio, and the underlying portfolio is called an efficient portfolio [2]. On a visual graph, the effective front end of the portfolio presents a convex curve, with the convexity representing that the function has a monotonically increasing character. The AMB curve is often a valid limit in the absence of risk-free, non-volatile, risk-free assets. Point A is the one with the highest return during the life of the investment. The AMC curve is the effective limit of a portfolio when you add a risk-free asset over time. If the market allows short selling, AMB will contract, and if it is constrained, AMB will be split. Indeed, the effective limit for short selling of a portfolio is much more complicated and complicated than one that permits short selling. In a two-dimension voting system, each portfolio is either above or below the effective boundary. Therefore, the effective frontier consists of the overall (Pareto) optimum portfolio, and the rational investor can only choose a portfolio on the effective boundary. Portfolio theory demonstrates how investors can make the most of their specific preferences by choosing between different financial instruments [3]. The best way to do that is to evaluate the trade-off between a higher return and a higher risk. Capital Investment Pricing Model, APT Model et al. development has fundamentally changed the traditional, fundamental approach to investment management, and has resulted in a more systematic and comprehensive approach to the management of investments [4].

Portfolio theory plays a key role in financial markets, especially in financial risk management, and provides an important theoretical and comprehensive analytical framework for portfolio construction and risk analysis. Inspired by the portfolio theory proposed by Markowitz, the modern investment management process can be informed by the following points. Markowitz has a precise definition of risk and return in his investment management. Since then, it has been recognised that risk and return are two of the main parameters (indicators) for the description of sound investment targets. Before Markowitz, investment advisors and fund managers considered risk, but they were more concerned with profit because they couldn't measure it efficiently. Markowitz defines ROI as a function of the expected (average) return on investment and the variance (or standard deviation) of the asset's risk. Therefore, Markowitz proposed an ANOVA approach to maximize the efficiency of stock markets [5].

Therefore, the study of the rationality of the diversification under the capital management background provides a significant theoretical basis. Before Markowitz, there was no systematic approach to decentralized management, although it was widely accepted as a means of reducing risk [6]. According to the model of portfolio variance, the variance of portfolio is not only a linear combination of the variance of different securities, but also the relationship between them. Although individual bond yields are not attractive for standard growth metrics, they are part of a portfolio that has little or no relationship to the underlying securities [7]. For a portfolio with a large number of

securities, the variance of the portfolio depends to a large extent on the covariance of the securities, and the difference is small [8]. The Portfolio Variance Formula thus provides not only a reasonable explanation of Diversified Investment but also useful guidelines for efficient diversification [9,10]. Markowitz's "Efficient Portfolio" concept has changed the focus of fund managers away from the analysis of individual securities to the creation of an efficient portfolio. Thus, investment management practices have undergone a fundamental change with regard to the return on securities, the expected standard deviation and the expected correlation coefficient [11].

This model offers a scientific and quantitative framework, so long as you have sufficient history information, you will be able to figure out the best portfolio when you are aware that the risk of the portfolio can be reduced efficiently. Markowitz thinks that when we build a portfolio, we need to decide what amount of funds we need to invest in so that we can obtain a better return and lower risk? How do we look for the most economical combination with the same return in order to minimize the investment risk? The model offers a scientific quantitative framework, which can be used to search for the optimum portfolio as long as it has the best information.

3. Limitations

The Markowitz model is also limited and difficult: Markowitz's model requires the expected returns of a security, variance, and covariance. Because of the huge quantity of stock, the estimate of the fundamental investment is huge, so Markowitz's application is quite limited. Therefore, Markowitz's model has been used in the optimization of asset distribution.

3.1 The Unreliability of the Solution Caused by Data Error

The Markowitz model can ensure an effective portfolio if there is no estimation error in the data. But because the expected data is not known, it has to be estimated statistically, so it is not error-free. This inaccuracy in the data input caused by the statistical estimation may result in over-investing in some asset classes and under-investing in others. Because the error caused by data collection and processing is often difficult to avoid and eliminate, the error can only be reduced as much as possible in the process of data collection and calculation.

3.2 Instability of the Solution

Another application of Markowitz's model is that a small change in input data can cause a big change in the weight of an asset. Because of the instability of the solution, Markowitz's model is not suitable for the design of real asset allocation policy. The Markowitz model provides a solution for new asset weights that may vary considerably from the previous quarter if the contributions are restated quarterly. This brings some errors to the calculation and measurement, which increases the risk.

3.3 High Cost of Reconfiguration

The adjustment of the proportion of assets adds unnecessarily to the transaction costs. There are so many negative consequences of a change in the asset ratio that the correct policy might be to maintain the status quo, not optimize it. While diversification may reduce the risk of an individual, part of the risk is initially associated with other or all of the securities. When a risk has the same effect on all the securities in the market, all of them will react in the same way. Thus, the portfolio of investment securities is not immune to systemic risk. Secondly, even if investments are diversified, they need not be invested in a number of different companies. It can be diversified into shares, bonds, real estate, etc. Lastly, the diversification approach is not applied by all investors, so that the practical effectiveness of risk diversification is not always fully exploited [12]. Portfolio is a portfolio, but as The Times develops, it has become a mere substitute for a portfolio.

4. Conclusion

Finally, portfolio theory believes that investors only consider returns and risks, but this is not the case. Investors have their own preferred industries when investing, they consider the lucky value of the chosen stock code due to cultural influences and local preferences due to location.

After the limitations of the theoretical starting point have been discussed, the limitations of the theory will be discussed. This theory only tells investors how to buy an investment, but not when to buy. How can investors choose the appropriate entry time to avoid buying at the top and getting left behind? The following Improvement methods can be cost averaging method. The total investment is evenly distributed according to the investment period. When the stock price is low, more shares are bought, and when the stock price is high, fewer shares are bought. In the long run, the average price per share is lower than the average price paid for these shares. In addition to continuous investment capital, investors using the average price method can therefore enter the market in batches to reduce the investment risk at one point in time. This paper expounds the application of portfolio theory in the financial field from various aspects, and gives the limitations of this theory and possible improvement directions. This has important theoretical and practical significance for enriching the application of portfolio in financial markets. However, there are still some deficiencies in this paper. In the process of research, this paper focuses on theoretical analysis, and rarely uses actual data for theoretical testing, which is undoubtedly insufficient. In the future, the paper can choose different assets, which can be risky assets, including risk-free assets, to construct investment portfolio, so as to provide reference for investors with different risk preferences to carry out risk management in the market. In addition, in the selection of models, this paper can also select the commonly used VAR, GARCH or ARMA models to predict volatility, so as to enrich the price forecasting theory.

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