

Research on Financial Asset Allocation Based on Mathematical Programming Model

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Abstract: With the increase of the total amount of family finance and the continuous enrichment of the types of family financial assets, the awareness of family financial management is increasingly strengthened, and people's understanding of family financial assets and their choice behavior begin to change. Financial asset investment has been deeply involved in people's social business activities, especially commercial banks, investment institutions, foundations, etc., which must participate in the investment and management of valuable financial assets at home and abroad. If investors want to reduce the risk of assets without losing profits, they need to diversify their investments and allocate assets effectively. For specific family financial products, some situations often occur in the process of combination, for example, the specific share of insurance assets is gradually increasing, while the share of cash and savings deposits is gradually decreasing. In this paper, the dominant principle of investment strategy is established, and the mathematical programming model of financial asset allocation is established. On this basis, the method of selecting the optimal financial asset portfolio is put forward.

Keywords: Financial asset allocation, Mathematical model, Investment portfolio.

1. Introduction

With the continuous development of China's economy, people's living standard has been gradually improved, and their wealth has been greatly increased. How to realize the increment and preservation of wealth has become an increasingly concerned issue. Portfolio is an effective means to realize wealth appreciation and value preservation [1]. With the deepening of China's financial reform, family financial assets are becoming more and more important, and their proportion in the overall financial assets has also been improved. However, for specific family financial products, some situations often appear in the process of combination [2]. The optimization of financial portfolio investment strategy is to optimize financial assets and allocate funds reasonably to achieve greater expected return with less risk [3]. Relevant personnel should carefully analyze the management problems of family asset portfolio, clarify its existing risk factors and formulate specific solutions. Only in this way can people's economic benefits be truly improved, thus improving people's quality of life [4]. It is assumed that the market investors are rational investors, all of whom pursue the maximization of interests, and the market has an objective evaluation mechanism, which makes the funds of the whole society have better circulation and full use efficiency, and finally achieves the effect of optimal allocation of resources [5].

As a rational economic subject, an enterprise needs to make decisions according to the expected future costs and benefits. For individuals, reasonable asset allocation can ensure the controllability of asset risk while ensuring considerable asset yield [6]. The establishment of investment markets such as assets and futures provides investors with investment places such as hedging and obtaining high profits [7]. Financial asset investment has been deeply involved in people's social business activities, especially commercial banks, investment institutions, foundations, etc., which must participate in the investment and management of valuable financial assets at home and abroad. The specific forms of family financial assets are developing towards diversification, which

indirectly makes its development process hide many risks [8]. Relevant personnel should carefully analyze the management problems of family asset portfolio, clarify its existing risk factors and formulate specific solutions. Only in this way can people's economic benefits be truly improved, thus improving people's quality of life [9]. In this paper, the dominant principle of investment strategy is established, and the mathematical programming model of financial asset allocation is established. On this basis, the method of selecting the optimal financial asset portfolio is put forward.

2. Allocation of Financial Assets

2.1. Concept and significance of investment portfolio

With the continuous development of society, the securities market will also develop in reality, but in different time periods, the specific factors of profitability will be reflected in different forms during the development of the securities market. Therefore, only when the relevant people base themselves on the development process of the financial market and constantly do a good job in securities portfolio, and make clear the different types of risk factors, can they really let investors reduce their own risks and improve their own economic benefits when they invest [10]. It is impossible that there is no risk in the development of the securities market. Many reasons will lead to risk factors in the securities market and affect investors' judgment. In view of this situation, investors' specific attitude towards risk determines their choice behavior. Under reasonable conditions, investors should invest their wealth in all risky assets in a certain proportion, so all investors should participate in risky assets investment. All investors should have the same proportion of risky asset portfolios, and their portfolios differ only in that they distribute wealth between safe assets and risky asset portfolios differently because of their different risk aversion. Portfolio can also effectively obtain the minimum variance on the basis of the specified income level. If the minimum variance can be determined in reality, the quality and

efficiency of portfolio work can be continuously guaranteed.

2.2. Risk evaluation model of financial investment portfolio

With the deepening of China's financial reform, family financial assets are becoming more and more important, and at the same time, their proportion in the overall financial assets has also been increased, which can reflect the changes in people's understanding and choice of family financial assets from the side [11]. Under such circumstances, it is helpful to formulate specific management measures to analyze the related influencing factors of family financial assets investment behavior. For investors, there is often a certain degree of wage income risk in the investment process, and these risks will also have an impact on the investment behavior of family financial assets. If the risk is too high, then investors will choose to stop their investment behavior. Set factor set U and evaluation grade set V for evaluating financial projects:

$$U = \{u_1, u_2, \dots, u_m\} \quad (1)$$

$$V = \{v_1, v_2, \dots, v_m\} \quad (2)$$

In reality, there are different types of assets, and no matter which specific type, there are some risks, which affect the specific investment behavior. If the transaction cost of risky assets is low in the actual situation, the specific cost of fixed assets will be reduced in real life. Therefore, when evaluating different types of risky costs, relevant people must be familiar with the type of the whole product, and evaluate the manpower and financial resources in the product types. Fuzzy evaluation is carried out on each factor in U according to the grade index in the evaluation set, and the evaluation matrix is obtained:

$$R = (r_{ij})_{n \times m} \quad (3)$$

In which r_{ij} indicates the degree of u_i 's membership in v_j . After determining the importance index of each factor, record it as:

$$A = \{a_1, a_2, \dots, a_m\}, \quad \sum_{i=1}^n a_i = 1 \quad (4)$$

Synthesis:

$$\bar{B} = AR = (\bar{b}_1, \bar{b}_2, \dots, \bar{b}_m) \quad (5)$$

After normalization, the following results are obtained:

$$B = \{b_1, b_2, \dots, b_m\} \quad (6)$$

Therefore, the risk evaluation level of financial portfolio projects can be determined.

As one of the most important components of everyone's daily life, family income is a necessary condition for family formation, and it is also the basic factor to maintain it after building a family. In today's social environment, low family income will directly affect people's lives. If people can't even guarantee the most basic quality of life, then naturally there will be no family financial assets investment behavior. For investors, in the process of investment, the inflation in the market often leads to the fact that the original asset portfolio strategy can't meet the actual demand, and at the same time, its original asset strategy will also change. In view of this situation, if we want to reduce the risk of family financial assets, we must reasonably adjust the portfolio adjustment of assets, and reduce the risk factors by reducing the stock weight in the investment composition.

3. Result Analysis and Discussion

3.1. Result Analysis

When investors choose the optimal portfolio investment strategy, they must first determine the financial assets participating in the portfolio and find the optimal portfolio investment on the selected financial assets. Financial portfolio investment can reduce risks while maintaining good returns, but the degree of risk reduction is not only related to the number of financial assets in the portfolio and the advantages and disadvantages of each financial asset, but also related to the correlation between them. Compare the output data of this model with the real financial investment data, as shown in Figure 1.

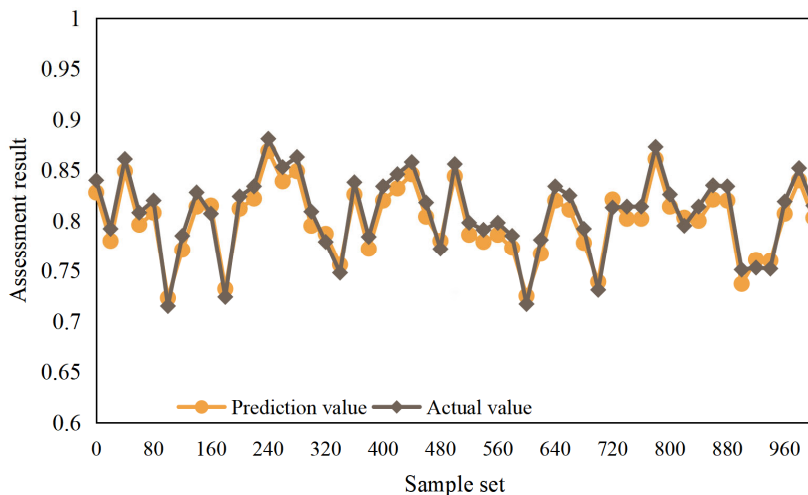


Figure 1. Model learning results of this paper

It is not difficult to see that the results of model learning in this paper are convergent, and can approximate the original data well. The results are satisfactory in terms of both local data and medium-and long-term trend fitting, and there is a basis for forecasting future data. When selecting financial assets, investors should analyze the basic factors, select the financial assets that may be invested within the scope

permitted by funds, combine their personal preferences, sort the financial assets by using the principle of superiority, and find the optimal portfolio investment strategy under the condition that both returns and risks are acceptable. Comparing the accuracy and average absolute error between the financial portfolio model in this paper and the traditional SVM, the results are shown in Figure 2 and Figure 3.

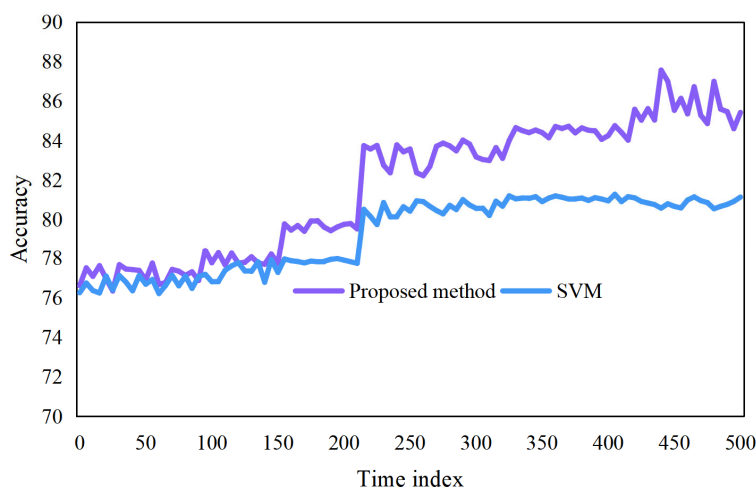


Figure 2. Accuracy comparison

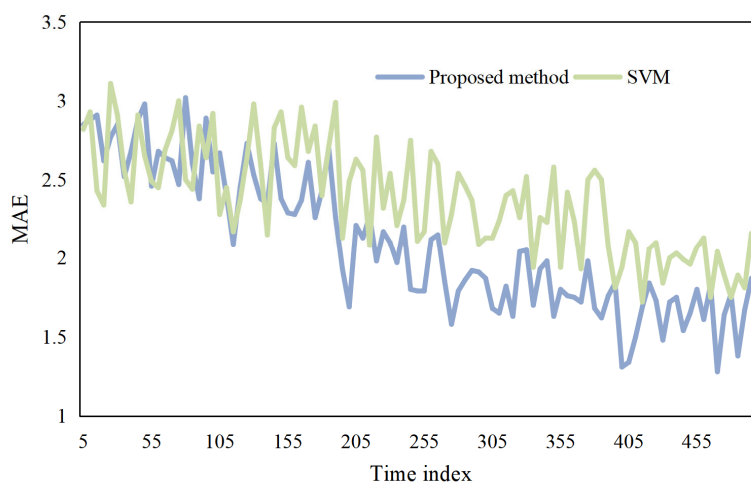


Figure 3. Comparison of average absolute error

As can be seen from Figure 2 and Figure 3, after many iterations, the accuracy of this method is obviously better than that of the comparison algorithm in financial asset allocation, with an accuracy of 93.55% and an error reduction of 45.69%. Therefore, the mathematical programming model of financial portfolio in this paper is a reasonable and feasible evaluation model, which is of great significance for solving the problem of financial asset allocation.

3.2. Measures of financial portfolio management

Although China's family financial market participation is increasing day by day, and family financial assets are gradually diversified, compared with developed countries, China residents still mainly take savings deposits, and the proportion of risky assets investment is very low. Diversified financial market participants are beneficial to the improvement of financial market efficiency. Therefore, the market participation of China financial market investors can

be improved by strengthening financial education, cultivating financial awareness, reducing transaction costs and promoting financial innovation. Perfect capital market and rich financial products are prerequisites for the development of family finance. The diversification of residents' assets is the inevitable result of China's sustained economic growth, increasing residents' income level and rapid accumulation of wealth. However, China residents mainly invest in deposits, with a high savings rate.

In the development of China's financial market, people's investment is the main factor, and in the process of asset portfolio, there will be a high storage rate, which has an impact on people's economic benefits. Therefore, if we want to solve this problem, we must innovate the capital market, reform the financial market and improve the multi-level storage of financial assets based on the current situation of national development. Due to the lack of social insurance and welfare systems usually found in developed countries, individuals need more savings to protect their future.

Therefore, the development of family finance needs to promote the reform of social security system, establish a multi-level insurance system and a new welfare system.

4. Conclusions

Although China's family financial market participation is increasing day by day, and family financial assets are gradually diversified, compared with developed countries, China residents still mainly take savings deposits, and the proportion of risky assets investment is very low. The specific forms of family financial assets are developing towards diversification, which indirectly hides many risks in its development process. Therefore, relevant personnel should carefully analyze the management problems of family asset portfolio, clarify its existing risk factors and formulate specific solutions. In this paper, the dominant principle of investment strategy is established, and the mathematical programming model of financial asset allocation is established. On this basis, the method of selecting the optimal financial asset portfolio is put forward. After many iterations, the accuracy of this method is obviously better than that of the comparison algorithm in financial asset allocation, with the accuracy reaching 93.55% and the error reduced by 45.69%. Therefore, the mathematical programming model of financial portfolio in this paper is a reasonable and feasible evaluation model. Diversified financial market participants are beneficial to the improvement of financial market efficiency. Therefore, the market participation of China financial market investors can be improved by strengthening financial education, cultivating financial awareness, reducing transaction costs and promoting financial innovation. Only in this way can we really improve people's economic benefits and improve people's quality of life.

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