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Research on Portfolio International Diversification and Forecasting the Future Market

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Abstract: International portfolio diversification could tackle the problem of the case of high risk but low return of one single investment. It could be the combination of any two or even more investments. Selecting investments that involve bright prospects is essential. As long as the selection of portfolio is feasible and desirable, the result of the investment would be considerable. The paper mainly tells the importance of portfolio international diversification as well as the models of forecasting the future market. The purpose of this paper is to make sure that the investors can take the least risk but earn the biggest possible income. The portfolio is an investing method that deserves concern. Based on this, deciding which model to use to forecast the future market is necessary. The paper has outlined several models as well as calculations for investors to choose from. Furthermore, the pros and cons of each of them are concluded, and the comparisons between each are made.

Keywords: portfolio international diversification, forecasting the future market, lowering the risk, preventing uncertainties

1. Introduction

1.1. Background

The international portfolio is adopted when the investor is willing to lower the risk as measured by standard deviation while earning as much as can. The success of international portfolio diversification depends on the correlation of the return. One of the most essential advantages of any investment portfolio comes from its diversity. Portfolio diversification could eliminate exposure in any single position and help investors prevent their investments from varying in key parts. Also, it could enhance your returns. By owning a couple of different assets you lower the total risk of your portfolio so that no single investment could create a huge loss. Investing in gold and bitcoin as a portfolio could be a perfect example. If you're not already familiar with gold, it could take time to catch up. Choosing this sort of asset over conventional stocks and bonds is not just a matter of picking which one you think will gain more. There are also factors such as risk, cash flow, taxes, and more. Therefore, investing gold could add complexity to the investment decisions. The same problem happens to Bitcoin as well. A portfolio, however, could tackle such a problem.

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1.2. Related Research

As Eun and Resnick's research shows, in the case of studying the return from international diversification of investment portfolios from the Japanese as well as the US, they found that the US' return had exceeded Japan's return from the portfolio. For American investors, the high return means more gains rather than lowering the risk. The opposite is true for Japanese investors [1]. The research, applying the multi-period investment model to a universe of international securities based on the simple probability assessment approach, carried out by Grauer and Hakansson outlined that, the return of the portfolio excluding the US is remarkably large. It particularly has avoided the case of facing high risk [2].

1.3. Objective

Next, the paper will outline the different models for constructing a portfolio as well as forecasting the future market. Basic: Portfolio construction method by showing the general understanding of portfolio, as well as the recent problem constructing portfolio followed by the different methods and models to tackle the issue. 2.1 Machine learning and soft computing techniques. Using the SVM model to provide an alternative solution in investment as well as to forecast the future market. This part will involve a comparison with other feasible models and then outline the advantages of the SVM model. 2.2 The all-rounded concern. This part is also mainly about the SVM model, but specifically in calculating the return using the SVM model to construct a portfolio, which also involves comparison with other models. 2.3 Forecasting the future market. This is another method to forecast the future market. However, this part contains the failure and the reason for it. 2.4 Lowering the uncertainty. The MV-FR model is used in this part. It is not only about lowering the risk that comes from uncertainty but also about enhancing the return on investments. 2.5 Advantages of MIP. Several advantages of the MIP model are listed in this part.

2. Portfolio Construction Method

Choosing the sensible stocks to construct a portfolio is recognized as a massive challenge due to its uncertainty. The variation in the expected value of the stocks could visibly impact the selection of stocks in the portfolio. However, the predictability of the trend of the value of the stocks has always been doubted.

The well-accepted efficient market hypothesis (EMH) states that "A market is efficient concerning information set θ if it is impossible to make economic profits by trading based on information set θ" [3]. Therefore, the conclusion is the whole market return could not be exceeded by the expert stock selection or market timing. According to the random walk hypothesis, the historical data could not predict the future, owing to the vary of the value of the stock is independent and has no memory [4]. As long as the market is of value, the price of the stocks has reflected all the data, resulting in the impossibility that a trade without insider trading beats the market, which is consistent with EMH. So, a reliable method of prediction could not be made in a short period. Nevertheless, in the past 20 years, few advanced technologies have succeeded in being applied to the selection of stocks as well as the prediction of the finance market.

2.1. Machine Learning and Soft Computing Techniques

Machine learning and soft computing techniques, such as artificial neural networks (ANNs), fuzzy logic (FL), genetic algorithms (GAS), support vector machine (SVM), etc. have been used predominantly in the past two decades for the prediction of stock prices. According to the studies, the performance of the machines has outperformed classical linear statistical models [5-9]. Cao & Tay

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have used Chicago mercantile markets data sets to see the feasibility of applying a support vector machine (SVM) for financial time series forecasting [10]. They compared the results of SVM with those of the backpropagation neural network (BPNN) and the regularized radial basis function (RBF) neural network. In their study, SVM shows its advantage over than BP neural network. The conclusion is that support vector machines forecast significantly better than the BPNN for financial time-series forecasting (Cao & Tay, 2003). Kim again used SVM to predict the KOSPI and the tendency of the variation of the daily price. The result is, that SVM provided a desirable alternative method for the prediction of the financial time series compared with the basic model given by BPNN and CBR.

2.2. The All-Rounded Concern

Hossain & Nasser compared the ARMA-GARCH model and standard BPNN and SVM in order to forecast changes in the NIKKEI 225 and S & P 500 stock indices. Their study showed that, though the ARMA-GARCH model gave the best performance in predicting the right direction of varying, SVM did the best in predicting the error, and was found comparatively easy, which could be easier to explain than the complex GARCH or ANN model. In the same year, Huang invented a methodology for effective stock selection using support vector regression (SVR) as well as genetic algorithms (GA). The result shows that the return of the investigation the method provided significantly outperforms the basic one.

2.3. Forecasting the Future Market

Wang & Zhu proposed a two-step kernel learning method based on the support vector regression (SVR) for financial time series forecasting. Their study shows a hopeful result in predicting the finance market. Based on its strategy of trading always outperforming the market, the excess returns are statistically significant. However, they have not considered the trading cost. Therefore, when the model is frequently used in adjusting the portfolio, the model is not profitable.

2.4. Lowering the Uncertainty

The combination of the prediction of the return and the model of the portfolio has been widely verified as effective. The derived prediction-based portfolios can be classified into five main categories. Mean-variation(MV) model could compare the out-of-sample performance, by using different neural networks to predict the return. Based on the frequent variation of the prediction of the portfolio, the risk budgeting method is applied to advance these portfolios, where the stocks that vary more frequently have more domination over the portfolio. Empirical tests are implemented with component stocks of the Shanghai Stock Exchange (SSE) 50 index, the range of its daily data was from 2011 to 2021. The result shows that, between the different risk aversion levels the portfolio based on the mean-variation forecasted error (MV-FR) was overwhelming better than the others. Besides, such risk-predicting methods have effectively lowered the variation of the portfolio, while promoting the return after adjusting the risk.

2.5. Advantages of MIP

Grantham, Mayo, Van, and Company LLC(GMO) used mixed-integer-programming (MIP) to construct a portfolio that is close to the target portfolio (in the safety part), while having identical liquidity, expected return, and turnover, by controlling the friction cost, and use less unique stocks and less trade. It also applies MIP to the portfolio which is made up of plenty of portfolios. The MIP it used, constructs 11 quantitatively managed portfolios representing over $8 billion in assets. The

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advantages include: (1) stabilize the in-hand client business. (2) Create essential as well as new opportunities. (3) Reduce the stock names by an average of 40% to 60%. (4) Reducing the annual cost of trading the portfolios by at least $4 million by reducing the number of trading tickets written by 75% to 85%. (5) Progress the transaction steps. (6) Improve the virtual behavior of the American fund made up of stocks with small market capitalization.

3. Discussion

3.1. Comparison

In Cortes and Vapnik's study, they compared it with the classical method to specifically outline the ability to forecast the future market for SVM. The same with the study that Wang&Zhu have made. The two-step kernel learning method has also made a perfect performance in forecasting the future market. However, due to the last concern of the transaction cost, the method is identified as not desirable in this part. In comparison, the portfolio constructed by MIP used by Grantham, Mayo, Van Otterloo and Company LLC could reduce the annual cost of trading the portfolios by at least $4 million by reducing the number of trading tickets written by 75% to 85%. Kim, who has found another powerful reason for using SVM to predict the future market, used SVM to predict the trend of KOSPI and daily price changes. The results show that, compared with the basic models given by BPNN and CBR, SVM provides an ideal alternative for the forecasting of financial time series. In the case of lowering the investing risk, Hossain & Nasser showed that the SVM model has the best performance in predicting the risk compared with BPNN, ANN as well and ARMA-GARCH modes, and also found to be easier to explain the reason. Identically, the MV-FR is also focused on predicting the risk based on the frequent variation of the prediction of the portfolio. Not only has it done overwhelmingly well in predicting the risk, but it enhanced the return after adjusting the risk. Nevertheless, the data it used ranged from 2011 to 2021. Though empirical tests are implemented with component stocks of the Shanghai Stock Exchange (SSE) 50 index, the period is a bit old. Whether can it accurately calculate the risk of a portfolio now is not predictable. The MIP used by Grantham, Mayo, Van Otterloo, and Company LLC could stabilize the in-hand client business, which can also be a factor in lowering the risk of the portfolio.

3.2. Application Filed

In general, Cao and Tay's study was a success in seeing the feasibility of applying a support vector machine (SVM) for financial time series forecasting. Based on SVM, Kim also made a considerable found in making an alternative method. Hossain and Nasser have made a study as a milestone, also about SVM, particularly in forecasting the risk as well as easily understood explanation. The same as MV-FR, which can both better forecast the risk and further improve the return after being adjusted. Wang and Zhu, however, their research due to the lack of concern about the transaction cost, show a non-profitable performance. The advantages of MIP, established by Grantham, Mayo, Van Otterloo, and Company LLC, include two main uses: lowering the risk and reducing the transaction cost.

4. Conclusion

The paper mainly talks about the advantages of the portfolio, the construction of a portfolio as well and forecasting the future market to earn the highest return possible with the lowest risk. As the studies show, the portfolio is a necessary method of investing. For forecasting the future market, the SVM model is worth the most consideration. It can perfectly forecast the future market, enhance the return as well and provide a feasible alternative way. For future investments, the investors should consider combining the portfolio together with the SVM model to decide the best way of investment.

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