

Comparison of Portfolio Optimization Models with Real Features: An Empirical Study Based on Chinese Stock Market

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Abstract. In this paper, we compare the performance of four single-period portfolio selection models: Mean-Variance model (MV), Mean Absolute Deviation model (MAD), Conditional Value-at-Risk model (CVaR) and Minimax model (MM). Real features such as transaction cost and cardinality constraint are considered. Systematic in-sample and out-of-sample analyses are carried out to evaluate the efficiency of these four models using historical data from periods with different markets trends in Chinese stock market. Our empirical results reveal that portfolio strategies generated by these four models outperform the market portfolio with higher Treynor ratio and positive information ratio in the bull market and less volatile market, while they generally underperform the market portfolio in the bear market. Moreover, we find that the MM model demonstrates an ability of generating superior portfolio in volatile market with high degree of uncertainty.

Keywords. Portfolio selection model, real features, empirical analysis, market trends, Chinese stock market.

1 Introduction

Portfolio selection is to seek a best allocation of investment among a basket of assets. The pioneering contribution in the field of portfolio theory was made in the 1950s by Harry Markowitz who developed the analytical framework of portfolio selection as a return-risk bicriteria tradeoff where the variance is minimized under a specified expected return. The mean-variance portfolio optimization model can be described as follows.

$$\begin{aligned} \min \quad & \sum_{i=1}^n \sum_{j=1}^n \sigma_{ij} x_i x_j \\ \text{s.t.} \quad & \sum_{j=1}^n r_j x_j \geq \rho M_0 \end{aligned} \tag{1}$$

$$\sum_{j=1}^n x_j = M_0 \tag{2}$$