PARTICLE SWARM OPTIMIZATION ALGORITHM AS A TOOL FOR PROBLEM SOLVING OF PORTFOLIO SELECTION AND OPTIMIZATION BASED ON MARKOWITZ MEAN-SEMI VARIANCE MODEL

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Abstract

Selecting an optimal portfolio is very complicated as it depends on many factors such as assets interrelationships, preferences of the decision makers, resource allocation and several other factors. Allocation of capital among different stock options in a way that this investment provides its stockholder with the most interest is an ideal object for many years. As a result, the decision maker has to take several issues into consideration. These issues are conflicting which makes the problem as a multi-objective one. The main idea of this study is to check the applicability of Particle Swarm Optimization (PSO) to solve multi objective portfolio selection problem. A portfolio containing multiple assets reduces the overall risk by diversifying away the idiosyncratic risk. It is therefore good to consider as many assets as possible, with the limitations of the costs of maintaining such a varied portfolio. Calculating the optimal weights for the portfolio may be a computationally intensive task and thus it is interesting to find heuristic optimization methods that are fast and yet reliable. To test the performance of PSO in this task, subset of the stocks of tehran stock exchange include 146 companies are used here and the percentage of the investment put in each of the assets (weights) is defined by minimizing the semi variance as a Risk criteria of the portfolio. Considering monthly share prices of the companies between 2001 and 2009, a model was developed to select and optimize their stock portfolios. In this line, trough adding a number of the real world limitations to the mean-semi variance base model of Markowitz, the developed model was prepared and its related algorithm were designed using MATLAB software. Finally, the algorithm was carried out for different sizes of stock portfolios. Results of the study prove high stability and optimization for particle swarm algorithms in different frequencies and acceptable times.

Key-word—stock portfolio optimization, multi objective problems, semi variance, risk and return, particle swarm optimization
References


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