Portfolio Selection Using Goal Programming and Genetic Algorithms

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Abstract

This paper is concerned with the application of goal programming and its extensions to portfolio selection. The portfolio investigated consists of real shares taken from the FTSE 100 index for each month from December 1989 to March 1996. Share prices are adjusted to take into account factors such as right issue, scrip issues or dividends paid out during the period. Several models are developed, tested and the results are compared.

The first model tested is a two staged goal programming approach. The first stage requires the finding of the sensitivity relationships between all of the shares in the FTSE to some economic factors and to the index itself. The second stage involves solving the weighted goal programming model using the sensitivity relationships obtained from stage one with some user dependent scenarios.

The second portfolio selection model uses Konno's approximation of the Mean Variance model. In particular, using piecewise linear approximation and applying linear and goal programming techniques to the problem. Similar

techniques are also applied to Konno Mean Absolute Deviation model. Konno's models are also extended to include index tracking.

To reflect the reality of portfolio selection, the ideas of baskets are raised. This is first solved using mixed zero-one integer programming, and secondly, using goal programming and genetic algorithms. Comparisons are made regarding the solutions' quality, time and tracking errors.