Dynamics of Continuous, Discrete and Impulsive Systems
Series **B:** *Applications & Algorithms* **17 (2010)** 55-65

AN AMENDATORY BRANCH AND BOUND ALGORITHM FOR MAD MODEL WITH CONCAVE TRANSACTION COSTS AND BOUNDED ASSETS CONSTRAINTS

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Abstract. This paper is concerned with a portfolio optimization problem under transaction costs and bounded constraints. The mean-absolute deviation (MAD) portfolio optimization model can be transformed into a set of linear programming by using ε-deviation piecewise linear functions to estimate transaction cost functions. An amendatory branch and bound algorithm is proposed to obtain ε-deviation approximate efficient portfolio. In order to compare the algorithm proposed by Konno and Wijayanayake with the amendatory algorithm, a computational experiment from the real stock data in the Shanghai Stock Exchange is offered. The empirical results show that the amendatory algorithm needs less calculation than the previous algorithm, while getting the same optimal portfolio.

Keywords. Portfolio selection; Transaction costs; Bounded assets; Mean-absolute deviation model; Branch and bound algorithm.

AMS (MOS) subject classification: 90C, 60G.

1 Introduction

The standard formulation of the portfolio optimization problem is the mean-variance methodology originally introduced by Markowitz [4]. Markowitz's mean-variance model has played an important role in the development of modern portfolio selection theory. The previous model has been widely extended. Extended models mainly include the mean semi-variance model [11], the mean absolute deviation model [3,5,21], the semi-absolute deviation model [14], the admissible efficient portfolio selection model [18-20].

In financial markets, practitioners are very much concerned about transaction costs because ignoring the transaction costs will lead to an inefficient portfolio. As a result, lots of efficient algorithms are proposed to deal with this problem [1-2,6-7,12,15-17,22-23]. Unfortunately, transaction costs are often treated in a special manner. For example, the transaction costs in [2,12,15-17,22-23] are seen as fixed transaction costs or as a linear function or a V-shaped function. Mulvey [13] used a piecewise linear convex function to approximate the transaction cost function. However, this approach is