Dynamics of Continuous, Discrete and Impulsive Systems
Series **B:** *Applications & Algorithms* **12 (2005)** 565-587

Multiperiod Portfolio Selection on a Minimax Rule

Mei Yu[1], Shou-Yang Wang[2], Kin Keung Lai[3] and X. Chao[4]

[1]School of Business and Finance
University of International Business and Economics, Beijing 100029, China
E-mail: yumei@uibe.edu.cn
[2]Institute of Systems Science, Academy of Mathematics and Systems Sciences
Chinese Academy of Sciences, Beijing 100080, China
E-mail: sywang@iss02.iss.ac.cn
[3] Department of Management Sciences, City University of Hong Kong, Hong Kong
and College of Business Administration, Hunan University, Changsha 410082, China
E-mail: mskklai@cityu.edu.hk
[4]Department of Industrial Engineering
North Carolina State University, Raleigh, NC 27695-7906, USA
E-mail: xchao@cos.ncsu.edu

Abstract. In this paper, we study the multiperiod portfolio selection problem in a financial market using a minimax principle. The investor seeks an investment strategy to maximize his/her terminal wealth and to minimize the total risk which is defined as the sum of the maximum of absolute deviations of investment on each asset over all periods. A closed-form analytical optimal strategy is obtained via dynamic programming method. This model can be used as an alternative to the multiperiod asset allocation model, first proposed by Markowitz (1959), in which the risk is defined as the variance of the terminal wealth. An example is given to demonstrate the application of this model.
Keywords. Portfolio optimization, minimax rule, bicriteria piecewise linear program, dynamic programming.

1 Introduction

The celebrated basic portfolio model was introduced by Markowitz (1959,1989), who analyzed a single-period portfolio selection problem based on the mean and variance of portfolios. From then, the Markowitz model has been extensively studied and extended. Here we briefly mention two important directions of extensions.

The first direction of extensions is dynamic multi-period portfolio selection. Work in this area includes Smith (1967), Chen, Jen and Zionts (1971), Mossin (1968), Merton(1969,1990), Samuelson (1969), Fama (1970), Hakansson (1971), Mossin (1968), Elton and Gruber (1974a,1974b, 1975), Winkler and Barry (1975), Francis (1976), Dumas and Luciano (1991), Grauer and Hakansson (1993), Pliska (1997), and Li and Ng (2000). We remark that no analytical result had been reported in the literature on mean-variance efficient frontiers for multiperiod portfolio selection problem until Li and Ng (2000)