

MULTICRITERIA OPTIMAL CONTROL MODELS FOR PORTFOLIO MANAGEMENT

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Abstract

In this paper we propose a multicriteria optimal control model for the dynamic multi-stage portfolio optimization. The information available at each decision step is applied to simultaneously attain the maximal rate of return, minimal risk, and maximal investment flexibility by the appropriate selection of an optimal compromise regarding the investments. The input data concerning the portfolio structure and the state of economical environment at each moment of time are provided in form of the data matrices, transformed then to a state vector, only a part of it being known to the decision-maker. The evolution of the portfolio structure is described as a discrete-time control system, with the sell/buy transactions as controllable events. Missing state variables are estimated using the Kalman filtering techniques. The investor's goals are modelled as reference points in the space of the criteria values for different planning horizons. To find the best-compromise long-range allocation strategy we propose a decision-making method applying the multiple reference points and distance functions model of the preference structure in discrete multicriteria optimal control problems. This method can be implemented as an on-line interactive decision support system applying the multiple reference point decision-making procedure (MREF) as the user interface.

Keywords. Multicriteria optimization, portfolio theory, stochastic estimation, dynamic programming, discrete-time control systems.

page 90

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