© 1992 The Operations Research Society of Japan

ABSTRACT

Goal Programming Model Approach for Risk Management on Banking Based on Asset Liability Management (ALM)

Norio Hibiki Tadaaki Fukukawa
Keio University

The recent financial deregulation and internationalization have caused a great deal of financial risk to banking in Japan. Therefore financial risk management becomes very important, and banks need to manage not only profit, but also risk.

Several models relating to the bank management have been studied as mathematical programming problems in finance literatures. Risk measures are variously defined, however there are no models based on the idea of risk management (ALM). Therefore we propose the risk measures based on ALM, and the mathematical programming model approach with them. Then goal programming, which is one of the mathematical programming, is applied to the model, in order to manage profit and risk by setting their aspiration levels and required levels, and to represent the trade-off relation between profit and risk.

In this model, the management is assumed to have three kinds of conflicting goals, which are the goals of (i) interest rate risk exposure, (ii) profit, and (iii) maturity gap for active risk management (which means taking actively the risk based on expecting the trend of the interest rate). In addition to these specific goals, regulations, policy on banking and market conditions have to be considered. The four kinds of constraints are formulated, which are the constraints of (i) the upper limit of liquidity risk exposure, (ii) the lower limit of risk asset ratio, (iii) the lower limit of the ratio of cash to deposit, and (iv) the upper and/or the lower bounds of feasible funding, investment, and so on.

Finally, several numerical examples are analyzed in order to investigate the performance of the approach. Due to space restriction, we describe two examples, which are (i) solved in various kinds of goal levels, and (ii) solved in different expectation to the trend of interest rate, in this paper. The results presented are so remarkably good that the model provides a very real advance over previously reported models.