RATIONAL DECISION-MAKING IN PORTFOLIO MANAGEMENT*

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WEALTH-HOLDERS have the option to hold their wealth in many different combinations of stocks, bonds, and cash. The allocation of wealth among these types of assets involves a series of choices extending over time. Rational choice among portfolios involves three steps: (1) deciding upon an objective and criterion for choosing among portfolios; (2) forming beliefs about the probable returns from stocks and bonds and the probable usefulness and satisfaction of holding cash balances; and (3) allocating the portfolio among the various forms of assets in the light of these probability beliefs and the criterion.

The first part of this study is devoted to an analysis of bases for choices among portfolios. The fact that these choices are repetitive in nature with cumulative effects is used as the key factor in defining a goal, a subgoal, and a criterion—or measure—for choosing among portfolios.

The goal of portfolio management is taken to be maximization of portfolio value at the end of a large number of investment periods called "years." Since it is impossible to specify which portfolio actually will be the most valuable at the end of a number of years, it is necessary to use another basis—a subgoal—for choosing among portfolios. The subgoal is an objective which can be reached at the time of making the choice by a decision-maker who has a filled-in payout matrix.

The subgoal proposed in this study is the choice of that portfolio which has the greatest probability (P') of being more valuable than any other specified portfolio at the end of n years, n being large. It is proved that P' for that one portfolio approaches unity as n approaches infinity. Consequently, the portfolio with the highest P' when n is large is almost certain to be more valuable than any other significantly different portfolio in the long run. Selection of the portfolio with the maximum P' is accepted as a rational way to reach the goal of maximum long-run portfolio value.

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It is shown that the portfolio with the probability distribution of returns with the highest geometric mean (G) also has the greatest probability of being more valuable than any other specified portfolio at the end of a large number of years. For this reason, G is accepted as a rational criterion for choice among portfolios.

The second part of the study deals with the problem of allocating a portfolio between risk assets and safe assets on the basis of specified probability beliefs about returns from stocks and bonds. Specifically, it deals with the problem of determining what proportion of a portfolio to allocate to a risk asset in order to maximize G, the geometric mean portfolio return. Both G and this proportion (i.e., $q_{\max}$) are functions of the whole probability distribution of returns from the risk asset and may be determined by means of equations. These equations are often difficult to solve except, possibly, by trial and error. However, equations involving only the mean and variance of the probability distribution of returns from the risk asset often give good estimates of G and $q_{\max}$.

Reference period returns are used to illustrate the hypothetical results of proper allocation of a portfolio between bonds and stocks. In a period characterized by wide changes in returns from the risk asset, diversification between stocks and bonds would have been profitable. On the other hand, holding stocks on margin would have increased the portfolio return in a period characterized by stability. The small variance makes such hypothetical borrowing profitable. The analysis also indicates the effect of uncertainty on the interest elasticity of demand for funds to buy stocks.