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Selecting a portfolio with skewness: Recent evidence from US, European, and Latin American equity markets

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Abstract

Polynomial goal programming, in which investor preferences for skewness can be incorporated, is utilized to determine the optimal portfolio from Latin American, US and European capital markets. The empirical findings suggest that the incorporation of skewness into an investor's portfolio decision causes a major change in the resultant optimal portfolio. The empirical evidence indicates that investors do trade expected return of the portfolio for skewness.
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1. Introduction

In a recent paper, Chunhachinda et al. (1997) examined portfolio selection with skewness utilizing the indices of 14 world capital markets. Many researchers in the empirical as well as theoretical articles have argued that the higher moments of the rates of return distributions, such as skewness, cannot be neglected unless there

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is reason to believe that the rates of return have a normal (symmetrical) probability distribution and/or quadratic utility function. This is tantamount to the assertion that the higher (more than two) moments are irrelevant to the investor's decision under uncertainty (see for example Arditti, 1967; Samuelson, 1970; Rubinstein, 1973; Tobin, 1958; etc.). There is ample evidence (e.g., Ibbotson, 1975; Prakash et al., 2001; etc.) that the rates of return do not admit to a symmetrical probability distribution. Furthermore, others have shown that the assumption of a quadratic utility function is appropriate only for relatively low rates of return (Tobin, 1958; Pratt, 1964), which will preclude its use in many cases.

As shown by Arditti (1967), an investor's preference for positive skewness in the rates of return distribution is consistent with the notion of decreasing absolute risk aversion. This is because positive skewness refers to a right-handed, elongated tail for the density function. Positive skewness is desirable, since increasing skewness decreases the probability of large negative rates of return. Based on the previous research (e.g., Kraus and Litzenberger, 1976; Prakash and Bear, 1986; Stephens and Proffitt, 1991), we also assume that the higher moments of rates of return distributions are relevant to the investor's decision and cannot be ignored.

With the consideration of skewness, the portfolio selection problem becomes three-dimensional. The efficient set will now be a function of required minimum expected rates of return, variance, and skewness. As we will see later, an investors' preference for positive skewness makes the optimal portfolio selection procedure cumbersome and less precise. Perhaps this is the reason that in his Nobel prize speech, Markowitz (1991, p. 471) "...sought as good as an approximation as could be implemented..., thus we (*he*) prefer an approximated method which is computationally feasible to a precise one which cannot be computed." He cites a study by Levy and Markowitz (1979) in which reported that the probability distributions and the expected utility functions utilized, the mean–variance efficient frontier approximates expected utility quite well for diversified portfolios. The data studied were annual returns from 1958 through 1967, for 149 mutual funds, and 1948 through 1968, for 97 randomly selected stocks. Markowitz does point out that there is more work to be done, especially mentioning the computational problems when dealing with higher moments. [1] While analyzing the demand for money, Tsiang (1972) claimed that higher moments can be ignored. However, Levy (1974) argues directly against Tsiang's findings showing that one cannot apply the mean–variance analysis while ignoring all higher moments of the probability distribution.

Following Lai (1991) and Chunhachinda et al. (1997), we incorporate an investor's preference for positive skewness. This necessitates the use of goal programming in portfolio selection. This procedure, goal programming, is a multi-objective technique which analyzes the properties, such as the mean, variance, and the skewness, of the rates of return distribution. The goal programming procedure provides a set of weights for an optimum investment portfolio which addresses the trade-off between competing objectives, such as maximizing the expected rate of return and positive

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