
International Review of Accounting, Banking and Finance
Vol 2, No. 1, Spring 2010 Page 1~8

IRABF
© 2010

A Generalized Markowitz Portfolio Selection Model with Higher Moments

Chin W. Yang [a] , Ken Hung [b]

a. Dept. of Economics Clarion University, Clarion, PA and National Chung Cheng University, Chia-Yi, Taiwan
b. Sanchez School of Business Texas A&M International University Laredo, Texas*

Abstract: This paper proposes a generalized Markowitz portfolio investment model via adding measures of skewness and peakedness into the original Markowitz investment model. With the third and fourth moment in the objective function, we find the magnitude of risk and shapes of the efficient frontier differ from that of the original model. And the original Markowitz model can be seen as a special case of the generalized model.

---

1. Introduction

No doubt, one of the important applications of quadratic programming is the Markowitz portfolio selection model (1952 and 1959) upon which modern investment theory is built. While the quadratic spatial equilibrium model (Takayama and Judge 1971) had wide applications in agriculture and energy markets (see Labys and Yang, 1997), the applications of the Markowitz portfolio model are limited mostly to financial markets and used scarcely in wine investment market (Labys et al. 1981). Perhaps it is one of the least understood models in the finance literature since his model primarily falls within the domain of operations research (Markowitz 1956). Nonetheless, the portfolio selection models have since advanced beyond its prototype (see Sharpe 1963 and 1964, Lintner 1965, Mossin 1956, Ross 1976, Markowitz and Perold 1981 and Markowitz 1987). Not surprisingly, the main focus of these models is primarily on the expansions and improvements in the mean variance space including the equivalence of the Markowitz risk minimization and Sharpe angle maximization models (Yang et al. 2002). Well-known in the literature, if stock returns follow normal distribution, mean and variance are sufficient to describe the return behavior for diversifier. More often than not, however, stock returns do not obey normality and as such higher moments may well be required for more accurate depiction of stock market. The traditional quadratic utility function may well be inadequate to describe a class of behaviors when the degree of skewness plays a role in investment. The purpose of this paper is to expand the original Markowitz model via adding the measures of skewness (third moment about the mean) and peakedness (fourth moment about the mean) as will be done in the next section. Section III provides empirical results by using five companies and compares the efficient frontiers between the original and augmented Markowitz portfolio selection models. It can be easily shown that the original Markowitz model is a special case of the generalized model. A conclusion is given in section IV.