MEAN-VARIANCE EFFICIENT PORTFOLIO SELECTION: AN EMPIRICAL STUDY ON THE NATIONAL STOCK EXCHANGE

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ABSTRACT

Over the last few years, there have been rapid changes in the Indian securities market, more so in the secondary market. Advanced technology and online-based transactions have modernized the stock exchanges. The number of companies listed and the total market capitalization in the Indian equities market is relatively large as compared to the country’s stage of economic development. A systematic and rational financial investment decision in a rapidly changing world of equities investment forms the core of this thesis.

The limited literature available in India in the area of portfolio selection compared to the efficient markets of the developed economies, such as United States of America (USA) and United Kingdom (UK) provides the stimulus to conduct an in-depth study in this field. The explanatory power of equity variables such as return, dividend, beta, liquidity, etc. have been studied in isolation limiting their application in improvement of the existing portfolio selection models. The mathematical complexity of some existing models hinders its applicability.

A balanced portfolio which provides an investor with capital protections and opportunities for superior gains is required. A flexible model capable to accommodate for the real-world constraints and objectives of an investor has been formulated using the Quadratic programming approach.

The model is tested on real data drawn for the Nifty securities for a period of twelve financial years starting from 2000 to 2012. Eight portfolio model formulations namely diversifier’s portfolio, satisficer’s portfolio, plunger’s portfolio, market trend portfolio, capital gain bias portfolio, dividend gain bias portfolio, equal priority portfolio and the ideal portfolio were created for investors with different priorities and risk appetite. The objective of risk (variance) minimization is achieved by optimising across other important portfolio variables such as earnings per share, dividend, free float, impact cost, institutional holding, market capitalisation, net profit, price to book value ratio, price-earnings ratio, promoter’s shareholding, sales, turnover, beta, unsystematic risk and volume simultaneously. All the portfolios created were compared with the Markowitz’s efficient frontier in the risk-return space. Ideal portfolio was found to be the closest to the Markowitz’s portfolio.
Two multiple regression equations have been estimated with returns and excess returns to standard deviation as the dependant variables. Regression models explained the relevance of a new variable namely impact cost having significant explanatory powers for predicting security return and Sharpe ratio. Granger causality tests were undertaken to find out the relationship of causation between returns on a security and the variables set as constraints in the programming problem. The null hypothesis that dividend, impact cost, net profit, promoter’s holding, sales and volume do not cause returns could not be rejected.

The portfolio utility analysis was undertaken to empirically find the utility derived by an investor from alternate portfolios for changing levels of risk tolerance. A direct relationship between the degree of risk tolerance and the value of portfolio utility was found from the quantitative analysis. The portfolio selection model formulations were plotted in the risk-return space along with the utility curves to find the optimal portfolio choice for different types of investors. The evaluation of the alternate portfolio selection model formulations is attempted by using Sharpe ratio (1966) and Treynor ratio (1965). The Sharpe ratio is the highest for Markowitz portfolio followed by the ideal portfolio. The ideal portfolio performed the best, even better than the Markowitz portfolio when evaluated according to Treynor’s ratio. Tests of equality of mean, variance and portfolio utility for ideal portfolio, Markowitz’s portfolio and index portfolio were conducted to investigate the proximity of these portfolios.

The mean-variance model formulated and applied in this research work will be of immense use for the Indian investors both individual and institutional, brokerage houses, mutual fund managers, banks, high net worth individuals, portfolio management service providers, financial advisors, regulators, stock exchanges and research scholars in the area of Portfolio Selection.