Research Article

Estimation Risk Modeling in Optimal Portfolio Selection: An Empirical Study from Emerging Markets

Sarayut Nathaphan[1] and Pornchai Chunhachinda[2]

[1] *Business Division, Mahidol University International College, Nakhonpathom 73170, Thailand*
[2] *Thammasat Business School, Thammasat University, Bangkok 10200, Thailand*

Correspondence should be addressed to Sarayut Nathaphan, sarayut.mark@gmail.com

Efficient portfolio is a portfolio that yields maximum expected return given a level of risk or has a minimum level of risk given a level of expected return. However, the optimal portfolios do not seem to be as efficient as intended. Especially during financial crisis period, optimal portfolio is not an optimal investment as it does not yield maximum return given a specific level of risk, and vice versa. One possible explanation for an unimpressive performance of the seemingly efficient portfolio is incorrectness in parameter estimates called "estimation risk in parameter estimates". Six different estimating strategies are employed to explore ex-post-portfolio performance when estimation risk is incorporated. These strategies are traditional Mean-Variance (EV), Adjusted Beta (AB) approach, Resampled Efficient Frontier (REF), Capital Asset Pricing Model (CAPM), Single Index Model (SIM), and Single Index Model incorporating shrinkage Bayesian factor namely, Bayesian Single Index Model (BSIM). Among the six alternative strategies, shrinkage estimators incorporating the single index model outperform other traditional portfolio selection strategies. Allowing for asset mispricing and applying Bayesian shrinkage adjusted factor to each asset's alpha, a single factor namely, excess market return is adequate in alleviating estimation uncertainty.

1. Introduction

Efficient portfolio is a portfolio that yields maximum expected return given a level of risk or has a minimum level of risk given a level of expected return. Traditional efficient portfolio and its extension incorporating single factor model as suggested by Markowitz [1], Sharpe [2], and Elton, Gruber, Padberg [3], and Michaud [4] had been explored and implemented in active portfolio management. Optimal portfolio or the active portfolio is determined at the tangency of the capital allocation line and the efficient frontier. Portfolio or asset allocation came into play dividing individual wealth investing in three investment choices. The first choice of investment is an active portfolio, the second is the market index portfolio or passive portfolio, and the third is riskless asset or cash. However, performance of an investment strategy recommended by a fund manager, mostly, is not impressive. Especially during the financial crisis period, optimal portfolio is not an optimal investment

as intended. One possible explanation for an unimpressive performance of the seemingly efficient portfolio is incorrectness in parameter estimates called "estimation risk in parameter estimates". Two crucial parameters in an efficient portfolio construction are expected return and variance-covariance matrix. Estimation risk in portfolio formation is caused by treating sample estimates as true parameters. This paper aims at taking estimation risk in parameter estimates into account when constructing an efficient frontier using empirical Bayesian shrinkage incorporating single factor (index) model and comparing Bayesian portfolio's performance with other portfolio formation strategies during two financial crisis periods.

Various studies in the past can be divided into three groups. The first group conducted their studies based on historical data ignoring estimation risk. This group includes Markowitz [1], Sharpe [2], Kraus and Litzenberger [5], Kroll, Levy and Markowitz [6], and Chunhachinda et al. [7, 8]. The second group of studies took estimation risk