Abstract

This dissertation explores estimation risk in the portfolio selection process and proposes an appropriate approach for dealing with estimation risk namely Hierarchical Bayesian Portfolio selection incorporating estimation uncertainty. Based on the U.S. sectorial index, the result indicated that, when estimation risk is taken into account, the admissible efficient set is not changed and the Bayesian admissible efficient set always lies to the right of the traditional admissible efficient set due to higher risk from estimation. Portfolio decisions based on a traditional approach, ignoring estimation risk, would lead to a suboptimal portfolio due to utility loss caused by underestimation of risk. By incorporating both the single index and the three-factor models in an empirical Bayesian approach to estimate grand mean, shrinkage estimators incorporating single index model have shown a noticeable improvement over optimized portfolios based on historical estimates due to its highest Sharpe's ratio. The result suggests that the shrinkage Bayesian portfolio, incorporating single index model or Bayes-CAPM seems to be an appropriate portfolio selection strategy. By treating the common risk factor as a random variable, the study suggests an appropriate portfolio formation, namely the three-layer Hierarchical Bayesian approach assuming variance is known. Since the predictive posterior distribution of the unobserved common risk factor does not have a closed form, a Markov Chains Monte Carlo approach via Gibbs sampling is applied in calculating the Ergodic average of the unobserved common risk factor. The evidence suggests that the three-layer Hierarchical Bayesian Portfolio incorporating a single factor model is an appropriate portfolio selection strategy due to its highest Sharpe's ratio.