Bayesian Approach to a Portfolio Selection Problem

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Mean-Variance (MV) theory of Markowitz for portfolio selection is still one of the most important contributions to modern financial economics. However, MV portfolio selection based on estimates of population moments of returns, leads to a problem of estimation risk that arises from difference between the estimates and the true parameter values. It is known, that estimation risk has a huge impact on mean/variance optimized portfolios, which is one of the primary reasons to make standard Markowitz optimization problematic to apply in practice. In the literature several approaches to incorporate estimation risk into portfolio selection are suggested. In this paper the Bayesian approaches are developed. We will look in detail at the Bayes-Stein estimator developed by Jorion that a priori assumes equal expected returns for all assets. We will show that optimal portfolios based on the Bayes-Stein estimator correspond to portfolios on the original mean-variance efficient frontier with a higher risk aversion.