Institut für Ökonometrie und Statistik

Forschungsseminar

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Seminargebäude - S12

Optimal Shrinkage Estimation of High-Dimensional Portfolios

Abstract

In this paper we estimate the mean-variance (MV) portfolio in the high-dimensional case using the recent results from the theory of random matrices. We construct a linear shrinkage estimator which is distribution-free and is optimal in the sense of maximizing with probability 1 the asymptotic out-of-sample expected utility, i.e., mean-variance objective function. Its asymptotic properties are investigated when the number of assets p together with the sample size n tend to infinity such that $p/n \to c \in (0, +\infty)$. The results are obtained under weak assumptions imposed on the distribution of the asset returns, namely the existence of the fourth moments is only required. Thereafter we perform numerical and empirical studies where the small- and large-sample behavior of the derived estimator is investigated. The suggested estimator shows significant improvements over the naive diversification and it is robust to the deviations from normality.