

Model risk in portfolio optimization

Abstract

We consider a one-period portfolio optimization problem under model uncertainty. For this purpose, we introduce a measure of model risk. We derive analytical results for this measure of model risk in the mean-variance problem assuming we have observations drawn from a normal variance mixture model. This model allows for heavy tails, tail dependence and leptokurtosis of marginals. The results show that mean-variance optimization is seriously compromised by model uncertainty, in particular, for non-Gaussian data and small sample sizes. To mitigate these shortcomings, we propose a method to adjust the sample covariance matrix in order to reduce model risk.