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Robust portfolio estimation

This paper studies a robustness of an optimal portfolio estimators and local asymptotic normality of the return process when the return process has an MA(∞) representation with skew normal innovations. The paper is composed of two parts. In the first part we discuss the influence of the skewness parameter δ of the skew-normal distribution on the optimal portfolio estimators. Based on the asymptotic distribution of portfolio estimators \( \hat{g} \) for Non-Gaussian dependent return process, we evaluate the influence of \( \delta \) on the asymptotic variance of \( \hat{g} \). In particular we study how small departure from normality influence the variance of the estimators. From this we evaluate the robustness and sensitivity of the portfolio via numerical computations. In the second part of the paper we assume that the MA coefficient and the mean of the return process depends on a lower dimensional set of parameters. Based on this assumption we prove the LAN property of the return’s distribution when the innovations follows a skew normal law. The influence of \( \delta \) on the central sequence of LAN is evaluated theoretically and numerically.