Estimating Large Efficient Portfolios with Heteroscedastic Returns

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Abstract: In this paper, we propose a method to estimate mean-variance efficient portfolios when asset returns can be heteroscedastic. We prove that under mild assumptions, our estimated portfolio asymptotically achieves the maximum expected return and meanwhile satises the risk constraint, thus approaching mean-variance efficiency in a setting where the asset returns may exhibit heavy-tailedness, heteroscedasticity, and volatility clustering. Simulation and empirical studies strongly support our theoretical results.