Efficient QMC methods for estimating nested expectations

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Special session: Recent advances in QMC methods for computational finance and Financial Risk management

We consider the problem of estimating some common risk measures (probability, value-at-risk, conditional value-at-risk) of a future loss from a financial portfolio, where the future loss is expressed as a conditional expectation. Since the conditional expectation is intractable in most cases, one may resort to nested simulation. To reduce the complexity of nested simulation, we present an improved multilevel Monte Carlo (MLMC) method by using quasi-Monte Carlo (QMC) to estimate nested expectations. We prove that using QMC can accelerate the convergence rates in the multilevel nested simulation. Numerical results show that the optimal MLMC complexity is attained even in large portfolios.