Stochastic Portfolio Optimization with Round Lot Trading Constraints

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1 Session Description

We study an extension of the classical Markowitz mean-variance portfolio optimization model. We consider that the expected asset returns are stochastic by introducing a probabilistic constraint which imposes that the expected return of the constructed portfolio must exceed a prescribed return threshold with a high confidence level. We account for the real-world trading constraint that requires the purchase of stocks in large lots. To solve the deterministic equivalent of the resulting stochastic problem, we propose an exact solution approach in which the uncertainty in the estimate of the expected returns and the trading restriction, modelled with general integer variables, are simultaneously considered. The algorithmic approach rests on a non-linear branch-and-bound algorithm which features two new branching rules. The first one is a static rule, called idiosyncratic risk branching, while the second one is dynamic and is called portfolio risk branching. The results obtained with the two proposed branching rules are compared with the results obtained with the solvers Bonmin, MINLP BB and CPLEX.

References

[1] Bonami P., M.A. Lejeune. 2009. An Exact Solution Approach for Integer Constrained Portfolio Optimization Problems under Stochastic Constraints. *Operations Research* 57 (3), 650-670.

[2] M.A. Lejeune. A VaR Black-Litterman Model for the Construction of Absolute Return Fund-of-Funds. Forthcoming in *Quantitative Finance*.