

Multi-Period Portfolio Optimization with Constraints and Transaction Costs

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- [dyn_port_opt.pdf](#)

We consider the problem of multi-period portfolio optimization over a finite horizon, with a self-financing budget constraint and arbitrary distribution of asset returns, with objective to minimize the mean-square deviation of final wealth from a given desired value. When there are no additional constraints, this problem can be solved by standard dynamic programming; the optimal trading policy is affine, i.e., linear plus a constant. We describe a suboptimal policy that handles additional constraints on the portfolio or trading, such as linear transaction costs or a no-shorting constraint. The suboptimal policy involves solving an optimization problem, typically a convex quadratic program, at each step, using the Bellman (value) function for the associated unconstrained problem to approximately account for the value of future portfolios. Examples show that this suboptimal trading policy often obtains an objective value close to that for the associated problem without constraints, and is therefore nearly optimal. In particular we will see that even with transaction costs, our suboptimal trading policy performs almost as well as when there are no transaction costs.