ELECTRICAL PORTFOLIO MANAGEMENT WITH FINANCIAL RISK CONSTRAINT

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Liberalization of energy markets involves a new set of problems for electrical companies: it is thus necessary for such companies to master both traditional problems, such as optimization of electrical generation, and emerging problems, such as integration of spot markets and risk management. The historical problem, which consisted in managing the electrical generation at lowest cost, evolved as problem of cost minimization under risk constraint: financial risks are now added to the traditional risks.

We focus here on solving a portfolio optimization problem under risk constraint. The portfolio we consider consists of financial contracts and energy assets. We are interested in minimizing its expected cost. Controls are generation decisions and trading activities, and primitive random variables are energy demand, reservoir inflows and market prices. This problem is subject to bounds constraints on generation decisions and trading activities, energy balance constraint (which is a global constraint which states equilibrium between the generation, the demand and the financial contracts), dynamics for reservoirs (linking the level of the reservoir at the beginning of the days \(d\) and \(d+1\) depending on the inflows and the production during the day \(d\)), and financial risk constraint. In this talk, we reformulate this problem and show that, for a specific class of risk measures, it can be solved using stochastic dynamic programming in discrete time, after having introduced a two parameters family of Bellman functions.

References