Multi-Period Portfolio Selection for Stochastic Liabilities

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Abstract

In this paper we investigate a multi-period portfolio selection problem of an investor with a given consumption pattern. Following Dhaene et al. (2004) we assume a Black & Scholes type market with a basket of 1 riskless and m risky securities. In determining the optimal investment strategy we restrict ourselves to the class of so-called constant mix strategies.

In this contribution we generalize the results of Dhaene et al. (2004) who analyze a problem of an investor that has to meet a series of deterministic cash-flows which have to be paid at the end of n subsequent years.

We consider two types of problems. First, we search for the optimal investment mix of an investor who has to meet a series of future random obligations (or has to satisfy a series of future consumptions, characterized by the same distribution function). In the second application we investigate a problem of finding the optimal investment strategy of an investor who tries to meet a series of future deterministic obligations with unknown (random) time horizon.

The choice of the optimal investment strategy will be based on minimization of a risk measure of the present value function. We solve this problem by using comonotonic approximations for scalar products of random variables (see Hoedemakers et al. (2003) and Dhaene et al. (2002)). These approximations facilitate greater accuracy and reduce simulation time required for computing certain risk measures.

Keywords: portfolio selection, constant mix strategy, Black & Scholes, comonotonicity.

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