GORAN PESKIR (University of Manchester)

Title: Constrained Dynamic Optimality and Binomial Terminal Wealth

Abstract: Assuming that the stock price follows a geometric Brownian motion and the bond price compounds exponentially, we recently derived a dynamically optimal control for the investor aiming to minimise the variance of his terminal wealth over all admissible controls such that the expectation of the terminal wealth is bounded below by a given constant. We showed that the dynamically optimal wealth process solves a meander type equation which makes the wealth process hit the given constant exactly at the terminal time. This was done under no pathwise constraint on the wealth process which could take low/negative values of unlimited size. In this talk we consider the analogous variance minimising problem upon imposing the guarantee that the (discounted) wealth process always stays above a given constant regardless of whether the investment is unfavourable. We show that the dynamically optimal wealth process can be characterised as the unique (strong) solution to a stochastic differential equation with time-dependent coefficients. By analyzing this stochastic differential equation (extending Feller's test to time-inhomogeneous diffusions that is of independent interest) we show that the dynamically optimal terminal wealth can only take two values. This binomial nature of the dynamically optimal strategy stands in sharp contrast with other known portfolio selection strategies encountered in the literature. A direct comparison shows that the dynamically optimal (time-consistent) strategy outperforms the statically optimal (time-inconsistent) strategy in the variance minimising problem.

Joint work with Jesper Pedersen (Copenhagen).