Seminário da linha Estatística e Gestão do Risco

Workshop - Matemática nos Mercados Financeiros

Data: 4 de Maio de 2016

Local: Departamento de Matemática, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa.

Sala 1.9 do Edifício VII.

PROGRAMA

15h00 **Gonçalo Faria**, Business School and CEGE, Universidade Católica do Porto, "The Correlation Risk Premium Term Structure"

15h40 **Nuno Azevedo**, Financial Stability Department - Banco de Portugal, "Dynamic Programming for Modulated Jump-Diffusion"

16h20 *Coffee break*

16h30 **Cláudia Nunes Phillipart**, Instituto Superior Técnico, Universidade de Lisboa "The value of a firm with exit and suspension options"

17h10 **João Beleza**, Instituto Superior de Engenharia de Lisboa, Instituto Politécnico de Lisboa, "Bonds Historical Simulation Value at Risk"

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ABSTRACTS

The Correlation Risk Premium Term Structure: As the recent financial crisis has shown, diversification benefits can suddenly evaporate when correlations unexpectedly increase. We analyse two alternative measures of correlation risk and their term structure, based on S&P500 correlation swap quotes and the synthetic correlation swap rates estimated from option prices. Our main empirical findings are supported by a Lucas Orchard type model, with heterogeneous agents that differ in their beliefs about the probability of a systemic rare disaster. When the latter occurs, there is an increase in the dispersion in beliefs about expected consumption growth rate and in the consumption share of the more pessimistic agent. This generates a flattening of the term structure for both the risk neutral expected correlation and the correlation risk premium during periods of enhanced uncertainty.

Dynamic Programming for Modulated Jump-Diffusion: We will discuss a class of stochastic optimal control problems with deterministic finite horizon and state variable dynamics determined by modulated jump diffusions. We will consider two alternative, yet related, classes of processes modulating the dynamics: a Markov process and a Semi-Markov process, both with a

nite state space. We will focus mainly on the derivation of generalized dynamic programming principles, as well as on the corresponding Hamilton-Jacobi-Bellman equations which turn out as partial integro- differential equations. Time allowing, as an application of our results, we study a finite horizon consumption- investment problem for a jump-diffusion

nancial market consisting of one risk-free asset and one risky asset whose coefficients are assumed to depend on the state of a continuous time finite state Markov process. We provide a detailed study of the optimal strategies for this problem, for the economically relevant families of power utilities and logarithmic utilities.

The value of a firm with exit and suspension options: We study the optimal decision of a firm that chooses to abandon activity, continue producing or temporarily suspend operations, using a real options approach. This is an optimal impulse problem, where a strategy is a sequence of impulses (corresponding to switching from production to suspension and vice-versa), with a stopping time (the time that the firm decides to exit, permanently, the market).

In order to find the optimal solution we need to solve two interconnected Hamilton-Jacobi-Bellman equations, which then lead to several possible thresholds, depending on relations on the parameters (parameters of the diffusion and also costs).

We then present the most relevant cases, in particular the one where the economical intuition is not on line with the mathematical solution.

Bonds Historical Simulation Value at Risk: Due to the pull to par evolution of bond prices, bonds historical returns tend to zero as time to maturity approaches. As a consequence, bonds historical returns can not be used to compute Value at Risk (VaR) by historical simulation. They would systematically overestimate VaR. In this paper we propose an adjustment of bonds historical returns, that al- lows computing VaR by historical simulation. The aim of our proposal is to compute VaR by historical simulation of portfolios with bonds, keeping the same level of simplicity the historical simulation method allows, for instance, for stocks.