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Virtual Workshop on Financial Mathematics and Stochastic Analysis

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June 22nd and 23rd 2020

Registration: https://ucsb.zoom.us/webinar/register/WN_aKVFBV2QQwmT4QDl1S9Mbw

Monday, June 22nd 2020

Numerical methods in mean-field game for large banking system with defaults

Speaker: Tomoyuki Ichiba (University of California, Santa Barbara, USA)

Time: 06:00 PM Central European Time (09:00 AM Pacific Standard Time)

Credit Risk and mild explosivity of Credit Default Swaps in the Corporate Energy Sector

Speaker: Isabel Figuerola-Ferretti (Universidad Pontificia Comillas, Spain)

Time: 07:00 PM Central European Time (10:00 AM Pacific Standard Time)

Tuesday, June 23rd 2020

A Market Approach for Convergence Trades

Speaker: Ioannis Paraskevopoulos (Bankia, Spain)

Time: 06:00 PM Central European Time (09:00 AM Pacific Standard Time)

Portfolio Selection using the Distribution Builder

Speaker: Stephan Sturm (Worcester Polytechnic Institute, USA)

Time: 07:00 PM Central European Time (10:00 AM Pacific Standard Time)

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Abstracts

Numerical methods in mean-field game for large banking system with defaults , Tomoyuki Ichiba, University of California, Santa Barbara, USA

We consider the dynamics of the cash reserves of an interconnected banking system. Whenever a bank defaults (by letting its reserve reach a given threshold), each bank is impacted negatively, via an instantaneous jump on its reserve level. We also take into account the arrival of new financial institutions in the system. The underlying dynamics of such a system is written in the spirit of the spiking neural network models as studied by Delarue, Inglis, Rubenthaler and Tanre. Each bank optimizes the cost in a set of mean-field games. We discuss numerical methods to solve the mean-field game and identify the resulting dynamics as the equilibrium of the game among banks in interaction. Part of research is joint work with R. Elie and M. Lauriere.

Credit Risk and mild explosivity of Credit Default Swaps in the Corporate Energy Sector, Isabel Figuerola-Ferretti (Universidad Pontificia Comillas, Spain)

This paper provides a new dimension to the determinants of credit risk in the energy sector over the last two decades. We measure credit risk in energy corporations using CDS spreads and CDS sectorial energy indexes to assess whether credit risk in energy companies exhibited significant departures from random walk behavior during the last two decades. Using the multiple bubble methodology proposed by Phillips Shi and Yu (2015) we detect first departure from random walk around the Global Financial Crisis and a second departure around and after the recent 2014 crude oil price collapse. We associate the salient features observed in CDS spreads with their fundamental forces. Results show that the 2014 and 2015-2016 episodes of mild explosivity reported for CDS spreads can be tied to statistically significant decreases in crude oil prices as well as to abrupt increases in debt levels following the effects of Taper Tantrum in 2013.

A Market Approach for Convergence Trades, Ioannis Paraskevopoulos (Bankia, Spain)

This paper uses a VECM representation for cointegrated assets in the continuous time framework. Subject to the existence of an alternative asset for the investment horizon, it derives optimal weights for positions on pairs that are traded continuously. This involves maximizing the portfolio value at terminal time but without the requirement of a functional form for investor's preferences. To this end, we connect the derived optimal portfolio with European type spread options which can be replicated by equivalent digital options. In consequence, the optimal investment policies are the delta hedging strategies of a contract that gives the right to exchange one asset for another in some prespecified future dates. Our framework is tested empirically using pairs identified from the Dow Jones Industrial Average. This analysis uses unbiased maximum likelihood estimates of the continuous VECM parameters. The combination of a model derived selection procedure and optimal portfolio weights delivers consistent profitability that outperforms competing benchmark methodologies.

Portfolio Selection using the Distribution Builder, Stephan Sturm (Worcester Polytechnic Institute, USA)

Portfolio optimization subject to personal preferences of an economic agent is a mainstay in financial mathematics. The common way this problem is set up is via a utility function representing the agent's preferences. This supposes in practice that agents behave rationally as well as that there is a practical and tangible way to determine their utility function. An alternative approach, known as Distribution Builder, has been proposed by Goldstein, Sharpe and Blythe: investors should determine directly the distribution of the terminal payoff given their budget constraint. In this talk we first review the concept of the distribution builder and the mathematical model behind it, and then propose extensions to optimization of intertemporal consumption and in incomplete markets. This is based on ongoing joint work with Carole Bernard and Mauricio Elizalde Mejía.

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