

IAS Quantitative Finance and FinTech Mini Workshop

Date: 23 June 2016 (Thursday)

Time: 1:30 – 6:00 pm

Venue: Cheung On Tak Lecture Theater (LT-E), HKUST

Program Schedule

Time	Event
1:30 – 1:45	Opening Remarks
1:45 – 2:30	Plenary Talk: "Rank Tests at Jump Events" George Tauchen (Duke University)
2:30 – 3:00	"Simulation-based Value-at-Risk for High-dimensional Nonlinear Portfolios" Hoi Ying Wong (The Chinese University of Hong Kong)
3:00 – 3:30	"Affine Jump-Diffusions: Stochastic Stability and Limit Theorems" Xiaowei Zhang (The Hong Kong University of Science and Technology)
3:30 – 4:00	Group Photo / Coffee Break
4:00 – 4:45	Plenary Talk: "Novel Factor Models for Validating Market Risk Factors and Forecasting Bond Risk Premia" Jianqing Fan (Princeton University; Visiting Professor of HKUST Jockey Club Institute for Advanced Study)
4:45 – 5:15	"Financial Intermediation and Capital Reallocation" Kai Li (The Hong Kong University of Science and Technology)
5:15 – 5:45	"Open Quant Cloud Platform" Zhibin Lei (Hong Kong Applied Science and Technology Research Institute)

Plenary Talk: Rank Tests at Jump Events

George Tauchen

Duke University

We propose a test for the rank of a cross-section of processes at a set of jump events. The jump events are either specific known times or are random and associated with jumps of some process. The test is formed from discretely sampled data on a fixed time interval with asymptotically shrinking mesh. In the first step, we form nonparametric estimates of the jump events via thresholding techniques. We then compute the eigenvalues of the outer product of the cross-section of increments at the identified jump events. The test for rank r is based on the asymptotic behavior of the sum of the squared eigenvalues excluding the largest r . A simple resampling method is proposed for feasible testing.

The test is applied to financial data spanning the period 2007-2015 at the times of stock market jumps. We find support for a one-factor model of both industry portfolio and Dow 30 stock returns at market jump times. This stands in contrast with earlier evidence for higher-dimensional factor structure of stock returns during "normal" (non-jump) times. We identify the latent factor driving the stocks and portfolios as the size of the market jump.

(Joint work with Jia Li, Viktor Todorov and Huidi Lin)

Simulation-based Value-at-Risk for High-dimensional Nonlinear Portfolios

Hoi Ying Wong

The Chinese University of Hong Kong

Value-at-risk (VaR) has been a standard risk measure for quantifying market risk since its introduction. While the Delta-normal approach can theoretically be applied to approximate the VaR of portfolios, the accuracy of such an approach, however, significantly diminishes when the portfolios concerned contain derivative positions with nonlinear payoffs. The lack of closed form solutions for these potentially highly correlated derivative prices further complicates the problem. This paper proposes a model-free simulation-based algorithm for VaR evaluation. The proposal leverages cross-sectional information and applies variable selection techniques to simplify the simulation framework, which can be made possible by formulating the problem of interest into a high-dimensional sparse regression problem. Asymptotic properties of this new approach are established which demonstrate the advantages of the additional model selection component in the original least-squares Monte Carlo approach. Numerical results verify the effectiveness of our approach in comparison with existing practices.

(Joint work with Junyao Chen and Tony Sit)

Affine Jump-Diffusions: Stochastic Stability and Limit Theorems

Xiaowei Zhang

The Hong Kong University of Science and Technology

Affine jump-diffusion (AJD) processes constitute an important class of continuous time stochastic models that are widely used in finance and econometrics. Most methods for parameter estimation (e.g. maximum likelihood estimation or generalized methods of moments) of this type of processes generally assume ergodicity in order to establish consistency and asymptotic normality of the estimator. In this talk, we present several results on the stochastic stability of AJDs. We establish ergodicity of AJDs by imposing a “mean reversion” assumption and a mild condition on the distribution of the jumps, i.e. the finiteness of a logarithmic moment. As a stronger result, exponential ergodicity is proved if the jumps have a finite moment of a positive order. In addition, we prove strong laws of large numbers and functional central limit theorems for additive functionals of this class of models. These limit theorems lay a solid foundation for parameter estimation methods of AJDs.

Plenary Talk: Novel Factor Models for Validating Market Risk Factors and Forecasting Bond

Risk Premia

Jianqing Fan

Princeton University

We provide an econometric analysis for the factor models when the latent factors can be explained partially by several observed explanatory proxies. In financial factor models for instance, the unknown factors can be reasonably well predicted by a few observable proxies, such as the Fama-French factors. In diffusion index forecasts, identified factors are strongly related to several directly measurable economic variables such as consumption-wealth variable, financial ratios, and term spread. To incorporate the explanatory power of these observed characteristics, we propose a new two-step estimation procedure: (i) regress the data onto the observables, and (ii) take the principal components of the fitted data to estimate the loadings and factors. The proposed estimator is robust to possibly heavy-tailed distributions, which are encountered by many macroeconomic and financial time series. With those proxies, the factors can be estimated accurately even if the cross-sectional dimension is mild. Empirically, we apply the model to forecast US bond risk premia, and find that the observed macroeconomic characteristics contain strong explanatory powers of the factors. The gain of forecast is more substantial when these characteristics are incorporated to estimate the common factors than directly used for forecasts.

(Joint work with Yuan Liao, Yuan Ke)

Financial Intermediation and Capital Reallocation

Kai Li

The Hong Kong University of Science and Technology

To understand the link between financial intermediation activities and the real economy, we put forward a general equilibrium model where agency frictions in the financial sector affect the efficiency of capital reallocation across firms and generate aggregate economic fluctuations. We develop a recursive policy iteration approach to fully characterize the nonlinear equilibrium dynamics and the off-steady state crisis behavior. In our model, adverse shocks to agency frictions exacerbate capital misallocation and manifest themselves as variations in total factor productivity at the aggregate level. Our model endogenous generates counter-cyclical volatility in aggregate time series and counter-cyclical dispersion of marginal product of capital and asset returns in the cross-section.

(Joint work with Hengjie Ai, and Fang Yang)

Open Quant Cloud Platform

Zhibin Lei

Hong Kong Applied Science and Technology Research Institute

We will introduce the OQCP platform based on scalable cloud architecture with enhancement on integration, performance tuning and optimization for quant strategies and math modeling tools. It aims to serve as an open and extensible platform for financial industry and university research.