International Conference on Financial Risks and Uncertainties 2017

June 17, 2017 (Sat) 9:45 – 17:30
June 18, 2017 (Sun) 10:00 – 17:15

Ohama Nobumoto memorial hall in Ishigakijima, Okinawa, Japan

京都大学　経済研究所
Institute of Economic Research, Kyoto University

首都大学東京　金融工学研究センター
Research Center for Quantitative Finance, Tokyo Metropolitan University

Scientific Committee

Chiaki Hara (Kyoto University)
Katsumasa Nishide (Hitotsubashi University)
Kyoko Yagi (Tokyo Metropolian University)
Masaaki Fukasawa (Osaka University)
Masaaki Kijima (Tokyo Metropolitan University)
Teruyoshi Suzuki (Hokkaido University)
Toshiki Honda (Hitotsubashi University)
Yuan Tian (Ryukoku University)

Organized by
Research Project at KIER Joint Usage and Research Center,
"Analysis of systemic risk with model uncertainty",
Institute of Economic Research, Kyoto University.

Co-organized by
Research Center for Quantitative Finance, Tokyo Metropolitan University.
Japanese MEXT Grants-in-Aid for Scientific Research (A) # 25245046.
Credit Pricing Corporation (CPC).

Official website: `https://sites.google.com/site/kierfinconf2017/`

June 17 (Sat)

Session 1

9:45–10:30	Hyun Jin Jang	Ulsan National Institute of Science and Technology
	"Dynamics of Systematic risk and Systemic risk in CDOs"	
10:30–11:15	Tomonori Nakatsu	Ritsumeikan University
	"Some properties of density functions on maxima of solutions to one-dimensional stochastic differential equations"	
11:15–12:00	Christopher Ting	Singapore Management University
	"A Model of Price Impact Function"	

Session 2

13:30–14:15	Yuan Tian	Ryukoku University
	"Debt Rollover, Bankruptcy, and Debt Maturity"	
14:15–15:00	Nan Chen	The Chinese University of Hong Kong
	"A Primal-Dual Iterative Monte Carlo Method for Stochastic Dynamic Programs and Its Applications in Finance"	

Session 3

15:15–16:00	Rusudan Kevkhishvili	Kyoto University
	"An Application of Time Reversal to Credit Risk Management"	
16:00–16:45	Hiroyuki Nakata	University of Leicester
	"Loan Monitoring and Bank Risk"	
16:45–17:30	Kit Pong Wong	University of Hong Kong
	"A Comparative Statics Approach to Higher-Order Absolute Risk Aversion"	

June 18 (Sun)

10:00–17:00	Reports and discussions on recent developments on the analysis of capital markets with model uncertainty
17:00–17:15	Closing address

June 17, 9:45–10:30

Dynamics of Systematic risk and Systemic risk in CDOs

Hyun Jin Jang

Ulsan National Institute of Science and Technology

We introduce methods of quantifying and forecasting systematic risk and systemic risk in the credit portfolio of CDO tranches. For systematic risk, the one factor Marshall-Olkin copula model is employed because it allows simultaneous defaults, and provides an analytic formula for CDO prices. For systemic risk, the interacting intensity-based model is adopted to consider contagious tendency existing in credit events. Using the daily price data for CDO tranches on iTraxx Europe during the whole life of the index, we extract the parameter sequences for both models over time. After calibration, we select the time series models with minimal forecasting errors through several performance measures. We predict one-step future levels of systematic- and systemic risks with rolling window analysis, and estimate historical and future loss distributions on the iTraxx Europe portfolio over time.

June 17, 10:30–11:15

Some properties of density functions on maxima of solutions to one-dimensional stochastic differential equations

Tomonori Nakatsu

Ritsumeikan University

In the talk, we shall obtain some properties of the probability density function concerning maxima of a solution to one-dimensional stochastic differential equations. In particular, we will first obtain lower and upper bounds for the density function of discrete time maximum of the solution. Then, we shall show that the density function of discrete time maximum converges to the density function of continuous time maximum of the solution. Finally, the positivity of the density function of continuous time maximum and a relationship between the density functions of the continuous time maximum and the solution itself will be obtained.

June 17, 11:15–12:00

A Model of Price Impact Function

Christopher Ting

Singapore Management University

In trading, price impact is an important element in pre- and post-trade analysis. Starting from first principles, we derive a Bernoulli ordinary differential equation for which the solution is a price impact function of order flow. In our framework, investors require a premium to compensate their exposure to liquidity risk. This new concept is consistent with the stylized "size anomaly" that illiquid small stocks tend to "outperform" liquid big stocks. Our research produces a framework not only to estimate liquidity risk premium, but also to model stochastic volatility. Furthermore, our model suggests a Black-Scholes formula that depends also on the order flow, and provides a plausible explanation for the return reversal effect.

June 17, 13:30–14:15

Debt Rollover, Bankruptcy, and Debt Maturity

Yuan Tian

Ryukoku University

This paper develops a framework for jointly analyzing the debt rollover and bankruptcy decisions. The existing literature in dynamic corporate finance has examined equity holders' bankruptcy decision and debt holders' rollover decision independently. However, since the recovery value of debt upon bankruptcy may be less than the face value, debt holders make rollover decision taking into consideration equity holders' bankruptcy decision. In the meantime, equity holders' bankruptcy decision-making depends on debt holders' rollover decision. We demonstrate how the bankruptcy decision and rollover decision interact with each other and show the model implications for debt maturity.

June 17, 14:15–15:00

Error Analysis of Finite Difference and Markov Chain Approximations for Option Pricing

Nan Chen

The Chinese University of Hong Kong

In this paper we use the information relaxation technique to develop a value-and-policy iterative method to solve stochastic dynamic programming problems. Each iteration generates a confidence interval estimate for the true value function and a corresponding suboptimal policy so that we can use the gap between the upper and lower bounds to access the quality of the policy. We show that the resulted sequences of suboptimal policies will converge to the optimal one within finite number of iterations through our method. A regression-based Monte Carlo algorithm is introduced to overcome the dimensionality curse in the implementation of this approach for high dimensional cases. Our formulation reduces the original problem to solving a sequence of open loop control problems. We can thereby rely on a variety of well-developed deterministic optimization algorithms to accelerate the computational speed. It is different from the traditional literature of approximate dynamic programs where a majority of methods need to solve stochastic optimization problems. As numerical illustrations, we apply the algorithm to the optimal order execution problem and the portfolio selection problems. Some new insights about optimal value and optimal policy are also discussed.

June 17, 15:15–16:00

An Application of Time Reversal to Credit Risk Management

Rusudan Kevkhishvili

Kyoto University

This article develops a new risk management framework for companies on the basis of the leverage process (a ratio of company asset value over its debt). We approach this task by time reversal, last passage time, and the h-transform of linear diffusions. For general diffusions with killing, we obtain the probability density of the last passage time to a certain alarming level and analyze the distribution of the time left until killing after the last passage time to that level. We then apply these results to the leverage process of the company. Finally, we suggest how a company should determine the aforementioned alarming level. Specifically, we construct a relevant optimization problem and derive an optimal alarming level as its solution.

June 17, 16:00–16:45

Loan Monitoring and Bank Risk

Hiroyuki Nakata

Ritsumeikan University

We study the optimal use of loan monitoring systems in regulated banks, where the bank chooses which loans to monitor and the regulator imposes regulatory costs for holding risky loans. We find that improvements in monitoring technology increase the value and monitoring activity of loans, and therefore also the incentive to hold risky loans under monitoring. A regulator controlling bank risk will respond by imposing greater financial penalties on risky lending. Improvements in monitoring technology carry therefore both costs and benefits, and our contribution is to show that the costs always outweigh the benefits and that the bank therefore gains from destroying its monitoring technology. We discuss the implications of this finding for bank regulation.

June 17, 16:45–17:30

A Comparative Statics Approach to Higher-Order Absolute Risk Aversion

Kit Pong Wong

University of Hong Kong

Higher-order risk attitudes are related to higher-order moments of risk, and are unequivocally characterized by the signs and levels of higher-order derivatives of utility functions. In contrast to the direction of higher-order risk aversion, the intensity of higher-order risk aversion beyond the Arrow-Pratt measure of absolute risk aversion is far from conclusive. The purpose of this paper is to use a comparative statics approach to give a choice-theoretic interpretation to a general measure of higher-order absolute risk aversion. This is done by focusing on a family of risky distributions that can be ranked in a way that individuals who are more higher-order risk averse than a reference individual possess the same ordering as the reference individual, but not vice versa, a sort of comparative statics results. We show that such a family of risky distributions exists and can be completely characterized by a single-crossing property. We offer an application wherein individuals can shift from an initial payoff distribution to a preferred payoff distribution at a utility cost or a monetary cost. In either case, individuals who are more higher-order risk averse than a reference individual indeed spend more on improving their payoff distributions, a result consistent with intuition.