TMU Workshop on Finance 2019

Research Center for Quantitative Finance
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Invited Speakers	
Rusudan Kevkhishvili	Kyoto U.
Michael Tehranchi	U. Cambridge
Yuan Tian	Ryukoku U.
Kit Pong (Keith) Wong	U. Hong Kong
Zuoquan Xu	Hong Kong Polytechnic U.
Sheung Chi (Phillip) Yam	Chinese U. Hong Kong
Xiang Yu	Hong Kong Polytechnic U.

Rusudan Kevkhishvili[1]

Kyoto University

"Analysis of CDS Spread Fluctuations with an Application to the Negative Basis Arbitrage"

Abstract

In this article, we first construct the empirical measure of spread (EMS) to capture the dynamics of quoted CDS spreads. It is the measure of creditworthiness of a company derived from the asset model in Egami and Kevkhishvili [2017].[2] We then use the information provided by the EMS to derive a refined negative CDS-bond basis trading strategy. Our contributions are twofold. By analyzing the period encompassing the global financial crisis, we find that the EMS is a forward-looking or leading indicator and can explain the movement of near future CDS spreads (20 or 30 days ahead). We then demonstrate that this feature of the EMS is present in non-crisis periods as well and is useful in negative basis arbitrage trading. Specifically, we set up a finite-horizon optimal stopping problem for an investor who uses CDS contracts to hedge a long position in a zero-coupon bond. Using this problem, we provide a trading tool for the investor and show that the information obtained from the EMS can enhance the gain from negative CDS-bond basis arbitrage.

Michael Tehranchi

University of Cambridge

"Duality for homogeneous optimisation problems"

Abstract

This talk is concerned with stochastic optimal control problems with a certain homogeneity. For such problems, a novel dual problem is formulated. The results are applied to a stochastic volatility variant of the classical Merton problem. Another application of this duality is to the study the right-most particle of a branching Levy process.

Yuan Tian

Ryukoku University

"Dynamic investment and financing with leverage and liquidity management"

Abstract

Aiming to provide a quantitative guidance for integrating the liability management, such as debt and equity financing, with the asset management, such as investment and liquidity reserve maintenance, we develop a theoretical model of dynamic investment, dividend payout, debt borrowing, external equity financing/bankruptcy, and risk management for financially constrained firms. Mathematically, we solve the optimization problem by simultaneously employing the variational inequality approach for the equity value and the fixed-point approach for the debt value. In particular, we characterize the role of debt, interacting with liquidity management, in shaping up firms' investment, financing, and payout decisions. (Joint work with Nan Chen and Jiahui Ji)

Kit Pong (Keith) Wong

University of Hong Kong

"Optimal Effort in a Two-Period Model"

Abstract

This paper develops a generic model of effort in two periods wherein an individual exerts effort in monetary terms in the first period so as to improve risk in the second period. We specify such a risk improvement by means of a linear combination of two fixed probability distribution functions that can be ranked via first-order stochastic dominance. When the two fixed probability distribution functions degenerate into singletons, our two-period model of effort reduces to the two-period model of self-protection. Within an intertemporal framework with Kreps-Porteus-Selden preferences, we examine the comparative statics of effort with respect to the prevalence of uncertainty. We further examine the precautionary motive of saving in our two-period model of effort wherein the underlying uncertainty is endogenously determined by the choice of effort. Finally, we show that our results are consistent with recent experimental evidence for the negative relationship between prudence and self-protection regardless of the timing of loss.

Zuoquan Xu

Hong Kong Polytechnic University

"Optimal investment, heterogeneous consumption and the best time for retirement"

Abstract

This paper studies an optimal investment and consumption problem with heterogeneous consumption of basic and luxury goods, together with the choice of time for retirement. The utility for luxury goods is not necessarily a concave function. The optimal heterogeneous consumption strategies are shown to consume only basic goods when the wealth is small, to consume basic goods and make savings when the wealth is intermediate, and to consume small portion in basic goods and large portion in luxury goods when the wealth is large. The optimal retirement policy is shown to be universal, in the sense that all individuals should retire at the same level of marginal utility. This level is determined only by income, labor cost as well as market parameters, but independent of individual's utility, which could have important policy implications for government in making pension and retirement age decisions. It is also shown that individual's prefer to retire as time goes by if the marginal labor cost increases faster than that of income. The main tools used in analyzing the problem are from PDE and stochastic control theory including viscosity solution, variational inequality and dual transformation. This is a joint work with Harry Zheng at Imperial College London.

Sheung Chi (Phillip) Yam

Chinese University of Hong Kong

"Optimal Savings and the Value of Population under Stochastic Environment: Transient Behavior"

Abstract

In the work of Arrow et al. (2007, PNAS), they studied a macroeconomic growth model so that the population dynamic was involved in both the total utility (objective function) of the whole population and in the capital investment process. In essence, they assumed the deterministic evolution for both dynamics, such that the labor force of the population is also incurred through the Cobb–Douglas production function. In this talk, we shall discuss the well-posedness of the extension of their problem, particularly over a finite time horizon, in which we also allow more realistic and generic population growth and incorporate a stochastic environment for both the demography and capital investment. Technically, some novel PDE methodologies have been developed in our work, and we believe that this can be of parallel use in various sophisticated modelling in economic growth theory.

Xiang Yu

Hong Kong Polytechnic University

"Optimal Stopping under Model Ambiguity: a Time-Consistent Equilibrium Approach"

Abstract

An unconventional approach for optimal stopping under model ambiguity is introduced. Besides ambiguity itself, we take into account how ambiguity-averse an agent is. This inclusion of ambiguity attitude, via an alpha-maxmin nonlinear expectation, renders the stopping problem time-inconsistent. We look for subgame perfect equilibrium stopping policies, formulated as fixed points of an operator. For a one-dimensional diffusion with drift and volatility uncertainty, we show that every equilibrium can be obtained through a fixed-point iteration. This allows us to capture much more diverse behavior, depending on an agent's ambiguity attitude, beyond the standard worst-case (or best-case) analysis. In a concrete example of real options valuation under volatility uncertainty, all equilibrium stopping policies, as well as the best one among them, are fully characterized. It demonstrates explicitly the effect of ambiguity attitude on decision making: the more ambiguity-averse, the more eager to stop—so as to withdraw from the uncertain environment. The main result hinges on a delicate analysis of continuous sample paths in the canonical space and the capacity theory. To resolve measurability issues, a generalized measurable projection theorem, new to the literature, is also established. This is joint work with Yu-Jui Huang, University of Colorado.