

RMI Research Workshop Series

	Session 1	Session 2
Speaker:	Prof Chu Zhang Hong Kong University of Science and Technology	Prof Steven Kou Columbia University
Title:	On the Number and Dynamic Features of State Variables in Options Pricing	The Recent Financial Turmoil and Related Financial Engineering Research Problems
Date / Time:	3th April 2009, 3.00pm – 4.10pm	3th April 2009, 4.30pm – 5.40pm
Venue:	BIZ 2 #03-03, Seminar Room 7	
Chair-person:	Prof Xia Yingcun, National University of Singapore	

Light refreshments will be served during the break (4.10pm – 4.30pm)

Session 1: Abstract

In this paper, we investigate the number of state variables required for options pricing and the dynamic features that govern the evolution of these state variables. We adopt a nonparametric regression technique with the use of model-free implied variance-swap prices of various maturities as proxies for the transformed state variables. The methodology is applied to the prices of S&P500 index options during the period 1996-2005. We find that, in addition to the index value itself, two state variables, approximated by a short-term variance-swap price and a long-term variance-swap price, are adequate for pricing the index options and fitting the data well in time-series and cross-sections. The drift and the squared diffusion of the state variables exhibit strong non-linearity, which explains why popular models in the literature are unable to fit the data satisfactorily.

About the speaker

Dr. Chu Zhang is currently an associate professor of finance in the Finance Department of The Hong Kong University of Science and Technology. Dr. Zhang obtained his MBA and PhD degrees in finance from the University of Chicago. He also holds a Bachelor of Science degree in mathematics and Master of Science degree in quantitative economics. After graduation from University of Chicago, Dr. Zhang taught investments, portfolio management, and corporate finance at undergraduate, MBA and PhD levels at the University of Alberta in Canada for six years before joining HKUST. At HKUST, he taught asset pricing theories at the Ph.D level and has been teaching fixed-income securities and fixed-income derivatives in undergraduate and master-of-science courses. Dr. Zhang has a wide range of research interest in financial markets and corporate decisions. He has published in various finance journals such as Journal of Finance, Journal of Financial Economics, Journal of Business, Journal of Banking and Finance, and Journal of Futures Markets. Dr. Zhang also serves as a referee for many finance journals.

Session 2: Abstract

In this talk we will present two of financial engineering problems that are related to the recent financial turmoil: (1) How to model CDOs by incorporating clustering defaults? We propose a new model based on Polya processes and the cumulative intensity of counting processes that can calibration the current CDO data very well. (2) What are good external risk measures for the financial regulators? We propose a new axiomatic approach to justify the current governmental regulations, by using axioms from robust statistics and the separation by hyperplanes from functional analysis. This is a joint work with Xianhua Peng.

About the speaker

Professor Steven Kou is a full professor at Columbia University, where he teaches courses in financial engineering. Professor Kou is well known for his research on the double exponential jump diffusion model, credit risk models, models for growth stocks, the numerical pricing of discrete path-dependent options, and option pricing in incomplete markets. His results have been widely used on Wall Street, and have been incorporated into standard M.B.A. textbooks, such as the textbook by John Hull.