Joint-University Symposium on Financial Risk Management:
Topics on Time Consistency

(Sat) April 22, 2017
Venue: Lecture Theatre LT6, Lady Shaw Building
The Chinese University of Hong Kong

Session Chairs

Alain BENSOUSSAN	The University of Texas at Dallas / City University of Hong Kong
Wai Keung LI	The University of Hong Kong
Hoi Ying WONG	The Chinese University of Hong Kong
Hailiang YANG	The University of Hong Kong

Invited Speakers

Mei Choi CHIU	The Education University of Hong Kong
Xiangyu CUI	Shanghai University of Finance and Economics
Robert ELLIOTT	University of Calgary / University of South Australia
Rui GUO	Renmin University of China
Xuedong HE	The Chinese University of Hong Kong
Duan LI	The Chinese University of Hong Kong
Marcel NUTZ	Columbia University
Cornelis OOSTERLEE	Delft University of Technology / Centrum Wiskunde & Informatica
Mogens STEFFENSEN	University of Copenhagen
Kwok Chuen WONG	Dublin City University
Yan ZENG	Sun Yat-Sen University

Organizing Committee

Ryan, K. C., WONG	Dublin City University
Phillip YAM	The Chinese University of Hong Kong
Hailiang YANG	The University of Hong Kong

Symposium on Financial Risk Management: Topics on Time Consistency

Programme (Part 1)

Date: 22nd April, 2016 (Saturday)

Venue: Lecture Theatre 6, Lady Shaw Building, The Chinese University of Hong Kong

Morning Session

Time	Speaker	Title
0845-0850	**Phillip YAM** (The Chinese University of Hong Kong)	Opening Speech
	Morning Session 1 Session Chair: **Alain BENSSOUSAN** (The University of Texas at Dallas / City University of Hong Kong)	
0850-0930	**Robert ELLIOTT** (University of Calgary / University of South Australia)	Dynamic Risk Measures and Nonlinear Expectations with Markov Chain noise
0930-1010	**Rui GUO** (Renmin University of China)	Time-Inconsistent Risk Preferences and the Term Structure of Dividend Strips
1010-1050	**Yan ZENG** (Sun Yat-Sen University)	Optimal Dividend Strategy for A General Diffusion Process with Time-Inconsistent Preferences and Penalty Cost for Ruin
1050-1110	Coffee Break	
	Morning Session 2 Session Chair: **Hailiang YANG** (The University of Hong Kong)	
1110-1150	**Mei Choi CHIU** (The Education University of Hong Kong)	Time Consistent Mean-Variance Portfolio under Regime-Switching Cointegration
1150-1230	**Duan LI** (The Chinese University of Hong Kong)	Self-Coordination in Time Inconsistent Stochastic Control: A Planner-Doer Game Framework
1230-1235	Photo Session	
1235-1350	Lunch Venue: Chung Chi Staff Restaurant	

Symposium on Financial Risk Management: Topics on Time Consistency

Programme (Part 2)

Date: 22nd April, 2016 (Saturday)

Venue: Lecture Theatre 6, Lady Shaw Building, The Chinese University of Hong Kong

Afternoon Session

Time	Speaker	Title
	Afternoon Session 1 Session Chair: **Wai Keung LI** (The University of Hong Kong)	
1350-1430	**Mogens STEFFENSEN** (University of Copenhagen)	Time-Consistent Consumption and Investment
1430-1510	**Kwok Chuen WONG** (Dublin City University)	A Paradox in Time Consistency in Mean-Variance Problem?
1510-1550	**Xuedong HE** (The Chinese University of Hong Kong)	Optimal Exit Time from Casino Gambling: Strategies of Pre-Committed and Naive Gamblers
1550-1610	Coffee Break	
	Afternoon Session 2 Session Chair: **Hoi Ying WONG** (The Chinese University of Hong Kong)	
1610-1650	**Marcel NUTZ** (Columbia University)	A Mean-Field Competition
1650-1730	**Xiangyu CUI** (Shanghai University of Finance and Economics)	Resolving Time Inconsistency via A Competition Scheme
1730-1810	**Cornelis OOSTERLEE** (Delft University of Technology / Centrum Wiskunde & Informatica)	The Monte Carlo-Based Stochastic Grid Bundling Method and Multi-Period Mean-Variance Time-Consistent Portfolio Optimization
1810-1815	**Phillip YAM** (The Chinese University of Hong Kong)	Closing Remark
1900-2100	Workshop Banquet Venue: Royal Park Hotel, Shatin	

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List of Abstracts (Part 1)

Mei Choi CHIU (*The Education University of Hong Kong*)

Title: Time Consistent Mean-Variance Portfolio under Regime-Switching Cointegration

Abstract: Continuous-time cointegration models with constant parameters are shown to exhibit statistical arbitrage. However, the model parameters can change over time and the cointegration feature may even disappear due to regime shifts. This research investigates the optimal investment strategy under the Markov regime-switching cointegration models using a time-consistent mean-variance criterion. Explicit solution is derived for the optimal trading rule. We discuss the difficulty of computing the efficient frontier due to the Poisson random measure associated with the Markov regime-switching cointegration model. (This research is supported by the Research Grant Council of Hong Kong with GRF Project Number: 18200114.)

Xiangyu CUI (*Shanghai University of Finance and Economics*)

Title: Resolving Time Inconsistency via a Competition Scheme

Abstract: Comparing to the present payoff, the decision makers often evaluate the payoff received in the future by a relative large discount factor, which is described as a quasi-hyperbolic discounting function. When such decision makers consider dynamic decision problems, they encounter time inconsistency phenomena, i.e., the long term optimal decision policy determined at time 0 is no longer optimal when reconsidering the problem at time t. The product sale problem faced by the salespersons with quasi-hyperbolic discounting is a typical example. In this paper, we propose a competition scheme between the salespersons to resolve the time inconsistency, under which the winner can receive a bonus from the company. With detailed analysis, we have shown that the competition scheme can improve the time inconsistency degree of the salespersons' group.

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List of Abstracts (Part 2)

Robert ELLIOTT (University of Calgary / University of South Australia)

Title: Dynamic Risk Measures and Nonlinear Expectations with Markov Chain Noise

Abstract: It is increasingly clear that a good understanding of risk and related dynamic models are required. One aspect of this is the development of simple ways of numerically representing risk. Some of these ways are well known, for example, value at risk, expected shortfall, etc.. Unfortunately, these methods are static and fail to give consistent answers when considered at multiple time points. Progress has been made in developing dynamic risk measures, which give time consistent answers. Some of these ideas are related to the g-expectations considered by Peng and others. Central to the mathematical study of our consistent risk measures is the theory of Backward Stochastic Differential Equations (BSDEs). Most previous work in this area uses only noise from a Brownian motion. In our models the randomness is introduced through a martingale associated with a Markov chain. In particular we show that under certain conditions the solution to a BSDE is a time consistent risk measure.

Rui GUO (Renmin University of China)

Title: Time-Inconsistent Risk Preferences and the Term Structure of Dividend Strips

Abstract: I construct a general equilibrium model with time-inconsistent risk preferences to explain the downward-sloping term structure of dividend strips, an empirical pattern found by van Binsbergen et al. (2012). As risks draw temporally closer, investors will be increasingly driven by emotions, such as anxiety or excitement, which will distort their aversion to immediate risk, rendering it either higher or lower than their aversion to future risks. Dynamically, this leads to self-control problems. I explore its asset pricing implications and show that the term structures of dividend strips are downward-sloping when investors are less averse to immediate risk.

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List of Abstracts (Part 3)

Xuedong HE (The Chinese University of Hong Kong)

Title: Optimal Exit Time from Casino Gambling: Strategies of Pre-Committed and Naive Gamblers

Abstract: We consider a casino gambling model and study the strategies of a pre-committed gambler, who commits her future selves to the strategy she sets up today, and of a naive gambler, who fails to do so and thus keeps changing plans at every time. We identify conditions under which the pre-committed gambler, asymptotically, adopts a stop-loss strategy, exhibits the behavior of disposition effect, or does not exit. For a specific parameter setting when the utility function is piece-wise power and the probability weighting functions are concave power, we derive the optimal strategy of the pre-committed gambler in closed form whenever it exists. Finally, we study the actual behavior of the naive gambler and highlight its marked differences from that of the pre-committed gambler. This is a joint work with Sang Hu, Jan Obloj, and Xunyu Zhou.

Duan LI (The Chinese University of Hong Kong)

Title: Self-Coordination in Time Inconsistent Stochastic Control: A Planner-Doer Game Framework

Abstract: Time inconsistency has been a thorny issue in many economic and financial decision making problems, especially when risk measures are involved in performance criteria. We develop in this research a two-tier planner–doer game framework with self-coordination. By aligning the global interest of the planner and the local interests of the doers by applying suitable penalty functions, a degree of internal harmony (measured quantitatively by the expected cost of self-coordination) can be achieved by the self-coordination policy. We establish an axiom system for modified preferences, under which the self-coordination policy can be obtained by solving a corresponding optimization problem. We then apply our game frame work successfully in dynamic mean-variance portfolio selection.

Marcel NUTZ (Columbia University)

Title: A Mean-Field Competition

Abstract: We introduce a mean field game with rank-based reward: competing agents optimize their effort to achieve a goal, are ranked according to their completion time, and paid a reward based on their relative rank. On the one hand, we propose a tractable Poissonian model in which we can characterize the optimal efforts for a given reward scheme. On the other hand, we study the principal agent problem of designing an optimal reward scheme. A surprising, explicit solution is found to minimize the time until a given fraction of the population has reached the goal. (Work-in-progress with Yuchong Zhang)

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List of Abstracts (Part 4)

Cornelis OOSTERLEE (Delft University of Technology / Centrum Wiskunde & Informatica)

Title: The Monte Carlo-Based Stochastic Grid Bundling Method and Multi-period Mean-Variance Time-Consistent Portfolio Optimization

Abstract: In our research work we have developed an efficient Monte Carlo method for high-dimensional American options, called the Stochastic Grid Bundling Method (SGBM). We have developed this simulation-based approach further towards solving the constrained dynamic mean-variance portfolio management problem. We dealt with target-based as well as time-consistent problems with constraints. For these target-based and time-consistent dynamic optimization problems, we developed a sub-optimal strategy, called the multi-stage strategy, which can be utilized in a forward fashion. It solves the unconstrained dynamic problem. Based on this fast yet sub-optimal strategy, we propose an approach to improve the solution, based on the backward recursive programming. In our numerical tests, highly satisfactory asset allocations can be achieved for the time-consistent dynamic portfolio management problem in case various constraints are cast on the control variables. We will explain our methodology and finding in the presentation.

Mogens STEFFENSEN (University of Copenhagen)

Title: Time-Consistent Consumption and Investment

Abstract: We present some developments in consumption-investment problems with consistency issues. First, we review the mean-variance consumption-investment problems that have been studied in the recent literature. Second, we present some alternative quadratic objectives and present the corresponding optimal portfolios. Finally, we show how consistency issues show up also in utility optimization in case of non-linear aggregation of certainty equivalents of consumption.

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List of Abstracts (Part 5)

Kwok Chuen WONG (Dublin City University)

Title: A Paradox in Time Consistency in Mean-Variance Problem?

Abstract: In this talk, we shall establish that, if investors with mean-variance preference adopt the time-consistent equilibrium solutions, an investor facing short-selling prohibition can acquire a greater objective value than his counterpart without the prohibition in a buoyant market. It can be shown that the pure strategy of solely investing on bond can sometimes simultaneously dominate the equilibrium strategy. With numerical experiments, the constrained investor can dominate the unconstrained one for more than 90% of the time horizon. The source of paradox is rooted from the nature of game-theoretic approach on time consistency, which purposely seeks for an equilibrium solution but not the ultimate maximizer. Our obtained results actually advocate that, to properly implement the concept of time consistency in various financial problems, all economic aspects should be critically taken into account at a time.

Yan ZENG (Sun Yat-Sen University)

Title: Optimal Dividend Strategy for a General Diffusion Process with Time-Inconsistent Preferences and Penalty Cost for Ruin

Abstract: This paper considers the optimal dividend strategy for a company whose surplus follows a general diffusion process. The company's manager, who has time-inconsistent preferences, seeks the optimal dividend strategy and is subjected to a penalty cost when the company goes bankruptcy. We tackle the optimization problem by assuming that the manager is time-consistent, naive or sophisticated, and we obtain analytical solutions, respectively. Our results show that the sophisticated manager tends to pay out dividends earlier than the naive manager, who in turn tends to pay out dividends earlier than the time-consistent manager, and that managers with a higher level of time inconsistency tend to pay out dividends earlier; in contrasts, the penalty cost leads to delay in dividend payments. Finally, we provide several examples to illustrate our results. (Coauthors: Shumin Chen, Zhongfei Li)

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Campus Map

Workshop Venue: Lecture Theatre 6, Lady Shaw Building, The Chinese University of Hong Kong
Lunch Venue: Chung Chi Staff Restaurant

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Map of Banquet Venue

Banquet Venue: Royal Park Hotel, Shatin

Organizing Committee

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