Risk Measures, XVA Analysis, Cost of Capital & Central Counterparties

18 – 19 April 2016
Singapore

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PROGRAMME

Overview | Daily Schedule

PROGRAMME OVERVIEW

18 April 2016 Monday	
13:00 - 13:30	Registration
13:30 - 13:40	Opening Address
13:40 - 14:30	Hans FÖLLMER Humboldt University of Berlin, Germany
14:30 - 15:20	Claudio ALBANESE Global Valuation & Cass Business School, United Kingdom
15:20 - 15:50	Group Photo & Tea Break
15:50 - 16:40	Stéphane CRÉPEY Université d'Evry, France
16:40 - 17:40	Panel Discussion led by · Claudio ALBANESE (Global Valuation & Cass Business School, United Kingdom) · Mauro CESA (Risk Magazine, United Kingdom) · Alex LIPTON (Bank of America & New York University, United States) · Dilip MADAN (University of Maryland, United States) · Henrik RASMUSSEN (Standard Chartered Bank, Singapore) · Jochen THEIS (Standard Chartered Bank, Singapore)
19 April 2016 Tuesday	
08:30 - 09:00	Registration
09:00 - 09:50	Dilip MADAN University of Maryland, United States
09:50 - 10:20	Tea Break
10:20 - 11:10	Lixin WU Hong Kong University of Science and Technology, Hong Kong
11:10 - 12:00	Agostino CAPPONI Columbia University, United States
12:00 - 13:30	Lunch
13:30 - 14:20	Alex LIPTON Bank of America and New York University, United States
14:20 - 15:10	Yannick ARMENTI Université d'Evry, France
15:10 - 15:40	Tea Break
15:40 - 16:30	Gary WONG Global Valuation, United Kingdom
16:30 - 17:20	Steven KOU National University of Singapore, Singapore
17:20 - 17:30	Closing Address

Monday, 18 April 2016		
TIME	**ACTIVITY**	**REF**
13:00 - 13:30	Registration	--
13:30 - 13:40	Opening Address	--
13:40 - 14:30	**Hans FÖLLMER** Humboldt University of Berlin, Germany *Local vs. Global Risk Assessment*	Pg 3
14:30 - 15:20	**Claudio ALBANESE** Global Valuation & Cass Business School, United Kingdom *XVA Metrics: Quantifying the Capital Structure of Banks in Incomplete Markets*	Pg 1
15:20 - 15:50	Group Photo & Tea Break	--
15:50 - 16:40	**Stéphane CRÉPEY** Université d'Evry, France *Central Clearing Valuation Adjustment*	Pg 2
16:40 - 17:40	**Panel Discussion** led by · **Claudio ALBANESE** Global Valuation & Cass Business School, United Kingdom · **Mauro CESA** Risk Magazine, United Kingdom · **Alex LIPTON** Bank of America & New York University, United States · **Dilip MADAN** University of Maryland, United States · **Henrik RASMUSSEN** Standard Chartered Bank, Singapore · **Jochen THEIS** Standard Chartered Bank, Singapore	--

Tuesday, 19 April 2016		
TIME	**ACTIVITY**	**REF**
08:30 - 09:00	Registration	--
09:00 - 09:50	**Dilip MADAN** University of Maryland, United States *From Financial Relativities to Conic Trading*	Pg 4
09:50 - 10:20	Tea Break	--
10:20 - 11:10	**Lixin WU** Hong Kong University of Science and Technology, Hong Kong *FVA Made Simple, But Not Simpler*	Pg 5
11:10 - 12:00	**Agostino CAPPONI,** Columbia University, United States *Arbitrage-Free XVA*	Pg 2
12:00 - 13:30	Lunch	--
13:30 - 14:20	**Alex LIPTON** Bank of America & New York University, United States *Systemic Risks in CCP Networks*	Pg 4
14:20 - 15:10	**Yannick ARMENTI** Université d'Evry, France *Multivariate Shortfall Risk Allocation and Systemic Risk*	Pg 1
15:10 - 15:40	Tea Break	--
15:40 - 16:30	**Gary WONG** Global Valuation, United Kingdom *The Gap between P&L and RoC vs XVA Risk Analysis of Portfolio, and the Role of New Technology to Manage the Risk*	Pg 5
16:30 - 17:20	**Steven KOU** National University of Singapore, Singapore *Elicitability, Co-Elicitability, Direct and Indirect Backtesting for Risk Measures*	Pg 3
17:20 - 17:30	Closing Address	--

ABSTRACTS

XVA Metrics: Quantifying the Capital Structure of Banks in Incomplete Markets

Claudio ALBANESE, Global Valuation & Cass Business School, United Kingdom

In the aftermath of the 2007 global financial crisis, banks have developed a family of XVA metrics which play a role in virtually all management and investment decisions. In this paper, we develop a mathematically rigorous and numerically tractable XVA methodology based on a capital structure model for derivative portfolios.

The cost to sustain counterparty default losses and funding costs for variation and initial margin are captured by CVA, FVA and MVA metrics, respectively. Following the principles of Solvency II, the KVA is defined as a risk margin, i.e. a process which controls dividend distribution policies and executive compensation to ensure lifetime sustainability of the portfolio. We find that the FVA and KVA are intertwined since capital is fungible as a source of funding.

This is a joint work with Stéphane CRÉPEY and Simone CAENAZZO.

Multivariate Shortfall Risk Allocation and Systemic Risk

Yannick ARMENTI, Université d'Evry, France

The ongoing concern about systemic risk since the outburst of the global financial crisis has highlighted the need for risk measures at the level of sets of interconnected financial components, such as portfolios, institutions or members of clearing houses. The two main issues in systemic risk are the computation of an overall reserve level and its allocation to the different components according to their systemic relevance. We develop here a pragmatic approach to systemic risk measurement and allocation based on multivariate shortfall risk measures, where acceptable allocations are first computed and then aggregated so as to minimize costs. We analyze the sensitivity of the risk allocations to various factors and highlight its relevance as an indicator of systemic risk. Moreover, we provide numerical schemes to assess the risk allocation in high dimensions.

This is a joint work with Stéphane CRÉPEY, Samuel DRAPEAU and Antonis PAPAPANTOLEON.

Arbitrage-Free XVA

Agostino CAPPONI, Columbia University, United States

We develop a framework for computing the total valuation adjustment (XVA) of a European claim accounting for funding costs, counterparty credit risk, and collateralization. Based on no-arbitrage arguments, we derive backward stochastic differential equations (BSDEs) associated with the replicating portfolios of long and short positions in the claim. This leads to the definition of buyer's and seller's XVA, which in turn identify a no-arbitrage interval. In the case that borrowing and lending rates coincide, we provide a fully explicit expression for the uniquely determined XVA, expressed as a percentage of the price of the traded claim, and for the corresponding replication strategies. In the general case of asymmetric funding, repo and collateral rates, we study the semilinear partial differential equation (PDE) characterizing buyer's and seller's XVA and show the existence of a unique classical solution to it. To illustrate our results, we conduct a numerical study demonstrating how funding costs, repo rates, and counterparty risk contribute to determine the total valuation adjustment.

This is a joint work with Maxim BICHUCH and Stephan STURM.

Central Clearing Valuation Adjustment

Stéphane CRÉPEY, Université d'Evry, France

This paper develops an XVA analysis of centrally cleared trading, parallel to the one that has been developed in the last years for bilateral transactions. We introduce a dynamic framework that incorporates the sequence of cash-flows involved in the waterfall of resources of the CCP. The total cost of the clearance framework for a member of the clearinghouse, called CCVA for central clearing valuation adjustment, is decomposed into a CVA corresponding to the cost of its losses on the default fund in case of defaults of other member, an MVA corresponding to the cost of funding its margins and a KVA corresponding to the cost of the capital that the member implicitly provides to the CCP through its default fund contribution (for completeness and reference we also compute a DVA term). In the end the structures of the XVA equations for bilateral and cleared portfolios are similar, but the input data to these equations are not the same, reflecting completely different financial network structures. The resulting XVA numbers are therefore very different, but interestingly they become quite comparable after scaling by a suitable netting ratio.

This is a joint work with Yannick ARMENTI (Université d'Evry, France).

Keywords: Counterparty risk, central counterparty (CCP), margins, de- fault fund, cost of funding, cost of capital, netting.

Local vs. Global Risk Assessment

Hans FÖLLMER, Humboldt University of Berlin, Germany

We discuss some mathematical aspects of systemic risk in large financial networks, in particular some consistency problems that are motivated by the interplay between local and global risk assessment. We focus on the systemic risk measures proposed by Chen, Iyengar, and Moallemi (2013). They involve an aggregation procedure and a convex risk measure that is applied to the aggregate position. Such a structural decomposition can be regarded as a consistency property. From this point of view, the dual representation of a systemic risk measure reduces to a criterion for consistency that is well known in the context of time-consistency. Then we discuss conditions for spatial consistency of a systemic risk measure with a given family of local conditional risk measures. We show how this is related to the analysis of spatial risk measures in Föllmer and Klüppelberg (2015).

Elicitability, Co-Elicitability, Direct and Indirect Backtesting for Risk Measures

Steven KOU, National University of Singapore, Singapore

We clarify the concepts of elicitability and co-elicitability for risk measures. This in turn helps us to know whether a risk measure can be directly backtested or not. Some counterexamples are given, suggesting that median shortfall is preferable over expected shortfall in terms of both direct backtesting and ellicitability.

This is a joint work with Xianhua Peng.

Systemic Risks in CCP Networks

Alex LIPTON, Bank of America & New York University, United States

We address the following important questions related to the broader application of central clearing to OTC derivative portfolios:

- Potential systemic risks and contagion introduced by the interconnected nature of the system;
- Liquidity issues driven by: P&L; changes in margining; losses due to default; CCP recapitalization;
- The connection between market volatility and default likelihood;
- Identification of the key points of failure;
- The magnitude of scenarios proving sufficiently large in order for a given clearing member to incur a loss or suffer liquidity issues.

We show that:

- There are material cross-risks between the default of GCMs and market volatility which must be captured in order to realistically assess default losses and contingent liquidity requirements;
- Our results do not support the fear that the move from bilateral clearing to central clearing of OTC derivatives poses a significant threat of contagion through the central counterparties, primarily attributable to the magnitude of risks being a comparatively small proportion of the capital held by the diversified financial institutions dominating the CCP membership.

This is a joint work with Russell BARKER, Andrew DICKINSON, and Rajeev VIRMANI.

From Financial Relativities to Conic Trading

Dilip MADAN, University of Maryland, United States

No arbitrage for two price economies with no locally risk free asset implies that suitably deflated prices are nonlinear martingales in which both the deflating process and the measure change depend on the process being studied. Further assumptions allow the nonlinear martingales in discrete time to become expectations with respect to a nonadditive probability. We go on to value trading strategies using such non-linear conditional expectations in a Markovian steady state. Fixed points for value and policy functions are developed. It turns out to be critical that the valuation is conducted by an expectation with respect to a non-additive probability for with a classical conditional expectation operator both the value and policy iterations fail. Illustrations are provided for Markovian systems in one, two and five dimensions. Trading positions are seen to balance prediction rewards against the demands for hedging value functions.

The Gap between P&L and RoC vs XVA Risk Analysis of Portfolio, and the Role of New Technology to Manage the Risk

Gary WONG, Global Valuation, United Kingdom

XVA is now part of the pricing and valuation of a trading portfolio, and its risk behaviour is highly complex and non-linear. Using Target Redemption Note (TARN) as a simple example, we illustrate the limitation of using first order sensitivities together with a set of x-gamma to manage and control the P&L, and the critical role played by comprehensive scenario analysis, building up a 'roadmap', to control risks. We then extend the analysis to characterise the market, credit and portfolio risk behaviour of a trading book, and see how well the XVA metrics can measure and control these risks - P&L, Capital consumption and RoC. Finally we illustrate how new technology can be used to build up comprehensive scenario analysis and produce the critical 'roadmap' for XVA P&L and capital management.

FVA Made Simple, But Not Simpler

Lixin WU, Hong Kong University of Science and Technology, Hong Kong

Funding valuation adjustment (FVA) has been a central issue in financial markets for years. There exist different and even opposing views on the definition and adoption of FVA from the viewpoints of pricing, booking or accounting. In this talk, we work under a framework of replication pricing and redefine, intuitively, FVA as well as CVA (i.e., credit valuation adjustment). With our formulations, we draw a boundary between FVA and DVA (i.e., debit valuation adjustment). From the viewpoint of accounting, we argue against the booking of FVA for derivative trades, echoing Hull and White (2013).

INFORMATION

Committee | Panelists | Speakers | Sponsors

Organizing Committee

- Stéphane CRÉPEY (University of Evry, France)
- Min DAI (National University of Singapore, Singapore)
- Samuel DRAPEAU (Shanghai Jiao Tong University, China)
- Steven KOU (National University of Singapore, Singapore)
- Alexandre THIERY (National University of Singapore, Singapore)
- Chao ZHOU (National University of Singapore, Singapore)

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- Dilip MADAN (University of Maryland, United States)
- Gary WONG (Global Valuation, United Kingdom)
- Lixin WU (Hong Kong University of Science and Technology, Hong Kong)

Sponsors

- Centre for Quantitative Finance at the National University of Singapore
- Chair Markets in Transition under the Aegis of Louis Bachelier laboratory (a joint initiative of Ecole polytechnique, Université d'Evry Val d'Essonne and Fédération Bancaire Française)
- China Academy of Research in Finance (CAFR/SAIF), Shanghai Jiao Tong University
- Europlace Institute of Finance grant "Collateral Management in Centrally Cleared Trading"
- National Natural Science Foundation of China (NSFC) "Systemic Risk and Uncertainty in Finance"
- National University of Singapore Grant "Mathematical Treatments of some Problems in Quantitative Finance"
- National University of Singapore Grant "Monte-Carlo Methods For Inference in Complex Stochastic Systems"
- Standard Chartered Bank (Singapore) Limited