

Swissquote Conference on Interest Rate and Credit Risk: Program

<u>Thursday, 28th October</u>		Venue: Polydôme at EPFL
07:45-08:45	<i>Registration/welcome coffee</i>	
08:45-09:00	Welcome Address Swissquote	
09:00-10:00	Dilip Madan	Capital Conservation and Risk Management (Discussant: Fabio Trojani)
10:00-10:30	<i>Coffee break</i>	
10:30-11:30	Giovanni Cesari	Modeling Counterparty Exposure and CVA (Discussant: Rüdiger Frey)
11:30-12:30	Pierre Collin-Dufresne	On the Relative Pricing of long Maturity S&P 500 Index Options and CDX Tranches (Discussant: Markus Leippold)
12:30-14:15	<i>Lunch break</i>	
14:15-15:15	Fabio Mercurio	LIBOR Market Models with Stochastic Basis (Discussant: Paul Schneider)
15:15-16:00	Jean-Pierre Danthine	Keynote Speech: Money Markets and Monetary Policy in and after the Crisis
16:00-16:30	<i>Coffee break</i>	
16:30-18:30	Panel Discussion	Financial Innovation after the Crisis Pierre Collin-Dufresne, Rajna Gibson, David Lando, Dilip Madan, Fabio Mercurio, Erwan Morellec (moderator)
18:30-19:30	<i>Aperitif</i>	

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Friday, 29th October		Venue: Polydôme at EPFL
08:15-09:00	<i>Welcome coffee</i>	
09:00-10:00	Rama Cont	Default Contagion and Systemic Risk in Financial Networks (Discussant: Thorsten Schmidt)
10:00-10:30	<i>Coffee break</i>	
10:30-11:30	Tomas Björk	Good Deal Bound Pricing, with Applications to Credit Risk (Discussant: Damir Filipovic)
11:30-12:30	Alex Lipton	Structural and Reduced-form Approaches to Calculating CVA for Portfolios of CDSs (Discussant: Semyon Malamud)
12:30-14:15	<i>Lunch break</i>	
14:15-15:15	Mark Davis	Dynamical Counterparty Risk Valuation via Bessel Bridges (Discussant: Julien Hugonnier)
15:15-15:45	<i>Coffee break</i>	
15:45-16:45	Antoon Pelsser	Robustness, Model Uncertainty and Pricing (Discussant: Olivier Scaillet)
16:45-17:45	David Lando	Corporate Bond Liquidity before and after the Onset of the Subprime Crisis (Discussant: Lorian Mancini)
17:45-18:00	Closing of the Conference	

Abstracts (in alphabetic order of speakers)

Tomas Björk, Stockholm School of Economics

Title: Good Deal Bound Pricing, with Applications to Credit Risk

Abstract: We consider an incomplete market in the form of a multidimensional Markovian factor model, driven by a general marked point process (representing discrete jump events) as well as by a standard multidimensional Wiener process. Within this framework we give an overview of the theory of arbitrage free good deal pricing bounds for derivative assets and present some recent applications to credit risk and regime switching models.

Giovanni Cesari, UBS

Title: Modelling Counterparty Exposure and Credit Valuation Adjustment

Abstract: The credit crisis that started in 2007, with the collapse of well-established financial institutions and the bankruptcy of many public corporations, has clearly shown the importance for any company entering in the derivative business of Modelling, Pricing, and Hedging Counterparty Credit Exposure.

Building an accurate representation of firm-wide credit exposure, for both risk and trading activities, is a significant challenge from a technical as well as a practical point of view. In this talk we consider several aspects of finding solutions to the problem of computing counterparty risk exposure and CVA for large books of both vanilla and exotic derivatives usually traded by large Investment Banks.

The main challenges faced when computing future value distributions for diverse portfolios of financial products are the following:

- **Scenario consistency.** When tackling a pricing problem, different transactions can be priced in isolation and the resulting value summed up to give the portfolio value. In a portfolio view, however, the behaviour of a portfolio in future scenarios cannot be estimated correctly unless all constituent trades are analyzed in the same set of common scenarios. This means that both the simulation and the pricing methodology has to be able to deal with all types of products in a consistent way.
- **Accuracy.** When dealing with hedging and pricing counterparty exposure (CVA) accuracy is key. The approach, often used in the industry, of generating scenarios and using analytical formulas for pricing has strong limitations. To deal with exotic types of transactions we suggest using American Monte Carlo (AMC) techniques. AMC allows the definition of a generic mathematical framework, which can be applied to all types of transactions in a consistent way.

- **Different financial products representations.** In general large Investment Banks have different desks with their own way of representing and pricing trades, so that the trades in any counterparty's portfolio might be a collection of different trade types that are booked, priced, and represented differently. If we are to apply a common simulation and pricing methodology to all trade types, an essential step is to convert all trade representations to a common representation that lends itself well to the framework we have chosen. The common representation we have come up with is the Portfolio Aggregation Language (PAL).

In light of these challenges, the main points we will consider in this talk are

- Computing CVA and counterparty risk for both vanilla and exotic products.
- Defining a generic mathematical and computational framework.
- We will give several practical examples of exposure computations across all asset classes
- We will show how to include right way / wrong way risk
- And finally we will show the impact of collateral

Pierre Collin-Dufresne, Columbia University

Title: On the Relative Pricing of long Maturity S&P 500 Index Options and CDX Tranches

Abstract: We investigate a structural model of market and firm-level dynamics in order to jointly price long-dated S&P 500 options and tranche spreads on the five-year CDX index. We demonstrate the importance of calibrating the model to match the entire term structure of CDX index spreads because it contains pertinent information regarding the timing of expected defaults and the specification of idiosyncratic dynamics. Our model matches the time series of tranche spreads well, both before and during the financial crisis, thus offering a resolution to the puzzle reported by Coval, Jurek and Stafford (2009).

Rama Cont, CNRS-Université de Paris VI and Columbia University

Title: Default Contagion and Systemic Risk in Financial Networks

Abstract: A banking system may be modeled as a network of counterparties, where nodes represent financial institutions and (weighted) links represent the exposures of institutions to each other. Using a unique data set of interbank exposures and capital levels of Brazilian financial institutions, we show

that such banking networks may be modeled as directed scale-free networks with regularly-varying degree and exposure distributions.

In such networks, the failure of a node may generate contagion via domino effects and default cascades. We define two indicators of default contagion - the Default Impact and the Contagion Index- which measure the extent of systemic risk generated by the failure of an institution. We use these indicators to investigate the magnitude and nature of systemic risk in the Brazilian financial system. We find that default contagion, whose importance had been minimized in several previous studies, can be a major source of systemic risk if its magnitude is measured properly. Our study also reveals some interesting connections between network properties and the magnitude of systemic risk in the network and points to quantities which could serve as efficient tools for monitoring and regulating systemic risk.

For large networks, we perform an asymptotic analysis of the size of default cascades and obtain an analytical criterion for the stability of the network with respect to the default of a given node. Our asymptotic results are shown to be in good agreement with numerical simulation of large networks and provide a theoretical framework for stress testing the resilience to contagion of a large counterparty networks.

Keywords: Default Contagion; Systemic Risk; Random Graph; Scale-free Network; Copula.

References:

- H. Amini, R. Cont, and A. Minca (2010). Resilience to Contagion in Financial Networks, Working Paper.
- R. Cont, E. Bastos e Santos, and A. Moussa (2010). The Brazilian Financial System: Network Structure and Systemic Risk Analysis, Working Paper.
- R. Cont (2009), Measuring Systemic Risk, Working Paper.
- R. Cont and A. Moussa (2010), Too interconnected to fail: contagion and systemic risk in Financial networks.

Jean-Pierre Danthine, Swiss National Bank

Keynote Speech: Money Markets and Monetary Policy in and after the Crisis

Mark Davis, Imperial College

Title: Dynamical Counterparty Risk Valuation via Bessel Bridges

Abstract: (this work is joint with Martijn Pistorius) Counterparty risk concerns evaluating potential losses on a financial trade conditioned on the counterparty defaulting at a specific time in the future.

The objective is to evaluate the distribution of the value of the trade at this time. We use a 'structural model' in which the default time τ is the first passage time to a barrier by the counterparty 'firm value', here proxied by a Brownian motion or some simple diffusion. The risk neutral default time distribution can be inferred from CDS spreads, so we face the inverse first-passage problem of determining a time-varying barrier and/or process parameters so that the first passage distribution matches the one backed out from calibration data. We present new results in this direction. We then use h-transform methods to show that, conditioned on default at a specific time s the firm value process is a time-changed Bessel bridge. Asset prices are modelled by diffusion processes driven by Brownian motions correlated to the firm value process or, using orthogonalization, by the firm value process itself plus other independent Brownian motions. We can now compute, by Monte Carlo or in some very simple cases analytically, the distribution at time s of, say, an option on these assets supposing that the counterparty defaults at $\tau = s$. We discuss case studies involving an interest rate swap and a Bermudan oil swap.

David Lando, Copenhagen Business School

Title: Corporate Bond Liquidity before and after the Onset of the Subprime Crisis

Abstract: We analyze liquidity components of corporate bond spreads by combining the superior data quality of transaction-level corporate bond prices from TRACE with the increase in bond spreads caused by the crisis. A single linear combination of four liquidity proxies captures most of the liquidity-related variation of spreads before and during the crisis. The contribution to spreads from illiquidity increases dramatically with the crisis. We use our measure to shed new light on flight-to-quality, liquidity risk, the impact of trading frequency, the role of funding shocks to lead underwriters, and the liquidity of corporate bonds issued by financial firms.

Alex Lipton, Bank of America Merrill Lynch and Imperial College

Title: Structural and reduced-form approaches to calculating credit value adjustment for portfolios of credit default swaps

Abstract: tba

Dilip Madan, University of Maryland

Title: Capital Conservation and Risk Management

Abstract: The theory of two price markets of Cherny and Madan (2010) yields closed forms for bid and ask prices. Defining profits as the difference between the mid quote and the risk neutral expectation and capital as difference between the ask and the bid price one obtains precise expressions for these entities and thereby also returns. New expressions are developed for the bid and ask prices in terms of the sensitivity of the inverse distribution function to the quantile level. The latter turns out to be a measure of risk exposure at the quantile level. The theory is illustrated on unhedged exposures in the Black Merton Scholes model, followed by variance swaps and call options for variance gamma underliers. It is argued that markets should economize capital and furthermore the maximization of expected utility may involve an uneconomic use of capital. We further observe that stock positions should be revised downwards from zero delta in left skewed markets in response to the target gamma when minimizing capital commitments.

Fabio Mercurio, Bloomberg

Title: LIBOR Market Models with Stochastic Basis

Abstract: We extend the LIBOR market model to accommodate the new market practice of using different forward and discount curves in the pricing of interest-rate derivatives. Our extension is based on modeling the joint evolution of forward rates belonging to the discount curve and corresponding spreads with FRA rates. We start by considering general stochastic-volatility dynamics and show how to address both the caplet and swaption pricing problems in general. We then consider specific examples, including a model for the simultaneous evolution of rates and spreads associated with different tenors. We conclude the presentation with an example of calibration to real market data.

Antoon Pelsser, Maastricht University

Title: Robustness, Model Uncertainty and Pricing

Abstract: Apply ideas of robustness and model uncertainty in a context of pricing derivative contracts in complete and incomplete markets. We will focus on the (simple) case with uncertainty in mean only. First, we show that in a complete market, an agent worried about model uncertainty will choose the replicating portfolio as this will eliminate the model uncertainty completely. Hence, a perfectly rational agent that is facing model uncertainty will price risks using no-arbitrage. Second, we show that in an incomplete market the agent will hedge as much of the risk as possible and will choose a market-consistent pricing operator.

Panel Discussion

Topic: Financial Innovation after the Crisis

Discussants: Pierre Collin-Dufresne, Rajna Gibson, David Lando, Dilip Madan, Fabio Mercurio, Erwan Morellec (moderator)