

TopQuants Autumn Event 2013 - Abstracts

We are very happy to announce that the following speakers this year have agreed to present at our Autumn Event. The speakers this year are:

- Paul de Beus – Partner at EY
- Robert Daniels – Partner at Capstone Financial Industry
- Tony de Graaf – Principal Risk Manager at PGGM Investments
- Kees Oosterlee – Professor at Delft Institute of Applied Mathematics, Delft University of Technology, and MT member at CWI (Center for Mathematics and Computer Science)
- Roald Waaijer and Dimphy Hermans – Respectively Manager and Consultant at Deloitte
- David Schrage – Head of Single Premium Variable Annuity Trading at ING Bank
- Igor Stojković – Business Advisor Big Data at ABN Amro
- Artem Tsvetkov – Head of FX Model Validation at ING Bank
- Joris van Velsen – Risk Modeller at ABN Amro
- Frans de Weert – Head of Risk Management Supervision at DNB

Please indicate at least your top two (preferably top four) preferences on the registration form, so we can come up with a schedule that fits everyone's preferences as best as possible.

The abstracts of all 10 talks follow on the subsequent pages.

Paul de Beus (EY) - DVOC - Delta Value of Changes for assessing models and usage in analyses of change

In the audit of an SII economic balance sheet and risk based capital requirements, the auditor should evaluate the outcome of complex models, like stochastic generators. The model values often are the result of various model choices, (risk) data vendor selection, significant assumptions such as scenarios of future events etc. Varying methods and assumptions which are equally valid could lead to varying results. This may reveal that outcome, or in audit language 'the accounting estimate', is highly sensitive to certain assumptions and therefore subject to high estimation uncertainty, and as a consequence the range of possible reasonable outcomes can be quite broad. This range could be much broader than the materiality threshold calculated for the fair presentation of the SII balance sheet, taken as a whole. As a consequence, when auditors evaluate their findings (including those of model validation), two questions should be answered: (a) is it acceptable to apply a range of reasonable outcomes which is higher than the traditional performance materiality; and (b) can we develop a method to define reasonable ranges. With this presentation it is our aim to instigate an industry discussion on this topic, and to advocate for an increased cooperation between auditors and actuaries.

A DV01 - Dollar Value of 1bp for models where interest rate is the key parameter and is defined as the difference in value from the model by changing the interest curve parallel with 1 basis point (original definition). A 'DV01' for models where e.g. volatility is the key parameter could be defined as the difference in value from the model by changing the volatility with e.g. 1 percentage point (i.e. estimating the 'vega'). Same could be applied to actuarial parameters like lapses, mortality et cetera. Hence – looking at the set of first partial derivatives of the valuation or risk metric function, defined by EY as DVOC - Delta Value of Change.

Insight in the DVOC has several advantages. One clearly is to conclude on the key parameters driving the majority (e.g. > 95%) of the value (could be an economic value or risk metric). Another advantage is to use these key risk drivers to analyse their (inherent) variability; this can and should be used to determine the acceptable range of resulting outcomes – the Tolerable Range (TR) for audit purposes. DVOC's could also work quite well in ex-ante risk management and ex-post P&L attribution (or movement) analyses.

Robert Daniels (Capstone Financial Industry) – Stress tests – a theoretical exercise or do they really work?

Why are we surprised when the outcome of a stress scenario is far worse than what was predicted? Often we tend to rationalize the outcome e.g. “it was a four sigma event”. However, could it be the case that the applied stress test methodologies are inherently weak? In this presentation we will discuss a variety of practical challenges surrounding stress test methodologies. For example:

- The combination of a macro-economic model with a risk model is by definition challenging, and can lead to a ‘walking behind the cycle’ effect;
- Parameter and framework risks - the simplifying assumption of uncorrelated and time invariant parameters;
- The stress test framework of the European Banking Authority seems nice, but is it credible?

Furthermore, we will discuss what to do with the outcome of stress tests, and will make suggestions for possible approaches to improve and perform stress tests.

Tony de Graaf (PGGM) - Monitoring market risk in a pension fund

Pension funds increasingly prefer a sound implementation of their investment policy to short-term gains (outperformance). The relationship with the pension fund manager has changed more and more from “trust me” to “show me”. Instead of a general investment objective, more elaborate and detailed investment directives are given, and risk management is seen as an instrument for the board of the pension fund to be ‘in control’. This development has led to an enormous increase in the types of risk analyses and controls that are performed.

In this presentation we will show how all this has affected the market risk management function of a pension fund manager. A number of market risk monitoring techniques, among which:

- Predictive stress tests
- VaR / TE attribution
- Balance sheet liquidity stress test
- Balance sheet market risk
- AIFMD leverage & liquidity measures

will be demonstrated and put in a broader context.

Kees Oosterlee (CWI, TU Delft) - The Stochastic Grid Bundling Method for Pricing and Hedging Financial Contracts

joint work with Shashi Jain (TU Delft)

In this presentation, we will discuss the so-called Stochastic Grid Bundling Method (SGBM), which is a Monte Carlo method to price options with early exercise features, like Bermudan swaptions. The method is developed to handle multi-dimensional features, like multi-D option contracts or multi-D stochastic processes for the underlying. It is based on regression, like the Longstaff-Schwartz method (LSM).

The method is a hybrid of regression- and bundling-based approaches, and uses regressed value functions, together with bundling of the state space to approximate continuation values at different time steps. A high biased direct estimator and an early exercise policy are first computed using SGBM. The early-exercise policy is then used to determine a lower bound to the true option price. SGBM can also be used to compute a duality-based high-biased estimator. Compared to LSM, the approximate option values computed using SGBM, have lower numerical noise, not just at the initial step but also the intermediate time steps; which makes it a good candidate for computations that require option values at intermediate times steps (for example, computing future exposures within the CVA context).

It generates a direct estimator of the option price, an optimal early-exercise policy as well as a lower bound value for the option price. An advantage of SGBM is that the method can be used for fast approximation of the Greeks (i.e., derivatives with respect to the underlying spot prices, such as delta, gamma, etc.) for Bermudan-style options. Computational results for various multi-dimensional Bermudan options demonstrate the simplicity and efficiency of the algorithm proposed.

Roald Waaijer and Dimphy Hermans (Deloitte) - Replication of a class of variable annuities for the purpose of economic capital calculations

In recent years, life insurance companies increasingly started using the replicating portfolio technique for calculating economic capital. Key difficulties occur in replicating complex insurance products with path-dependent guarantees. In this presentation we discuss the replication of complex insurance products by means of vanilla instruments using a data mining technique versus replication using exotic options.

This presentation includes:

- The visualization of a data mining technique
- A case study that compares the results of both approaches
- Audience discussion

David Schrager (ING) - Variable Annuities – observations on valuation and risk management

Variable Annuities (VA) are the answer to the demand for private (3rd pillar) pension products. VA markets in the US and Japan total billions of euros of premiums every year. In this presentation the basics of the product will be discussed. Furthermore several observations on industry practices for valuation and hedging are made. The core of the presentation discusses how to efficiently deal with policyholder behaviour in the valuation of these products. We present a model for dynamic lapse (i.e. client surrender) that is similar to mortgage prepayment models and develop an approximate analytical valuation formula for a standard VA with dynamic lapse.

Igor Stojković (ABN Amro) – On Big Data applications in financial services

Data has been collected and stored with an increasing speed, size and volume in various industry segments for over a decade. While analysis based on too much data can yield nonsense results (e.g. correlations between population size of butterflies in Western Australia and the price of one's favorite derivative) linking increased scope and volume of data to the relevant domain facts, may provide valuable new insights and opportunities.

In this talk we will first review some approaches in the Big Data field. Subsequently we will consider several use cases where big data can contribute existing practices substantially. These cases apply to credit risk, market risk and trading but are not witnessed in 'traditional' analysis.

Artem Tsvetkov (ING) - Wrong-way risk in FX, cross-currency basis, and consistent multi-currency curve framework

Large cross-currency basis opened after the credit crisis is the reason for a big divergence of derivative valuations under different collateral. We consider the cross-currency basis as a consequence of wrong-way risk in the FX market and develop a model in order to build a consistent multi-currency curve framework and price collateralized and uncollateralized deals.

Joris van Velsen (ABN Amro) – Lévy copulas – Basic ideas and a new estimation method

Distributional copulas play an important role in financial modelling. The concept of a Lévy copula is, however, less well known. In essence, a Lévy copula provides the relationship between the Lévy measure of a multivariate Lévy process and the Lévy measures of its marginal processes. This means that a Lévy copula can, for example, be used to parsimoniously model a multivariate jump process in a bottom-up approach.

This presentation consists of two parts. First, we give a general introduction of Lévy copulas and discuss some applications, such as multi-asset option pricing and Operational Risk modelling. Second, a new method is presented to estimate and select a Lévy copula of a discretely observed compound Poisson process. This method is particularly useful in Operational Risk modelling and is a first step towards solving the granularity problem.

Frans de Weert (DNB) - The importance of different perspectives and implicit assumptions in models

The financial crisis has made it painfully clear that models should be an input for decision making rather than leading the decision making. Nonetheless, it is still the case today that models lead decision making because senior management does not understand the key variables in the models, or start taking the key variables for granted. On the other hand, model developers focus more on optimizing the models rather than highlighting the shortcomings of the models. When managing capital it is crucial to focus on different perspectives. These different perspectives generally need to be supported by different models. This talk focuses on the alignment between models and capital management and the role that senior management and model developers should play to improve this alignment.