Monte Carlo Simulation in Finance: Models, Algorithms and Practice with Application to Derivatives Pricing, Risk Measures and CVA by Jörg Kienitz

Frankfurt: 29th & 30th April 2013

This workshop provides TWO booking options

Register to ANY ONE day of the workshop

Register to BOTH days of the workshop and receive €200 discount

Early Bird Discounts: 20% Before 22nd February 2013 / 10% Before 22nd March 2013

ABOUT THE COURSE:

Summary:

The goal of this two day seminar is to provide a detailed overview, offering insights into the latest techniques of modeling uncertainty in financial markets and demonstrating computational methods to tackle the industry applied models. We show the applicability of Monte Carlo simulation to derivatives pricing, risk measurements or CVA calculation.

We explain the how the basic method is set up and we discuss the main ingredients. Finally, we discuss methods for improving and speeding up the method as well as recent techniques for calculating Greeks.

Each single topic is illustrated using Matlab code **(No Laptops are needed for this event, however delegates will be given example sheets)**.

The seminar is an ideal way to get a detailed overview of Monte Carlo methods and how to apply such techniques to problems arising in finance.

Main Topics:

This seminar discusses the application of Monte Carlo simulation to financial problems. Problems include scenario generation, risk measures, derivatives pricing or CVA calculation. The bullet points are:

- Probability Theory and Stochastic Processes
- One and multifactor models
- General purpose and special sampling schemes for e.g. Heston or SABR models
- Static and dynamic Monte Carlo Methods
- Risk Measures via scenario generation
- Derivatives pricing and hedging strategies
- Interest rate simulation and CVA
- Calculating sensitivities ('Greeks') and early exercise rights
- Implementing Monte Carlo methods

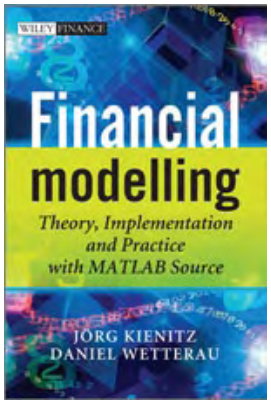
Methods:

- Presentation (slides)
- Illustration using computer examples

Prerequisites:

To participate in this course, you need to have a basic background in stochastic modelling but all the concepts and models are introduced and discussed in detail.

Each delegate will receive a complimentary copy of the Wiley 2012 publication: Financial Modelling: Theory, Implementation and Practice with MATLAB Source by Jörg Kienitz & Daniel Wetterau.



ABOUT THE PRESENTER:

Jörg Kienitz is the head of Quantitative Analytics at Deutsche Postbank AG. He is primarily involved in the developing and implementation of models for pricing and hedging of complex derivatives structures and for asset allocation. He also lectures at the Universities of Oxford, Bonn and Duisburg. He also gives courses on basic and advanced modelling for finance and programming including yield curve construction, simulation technqiues and option pricing. Jörg speaks at all major financial conferences such as Global Derivatives, WBS Fixed Income or RISK.

Jörg holds a Ph.D. in stochastic analysis and probability theory and authored several papers on mathematical and computational finance. He also is the co - author of the books “Monte Carlo Object Oriented Frameworks in C++” and “Financial Modelling – Theory, Implementation and Practice (with Matlab code)” which are published by Wiley.

DAY 1: MONTE CARLO SIMULATION IN FINANCE

Mathematical Basics

• Foundations of Probability
• How does Monte Carlo Work?
• Distributions

o Basic Distributions in Finance

• Stochastic Processes

o Diffusion Processes
o Jump-Diffusion Processes
o Jump Processes

Applications of the Monte Carlo Method

• Option Pricing
• Evaluating Hedge Strategies
• Scenario Generation and Risk Measures

Static Monte Carlo Simulation

• Sampling from the Uniform Distribution

o Random Number Generators
o Good ones and bad ones

• Sampling Techniques

o Inverse Method
o Ratio of Uniforms

• Sampling from the Normal and other Distributions

Dynamic Monte Carlo Simulation

• Path Generation Methods

o (Log) Euler-Scheme
o Predictor Corrector
o Bridge Sampling
o Exact Sampling

• Sampling from Jump Diffusion Processes

o SGS Sampling
o FGS Sampling
o Example: Merton Model

• Sampling from Stochastic Volatility Models

o Heston
o SABR

• Sampling from Pure Jump Processes

o Variance Gamma, NIG
o Stochastic Volatility Lévy Models

Day schedule: 09:00 – 17:30
Break: 10:30 – 10:45
Lunch: 12:30 – 13:30
Break: 15:15 – 15:30

DAY 2: MONTE CARLO SIMULATION IN FINANCE

CVA – Simulating Future Interest Rate

• Simulating Short Rate Processes

o Hull-White
o CIR

• Simulating Market Models

o Libor Market Models

• Calculating CVA for Fixed Income Products

Speeding up and improving your Monte Carlo

• Variance Reduction Techniques

o Antithetic Sampling
o Control variates
o Importance Sampling
o Stratification

• Quasi Random Numbers

o Halton Sequence
o Sobol Sequence

• Multi-Level Monte Carlo

Simulating Multi-Dimensional Models

• Introducing Dependence

o Correlation
o Copula

• Scenario Generation and Risk Measures (Calculating CVaR using Simulation)
• Multi-Dimensional Normal, Variance Gamma Models or NIG Models

Greeks (Adjoint, Proxies) and Early Exercise

• The Adjoint Method
• The Proxy Method
• American and Bermudan Options
• Illustration in the Libor Market Model contents
• How to apply Adjoints to higher order Greeks

Implementation Issues (from Algorithms to Code)

• Ingredients for a successful implementation of Monte Carlo algorithms
• Choosing a language (VBA, MatLab, C++, C#)
• Designing algorithms

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WBS

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Workshop Fee Structure:	Early Bird Discount: 20% Before 22nd February	Early Bird Discount: 10% Before 22nd March	Regular Event Fee
☐ Any One Day:	€959.20 + DE VAT	€1079.10 + DE VAT	€1199.00 + DE VAT
☐ Both Days (€200 Discount):	€1758.40 + DE VAT	€1978.20 + DE VAT	€2198.00 + DE VAT

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Prior to the two week deadline, cancellations are subject to a fee of 25% of the overall course cost.

Discount Structure:
The discount is available on any day permutation, and can be combined across delegates within the same company (only at the time of booking and not retrospectively).

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