



Monte Carlo Methods in Finance by Dr. Jörg Kienitz

London: 16th & 17th March 2009

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Monte Carlo Methods in Finance by Dr. Jörg Kienitz

In the seminar we discuss the application of the Monte Carlo method. We furthermore show how to implement it in an object oriented fashion using VBA. Choosing this language is motivated by the fact that Excel is the most widespread application. In addition we give hints how to set up the method in C++.

It is essential to cover the implementation to fully grasp the implications of derivatives pricing using Monte Carlo simulation. Starting from a simple Black / Scholes / Merton dynamic and simple option payoffs, we show how to extend the application to cover complex models and payoffs.

For example we show the implementation of the Heston model together with the QE scheme and apply it to the pricing of path-dependent options but also jump diffusion processes, Lévy processes or bridge simulation.

The source code will be made available such that further practice at your own location is possible. The code could also serve as a starting point for a proprietary application.

Presenter:

Jörg Kienitz is Head of Quantitative Analysis. This team is part of the Treasury department of Deutsche Postbank AG, Germany. He is responsible for model development, derivatives pricing, structured products pricing and asset allocation models. Jörg is an experienced presenter. He has trained finance professionals on mathematical subjects like Monte Carlo methods for several years. He also has extensive academic experience lecturing at university level including the universities of Bonn (math) and Duisburg (finance).

Jörg has authored several papers on mathematical and computational finance. He also is the co-author of the book “Monte Carlo Object Oriented Frameworks in C++” (together with Daniel J. Duffy) which will be published by Wiley in the first quarter of 2009.

Day 1: Monte Carlo Methods in Finance

Applications of Monte Carlo Methods in Finance and Mathematical Background

- Derivatives Pricing
- Value-at-Risk and Expected Shortfall Calculation
- Scenario based Optimization and Asset Allocation

- Basic Probability Theory (Laws of Large Numbers, Central Limit Theorem)
- Stochastic Processes with Examples
- Stochastic Differential Equation and basic Stochastic Calculus

- Applications and Examples

Random Number Generation

- Pseudo Random Numbers
- Congruential Generators
- Mersenne Twister
- Quasirandom Numbers
- Halton Sequences
- Sobol Sequences
- Generating Variates Due to Distributions
- Normal Distribution, Gamma Distribution, Chi Squared Distribution, Inverse Gaussian Distribution

- Applications and Examples

Path Generation – One-Dimensional Cases

- (Geometric) Brownian Motion
- Jump Extensions
- NIG Processes and Variance Gamma Processes
- Poisson Processes

- Applications (Stochastic Processes appearing in Equity, Credit, Interest Rates)

Path Generation – Multi-Dimensional Cases

- Multi-Dimensional Brownian Motion (Cholesky-, Spectral Decomposition)
- Beyond Brownian Motions
- Copulas

- Applications (Dependency, Credit, Interest Rates, Hybrids)

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

Day 2: Monte Carlo Methods in Finance

Stochastic Volatility Models

- The Heston and the Bates stochastic volatility model
- Monte Carlo Simulation Techniques – Comparison of numerical schemes
- The Quadratic Exponential (QE) Scheme

- Applications (Equity)

Variance Reduction Methods

- Controlling the Error
- Antithetic Variables
- Control Variates
- Importance Sampling
- Stratified Sampling
- Weighted Monte Carlo

- Applications and Examples

Advanced Monte Carlo I – Calculation of Sensitivities

- Finite Difference Methods
- Pathwise Methods
- Likelihood Ratio Methods
- Proxy Schemes

- Applications and Examples (Greeks for Discontinuous Payoffs)

Advanced Monte Carlo II – Early Exercise Features

- The Longstaff Schwarz Method
- Regression Now or Regression Later
- Dual Methods

- Applications and Examples (Regression Methods)

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Workshop Fee:

Any One day: £1099 + UK VAT

Both days: £1998 + UK VAT
(Including £200 Discount)

30% discount Academic delegates

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To register please fax the completed booking form to:

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Flight details:

All delegates flying into London on the morning of the event are reminded that they should arrive 30 minutes before the workshop starts for registration. The hotels West End location is approximately 1 hour from all 3 main London airports, Heathrow, Gatwick and City. Returning flights should equally allow for the events finishing time.

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