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19 – 20 April, 2010
The Institute of Physics, London, UK

Jörg Kienitz presents

Monte Carlo Methods in Finance

In the seminar we discuss the application of the Monte Carlo method to Quantitative Finance. In particular we focus on pricing derivatives. We investigate how several methods to simulate sample paths of risky assets, tune the efficiency of the method and finally solve advanced problems like computing hedge sensitivities and early exercise features.

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++ and Matlab.

It is essential to cover the implementation to fully grasp the implications and benefits of the method for derivatives pricing. 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,

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About the speaker

Jörg Kienitz is the head of Quantitative Analysis at Deutsche Postbank AG. He is primarily involved in the developing and implementation of models for pricing of complex derivatives structures and for asset allocation. He also lectures at university level at the Universities of Oxford, Bonn and Duisburg on advanced financial modelling and gives courses on 'Applications of Monte Carlo Methods in Finance' and on other financial topics including Lévy processes and interest rate models as well as lecturing on finance conferences like RISK Europe. Joerg holds a Ph.D. in stochastic analysis and probability theory. Jörg 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 September 2009.

Course Highlights

- Applications of Monte Carlo Methods in Finance and Mathematical Background Derivatives Pricing
- Random Number Generation
- Path Generation – One Dimensional Cases
- Path Generation – Multi-Dimensional Cases
- Stochastic Volatility Models
- Variance Reduction Methods
- Advanced Monte Carlo I - Calculation of Sensitivities
- Advanced Monte Carlo II – Early Exercise Features

Course Methodology

- Presentation (slides) and Case studies
- Hands On exercises
- VBA/Excel implementations of models and algorithms made available during and after the course

What have previous delegates said?

Quantitative Development, Barclays Capital:
"Your course was very interesting and useful, and I think you managed to present a large amount of information in a clear way."

Quantitative Research, Nordea Markets:
"...overall there was a good balance between the number of topics covered and the time spent on each...I'm only a bit annoyed that I didn't attend both days."

Risk Control, Commerzbank
"The course was very well structured and a large amount of background information and mathematical details were provided."

Prerequisites

It is assumed that the attendees have some working knowledge of VBA to follow the examples.

To participate in this course, you need to bring your own laptop.

Who should attend?

This course has been developed for financial professionals who want to use simulation methods or gain further insights into the methodology in terms of effectiveness and further applicapilty. The course introduces and elaborates on how to apply Monte Carlo methods, creating a flexible application in VBA to illustrate the methods.

The course is also of interest for risk managers, IT professionals, quants, consultants and backoffice staff interested in modern techniques for Quantitative Finance.

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Course Contents

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 and 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)

To participate in this course, you need to bring your own laptop.

Path Generation – Multi-Dimensional Cases

- Multi-Dimensional Brownian Motion (Cholesky-, Spectral Decomposition)
- Beyond Brownian Motion
- Copulae
- Applications (Credit, Interest Rates, Hybrids)

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

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
- Policy Iteration
- Dual Methods
- Applications and Examples (Regression Methods)

Further Information

Dates: 2 Days – 19 - 20th April 2010
Venue: The Institute of Physics, London, UK
Cost: £2100 exc. VAT

Enquiries

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Registration

Please Return Application form to:

Financial Training
MoneyScience Ltd,
4 St Pauls Road,
Bristol,
BS8 1LT,
UK

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Registration Form

Monte Carlo Methods in Finance

Title (Mr/Mrs/Ms/Dr/Other)

First Name

Last Name

Email Address

Participant's First Name (If different from above)

Participant's Last Name (If different from above)

Participant's Email Address (If different from above)

Company Name

Job Title

Department

Telephone Number

Tax Registration No.

VAT Registration No.

Address for Invoice

Postal Code

Country

Please Return Completed Application to:

SIGNED.....

Financial Training,
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Bristol, BS8 1LT, UK

DATE.....

or Sign, Scan and Return to jacob@moneyscience.com

☐ **I have read and understand the Terms and Conditions on the page following.**

Cancellation

If a person who has registered for this course is unable to attend for whatever reasons, a substitute delegate may be appointed to participate in advance. Cancellation will be accepted only in written form no later than twenty calendar days prior to the date of the course while a cancellation fee in the amount of 10% of the price or block price will be charged. Cancellation of the participation within a period of less than twenty calendar days prior to the date of the course is not possible for the technical and the organisational reasons. MoneyScience reserve the right at all times to cancel participation or cancel the entire seminar for whatever unspecified reasons, including possible force majeur. In this case, the price will be refunded in full to the applying participant.

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Terms and Conditions

MoneyScience Training Events are English-language seminars, training sessions and practical workshops delivered by expert, qualified tutors. Our objective is to provide industry professionals with advanced financial know-how and up-to-date analytical methods and skills.

Tuition Language

MoneyScience Events are held in English and all relevant manuals, training software etc. are also provided in English. In order to benefit from participation, a good working knowledge of English, including common financial phrases and related terminology, is required.

Registration

Clients who decided to participate, should submit their registration by mail to us in advance. Subject to availability, the participant will then receive a confirmation of participation. The number of participants is strictly limited to preserve an effective and focused learning environment.

Seminar Prices

The quoted seminar prices are per person and include all course material, lunches and refreshments, The price does **not** include hotel accommodation. Quoted prices are exclusive of VAT.

Discounts

Bulk discounts are offered when submitting an application for the participation of more than one person. Please contact jacob@moneyscience.com for further details.

Invoicing and Payment

An invoice for the seminar price will be sent to the participants on receipt of their Registration Form and should be paid within days. Full payment of the invoice must be made before the start of the course as a precondition of participation.

Terms of Cancellation

If a person who has registered for this course is unable to attend for whatever reasons, a substitute delegate may be appointed to participate in advance. Cancellation will be accepted only in written form no later than twenty calendar days prior to the date of the course while a cancellation fee in the amount of 10% of the price or block price will be charged. Cancellation of the participation within a period of less than twenty calendar days prior to the date of the course is not possible for the technical and the organisational reasons. MoneyScience reserve the right at all times to cancel participation or cancel the entire seminar for whatever unspecified reasons, including possible force majeur. In this case, the price will be refunded in full to the applying participant.