

19 May, 2010  
***The Institute of Physics, London, UK***

Jörg Kienitz presents

## Advanced Financial Mathematical Methods – Using Stochastic Volatility and Lévy Processes based models in Finance – Models, Algorithms and Practice

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The goal of this one day seminar is to provide a detailed overview, offering insights into the latest techniques of modelling uncertainty in financial markets and demonstrating computational methods to tackle the models. We show Monte Carlo simulation as well as semi-analytical methods based on Fourier transforms. The latter techniques are suitable for efficient calibration of the underlying models.

We explain the whole work-cycle for successfully handling derivatives within the above framework including market data, calibration, simulation, pricing, hedging and risk management.

The seminar is an ideal way to get a detailed overview of the latest development in financial modelling based on Lévy processes.

### 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. Jörg 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

This seminar discusses the most important issues that need to be addressed when we price and hedge options within a Lévy process framework using Monte Carlo and Fourier transform methods:

- Stochastic Movement; From diffusions to (time changed) Lévy processes
- One - factor and multi - factor options
- Market data
- Calibration
- Mathematical tools; Monte Carlo and Fourier transform methods
- Calculating sensitivities ('Greeks')
- We propose some of the most powerful models and propose efficient methods for the implementation and we discuss why they work, why some other methods are not optimal and we compare our results with other modeling approaches such as Stochastic Volatility Models.

### Course Methodology

- Presentation (slides)
- Illustration using computer examples

### Prerequisites

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

### Who should attend?

- Financial Engineers
- Risk managers
- IT staff supporting the structured products group
- Credit Risk Management
- Model Validation Quants
- Quantitative Analysts and Researchers
- Quantitative Model Developers

## Course Contents

### Part I:

#### Fundamental Theory Stochastic Processes in Quantitative Finance

- Stochastic Movement; Diffusions, Jump-Diffusions, Pure-Jump Processes
- Stochastic Volatility
- Financial Models

#### Mathematical Basics

- Characteristic Functions
- Lévy Measure
- Lévy-Khinchine Theorem

### Part II:

#### Models based on Lévy Processes

- Geometric Brownian motion
- Merton jump diffusion model
- Variance Gamma model
- Normal Inverse Gaussian model
- Distributional and path properties

#### Pricing Vanilla Options and Calibration

- Pricing options using FFT methods
- Carr-Madan method
- Cosine Method
- Using FFT for calibration
- Objective functions
- Local Optimization
- Global Optimization

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

### Further Information

**Dates:** 1 Day – 19 May, 2010

**Venue:** The Institute of Physics, London, UK

**Cost:** £1100 exc. VAT (1 day only)  
£1980 exc. VAT (1 day + hands on workshop)

### Enquiries

Jacob Bettany

**Tel:** +44 (0) 117 923 8851

**Email:** jacob@moneyscience.com

### Part III:

#### Stochastic Volatility Models based on Lévy Models

- Stochastic clocks and volatility
- The CIR Clock
- The Gamma Ornstein-Uhlenbeck (GOU) Clock
- The Variance Gamma CIR / GOU models
- The NIG CIR / GOU models
- Comparison to Heston and Bates stochastic volatility model

#### Pricing Exotic Options

- Monte Carlo methods for option pricing
- Setting up Monte Carlo simulation
- Schemes for VG model
- Schemes for NIG model
- Schemes for GOU clock
- Schemes for CIR clock
- Computing the Greeks

#### Pricing Forward Starting Options

- The forward characteristic function
- Comparing results using FFT and MC

#### Multidimensional Models

- The multidimensional VG model

### Part IV:

#### Implementation Issues From Algorithms to Code

- Choosing a language (VBA, Matlab, C++, C#)
- Designing algorithms
- Demo of running software for calibration and pricing

### Registration

Please Return Application form to:

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



Registration Form

Advanced Financial Mathematical Methods – Day 1

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:

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DATE.....

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

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

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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.

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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.

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