Advanced Financial Mathematical Methods – Stochastic Volatility and Exponential Lévy Models by Dr. Jörg Kienitz

London: 7th – 8th October 2010

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

Topics covered:

The goal of this two-day seminar is to give a detailed overview and insights into the latest techniques of modelling uncertainty in financial markets as well as showing 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.

Overview of Course:
This seminar discusses the most important issues that need to be addressed when we price and hedge options within Non-Gaussian process based frameworks 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 modelling approaches such as Stochastic Volatility Models.

What do you learn?
We see this seminar as an ideal way to get a detailed overview of the latest development in financial modelling based on Non-Gaussian processes. We cover the following topics:

- **Why needing Non-Gaussian models**
- **Where to get started with such models**
- **Properties of models based on Stochastic Volatility and / or Lévy processes**
- **Mathematical treatment of plain vanilla and exotic options**
- **Computational and coding issues**

In short, we propose that this seminar will kick-start the process of becoming acquainted with financial modelling using Stochastic Volatility and Lévy processes.

Presenter:
Joerg 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 is also lecturing at university level, 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.

Joerg holds a Ph.D. in stochastic analysis and probability theory. He 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 is published by Wiley.

All delegates will receive a complimentary copy of the Wiley 2009 publication: Monte Carlo Frameworks: Building Customisable High-performance C++ Applications by Daniel J. Duffy & Joerg Kienitz.

Day 1: Advanced Financial Mathematical Methods – Stochastic Volatility and Exponential Lévy Models

Market Data and the need for Non-Gaussian Models

- **The Volatility Smile**
- **Higher Moments**
- **Historical Distributions**
- **Applications of Non-Gaussian Models: Asset Allocation, Pricing, Simulation**

Fundamental Theory Stochastic Processes in Quantitative Finance

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

Mathematical Setup and Models based on Non-Gaussian Processes

- **Mathematical Setup**
- **Characteristic Functions**
- **Lévy Measure**
- **Lévy-Khinchtine Theorem**
- **Random Variables and Modelling of Financial Markets**

Models based on Non-Gaussian 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 Vanilla Options**
- **Pricing options using FFT methods**
- **Carr-Madan method**
- **Cosine Method**
- **Calibration to Vanilla Options**
- **Using FFT for calibration**
- **Objective functions**
- **Local Optimization**
- **Global Optimization**

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

Day 2: Advanced Financial Mathematical Methods – Stochastic Volatility and Exponential Lévy Models

Stochastic Volatility 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**
- **The Heston stochastic volatility model**
- **The Bates stochastic volatility model**

Pricing Exotic Options using Monte Carlo Simulation

- **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 and Asset Allocation using CVaR**
- **The multidimensional VG model**
- **The multidimensional NIG model**
- **Expected maximum likelihood estimation of Model Parameters**
- **Greeks and American Options**
- **Using FFT to price American Options**
- **Using Monte Carlo to price American Options**
- **Calculating Greeks using Monte Carlo Methods**

Implementation Issues From Algorithms to Code

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

We will illustrate the models using Excel and Matlab code. Some of the Matlab code can be compiled to a dll. This dll can than be used within Excel.

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

WBS

Advanced Financial Mathematical Methods – Stochastic Volatility and Exponential Lévy Models by Dr. Jörg Kienitz

London: 7th – 8th October 2010

Workshop Fee:

☐ Any One day: £1099 + UK VAT

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

30% discount Academic delegates

Delegate details:

Company:	
Name:	
Position:	
Name:	
Position:	
Name:	
Position:	
Department:	
Address:	
Country:	
Phone:	
E mail:	
Date:	
Signature:	

To register please fax the completed booking form to:

Fax: +44 (0) 1273 201360

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.

Sponsorship:
World Business strategies Ltd, offer sponsorship opportunities for all events,
E-mail headers and the web site.
Contact Sponsorship: +44 (0) 1273 201352

Disclaimer:
World business strategies command the rights to cancel or alter any part of this programme.

Cancellation:
By completing of this form the client hereby enters into a agreement stating that if a cancellation is made by fax or writing within two weeks of the event date no refund shall be given. However in certain circumstances a credit note maybe issued for future events.

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).

Registration:
Tel: +44 (0) 1273 201352
Fax: +44 (0) 1273 201360

Contact:
http://www.wbstraining.com
sales@wbstraining.com