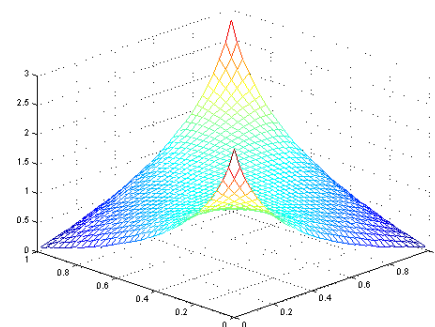




# Financial Engineering Workshops

London → 29 NOVEMBER 2005 – 2 DECEMBER 2005



## Speakers:

Dilip Madan, Robert H. Smith  
School of Business,  
University of Maryland/  
Consultant to Morgan Stanley

Paul Embrechts,  
Johanna Neslehova,  
Rosario Dell'Aquila,  
Risk Lab, ETH, Zurich

**Claudio Romano,**  
Capitalia Bank Holding, Rome

Annalisa Di Clemente,  
University of Rome

Stavros Zenios,  
Wharton Financial Institutions  
University of Pennsylvania/  
University of Cyprus

Gautam Mitra,  
CARISMA, Brunel University

Paresh Date,  
Rogemar Mamon,  
Keming Yu,  
CARISMA, Brunel University

- Extreme Value Theory and Copulas  
29 November 2005, London
- Financial Innovation & Structured Products in the Equity World  
30 November 2005, London
- Practical Financial Optimisation:  
Decision Making for Financial Engineers  
1 December 2005, London
- Hidden Markov Models, Kalman Filters,  
Non-Linear Time Series Analysis;  
Robust regression  
2 December 2005, London

## FOR FURTHER INFORMATION

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## Extreme Value Theory and Copulas

29 November 2005, London

### The Workshop

Extreme Value Theory was originally conceived as the probabilistic theory for studying rare events; copula functions are implemented for measuring and optimising portfolio credit risk.

These three presentations cover the application of these powerful techniques to real world problems of operational and credit risk.

Attendees will gain valuable knowledge and new practical techniques to apply in a variety of scenarios, including portfolio credit risk measurement and management, for example:

- EVT is a valuable tool for managing operational risk
- Basel II for credit risk recommends the use of the Gaussian Copula

#### Quantitative Models for Operational Risk: Extremes, Dependence, Aggregation and Robustness

Paul Embrechts, Johanna Neslehova and Rosario Dell'Aquila, ETH Zurich

- Introduction
- Advanced EVT Models: POT Analysis of Operational Risk Data
- Dependent Risk Processes
- Dependent Aggregated Losses
- Aggregating (Operational) Risk Measures
- Robust Estimation and Testing

#### Applying Extreme Value Theory and Copula Functions to market And Operational Risk

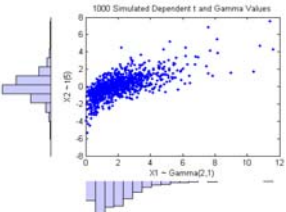
Claudio Romano, Capitalia Bank Holding, Rome

- Copula Function
- Tail Dependence
- Elliptical Copulas
- Applying Copula to Risk Management
- Estimating Risk Measures for a Portfolio with Copula
- An Application of Copula Function to Portfolio Credit Risk Measurement

#### Measuring and Optimising Portfolio Credit risk: A Copula Based Approach

Annalisa Di Clemente, University of Rome "La Sapienza"

- Measuring Portfolio Credit Risk: A Copula-based Approach
- Copula Functions
- Portfolio Credit Risk Optimization Model
- Application to a Hypothetical Loan Portfolio



**BACKGROUND AND OBJECTIVE:**

The objective of the five one-day workshops is to bring together practitioners, academics and PhD students working in the area of risk modelling, financial mathematics, computational finance and optimisation. The workshop will provide an opportunity for participants engaged at the forefront of this area to discuss problems and challenges and suggest fruitful directions for future research, which focus on the emerging requirements of the finance industry.

The speaker panel includes world leaders such as Dilip Madan, Robert H. Smith School of Business, University of Maryland/ Consultant to Morgan Stanley; Paul Embrechts, ETH, Zurich; Gautam Mitra, CARISMA Brunel University; Stavros Zenios, Wharton School of Business/ University of Cyprus; Claudio Romano, Credit Risk Analyst, Capitalia Bank Holding, Rome. All the speakers have achieved distinction through their research contributions and also possess wide experience of real world applications of highly sophisticated quantitative models.

**BENEFITS OF ATTENDING:**

You will learn about the latest developments in the field from acknowledged research leaders, gathered together in London. By networking and listening to the presentations, you will gain valuable knowledge and practical techniques to apply your own area of practice or research. You will gain first hand experience of the innovative thinking and best practices currently being developed in some of the world's leading educational institutions.

**WHO SHOULD ATTEND:**

Academics and Researchers in the field of **Quantitative Finance**  
 Industry Area:  
 Risk Management, Quantitative Analytics, Hedge Funds, Asset Management, Equity, Derivatives, Capital Management, Credit, Corporate Banking, Investment Banking, Investment Consulting, Operations, Debt/Fixed Income, Insurance, Pensions, Commodities, Trading, Information Technology,

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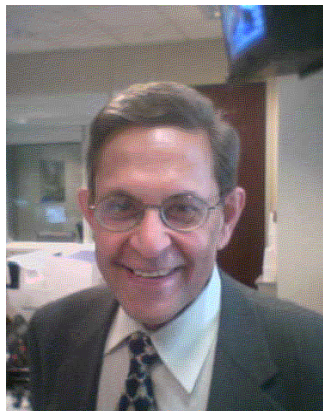




## Financial Innovation & New Structured Products in the Equity World

30 November 2005, London

### Presenter



**Dilip B. Madan**

Robert H. Smith School of Business, University of Maryland / Consultant to Morgan Stanley

Ph.D. in Economics (1971), University of Maryland and Ph.D. in Mathematics (1975), University of Maryland

Dilip Madan works on improving the quality of financial valuation models, enhancing the performance of investment strategies, and efficient risk allocation in modern economies. His current research deals with the theory of stochastic processes' applications to risk management in economic and financial spheres. Madan has published extensively in the field of financial engineering and innovation. He is the ex- president of the Bachelier Finance Society.

### Workshop Programme:

We will survey the broad range of products now being traded and created in the market for equity investments. These include what are now called vanilla cliquet products and the more recently developed swing and reverse swing cliquet trades. Multiasset structures and dispersion products will also be discussed. A theoretical discussion of the rationale for the creation of these products will be presented. The structure of risk exposures to be managed in the creation of such liabilities will then be enumerated. We shall discuss concepts like the volgamma, the skewgamma and crossgamma effects. This will be followed by a theoretical discussion of the implications of the technology of hedging to acceptability. Concepts of coherent risk measures and coherent utilities are employed to define risk acceptability. We will then survey a collection of models ranging from the traditional jump diffusion, to a number of stochastic volatility models, the local volatility model and a recent extension to local Lévy models, used by industry in the valuation and regular marking to market of these product liabilities. The results of applying a variety of models to the valuation of a variety of products will conclude the presentation.

### Overview of the New Equity Structured Products

- A Survey of the Products
  - Common Components for the Products
  - Classification of Products
  - Trigger Redeemable Notes / Vanilla Arithmetic and Product Cliquets / Swing Cliquets / Napoleonic Features / Incorporating Lock-Ins / Intermediate floors and cap / Melting Baskets / Dispersion Trades / Correlation Trades
- Rationale for the Products
  - Rationale for the Products
  - The Answer from Utility Theory
- A Unified view of the Products and their Rationale
  - Log Gaussian Products
  - Consequences of differences in volatilities
  - Estimated Products
  - Down and In Trigger Redeemable Notes
  - Path Dependent Products
  - Correlation Trades

### Risks Involved in Equity Structured Products

- Risk exposure of products
  - Describing the Risks
  - Enumeration of Risks
  - Assessing the Risks
  - Surface Exposure of Products
  - Remarks on Cliquet Volgamma/ Reverse Cliquet Volgamma/ Swing Cliquet Skewgamma
  - Skew gamma in variance swaps
  - Importance of Forward Skews
  - Cross Gamma Effects
  - Cross Gamma in Basket Option Trades
  - Structures Exposed to Digital Risk
  - Correlation between Equity and Interest Rate Risks
- Supply side of structured products
  - Supply Side of Structured Products
  - The Relatively Liquid Hedging Assets
  - Acceptable Risks
- Modelling the bid and ask prices
  - The Ask Price Problem/ The Bid Price Problem
  - Implications of the Dual Problems
  - Acceptability, Hedging, and Arbitrage

### Best Practice Modelling for Pricing and Hedging Equity Structured Products

- Description of models and their properties
  - Local Volatility Model
  - Local Lévy Models
  - Heston Stochastic Volatility
  - Merton Jump Diffusion with stochastic volatility
  - Stochastic Volatility for Lévy Processes
  - Stochastic Jump Arrival Rates
- Results of market calibration
  - Results of Calibration on SPX for 20040706
  - HSV Calibration / SVJ Calibration / VGSA Calibration
  - SVDNE / SVVG / SVCGMY / SVADNE / SVAVG / SVACGM
  - Common Features of Models
- Model prices for equity structured products
  - The Products Priced by the Models
  - Model Pricing
  - Locally Floored Globally Capped Cliquet Model Rankings
  - Locally Capped and Globally Floored Cliquet
  - Locally Capped and Globally Floored
  - Capped Swing Cliquet / Capped Swing Cliquet / Capped Reverse Swing Cliquet
  - Reverse Swing Cliquet
  - Uncapped Swing Cliquet with Lock In / Swing Cliquet with Lock In
  - Trigger Autocancellable Redeemable Note
  - Model Rank Correlations
  - Volatility Options
- Spot and option risks to be hedged in equity structured products
  - Risks in Equity Structured Products
  - Forward Spot Slides and Option Trades
  - Implicit Hedge Costs
  - Conclusion

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## Hidden Markov Models; Kalman Filters; ARCH, GARCH and Time Series Analysis; Robust Regression

2 December 2005, CARISMA, Brunel University

### The Workshop

#### Kalman Filtering in Mathematical Finance

- Pareshe Date, CARISMA, Brunel University

For modelling evolution of variables, which are not directly observable (such as short rate, stock price volatility and spot prices in energy markets), the use of Kalman filter is becoming increasingly common in mathematical finance. The first half of this short tutorial will outline the basic theory behind Kalman filter and discuss its use in calibration of dynamic state space models as well as in prediction of unobservable variables. The second half of the tutorial will focus on a specific application, viz. calibration of stochastic volatility model from high frequency asset price data. Results of numerical experiments in calibration of model and prediction of future volatility will be reported.

#### Hidden Markov Models in Quantitative Finance

- Rogemar Mamon, CARISMA, Brunel University

The tutorial is aimed to demonstrate the change of measure techniques in estimating optimally the parameters of an asset price model. We shall use hidden Markov model filtering techniques to process the signals received in the financial market. Recursive estimation of model parameters will be provided and discussed within the framework of a regime-switching model designed to capture the "quiet" and "turbulent" periods of the market. We shall illustrate an application to a data set of market prices and present statistical analysis of the results.

#### Robust Statistics, Robust Regression and Quantile Regression

- Keming Yu, CARISMA, Brunel University

This talk provides a brief review to robust statistics, robust regression and quantile regression. We begin with an introduction to and motivation for these techniques. We then outline various approaches to the techniques and discuss some typical application areas.

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#### THE CENTRE'S MISSION

The mission of CARISMA is to be a centre of excellence recognised for its research and scholarship in the following:

- Analysis of Risk
- Optimisation Modelling
- The Combined paradigm of risk and return quantification.

#### EXECUTIVE SUMMARY

There is a considerable upsurge of interest and a growing requirement for risk and optimisation modelling in many industry sectors and in particular in the finance industry. Supported by the strategic research initiative of Brunel University, Professor Gautam Mitra of the Department of Mathematical Sciences and Professor Christos Ioannidis of the Department of Economics and Finance, together with academic leaders from Human Sciences, Systems Engineering, and Electronic and Computer Engineering have set up CARISMA as an interdisciplinary research centre. The center's research direction is to follow new and rapid developments in the field of risk analysis and optimisation modelling.

The center's aim is to create a vibrant academic environment of research and learning and establish a programme of: Research Council funded research, Industry sponsored research, Collaboration with leading international researchers and institutions, PhD research, Professional training.

#### BACKGROUND

Optimum planning and scheduling have been long-standing goals in many private sector companies and public organisations. Organisations, however, face uncertainty, typically in demands, resource availability and yields. Thus, within the stochastic environment, the goals of maximum profit (return) in the private sector or best service level in the public sector are not always achievable as predicted by deterministic models.

In practice this translates directly into risk. Thus, risk may appear in many forms involving profit, liquidity, market share, service level and can be attributed to changes in economic conditions, environmental change, accidents and natural disasters. It is therefore necessary to extend the concept of optimisation and introduce mathematical models which can be used for optimisation with quantifiable risk.

The mathematical models and solution technologies for optimisation and models of risk are very close. The centre will pursue theoretical and applied research issues encompassing the growing use of risk and optimisation models in diverse industries.

The centre has set out to achieve its mission by:

- attracting high calibre researchers investigating theoretical as well as industrially relevant research problems
- collaborating with important industries
- networking and partnering with other international research centres

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29 November 2005 – 2 December 2005

VENUE: London

You can use this form to book any of the events listed – Please tick the appropriate box (opposite)

- Please book me on this event(s) ticked opposite
- Please send further information on the related event(s) ticked in the list opposite
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- Extreme Value Theory and Copulas  
29 Nov. 2005
- Financial Innovation and New Structured Products in the Equity World  
30 Nov. 2005
- Practical Financial Optimisation: Decision Making for Financial Engineers  
1 Dec. 2005
- Hidden Markov Models, Kalman Filters, Non-linear Time Series Analysis, Robust Regression  
2 Dec. 2005

## Related Events

- Workshop: Optimisation and its use in Business Applications, 3-4 Oct. 2005
- Decision Making Under Uncertainty: Stochastic Programming Workshop, 5-6 Oct. 2005
- Financial Planning using Integer Quadratic Programming, 7 Oct. 2005    Fin  SC

## Registration Fees

	1	2	3	4	5 days
<b>PhD Student</b>	£60	£120	£180	£240	£300
<b>Academic and researchers</b>	£95	£190	£285	£380	£475
<b>Industry</b>	£300	£550	£795	£1000	£1190

VAT is charged at 17.5%. Please contact UNICOM for details.

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- Alternatively, **telephone** UNICOM on +44(0) 1895 256 484 to provisionally reserve your place

## Registration Details

The registration fee for the event covers the following: Attendance, copy of the documentation, lunches and light refreshments. Accommodation is not included, but reduced rates have been negotiated. Please contact UNICOM Seminars for details. Detailed delegate information will be sent to you approximately two weeks before the event.

person /day, payable within one week of invoice. As we cannot guarantee that exactly the same course will be available, the transfer will be open to any other event taking place within six months from the date of the original event. The organisers reserve the right to amend the programme if necessary.

Please note that payment is required in advance of the event.

It is a condition of booking that all fees are paid before the date of the event. All invoices carry surcharges which are payable if the fee remains unpaid on the day of the event

**What happens if I have to cancel?** Confirm your CANCELLATION in writing up to 15 working days before the event and receive a refund less a 10% + VAT service charge. Regrettably, no refunds can be made for cancellations received less than 15 working days prior to the event and the invoice will remain due. SUBSTITUTIONS are welcome at anytime. You may also RANSFER your booking to a future event for a small additional charge of £125/

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