

FINANC ONCEPTS

Your Partner in Risk Management

Training Courses in Quantitative Finance

Finance Concepts Advanced Courses bring the latest developments in Quantitative Finance within the reach of market practitioners and risk managers through lectures given by the foremost experts in the field.

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Finance Concepts team



Marco AVELLANEDA is Professor of applied mathematics and Director of Division of Financial Mathematics at New York University's Courant Institute of Mathematical Sciences. He is a founding partner of *Finance Concepts*. He held positions as Vice president in the Derivatives Products group at Morgan Stanley, partner in the Gargoyle Equity Volatility Fund, Head of Volatility Arbitrage at Capital Fund Management and, more recently, Portfolio Manager in quantitative equity strategies at the Galleon Group in New York. Known in finance as the inventor of the Uncertain Volatility model and for his work on the weighted Monte Carlo algorithm, he has extensive experience in the fields of derivatives, quantitative strategies in equities and volatility trading from the point of view of hedge funds and Wall Street firms. An established author, Marco has written about 100 research papers and is Managing Editor for *International Journal of Theoretical and Applied Finance*.



Rama CONT is Director of the Center for Financial Engineering at Columbia University, New York, CNRS research scientist and a founding partner of Finance Concepts. His research interests include computational methods in option pricing, models based on implied volatility and issues related to model risk, model selection and calibration. Rama has taught at various academic institutions in Europe and the US including Ecole Polytechnique, Université de Paris VI, HEC, Osaka University and Princeton University, and is a regular speaker in training courses for finance professionals. He has worked as a consultant for several financial institutions in Europe on topics ranging from performance analysis of hedge funds to numerical methods for exotic options. Rama is the co-author of "Financial modelling with jump processes" (CRC Press 2003), "Credit Derivatives and Structured Credit" (Wiley 2005).



Richard BRUYERE is a consultant specialized in the field of capital markets, asset management, structured finance and private equity. Richard is also President of *Image & Finance*, specializing in asset management market surveys. After graduating from HEC, he helped launch the credit derivatives business at Société Générale before joining Credit Suisse First Boston (London) where he developed the structured credit business. He is the author of the book *Les produits dérivés de crédit*, the first publication on this subject in French which was awarded several times. An English version of the book, *Credit Derivatives and Structured Credit* (Wiley 2005), is now available. Richard teaches finance and capital markets at HEC (France's premier business school) and at the University Paris-VI in the Master (DEA) "Probabilité et Finance".



Bruno DUPIRE headed various Derivatives Research teams at Societe Generale, Paribas Capital Markets and Nikko Financial Products before joining the quantitative research team at Bloomberg in 2004. He is best known for his work on volatility modelling, including the Local Volatility Model (1993), simplest extension of the Black-Merton-Scholes model to fit all option prices, and subsequent results on stochastic volatility and volatility derivatives. His current interests include quantitative trading strategies and robust hedging. In 2002 he was included in the Risk Hall of Fame of the 50 most influential figures in Derivatives and Risk management.



Nicole EL KAROUI is Professor of Applied Mathematics at Paris VI University and a well known expert in mathematical finance with numerous publications in this field and a recognized expertise in stochastic models in finance, pricing of interest rate derivatives using change of numeraire techniques, credit risk, pricing and hedging of derivative instruments and stochastic optimization theory. Founder of one of the first graduate programs in quantitative finance, she has also accumulated more than 20 years of experience in consulting for various financial institutions and hedge funds in Europe. Her recent work has covered optimal design of derivatives in illiquid markets, credit risk and optimal portfolio management with American capital guarantees.



Peter TANKOV is assistant professor of financial mathematics at Ecole Polytechnique, France, where he teaches probability theory and mathematical finance. He holds a doctoral degree in applied mathematics from Ecole Polytechnique and has previously worked at INRIA Research Institute and Paris VII University. His research focuses on copulas and dependency modelling, applications of Lévy processes in finance, model calibration and option hedging. He is a co-author of the book *Financial Modelling with jump process* (CRC Press, 2003), and associate editor of the *Encyclopedia of Quantitative Finance* (Wiley).



Sasha STOIKOV is Head of Research for Cornell Financial Engineering Manhattan (CFEM). He holds a Ph.D. in mathematics from the University of Texas at Austin and a Bachelor of Sciences from the Massachusetts Institute of Technology. His research focuses on market microstructure, incomplete markets, and their impact on the optimal strategies of stock and option traders.

Finance Concepts : a team of renowned specialists in quantitative finance

The Finance Concepts team is at the leading edge of research in quantitative finance, with an internationally recognized expertise in quantitative modeling and computational methods in finance as well as an in-depth knowledge of financial models and investment strategies. Through our extensive experience in consulting with major financial institutions, we also have an up-to-date view of best market practices in risk management and issues related to practical use and implementation of quantitative models in finance.

Finance Concepts clients include major financial institutions and corporations such as:

Bank for International Settlements, BBVA, BNP Paribas, Calyon, CISCO, EDF, Finance Active, HSBC, Mizuho Corporate Bank, Morgan Stanley, NATIXIS, Société Générale, Total Trading

Finance Concepts : Your Training Partner

Finance Concepts Advanced Courses bring the latest developments in Quantitative Finance within the reach of market practitioners and risk managers through lectures given by the foremost experts in the field. They convey a constantly upgraded knowledge and provide accurate and suitable methods to improve your trading and risk management systems.

Our training courses are presented in the format of one- or two-day workshops, presented as public or in-house sessions. In each workshop experts on quantitative finance will present an overview of modeling approaches, while leading practitioners in the field of credit derivatives will present the current practices and recent evolutions in the market.

The workshops are targeted towards investors, asset managers, structurers, corporate treasurers, traders, quants, risk managers and hedge fund managers.

The number of participants is limited in order to allow for interactivity and intense discussions.

Our speakers

- **Marco AVELLANEDA**, Professor, NEW YORK UNIVERSITY *and* Partner, FINANCE CONCEPTS
- **Elie AYACHE**, Founder, ITO 33
- **Jean-Philippe BOUCHAUD**, Chairman, CAPITAL FUND MANAGEMENT
- **Richard BRUYERE**, Partner, FINANCE CONCEPTS
- **Rene CARMONA**, Professor of Operations & Financial Engineering, PRINCETON UNIVERSITY
- **Rama CONT**, COLUMBIA UNIVERSITY, CNRS Research Scientist *and* Partner, FINANCE CONCEPTS
- **Régis COPINOT**, Expert in Credit, Options, Interest Rates and Commodities trading
- **Alexandre D'ASPREMONT**, Assistant Professor, PRINCETON UNIVERSITY
- **Stéphane DENISE**, Asset Liability Management, BNP PARIBAS
- **Bruno DUPIRE**, Quantitative Research, BLOOMBERG *and* Partner, FINANCE CONCEPTS
- **Nicole EL KAROUÏ**, Professor, PARIS VI University *and* Partner, FINANCE CONCEPTS
- **Jean-Pierre FOUQUE**, Professor, UNIVERSITY OF CALIFORNIA
- **Christophe JAECK**, SOCIETE GENERALE, London
- **Peter FORSYTH**, School of Computer Science, UNIVERSITY OF WATERLOO, CANADA
- **James GATHERAL**, Managing Director, BANK OF AMERICA MERRILL LYNCH New York
- **Philippe HENROTTE**, Head of Financial Theory, ITO 33
- **Ibrahima KOBAR**, Head of Fixed Income, NATIXIS Asset Management
- **Iris MACK**, Former Trader, Faculty of Finance and Mathematics at EMBRY-RIDDLE Aeronautical University
- **Andrea RONCORONI**, Assistant Professor in Finance, ESSEC Business School
- **Philipp SCHÖNBÜCHER**, Assistant Professor, ETH ZÜRICH
- **Thomas SPITZ**, Global Head Structured Credit Markets, CALYON
- **Sasha STOIKOV**, Assistant Professor, CORNELL UNIVERSITY
- **Peter TANKOV**, Assistant Professor, ECOLE POLYTECHNIQUE, France
- **Stathis TOMPAIDIS**, Assistant Professor, UNIVERSITY OF TEXAS , Austin
- **Thomas WEBER**, Assistant Professor, STANFORD UNIVERSITY

Programme Overview

Title	Date	Duration
Leveraged ETFs and options on leveraged ETFs	2010	1 day
Portfolio Insurance Strategies: from CPPI to CPDO	2010	1 day
Quantitative Methods in Asset Management	2010	1 day
Trading and Modeling Volatility in equity Markets: A Quantitative Approach	2010	2 days
A Quantitative Approach to market making	2010	1 day
Multi-asset equity derivatives	2010	2 days
Convertible bonds and equity-to-credit arbitrage	2010	1 day
Advanced methods in Risk Management	2010	2 days
Volatility: modeling, hedging and arbitrage	2010	2 days
Calibration of option pricing models	2010	2 days
Asset Backed Securities : securitization, structuring and risk analysis	2010	2 days
Measuring and Managing Model Risk	2010	1 day

Leveraged ETFs and options on leveraged ETFs

SCOPE

The objective of the course is to review the

- Exchange-traded funds (ETFs)
- Leveraged ETFs, 3X, -3X,...
- Empirical facts about LETFs
- Path-dependence explained
- Empirical validation of the theoretical formula on 54 LETFs
- Rebalancing: replicating leveraged returns over long-term horizons

LEVEL

Advanced Course

PUBLIC

Traders, Risk Managers,
Hedge-Fund Managers,
Quantitative Analysts

1 DAY COURSE

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PROGRAMME

1. Leveraged ETF (Cash)

Path-dependence of Leveraged ETF Returns

Review of exchange-traded funds (ETFs)

Leveraged ETFs, 3X, -3X,...

Empirical facts about LETFs

Path-dependence explained

Empirical validation of the theoretical formula on 54 LETFs

Rebalancing: replicating leveraged returns over long-term horizons

2. Options on Leveraged ETFs

Relative-value trading and dispersion trading with LETFs

(FAS,FAZ, EDC,EDZ, UYG, SKF).

Portfolio Insurance Strategies: from CPPI to CPDO

SCOPE

The objective of the course is, on one hand, to discuss portfolio insurance techniques, and in particular the Constant Proportion Portfolio Insurance (CPPI) in the equity and credit worlds, and on the other hand, to cover the risk and performance analysis of Constant Proportion Debt Obligations (CPDO), a credit derivative product inspired by CPPI but with very a different risks and return structure.

LEVEL

Advanced Course

PUBLIC

Traders, Risk Managers,
Hedge-Fund Managers,
Quantitative Analysts

DURATION

1 day

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PROGRAMME

Introduction

Stop Loss strategies

Option based portfolio insurance

- Option –based portfolio insurance
- Replicating options with dynamic trading strategies
- Optimal option replication in presence of jumps in asset prices
- Computing risk measures for option-based portfolio insurance strategies

Constant Proportion Portfolio Insurance

- CPPI in a Black-Scholes model
- Performance of CPPI portfolios in presence of jumps. Gap risk
- Quantifying the gap risk: computing the loss probability, VaR and CVaR for CPPI-insured portfolios
- Crash notes: options on CPPI funds
- The effect of stochastic volatility
- Hedging the gap risk

CPDOs

- CPDO: cash flow structure and examples
- Comparison between CPPI and CPDO
- Risk analysis of a CPDO structure
- Rating agency methodologies
- A top-down model for analyzing CPDOs
- Are CPDO ratings justified?

Quantitative Methods in Asset Management

SCOPE

The objective of the course is to discuss modern quantitative approaches to fund management, with an emphasis on guaranteed funds and portfolio insurance strategies. We will focus on issues such as option-based portfolio insurance (OBPI) equity and credit CPPI, risk analysis of constant proportion portfolio insurance (CPPI) strategies, and on the notion of gap risk, that is, the risk associated to sharp downside moves of the underlying.

LEVEL

Advanced Course

PUBLIC

Traders, Risk Managers,

Hedge-Fund Managers,

Quantitative Analysts

1 DAY COURSE

SPEAKERS,

Rama Cont,

Columbia University

Peter Tankov,

Ecole Polytechnique

Julien Turc,

Société Générale

PROGRAMME

Guaranteed funds and portfolio insurance strategies

- Stop-loss strategies
- Option –based portfolio insurance
- Dynamic portfolio insurance strategies

Portfolio insurance with options

- Using options for portfolio insurance
- Replicating options with dynamic trading strategies
- Optimal option replication in presence of jumps in asset prices
- Computing risk measures for option-based portfolio insurance strategies

Constant Proportion Portfolio Insurance

- Introduction: CPPI strategies for equity and credit
- Analysis of CPPI in the Black-Scholes model
- Performance of CPPI portfolios in presence of jumps. Gap risk
- Quantifying gap risk: loss probability, VaR and CVaR for CPPI funds
- Choice of the leverage based on risk limits
- The volatility exposure of a CPPI fund

Pricing and hedging Gap Risk

- CPPI-embedded options and options on synthetic CPPI funds
- Protecting CPPI funds using gap notes
- Pricing and hedging single-name and multi-name gap notes

Credit CPPI strategies

- Long stock vs. short protection
- Characteristics of a CPPI strategy
- Designing a CPPI correlation trade
- Going through the crisis:
 - The long-only strategy
 - Long/short credit strategies
 - Long/short correlation strategies

CPDOs: a requiem

- Constant proportion debt obligations (CPDOs)
- Risk analysis and rating of CPDOs: a simple model

Trading and Modeling Volatility in Equity Markets: A Quantitative Approach

SCOPE

The objective of the course is to discuss modern quantitative approaches to Trading and Modeling Volatility in Equity Markets, with an emphasis on Volatility as a traded asset. We will focus on issues such as Modeling the implied volatility skew, Large Deviations/Riemannian geometry techniques and Maximum Entropy Methods (multi-asset valuation problems, time permitting).

LEVEL

Advanced Course

PUBLIC

Traders, Portfolio Managers,
Hedge-Fund Managers,
Quantitative Analysts

2 DAY WORKSHOP

SPEAKER,

Marco Avellaneda,
Courant Institute of
Mathematical Sciences,
New York University
And
Finance Concepts

PROGRAMME

Day 1

History and stylized facts about equity volatility

Volatility indices and comparing volatilities across names/industries

Behavior of equity volatility in 2007

Earnings announcements

Pinning on expiration dates

Hard-to-borrow stock

Managing a long-short portfolio of options across multiple underlying assets

Dispersion trading and trading correlation

Day 2

Essentials of the volatility surface

Steep descent approximation for auto-calibration of SV models

Differential-geometry methods in option volatility modeling

Application to options on baskets of stocks

Weighted Monte Carlo

Implementation of WMC as an optimization algorithm with examples

Hedging dispersions in the WMC framework

Correlation risk

A Quantitative Approach to market making

SCOPE

The objective of the course is to analyze the optimal quoting policy of an option market maker. The market maker's mean profits come from transaction premiums received over the course of a trading day, while the variance comes from uncertainty in the value of the inventory. In order to differentiate the first order risks from higher order ones, we present two models consistent with our framework. The first one focuses on Delta risk, the second model focuses on Vega and Gamma risks.

LEVEL

Advanced Course

PUBLIC

Traders, Risk Managers,
Hedge-Fund Managers,
Quantitative Analysts

1 DAY COURSE

SPEAKER,

Sasha Stoikov,
Cornell Financial Engineering
Manhattan (CFEM),
Cornell University

PROGRAMME

Option market making under inventory risk

1. A framework for market making

The state variables

The liquidity

The objective

2. The market maker in stocks

The optimal bid and ask prices

Numerical simulations

3. The market maker in options

The optimal bid and ask prices

Numerical simulations

High-frequency trading in a limit order book

1. Main building blocks for the model

The mid-price of the stock

The optimizing agent with finite horizon

The optimizing agent with infinite horizon

Limit orders

The trading intensity

2. Approximate Solutions

Optimal bid and ask quotes

Numerical simulations

Multi-asset equity derivatives

SCOPE

The objective of the course is to cover methods for calibration, pricing and hedging of complex derivatives instruments with multiple underlyings, especially with applications to basket options on FX and equity.

LEVEL

Advanced Course

PUBLIC

Traders, Risk Managers,
Hedge-Fund Managers,
Quantitative Analysts

DURATION

2 days

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PROGRAMME

Multi-asset derivatives and correlation risk

Basket options, rainbow options and mountain range options
Covariance, correlation and statistical dependence
Realized variance and co-variation
Estimating correlation in multi-currency models
Random matrix theory and filtering of empirical covariance matrices

Baskets options in multi-asset Black-Scholes models

Basket options and the basket skew
Basket options in a multidimensional Black-Scholes framework
Moment matching approximations
Arbitrage bounds
Accounting for uncertainty on correlations
Computing the sensitivity of multi-asset options to correlations

Weighted Monte-Carlo methods for multi-asset equity derivatives : theory and practice

The calibration problem for multi-asset equity derivatives
Weighted Monte-Carlo simulation and calibration (max-entropy)
Application to arbitrage pricing of basket options
Comparison between WMC and steepest Decent Method
Correlation Skew and the statistics of implied and historical correlations

Multi-asset stochastic volatility models

Modeling implied volatility skews with stochastic volatility models
Building multi-asset stochastic volatility models
Estimation of correlation parameters
A one-factor structure for volatilities
Models consistent with market implied volatility skews

Listed options : a quantitative perspective

Using a historical data base to analyze volatility across indices and single name options
Statistics of implied volatility skewness, term structure and kurtosis, for indices and single names
Volatility estimation and forecasting
Statistics of implied and realized correlations
Risk management of large volatility portfolios

Correlation trading in US equity markets

Indices and ETFs
Pricing index options in relation to component options
Managing Rega risk
Risk management of wing risk

Multi-asset models with jumps

Modeling implied volatility skews with Jump-diffusions
Correlation and dependence in the presence of jumps
Multi-dimensional jump-diffusion models
The impact of jump risk on basket options

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Convertible bonds and equity-to-credit arbitrage

SCOPE

In this one-day workshop, a panel of leading experts and practitioners will present a state of the art in pricing and modeling of convertible bonds and their implications for equity-to-credit arbitrage.

Emphasis will be on models which properly take into account various risk components of convertible bonds – interest rate risk, equity risk and credit risk – their implementation and their use in equity-credit arbitrage.

LEVEL

Advanced Course

PUBLIC

Investors, Asset Managers,
Structurers, Corporate Treasurers,
Traders, Quants, Risk Managers,
Hedge-Fund Managers

DURATION

1 day

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PROGRAMME

Convertible Bonds: theory and implementation

State of the art pricing models for convertible bonds

Risky bonds and hazard rates. Single factor models for convertible bonds

Default models, asset price dependent hazard rate

Comparison with the Goldman Sachs model, Tsiveriotis and Fernandes model

Takahashi, Kobayashi, Nakagawa model

Numerical methods for pricing of convertible bonds

Equity to Credit problem or

How to optimally hedge your credit exposure with equity options and CDS

Traditional model: intensity of default is a deterministic function of the equity level

Problem: what parametric form? How to calibrate? Problem at infinity?

Need to calibrate a full default intensity surface and a full local volatility surface to the surface of CDS spreads and option implied volatilities

Inherent numerical instability

New approach: incomplete markets

Calibrate a full jump-diffusion process with stochastic volatility to options and term-structure of CDS

Robustness, possibility to use sparse data

Theory of optimal hedging in incomplete markets

Optimally hedging default risk with the underlying equity

Refinement: optimally hedging with the addition of options and / or CDS

Calibration of structural equity-credit model

Structural vs Reduced Models in Credit Default Modeling: lessons from a BARRA study.

The Hull-White barrier model.

Avellaneda-Zhu: calibration of CDS curves when the firm value follows a diffusion process.

Extension of Avellaneda Zhu to jump-diffusion models

George Pan's stochastic barrier model

Cross-sectional study of calibration of Pan's model and comparison between a-priori and implied firm leverage

Advanced methods in risk management

SCOPE

This workshop is an overview on quantitative methodologies of market risk measurement and management. It covers the theoretical as well as practical aspects of modern risk-management for professionals involved in risk control and risk management.

LEVEL

Intermediate and Advanced Course

PUBLIC

Investors, Asset Managers,
Traders, Quants, Risk Managers,
Hedge - Fund Managers

DURATION

2 days

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PROGRAMME

Risk Measures

What is a risk measure ?
Requirements for a coherent risk measurement framework
Volatility, kurtosis and skewness
Value-at-Risk
Expected Shortfall
Statistical estimation and robustness of risk measures

Volatility and Correlation

Volatility as a risk measures
Estimating volatility
Estimating large covariance matrices : insights from random matrix theory

Value at Risk

Historical VaR : methods, advantages and drawbacks
Parametric Methods for estimating VaR :
Estimating VaR by Monte Carlo simulation
Value at Risk for derivatives : Delta-gamma VaR, Monte Carlo VaR
Issues with VaR aggregation

Beyond VaR

Coherent risk measures and aggregation issues
Expected shortfall and CVaR
Estimation issues and robustness

Model Risk

Model uncertainty and its impact on valuation of derivatives positions
Examples of model risk for typical derivatives positions
Measuring model risk : a new methodology

Model Validation

Criteria for validating models for pricing and hedging derivatives
Importance of model calibration procedures in the validation process
A blueprint for model validation procedures

Volatility : modelling, hedging and arbitrage

SCOPE

In this one-day workshop, will be presented a state of the art in volatility modeling from the point of view of pricing, hedging, risk management and volatility arbitrage.

LEVEL

Advanced Course

PUBLIC

Traders, Quantitative

Analysts, Risk Managers,

Hedge-Fund Managers

DURATION

2 days

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PROGRAMME

An overview of volatility modelling

Deterministic Volatility Models, Stochastic Volatility Models, Jumps And Lévy Processes.

Empirical Study Of Volatility Regimes

Beyond Fitting The Initial Smile: Fitting Future Skews (For OTM Cliquets) And ATM Volatility Moves (For Correct Delta) As Well

Impact On Different Products

Local Volatility Models

Extracting local volatilities from implied volatilities: Fokker-Planck Equation, Tanaka's Formula, Arbitrage portfolio

Forward Equation: Computing All Options In One Sweep

Forward Equation For American Options

Implicit Volatility As Harmonic Average of Local Volatilities

Problem with Smile evolution: The Flattening of Future Skews

Stochastic Volatility Models

Local Volatility As Expectation Of Future Instantaneous Volatility

Roles Of Correlation, Spot Dependency And Mean Reversion

Heath-Jarrow-Morton Treatment

Calibrated Markov Models

Smile Evolution Generated By Different Models

Jump Diffusion Models

Need of Jumps To Obtain Proper ATM Volatility Moves

Merton Model And Extensions

Heston, Bates, Duffie-Pan-Singleton: Analytical Results

Smile Evolution Generated By Different Models

Market Models of Implied Volatility

Modeling the dynamics of implied volatility

Revue of Existing Approaches

Obvious and Hidden Arbitrage Conditions: Short Dated Skew Dynamics

Strengths and Limitations Of This Type Of Modelling

Volatility Arbitrage

Conditions For Current Smile Not To Be Arbitrageable

Theoretical Skew From Historical Prices

Non Arbitrageable Smile Moves; Case of Sticky Strike And Sticky Delta

Locking Implied Volatilities Or Spreads Of

The Problem of Forward Skews

Hedging volatility risk

Decomposing Vega By Strikes And Maturities: Superbucket Analysis

Optimal Static Hedging

Monte Carlo Multiple Regression

Minimizing future Gammas: Gamma Projection

Reconstructing Volatility: Steepest-descent approximation and index option volatility curves

Major US indices, sector indices and ETFs

Stylized Facts about the volatility surfaces of single stocks and equity indices

Marginalization: a systematic approach for generating one-factor models

Varadhan's Formula and the Steepest Descent Approximation (SDA)

Most likely market configuration conditional on index displacements

"Reconstructing" the implied volatility skew of index options: empirical results.

Steepest Descent Analysis for general multi-dimensional stochastic volatility systems and stock-volatility correlation matrices

Work of Lee, Wang and Karim based on moment-matching. Cross-currency options and the JPY/EUR/USD triangle

Calibration of Option Pricing Models

SCOPE

The objective of the course is to discuss modern quantitative approaches to fund management, with an emphasis on guaranteed funds and portfolio insurance strategies. We will focus on issues such as option-based portfolio insurance (OBPI) equity and credit CPPI, risk analysis of constant proportion portfolio insurance (CPPI) strategies, and on the notion of gap risk, that is, the risk associated to sharp downside moves of the underlying.

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Quantitative Analysts

1 DAY COURSE

SPEAKERS,

Rama Cont,

Columbia University

Marco Avellaneda,

New York University

PROGRAMME

Calibration of Option Pricing Models

- The role of mathematical models in derivative markets.
- Pricing and hedging of exotic options
- How to ensure the coherence of the model price with the cost of hedging
- Complexity of model \leftrightarrow liquidity of options
- Numerical algorithm to solve the calibration problem
- Option Pricing Model

Impact of calibration on pricing and hedging

- The information content of option prices
- Extracting information from option prices
- Examples: implied distributions, Calibration of diffusion models
- Abstract formulation of calibration problem
- Solution strategies

Large Deviations & Steepest Descent Approximation Methods for Financial Derivatives

- Introduction to Options and Black Scholes formula
- Volatility as a traded asset
- Modeling the implied volatility skew
- Large Deviations/Riemannian geometry techniques
- Maximum Entropy Methods (multi-asset valuation problems, time permitting)

Factor analysis of Implied volatility surfaces

- Implied volatility as a state variable
- Implied volatility surfaces: static properties
- Dynamics of implied volatility surfaces and Vega risk
- Random surfaces and Karhunen-Loève decompositions
- Principal component analysis of implied volatility movements
- Empirical results: SP 500, DAX and FTSE index options
- A mean-reverting factor model for implied volatility
- Evolution of portfolios of vanilla options. Evolution of static hedges.
- Vega risk and vega hedging
- VaR for portfolios of options
- Dynamics of recalibrated models

Asset backed securities : securitization, structuring and risk analysis

SCOPE

Asset backed securities are an important component of credit market and form the basis for modern structuring. This course covers the new aspects of securitization and structuring in asset-backed and mortgage back securities.

LEVEL

Advanced Course

PUBLIC

Investors, Asset Managers,
Structurers, Corporate Treasurers,
Traders, Quants, Risk Managers,
Hedge - Fund Managers

DURATION

2 days

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PROGRAMME

Basics of Securitization and Asset-backed Securities

Categories of Asset-backed Securities

- classification by underlying assets
- classification by structure

Advantage with respect to classical bonds

Overview of the ABS market

Mortgage Backed-Securities

Basics of mortgage mathematics

Pass-thru mortgage-backed securities

Mortgage prepayments : definitions and basic facts

Modeling of mortgage prepayment behavior

Pricing and risk analysis of agency MBS

Option adjusted spreads (OAS)

Non-agency MBS : credit risk and rating methodologies

Beyond pass-thru securities : the motivation for structured ABS

Structured Asset-backed Securities

Collateralized debt obligations (CDOs)

Structure and cash flow analysis of a CDO

Cash vs synthetic CDOs

Modeling default correlations : Monte Carlo Simulation

The gaussian copula model

The market standard for quoting implied correlations

Base correlations and the correlation smile

Sensitivity to default correlation of CDO tranches

Risk analysis and leverage effects

Sensitivity and "delta hedging"

The rating of single CDO tranches

CDOs of asset backed securities

Structured mortgage products

Collateralized Mortgage Obligations (CMOs)

Structuring and set-up of a CMO

Cash flow and risk analysis of a basic CMO structure

Typology of CMOs

Advantages of CMOs with respect to pass-thru MBS

Z bonds

Floating rate MBS : floaters and inverse floaters

PACs and TACs

Stripped mortgage backed securities : IO / PO products

Measuring and Managing Model Risk

SCOPE

The objective of the course is to present an in-depth overview methods for measuring and managing Model Risk

LEVEL

Advanced Course

PUBLIC

Traders, Risk Managers,

Hedge-Fund Managers,

Quantitative Analysts

DURATION

1 day

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PROGRAMME

A Quantitative framework for Measuring Model Risk

- M**odel uncertainty in option pricing
- A** quantitative approach to model risk for derivatives
- R**elation with model calibration
- A** worst –case approach to model risk

Examples

- A** calibration-free approach to model risk
- A**pplication: computing reserves for model uncertainty in derivatives portfolios

Parameter uncertainty in option pricing models

- M**odel calibration via deterministic optimization: issues and shortcomings
- F**rom point estimates to confidence intervals: Model calibration as an ill-posed inverse problem
- A** stochastic algorithm for parameter selection
- W**orked out example: a local volatility model
- W**orked out example: the Bates model
- G**enerating confidence intervals for option prices

Model risk for exotic options:

A new method for generating posterior distributions for values of options

- M**odel calibration via random mixtures
- T**he minimal entropy random mixture
- I**nterpretation in terms of model risk minimization
- A**n arbitrage-free Weighted Monte Carlo algorithm
- G**enerating posterior distributions for values of exotic options
- W**orked out example: the Bates model.

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