Value-at-Risk

Market Risk Governance Analytics & Implementation

This cutting-edge training programme will provide you with invaluable practical information on:

- VaR risk capital & regulatory developments
- Key issues in risk governance, risk management and risk audits
- Historical simulation methodologies and issues
- VaRCoVaR methods and issues, expected tail-loss (conditional VaR)
- Monte Carlo simulation analytics and issues
- Importance of multi-factor term-structure models
- Auditing a risk management hedging system of a derivatives book
- Worked examples of actual implementation

Training Faculty:
Dr T.S. Ho (Independent Consultant)

London Dates
2-4 March 2011
5-7 September 2011

To register:
Tel: +44 (0)20 7017 7190 Fax: +44 (0)20 7017 7802
Email: enquiries@iirltd.co.uk Web: www.iff-training.com
The failure of numerous financial institutions and the spectacular losses in the financial markets in recent year, have had a profound and extremely significant impact on the thinking and innovations in risk management. In addition, the proliferation of new derivatives products has raised concern, both in the management of financial institutions and in the regulatory authorities assessing and monitoring the risk. The recent credit crisis provides a contextual reminder for the urgent need to understand and evaluate the potential of the tools employed to monitor the inherent risks involved. The chief lesson to be learned from these losses concerns risk limits.

Course Objectives
This intensive course outlines and illustrates a framework for measuring Value-at-Risk (VaR) and demonstrates how it could be used to generate the types of measures that align with current regulatory recommendations. This is done in the context of equity, fixed income and interest rate derivative products.

The nature of the risk measurement problem will be explained. During the course you will examine:

- A flow diagram of the risk measurement system (input and output of the system will be defined)
- The modelling of the term structure of interest rates
- Detailed examples of how the system can be implemented
- Finally, how the risk measurement system can be adapted to measure the size of credit exposure of any financial institution discussed.

Small Class Sizes
The number of participants is strictly limited to ensure that the course will be tailored to suit your precise needs. Our commitment to small class sizes means that the spaces on this course are allocated on a first come, first served basis. Therefore we strongly advise you to enrol early to be sure of securing your place – simply call our Hotline on +44 (0)20 7017 7190.

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Value-at-Risk
Market Risk Governance Ana

Course Instructor: T.S. Ho

Dr. T.S. Ho is the Managing and Technical Director of an educational consultancy firm based in the UK, and professorial advisor of global derivatives risk analytics and chief scientific officer at leading financial institutions. His academic positions include visiting scholar and professor of finance, and professorial research fellow at various universities.

A recipient of the “highly commended prize” in the Pilkington Teaching Awards and “best teacher” award, he has worked with numerous leading investment banks and has implemented risk management systems for derivative products for major financial institutions worldwide.

He holds a doctorate in Mathematical and Empirical Finance and has published papers on the valuation and hedging of complex derivatives, market risk, and credit risk in leading academic journals, books and conference proceedings. He has received a number of research and educational grants for innovation in finance teaching and research. He was awarded the ANBAR citation for “international recognition of outstanding contribution to the literature and body of knowledge”.

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Only by understanding our clients’ business issues can we hope to add substantial value. That’s why we work with our clients face to face all over the world. Our team of consultants will meet you anywhere around the globe and are always present in the UK, Europe, Asia Pacific, Scandinavia, North America and the Middle East. If you would like one of our consultants to meet with you to talk about your needs in more detail or if you would simply like more information as to how you’ll benefit from our in-company programmes, please contact Jeff Hearn (General Manager) on +44 (0) 20 7017 7190 or email: jhearn@iirltd.co.uk
# Your Comprehensive Course Programme

## VaR: Overview, Risk Capital & Regulatory Developments
- Motivation - Risk profile of derivatives portfolio
- Risk governance measurement - Common conceptual framework
- Basel II: Three Pillars & revisions to Basel II
- Solvency II - Scenario analysis & stress testing
- Banking regulators and back testing - Tier capital

**Computer Workshop 1**
- Understanding total risk (volatility) measures

## VaR Methodologies
- Historical simulation (empirical, non-parametric)
- Variance-Covariance Matrix (parametric)
- Monte Carlo simulation
- Lattice-Tree approach

**Computer Workshop 2**
- Historical simulation - Value-at-Risk reports

## Variance-Covariance (Correlation) Matrix (VaR/P)
- Principle assumptions
- Estimate volatilities (EWMA, GARCH) and correlations
- Cash flow mapping (Bucketing, Gridding) algorithm
- Portfolio aggregation
- Advantages and issues

**Computer Workshop 3**
- Variance-Covariance (Riskmetrics) computations

## VaR-Measuring Market Risk: Variance-Covariance Analysis
- Equity portfolio, treasury portfolio, derivatives portfolio
- Market risk
- Variance-Covariance matrices
- VaR of equity portfolio
- Effect of correlation on overall risk
- Do VaRs add? Conditional VaR
- VaR of fixed income sector
- VaR of derivatives (options)
- Quadratic model: Delta, Gamma measures
- Cornish-Fisher expansion
- Non-normal assumptions

**Computer Workshop 4**
- Variance-Covariance VaR reports for equity, fixed-income and derivatives trading portfolios

## VaR-Monte Carlo Simulation: Cash Market Portfolio
- Underlying principles
- Modelling equity price process
- Box-Muller transformation
- Polar rejection method

**Computer Workshop 5**
- Monte Carlo simulation - Value-at-Risk equity reports
- Box-Muller transformation
- Polar rejection method

## VaR-Monte Carlo Simulation: Options Portfolio
- Applied to options portfolio
- Why returns are less than expected
- Risk-neutral (Martingale) insights
- VaR/S versus VaR/P results

**Computer Workshop 6**
- Monte Carlo simulation applied to options portfolio
- Appropriate use of Black-Scholes/Merton option pricing model

## VaR-Monte Carlo Simulation: Correlated Assets Portfolio
- Multiple assets portfolios
- Modelling correlated stock price processes
- Independent price processes
- Perfectly correlated price processes
- Imperfectly correlated price processes
- Cholesky decomposition

**Computer Workshop 7**
- Monte Carlo simulation applied to multiple assets portfolios
- Modelling correlation
- Cholesky decomposition

## Global Description of Risk: VaR
- A framework for implementation
- Key features of VaR system modules
  - Review of recent regulatory developments
  - Interest rate risk framework
  - Market and credit risk
  - BIS Basel system of risk management
  - Measuring interest rate risk
  - Shortcomings of duration approaches

## A Sophisticated Approach to Measuring Interest Rate Risk
- Accounting for movements in (stochastic) yield curves
  - Level (inflation)
  - Steepness (monetary policy)
  - Curvature (mean reversion)
  - Simulation analysis
  - Modelling of a wide range of yield curve behaviour

## A Two-Factor Approach for Interest Rate Derivatives Flowchart of Risk Management System:
- Stochastic yield curve builder
- Derivative contracts converter
- Valuation module: gridding (mapping) option pricing models
- Risk analyser (PVBP analysis)

## Step-by-Step Worked Example - Actual Implementation in a Leading Bank:
- Principal Component Analysis (PCA) for extracting two factors
- Estimating volatility and correlation between factors
- Estimating mean reversion coefficient
- Generation of stochastic term structures of interest rates
- State-by-state interest rate scenarios analysis
- Valuing books of cash flows/derivatives over holding period
- Valuing interest rate options and swaptions

**Computer Workshop 8**
- Building one-factor stochastic yield curve model
- Effects and implications for VaR analysis and reports

## Stochastic Two-Factor Model
- Inputs - Current yield curve
- Interest rate factors - Short rate and long rate
- Inputs - Volatilities, correlations, mean reversion
- Worked example using real term structure
- VaR toolkit:
  - Current yield curve builder mathematics
  - Money market
  - Swap market
  - Futures market
  - Linear stripping
  - Geometric interpolation
  - Generation of interest rate scenarios
  - State-by-state interest rate scenarios analysis

**Computer Workshop 9**
- Building two-factor stochastic yield curve model
- Effects and implications for VaR analysis and reports

## Value-at-Risk Reports: Swap, Cash, Bond Book
- Worked example using real swap book
- VaR toolkit - Swap principal method valuation mathematics
- VaR toolkit - Gridding and bucketing mathematics

**Computer Workshop 10**
- Value-at-Risk for portfolios of linear risk cash flow instruments: cash, bonds and swaps

## Value-at-Risk Reports: Interest Rate Options
- Worked example using real interest rate cap book
- VaR toolkit: Black (1976) valuation mathematics

**Computer Workshop 11**
- Value-at-Risk for portfolios of non-linear risk cash flow instruments: interest rate options (caps and floors)

## Value-at-Risk, PVBP and Risk Management
- VaR and risk management hedging

## Credit Risk Losses and Credit VaR:
- Estimating credit losses: default probability, recovery rates
- M-KMV Vasicek and Merton structural models
- CreditMetrics: correlation and time horizon

**Computer Workshop 12**
- Structural models of credit VaR
- CreditMetrics VaR

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I would like to register on the training course: Value-at-Risk
(Venue to be confirmed)

COURSE
☐ 2-4 March 2011 (Ref: LF3457)
☐ 5–7 September 2011 (Ref: LF3506)

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1.4 Value-at-Risk. Suppose an investment fund indicates that, based on the composition of its portfolio and on current market conditions, there is a 90% probability it will either make a profit or otherwise not lose more than USD 2.3MM over the next trading day. This is an example of a value-at-risk (VaR) measurement. Value-at-risk is one example of a category of risk metrics that we might call probabilistic metrics of market risk (PMMRs). Value at risk (VaR) is a statistic that measures and quantifies the level of financial risk within a firm, portfolio or position over a specific time frame. This metric is most commonly used by investment and commercial banks to determine the extent and occurrence ratio of potential losses in their institutional portfolios. Risk managers use VaR to measure and control the level of risk exposure. One can apply VaR calculations to specific positions or whole portfolios or to measure firm-wide risk exposure. Value at Risk (VaR). Value at risk or VaR is a statistical measure of the amount of funds a investment, portfolio, or a company might expect to lose over a specified time horizon with a given probability. If you have a portfolio that is expected to lose no more than $100,000, 90% of the time (or 18 out of every 20 days) is said to have VaR of $100,000. But on the flip side, 10% of the time, or 2 out of 20 days, your portfolio has potential to lose at least $100,000.