Interest Rates

Overview

This program offers delegates a rigorous examination of interest rate risk management – methods for assessing and measuring risk – from traditional methods to statistical VaR based approaches, and from individual transactions to portfolio based approaches to risk management and control. It will also examine risk-modeling assumptions and what can go wrong with such techniques.

Learning Outcome Statements

- Identify and quantify interest rate risk
- Structure and price swaps
- Use interest rate derivatives in trading and ALM
- Implement portfolio risk management techniques
- Construct stochastic interest rate models
- Evaluate different portfolio investment strategies
- Implement VaR based portfolio risk models
- Gain a greater understanding of how your financial models can impact on your organisation's key financial decisions

Key Contents

- Interest Rate Risk Management Overview
  - Defining risk; interest rate risk overview
  - Sources of interest rate risk: Financial and non-financial firms
  - Interest rate risk in ALM
  - Risk management frameworks

- Interest Rate Risk: Identification and Measurement
  - Traditional approach: Maturity banding and gap analysis
  - Shortcomings of gap analysis
  - Duration (Delta) analysis
  - Convexity (Gamma) risk
  - Portfolio Approach

- Interest Rate Modeling
  - Deterministic interest rate models
  - Modeling the yield curve (bonds, swaps)
  - Bootstrapping zero coupon (spot) rates from market price/rate data

- Calculation of implied forward rates
- Convexity adjustment for interest rate futures
- Interpolation: yield curve smoothing algorithms
- Stochastic Term Structure Modeling
- Incorporating interest rate volatility into the interest rate model
- Stochastic term structure models
  - factor models (e.g. Black Derman Toy, Hull White)
- Building an arbitrage-free forward interest rate binomial tree
  - factor models
  - BGM (LIBOR) market model
  - Model calibration
- Modeling assumptions and variables
- Applications
  - Valuation of straight and callable bonds/swaps
  - Valuation of complex securities e.g. Bermudan options
  - Calculating effective duration and Option Adjusted Spreads (OAS)
  - Using stochastic models for scenario analysis and stress testing

- Management of Interest Rate Risk – Interest Rate Futures and FRAs
  - Exchange traded derivatives
  - Margining: definition and operation
  - The mechanics of trading futures contracts
  - Contract types and specifications
    - Short term interest rate futures
    - Bond futures
  - Short term interest rate futures (e.g. CME Eurodollar futures)
    - Contract specifications
    - Pricing and risk characteristics
    - Applications in interest rate trading, hedging and arbitrage
    - Hedging interest rate risk with Eurodollar futures
    - Calculating hedge ratios; contract amounts
    - Basis risk in hedging with futures
    - Adjusting hedging strategies to manage basis risks
    - Futures spreads
    - 'Stacking' futures
    - Using futures 'Strips' to manage longer term interest rate risk
  - Interest rate trading with futures
    - Speculation on short term interest rate expectations with futures
    - Relative value trading strategies
    - Calendar spreads
    - Butterflies
  - OTC Interest rate derivatives: Forward Rate Agreements (FRAs)
    - Market quotation and settlement conventions
    - Pricing FRAs with futures
    - Adjusting for convexity bias
    - Applications of FRAs in trading and interest rate risk management
    - Comparison of futures and FRAs: costs and benefits

- Bond Futures
  - Operational mechanics of trading bond futures
  - Bond futures contract types and specifications
  - Cheapest to Deliver (CTD) and the value of the delivery option
  - The cash-futures (carry) basis (Gross, Net)
  - Hedging interest rate risk with bond futures
  - Calculating duration/DV01 for bond futures
  - Duration hedging with bond futures; calculating hedge ratios
  - Basis risks in hedging with bond futures
  - Active interest rate strategies with bond futures
  - Directional and relative value interest rate strategies

- Interest Rate Swaps
  - Swaps market quotation and settlement conventions
  - Generic fixed vs. LIBOR swaps ('Par' swaps)
  - Overnight index (OIS) swaps
  - Basis swaps
  - Structured and off-market swaps
  - Swap pricing and valuation
    - Swap yield curve modelling using the (convexity adjusted) futures strip
    - Swap yield curve modelling using par swap rates and bond yields
    - Valuing off-market swaps using a deterministic swap curve model
    - Pricing and valuation of complex swaps using a stochastic term structure model
    - Option Embedded Swaps (Callable, Puttable)
    - Interest rate risk characteristics of swaps
    - Duration/DV01 properties of swaps
    - Convexity properties of swaps

- Interest Rate Risk Management with Swaps
  - Applications of interest rate swaps in ALM
    - Duration management in ALM; Pension Fund and Insurance applications
    - Hedging fixed and floating interest rate assets and liabilities
    - Creating 'synthetic' assets and liabilities
    - Credit risk arbitrage
    - identifying and realising comparative advantages
  - Cash flow hedging versus fair value hedging
    - Using swaps to hedge other sources of interest rate risk
    - Calculation of (DV01) hedge ratios
    - Dynamic hedging adjustments
  - Active interest rate strategies derivatives
    - Interest rate swaps as a substitute for fixed income bond trading
    - Directional and relative value rates strategies
  - Accounting for interest rate derivatives
    - Overview of accounting for derivative instruments
    - Hedge accounting treatment

- Interest Rate Options: Interest Rate Caps and Floors; Swap Options
  - Fundamental characteristics of options
  - Interest rate caps and floors
    - Quotation and settlement conventions
    - Conventional pricing methods: Black (1976) model
    - Why do markets use this model? Advantages and disadvantages
    - Put-Call parity relationships: Caps, Floors and Forward swaps
    - Interest rate collars
    - Applications of interest rate options in interest rate risk management
    - Caps/Floors/Collars as an alternative to swaps: Advantages and shortcomings
    - Development of optimal hedging strategies
    - Hedging contingent interest rate risks
    - Portfolio insurance strategies
  - Swaptions
    - Payer and Receiver swaptions; quotation and settlement conventions
    - Pricing swaptions: Black Vs. stochastic term structure models
    - European and Bermudan style swap options
    - Applications of swaptions in interest rate risk management
    - Managing contingent interest rate risk exposures
    - Hedging option embedded securities (callable bonds, MBS)
    - ALM applications of swap options: Pension fund and Insurance applications
    - Managing convexity risk using swaptions
    - Cost benefit analysis of swaptions versus forward swaps

- Portfolio Interest Rate Risk Management
  - Yield curve risk analysis; parallel and non-parallel shifts
  - Perturbation of par, spot and forward rates
  - Empirical behaviour: Principal component analysis (PCA)
  - Interest rate risk measures: Delta (DV01), Convexity (Gamma)
  - Linear risk analysis: Constructing a Delta vector risk report
  - Risk reporting: creating a replicating portfolio (futures, bond, swap) equivalence report
  - Non-linear instruments and risks: Gamma and Vega risks
  - Constructing Vega and Gamma risk matrices
  - Assessing hedge effectiveness using shocks and stress testing scenario analysis
  - Interest rate risk management in ALM
  - Immunisation and Dedicated Portfolio strategies
  - Assumptions and risks in interest rate risk immunisation
  - An alternative approach to measurement of risk: Value at Risk
  - A VaR based approach to analysing and managing portfolio interest rate risk
  - Calculating VaR for a portfolio using the Variance Covariance method
  - Advantages and shortcomings of the different VaR methodologies
  - Modelling assumptions and data requirements
  - Non-linear risks: incorporating options into VaR measurement
  - Assessing marginal risk contribution (Component VaR)