Derivative Mathematics - Evening

This course will explore the mathematical relationships that govern relative pricing of derivative contracts versus the underlying instrument and related derivatives. These arbitrage relationships are the basis for analyzing and valuing listed and over-the-counter derivatives. Course discussion will focus on the trading and risk management applications of these relationships in evaluating and determining the viability of alternative trading and hedging strategies as well as assessing their relative attractiveness.
The program begins with a survey of the two basic types of derivative contracts: first futures/forward contracts and then options. These will be explored in greater detail as they are the building blocks of all the more complex derivative instruments. The program will then proceed with a similar approach applied to a range of derivative contracts to include: swaps, caps and floors, swaptions, and other exotic options.

Available Session(s):

No sessions currently available. Email customerservice@nyif.com to get the next available date.

Targeted Audience

Traders, treasury managers, comptrollers, brokers, credit analysts, financial analysts and financial planners.

Special Offer

Clients who register for this course will receive a complimentary 6 month subscription to the Financial Times and FT.com. The Financial Times is the world's most respected financial newspaper providing a broad assessment on finance, business and the industrial sector. Subscriptions will start within 6-8 weeks of the application process, and are limited to one per client. For questions about your subscriptions call 800-628-8088 or email uscirculation@ft.com. US and Canada enrollees only.

Advance Preparation

No advance preparation required.

Prerequisites

Basic understanding of the terminology and characteristics of options and futures contracts

Learning Objectives

Students will be able to:
· Compare and contrast characteristics and risks of securities versus derivatives, as well as between the types of derivatives
· Explain trading and risk management applications
· Analyze arbitrage pricing relationships, when and why they hold and why they sometimes do not
· Describe the basic characteristics of exotic options: caps and floors, swaptions, barriers, binary, and more

Level: Basic

CPE Credits: 20.0

Instructional Method: Group-Live

Detailed Outline

Futures and Forward Contracts (Sessions I, II, and III)

Nature of Futures Contracts
· What is a futures contract?
· (a) Confusion over terms "commodities" and "futures"
· (b) Contracts for future purchase and sale
· Forward contracts versus futures
· Comparison to trading "cash market" securities
· (a) Securities buyers/sellers versus futures longs/shorts
· (b) Comparative cash flows cash versus futures positions
· (c) Different meaning of margin
· Role of the clearinghouse in futures trading

Characteristics of Futures Contracts
· Standardized contract specifications
· Daily settlement
· Margins
· (a) Futures margins, initial and

Options (Sessions III, IV, and V)

Options Pricing
· Brief review of option basics
· (a) Types of options and contract specifications
· (b) Static (intrinsic value/value at exercise) gains, losses and break-even considerations
· (c) Profit/loss diagrams
· Basic properties and boundary conditions of call and put values
· (a) Minimum and maximum values
· (b) Effect of interest rates on call and put option values
· (c) Effect of volatility on call and put option values
· (d) Early exercise considerations

Option Pricing Dynamics
· The "Greeks"
· (a) Delta, Gamma, Theta and Vega
· (b) Definitions
· (c) Mathematical derivations and graphical manifestations

maintenance
· (b) Comparison to securities margins

Types of Futures Contracts
· "Traditional" commodities
· (a) Precious metals - gold, silver, and platinum
· (b) Grains - wheat, soybeans, corn
· (c) Energy - crude oil, heating oil, natural gas
· (d) Others - cattle, lumber, cotton, coffee
· Financial futures
· (a) Interest rate - t-bond, t-note, Eurodollar
· (b) Stock index - S&P 500, NASDAQ 100, DJIA
· (c) Currencies - Yen, Sterling, Peso
· Characteristics of interest rate futures contracts
· (a) Contract specifications
· (b) Conversion factors - t-bonds and bunds
· (c) Cash settlement - Eurodollars
· Characteristics of index futures contracts
· (a) Contract specifications
· (b) Index points and cash values
· (c) Cash settlement

Futures (Forward) Pricing - Cost of Carry
· Generalized carry models
· (a) Intuition
· (b) Where it applies
· (c) Where it breaks down
· Carry considerations
· (a) Storage
· (b) Insurance
· (c) Interest
· (d) Income - interest or dividends
· Application to pricing "traditional" commodities
· (a) Negative carry - normal markets
· (b) Inverted markets
· (c) The role of expectations
· Application to pricing financial futures
· (d) Trading and hedging applications
· Black-Scholes Model - Implied Volatility
· (a) Historical volatility into B-S = B-S price
· (b) Market price of option into B-S = implied volatility
· (c) B-S assumes all have same volatility
· (d) Actually all differ - volatility smile
· Black-Scholes Model - volatility smile versus the volatility curve
· (a) Term structure of volatility
· (b) Market experience

Introduction to Arbitrage Pricing Relationships
· Synthetic positions
· Arbitrage trading strategies
· (a) Conversions
· (b) Reverse conversions (reversals)
· Put/call parity
· Using conversions, reversal and box spreads
· (a) The options market as a bank
· (b) Locking in mispricings with synthetic positions

Black-Scholes Option Pricing Model
· Black- Scholes - limiting case of binomial model
· (a) The formula
· (b) What the formula means
· (c) Computing an option price
· A generalized option pricing formula
· (a) Adjustments for cash flows on the underlying instrument
· (b) Options on dividend paying stocks
· Bond and foreign exchange options
· Options on futures

Options: Binomial Pricing Models
· Binomial trees
· (a) Nodes
· (b) Intervals
· (c) Centering proposition
· Two step process
· (a) Project stock prices to expiration,

· (a) Positive versus negative carry
· (b) Income yield versus opportunity cost of capital

Hedging with Futures Contracts
· Review of fundamentals of hedging
· (a) Concept
· (b) Risk and return of hedged positions
· (c) Simple applications
· Hedging with financial futures
· (a) Hedge ratios - duration or beta
· (b) Basis - cash minus futures
· (c) Dealing with margin finance risk - tailing a hedge

Futures Contracts: Other Risk Management Applications
· Index arbitrage
· Portfolio management

determine intrinsic values
· (b) Step back process to find option value
· Flexible versus standard binomial tress
· Mathematics of binomial trees
· (a) General considerations
· (b) One period pricing/arbitrage relationships
· (c) Two period pricing/arbitrage relationships
· (d) Multi period model
· Determination of "Greeks" on binomial trees

Swaps (Sessions VI and VII)

Swaps: Introduction
· Brief history of swaps market
· Growth of market - flexibility and variety of applications
· Managing exposures and monetizing market views
· (a) Lower financing costs
· (b) Fixing interest expense of floating rate debt
· (c) Portfolio management/asset allocation
· (d) Accessing markets
· (e) Accessing securities
· (f) Tailored solutions

Review of Swap Basics
· Structure of swap contracts and transactions
· Diagrammatic analysis
· (a) Box diagram
· (b) Cash flow diagrams

Exotic Options (Sessions VII and VIII)

Exotic Options: Cap and Floor Contracts
· Contract specifications
· (a) Notional amount of underlying
· (b) Strike price
· (c) Tenor/maturity
· (d) Settlement frequency
· Comparison to simple puts and calls
· Other valuation considerations
· (a) Volatility
· (b) Interest rates
· (c) Forward prices
· Cap/floor premium
· Diagramming positions
· (a) Profit/loss profiles of caps and floors
· (b) Exposure profiles - cap/floor with underlying position

Exotic Options: Combinations of Caps and/or Floors
· Collars

· All-in-cost
· (a) Simple presentations - too simplistic
· (b) Money market adjustments
· (c) Other considerations - more later

Pricing Swaps
· Equating present values
· (a) What does that really mean?
· (b) Fixed versus floating coupon
· (c) Floating versus floating coupon
· Methodology
· (a) Zero coupon swap curve
· (b) Swap coupon
· (c) Formulas
· (d) Reality
· Terminating a swap before term/pricing off-market swaps
· (a) Difference between present value of payments
· (b) Methodology
· (c) Up-front payments versus adjustment to floating leg
· Forward swaps

Types of Swaps
· Interest rate swaps
· Currency swaps
· Commodity swaps
· Equity swaps
· Credit swaps

Beyond Plain Vanilla Interest Rate Swaps
· Variations in notional amounts and coupons
· (a) Basis swaps
· (b) Zero coupon swaps
· (c) Amortizing swaps
· (d) Accreting swaps
· (e) Rollercoaster swaps
· Yield curve swaps
· Applications
· (a) Fixing interest expense of floating rate debt
· (b) Lower financing costs
· (c) Matching assets and liabilities
· Corridors
· Zero cost hedges

Exotic Options: Put-Call Parity

Other Types of Exotic Options
· General Considerations
· Types of Exotic Options
· (a) Binary or digital options
· (b) Barrier or knock-in and knock-out options
· (c) Look-back and modified look-back options
· (d) Other types of exotic options
· Pricing exotic options with binomial models

· (d) Speculating on rate movements
· (e) Speculating on yield curve shifts

Equity Swaps
· Equity swap contracts
· (a) Basic structure
· (b) Underlying index
· (c) Swap coupon
· (d) Settlement frequency
· (e) Comparison to interest rate swaps
· Variations in equity swaps
· (a) Combinations of indices - rainbow swaps
· (b) Swap for best of two (or more) indices
· (c) Total return swaps
· (d) Quanto swaps
· (e) Individual equities or specific portfolios
· Applications - asset allocation and hedging
· (a) Diversifying concentrated portfolios
· (b) Modifying asset class weightings: equity versus debt
· (c) Modifying asset class weightings

Currency Swaps
· Interest rate swaps with legs in different currencies
· Notional principal - exchange of or lack thereof
· (a) Initiation
· (b) Termination
· (c) Both
· (d) Neither
· Service payments
· (a) Fixed for floating
· (b) Floating for fixed
· (c) Fixed for fixed
· (d) Floating for floating
· (e) Zero coupon
· Applications
· (a) Hedging foreign exchange exposures
· (b) Reducing interest rates on borrowings

· (c) Speculation on exchange rate movements
· (d) Speculation on relative interest rate movements

Structured (Compound) Swap Solutions
· Financial engineering
· (a) Lego/building block approach
· (b) Box and cash flow diagrams
· (c) Reverse engineer from desired result to basic components
· Applications

Schedule Note

There will be no class on Tuesday, September 30, 2008.

For more information regarding administrative policies such as complaints and refunds, please contact our offices at 212-641-6616.