



Fixed Income Mathematics - Day

This course explores and analyzes the mathematics of bond prices and yields as well as a variety of quantitative analytical methodologies. The course begins with an in-depth investigation of the industry conventions for calculating price and yield applied to plain vanilla bonds, including the exploration of implicit assumptions and interpretation of resulting numbers. The course then turns to a variety of tools used in the pricing, valuation and quantification of the risk of fixed income securities and portfolios. The tools are then applied to a variety of other fixed income instruments: bonds with embedded options, mortgage-backed securities and interest rate futures.

Targeted Audience

Portfolio managers, institutional sales staff, research analysts, back office professionals, financial analysts, cash/money managers, auditors, and compliance staff.

Special Offer

Clients who register for this course will receive a complimentary 4-month subscription to FT.com. The Financial Times is the world's most respected financial newspaper, providing a broad assessment on finance, business and the industrial sector. The move to the electronic version follows an ongoing review of our environmental responsibilities as a global business and as part of the Pearson group. FT.com also has features that are not available in hard copy, such as: Special Reports, Alphaville, editor blogs, education sections and much more! Subscriptions will start within 6-8 weeks of the start of class and are limited to one subscription per client. (Please note: as of May 1, 2011, the electronic subscription replaces the hard-copy 3-month Financial Times subscription.)

Advance Preparation

No advance preparation required.

Prerequisites

Fixed Income Markets I or equivalent knowledge. Financial calculator required.

Learning Objectives

Students will be able to:

- . Calculate and interpret price, yield and accrued interest
- . Discuss yield to maturity as an expression of current value versus expected return
- . Identify by security appropriate interest compounding and day count conventions
- . Describe the various types of duration (Macquay's, modified, dollar, effective), as well as their application in quantifying and managing interest rate risk

Alumni Comments

"Excellent instructor!"

"Knowledge of instructor. His ability to develop real-world examples that are applicable to all lessons"

Follow-Up Courses

Yield Curve Analysis

Level: Intermediate

CPE Credits: 14.0

Instructional Method: Group-Live

Detailed Outline

Day 1

Interest Rates and Pricing Conventions

- . What is an interest rate: definitions
- . Interest conventions: simple and compound interest

Financial mathematics

- . Time value of money
- . Bond math basics

Day 2

Bond Price Volatility Part 2

- . Curvature of the price/yield function
- . Rate of change of duration
- . Second derivative of the price/yield function

Callable bonds

- . Effective duration

- . Accrued interest

Conventional yield measures

- . Nominal yield
- . Current yield
- . Yield to maturity
- . Yield to call
- . Conventions for yield quotes

Expected risks versus expected returns

- . Sources of return
- . Risks of fixed income securities

Yield to maturity reconsidered

- . As alternative expression of price
- . Why YTM is a poor proxy for future returns

Estimating returns

- . Realized compound yield
- . Total return (horizon) analysis

Types of yield curves

- . Security type
- . Construction

Interest rate levels and shape of the yield curve

- . Nominal interest rates (yields to maturity)
- . Related Considerations
- . Yield curve theories

Factors determining volatility

- . Non callable bonds
- . Callable bonds

Macauley's Duration

- . Developed as a measure of a bond's life
- . Immunizing portfolios

Quantifying price sensitivity to changes in

- . Negative convexity

Other uses of duration and convexity

- . Portfolio applications
- . Bond swap

Nature of futures contracts

- . What is a futures contract?
- . Role of the clearinghouse in futures trading
- . Forward contracts versus futures

Characteristics of futures contracts

- . Standardized contract specifications
- . Daily settlement
- . Margins

Fixed income futures contracts

- . T-bond and T-note futures
- . Eurodollar and t-bill futures

Financial futures/forward contracts pricing relationships

- . Cost of carry (carrying charges)
- . Cost of carry (arbitrage) pricing
- . Cash and carry trade example
- . Yield curve shape versus cash/futures relationship
- . Expectations in the pricing of futures/forwards

Hedging with futures contracts

- . definition
- . hedging considerations
- . hedging example

Introduction to mortgage backed securities

- . Mortgage loans

market yields

- . Modified duration
- . Dollar duration
- . Impact of convexity

- . Participants

Mortgage pass through securities

- . Types of mortgage pass through securities
- . Characteristics of pass throughs
- . Prepayment of principal (prepayment risk)
- . Mortgage pool characteristics
- . Mortgage pool prepayment considerations
- . Quantifying prepayment speed
- . Analysis of pass through securities

Collateralized mortgage obligations (CMOs)

- . CMO basics
- . Z-Bond tranches
- . Planned amortizations class (PAC) bond tranches
- . One sided PACs
- . Floating rate CMO structures
- . Stripped mortgage backed securities

Analytic tools for MBS

- . Total return analysis
- . Option valuation of pass through securities
- . Estimating price volatility

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