Course information 2023-24
FN3206 Derivatives and risk management

General information

MODULE LEVEL: 6

CREDIT: 30

NOTIONAL STUDY TIME: 300 hours

Summary

(A) Derivatives

The course focuses on financial derivatives, with a particular emphasis on equity derivatives (standard call and put options, exotic options), futures and forward contracts, and interest rate derivatives (swaps, caps and floors, swaptions). The course systematically addresses three basic questions: how do these products work, i.e. what are their payoffs? How can they be used, for hedging purposes or as part of trading strategies? And above all: how are they priced? The course emphasises a small number of powerful ideas: absence of arbitrage, replication, and risk-neutral pricing. Both discrete-time models (mainly binomial trees) and the Black-Scholes model are covered.

(B) Risk Management

The course aims to introduce quantitative concepts and techniques in many areas of finance. Sample topics include risk measures (e.g., Value-at-Risk and Expected Shortfall, including implementation and backtesting), univariate and multivariate volatility models, Monte Carlo simulations, and associated topics in Econometrics. The course also focuses on endogenous risk and financial market risk regulations. Recent stress events, such as the global crisis in 2008, Covid-19 in 2020 and Russia's invasion of Ukraine are used to illustrate the various methodologies presented in the course. Implementing the models and tools in R is an essential part of the course. The homework assignments are designed to guide the students to all stages of the analytical process, from locating, downloading, and processing financial data to the implementation of the tools and interpretation of results.

Conditions

Prerequisite: If taken as part of a BSc degree, the following course(s) must be passed before this course may be attempted:

- EC2066 Microeconomics **AND**
- EC2020 Element of econometrics **OR** FN2208 Financial Data Analysis

Aims and objectives

- To provide a comprehensive introduction to options, forwards and futures, and other financial derivatives.

Please consult the current EMFSS Programme Regulations for further information on the availability of a course, where it can be placed on your programme's structure, and other important details.

- To provide a toolkit for understanding a range of models used for market risk forecasting in the financial industry and key issues in using these models.

Learning outcomes

By the end of the course, successful students will be able to:

- Develop an understanding of the fundamental theorem of asset pricing (FTAP).
- Understand the connection between absence of arbitrage, replication, and risk-neutral pricing.
- Price a range of derivatives using binomial trees.
- Have a good understanding of the Black-Scholes formula.
- Appreciate the importance of the Greeks in risk management.
- Value forwards and futures.
- Understand the yield curve and value interest rate derivatives.
- Identify the time series properties of financial asset prices and returns.
- Univariate and multivariate volatility models
- Define and compare different risk measures: volatility, Value at Risk and Expected Shortfall.
- Implementation and backtesting of risk models
- Monte Carlo methods for risk in derivatives and bonds
- Endogenous risk
- Market risk regulations

Essential reading

Detailed course programmes and reading lists are distributed at the start of the course. Illustrative texts include:

- *Options, Futures, and Other Derivatives* by John Hull, Pearson. [Suggested text]

- Financial Risk Forecasting: The Theory and Practice of Forecasting by Jon Danielsson, Wiley.

Assessment

This course is assessed by a three-hour and fifteen-minute closed-book written examination.

Syllabus

The course is divided into two parts: (A) Derivatives; and (B) Risk Management.

(A) Derivatives

Topics include the binomial model, Black-Scholes, the Greeks, exotic options, forwards and futures, fixed income basics, and interest rate options.

(B) Risk Management

Topics include statistical properties of prices in financial markets, volatility forecasting, risk measures, risk forecasting, backtesting, simulation methods for risk in derivatives, endogenous risk and market risk regulations.

Please consult the current EMFSS Programme Regulations for further information on the availability of a course, where it can be placed on your programme's structure, and other important details.

FN3206 Derivatives and Risk Management   **Page 2 of 2**