UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Interest Rate Derivatives

2122-2-F1601M064-F1601M075M

Learning objectives

The course has a practitioner approach, presenting the current market best practices, often not yet documented in textbooks. Lecturers from the street are invited: traders, risk-managers, quants, consultants. The course aims to provide the students with the knowledge usually tested when applying for investment banks in the interest rate derivatives area.

Contents

The course is about the valuation of derivative products (linear, plain vanillas, and exotics) and presents the main Interest Rate and Credit models, with special emphasis on rate/credit curve construction and collateralization issues.

- FRA, Futures, and Swaps
- Rate curve bootstrapping in multi-curve regimes
- Black Model and its shifted log-normal variants
- Interest rate volatility: par, forward, no-arbitrage, and SABR model
- Term structure models: equilibrium, no-arbitrage, short rate, and market models
- Caps and Floors, Swaptions, and Bermudan Swaptions
- Credit Default Swaps
- Credit curve bootstrap
- Counterparty risk: clearing, collateralization, and XVA valuation adjustments
- Market risk management: greeks and static replica of structured products

Detailed program

- Interest Rate Basics
- Rate Curves Calibration
- Black Model
- Volatility
- Caps and Floors
- Swaptions
- Structured Products
- Greeks and Hedging
- Interest Rate Models
- Bermudan Swaption
- Credit Derivatives
- Counterparty Risk, Collateral Protection and Central Clearing
- Credit Default Swaps
- Credit Curve Bootstrapping
- XVAs: Introduction to Valuation Adjustments

- The Reform of Benchmark Interest Rate Indexes and Its Impact on Derivative Pricing

Prerequisites

Derivatives, stochastic processes, risk measures

Teaching methods

- Slide based lessons
- QuantLibXL (https://www.quantlib.org/quantlibxl) programming assignments using Excel.

Assessment methods

Students attending the lessons are asked to solve some assignments. Assignments have a deadline and are not required/allowed for students that did not actively partecipate to the semester didactical activity.

Assignments can be tackled cooperatively by team of students, up to three students. Successful assignments will contribute up to five points to the final grade.

The final oral exam will be individual.

Textbooks and Reading Materials

- John Hull, Options, Futures and Other Derivatives, 10th edition
- Paul Wilmott, on Quantitative Finance

Semester

First semester, October-January

Teaching language

English didactical material, Italian lessons.