

FE5208: Term Structure and Interest Rate Derivatives

SPRING 2020

Instructor: CHEN Yi-Chun, TEL: 6516-3992, Office: I-Cube 04-03-04, email: yichun@nus.edu.sg

Time and venue:

Mon 1900-2200 at I-Cube Level 1 seminar room

Office hours: Friday 2-4pm

Textbook (the first half):

Cairns, A.: Interest Rate Models: An Introduction, 2004

Outline:

The first half of the module introduces the classical interest models. I will follow Chapters 1, 3, and 4 of the textbook very closely in Lectures 1, 2, 4, and 5. I brief and relate auction theory to bond market in Lecture 3 and aggregating prediction in Lecture 6. Supplemental readings on these latter two topics will be provided in class.

Grading:

Project and homework (in group of 3-5 people, 10%) and Final Exam (40%)

Exam date and time: Final exam - 1-3.30pm on April 25.

Schedule:

1. 13 Jan: Lecture 1 - Introduction to Bond Market
2. 20 Jan: Lecture 2 - Discrete-Time Binomial Models
3. 27 Jan: No class
4. 3 Feb: Lecture 3 - The Economics of Bond Market
5. 10 Feb: Lecture 4 - Continuous-Time Short-Rate Models (I)
6. 17 Feb: Lecture 5 - Continuous-Time Short-Rate Models (II)
7. 24 Feb: No class
8. 2 March: Lecture 6 - Crowd Wisdom and Prediction Market

The second half of the module (starting from 9 March) will be taught by Prof LIU Xiaoqing. Attached below is the email from Prof Liu about his topics:

The following is an amendment for my part. I will only use Brigo and Mercurio's book as the reference. This book is well accepted in academia and industry.

(IV) Swaps and other derivatives.

Traditional methods for swaps pricing were quite simple, but became inadequate in recent years, as large differences in credit quality between potential counter-parties began to develop. As a result, there has been a bit of a revolution in swaps pricing since 2008.

References to be provided.

(V) Arbitrage-free Models

Traditional models suffer from being unable to match the observed yield curve exactly. Arbitrage-free models, such as Ho-Lee, Hull-White, and Black-Derman-Toy, remedy this defect. Numeric techniques such as binomial trees will be covered.

Brigo/Mercurio: Chapters 3 and 4.

(VI) HJM and Market Models

An extremely general and very powerful type of term structure model has been developed over the past two decades, and is widely used in industry. These models return to a very old approach of attempting to model the entire yield curve as a fundamental entity (rather than the short-interest rate), but repair a problem that was present in early attempts. Numeric methods such as simulation to be covered.

Brigo/Mercurio: Chapters 6, 7, and 8.

(VII) Trading, Hedging and Risk Management of an Interest Rate Derivatives Desk

Trading and risk running of interest rate derivatives are the most profound activities in the market place. Understanding the risk interaction among different instruments is a starting point, from which hedging techniques are developed. The sensitivity to complex long dated market risk and the exposure to credit risk challenge the management of interest rate portfolios.

References to be provided.