University of Bern
Institute for Financial Management

Spring 2024

## Syllabus

# Fixed Income

## Core Module Topics in Asset Management, Master

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### Schedule

Class meets:
Thursday, 2.15pm – 5pm (February 22 – Mai 30)
Room: Seminarraum 107, Engehalde

### Exam

Final Exam: June $4^{th}$, 2024, 12.45pm—14:45pm (Hauptgebäude, room 220)
Retake: September $9^{th}$, 2024, 14.45am—16:45am (Hauptgebäude, room 106)

### Graduate Assistants

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## Focus

Understanding the forces that affect the valuation, risk and return of fixed income securities and their derivatives has never been so important. As the world of fixed income securities becomes more complex, anybody who studies fixed income securities must be exposed more directly to this complexity. This class provides a thorough discussion of these complex securities, the forces affecting their prices, their risks, and of the appropriate risk management practices. The aim is to present methodologies and examples that can be applied somewhat universally, once the basic concepts have been understood.

The class starts with a descriptive introduction to debt markets and reviews elementary concepts associated with the valuation and hedging of debt contracts. It then examines in details methodologies in managing interest rate risk (e.g., immunization based on duration and convexity measures), and highlights their respective advantages and shortcomings. Fixed-income securities are actively traded as underlying assets to derivatives contracts (e.g., interest rate swaps). We thus proceed with a description of various interest rate derivative securities, and introduce widely-used binomial models of interest rates to price and hedge these securities. Among derivative contracts, a great deal of attention will be paid to Residential Mortgage Backed Securities, which were deemed to be one of the causes of the 2008 financial crisis; in this class, they receive a dedicated treatment. If time permits, we will present continuous-time generalizations of interest rate models. Most of these models are statistical in essence: we conclude this class instead by taking an economic approach in understanding how interest rates are determined in the interbank money market—we review and model the forces that operate in this market within an equilibrium context.

## Prerequisites

Knowledge of economics, capital markets, statistics, and mathematics. The pricing of Fixed-Income Securities is necessarily an analytical matter, but most derivations in this course only require little technical knowledge. Specifically, I will assume that you know basic notions of discounting and compounding, some elements of statistics and probability theory and basic economic concepts. The techniques we cover in this class are similar to those covered in "Derivatives" and "Risk Management"; This class complements both classes by focussing on—and provided a more advanced treatment of—debt markets.

For the assignment, some knowledge in Python or the willingness to learn it is required. There is a myriad of learning resources online that will help you acquire the necessary skills. In addition, the *Forschungsstelle Digitale Nachhaltigkeit* provides an introductory course to programming which is accessible to all students at the University of Bern. You can find more information on this course here.

# Organization of the Course

### Course Structure

The course is structured in a traditional lecture format, with weekly lectures based on a set of lecture notes and a final exam (no midterm exam). There is one graded assignment, which is to be submitted in **groups of 3 - 5 students** at the beginning of class on **May 23**. This assignment accounts for 30% of the final grade. Lecture notes, assignment, problem sets and hand-outs will become sequentially available on ILIAS.

# Course Materials

### Main textbook for the course

Pietro Veronesi, *Fixed Income Securities: Valuation, Risk, and Risk Management*, John Wiley & Sons, first edition, 2010. This book is an advanced undergraduate reference, which is useful for background material.

### Optional textbook

Suresh Sundaresan, *Fixed Income Markets and Their Derivatives*, Elsevier, Academic Press Advanced Series, third edition, 2009. This book provides an undergraduate introduction to debt markets.

# Grades

70% final exam, 30% assignment.

# Course Outline

The following is a tentative agenda for this class:

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| Topic 1: weeks 1-2 | Introduction to debt markets | Chapter 1 |
| Topic 2: weeks 2-7 | Duration and interest rate risk | Chapters 2, 3, 4 |
| Topic 3: weeks 8-13 | Binomial models of interest rates | Chapters 5, 6, 9 - 12 |