

CARNEGIE MELLON UNIVERSITY
Tepper School of Business – Fall 2015
Debt Markets (45-924)

Syllabus

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Office hours	Tuesday, Thursday 3-5pm
Lectures	Mondays and Wednesday, 1:30 to 3:15PM, Posner Hall 152

1 Objective

Fixed income markets continue to expand, and their complexity is ever increasing. At the end of 2011, outstanding U.S. government debt stood at around \$9.9 trillion, outstanding corporate debt stood at around \$8.2 trillion, and the notional size of the mortgage-backed securities market was around \$8.4 trillion. For government and corporate debt markets, these represent large increases over their values a few years earlier. Fixed income derivatives markets also continue to play an important role: At the end of March 2012, the notional size of the global interest rate swap market was \$293 trillion (compared to \$322 trillion in March 2010) and that of OTC forwards, swaptions and options was \$107 trillion (compared to \$95 trillion in March 2010).

The primary purpose of this course is to explore the valuation and characteristics of corporate debt securities. Specific examples of securities covered include straight, callable and floating debt, credit derivatives such as credit default swaps, and high-yield junk bonds. The course first covers the basic concepts of fixed income markets such as the term structure of interest rates, interest rate risk management, and interest rate modeling. We then study the impact of credit risk on the valuation of corporate debt securities. The course explores the complex structure of corporate debt such as seniority, maturity, covenants, and collateral. Students will also learn to do a credit risk analysis, in particular related to credit ratings, historical default and recovery rates, and business risk. We will also talk about leveraged finance such as LBO and junk bonds. The course should be of interest to any student who

plans to work in the area of fixed income portfolio management, commercial or investment banking, corporate treasury, or debt underwriting.

Students will learn about

1. Treasury market

- (a) basic concepts of fixed income instruments such as yield-to-maturity and term-structure of interest rates;
- (b) modern empirical methodologies to describe the term-structure such as curve fitting;
- (c) interest rate risk management using duration and convexity as well as swaps and forward contracts;
- (d) the workhorse modeling techniques for fixed income derivative (binomial interest rate trees)

2. Corporate bond market

- (a) overview of corporate bond features such as call provisions, sinking funds, convertible bonds, debt covenants, seniority;
- (b) tools to quantify credit risk: default probabilities, interest rate coverage, credit ratios, distance-to-default, Z-scores;
- (c) solid understanding of the pricing of corporate bonds and its implicit option to default
- (d) how to structure high-yield debt and transactions.

The course strongly emphasizes the applications of these models to value real world fixed income products and their derivatives. We shall focus both on the practical difficulties of applying the models to real data and on the use of Excel programming to compute security prices. The course includes real world case studies and data analysis to allow students to apply the models to a wide range of derivatives and new products, and to understand their risk and return characteristics.

2 Course Material

Each lecture is accompanied by slides. These slides contain the tools to solve the homework and final exam. In addition, there will be supplementary readings and Excel files, all posted on Blackboard. If you really want to purchase a book, get Veronesi's text book; but I do not require that you purchase the book. Please read the Wall Street Journal.

- Lecture notes

- Supplementary readings
- Excel files
- Wall Street Journal
 - <http://online.wsj.com/public/page/news-fixed-income-bonds.html>
 - <http://blogs.wsj.com/bankruptcy/>
- Text book:
 - Veronesi: Fixed Income Securities, Wiley, 2010
 - Hull: Options, Futures, and other Derivatives, Prentice Hall, 2012, 8th edition
 - Duffie and Singleton: Credit Risk, Princeton, 2003
- Practitioner book:
 - Kricheff: A Pragmatist's Guide to Leveraged Finance, 2013
 - Rosenbaum and Pearl: Investment Banking, 2013

3 Evaluation

Homework: There will be four problem sets to be handed in during the mini semester. You are welcome to form groups of 1-3 students to work on the homework together. Please hand in one solution per group. Although this course is very quantitative, it is not about putting numbers into formulas. You need to understand the intuition behind the formulas to do the homework and final exam, and in practice, too. So, it is really important to put some effort into the homework to help you work through the intuitions. The homework in this course is hard, in order to force you to think carefully about the material presented in class.

Final project: In the final project, you are asked to write a credit risk report, following industry standards such as Moody's. In particular, you choose a large US corporation to be your client, summarize their current debt policy, compute default probabilities and optimal leverage ratio, and advice them on their new optimal debt policy. Please write a 5 page report.

Class participation: This is important to the success of the course. Please come to class prepared and feel free to ask questions. Many of the key concepts are very challenging and often a strategic question by you will make the concept clearer for others in the class. If, for some reason, you have to miss a class, please get the notes from one of your classmates and review them carefully. Class participation will affect grades in borderline cases (e.g., to discriminate between an A- or a B+).

- Homework: 50%
- Final project: 50%

- Participation: 10%

In general, and for the final project in particular, students are expected to abide by the **Tepper School's Code of Conduct**. A student's responsibilities include refraining from lying, cheating, stealing, misuse of computing resources, and other distrustful behavior. Cheating includes, but is not limited to, (i) submission of work which is not the student's own for papers, assignments, or exams and (ii) collaboration in the preparation of an assignment, if such collaboration is explicitly prohibited by faculty. Please see Section 8 of the 2012-13 MBA Student Handbook for more information. I use the following grading scheme.

Grade	Value	Meaning
A+	9	Outstanding
A	8	Excellent
A-	7	Very good
B+	6	Above average
B	5	Average
B-	4	Below average
C+	3	Poor
C	2	Very poor
C-	1	Extremely poor
D+, D, R	0	Failure

4 Schedule

Week	Topic	Reference	Assignment
1	1. Introduction to Debt Markets	Veronesi 1	
2	2. Yield Curve Modeling 3. Interest Rate Risk Management I	Veronesi 2 Veronesi 3-4	1
3	3. Interest Rate Risk Management II	Veronesi 5	2
4	4. Corporate Debt Thanksgiving		
5	Guest speaker: Dave Blue, KeyBanc Capital Markets 5. Pricing of Credit Risk	DS 3-6	3
6	6. Floaters and Callable Bonds	Veronesi 11-12	4
7	7. Credit Risk Analysis		Final Project