

## Syllabus Real Estate Capital Markets – Fall semester AY 2017-18

### Instructor

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Office Hours: Wednesday 5-5:50pm, or by appointment.

### Teaching Assistant

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### Class Time

The class meets once per week on Monday from 6-9pm for 12 weeks. There is a 20 minute break around 7.30pm. The first class is on 9/25, the last class is on 12/18 (final exam). There will be no class on 10/9.

The classroom is **KMC 3-60**.

### Content

Real Estate Capital Markets studies debt and equity secondary markets linked to real estate assets. In Real Estate Capital Markets, we generally take the perspective of a *secondary market investor*, such as an investor in mortgage-backed securities, or the common equity of a REIT. The course places considerable emphasis on securitization, the housing finance system, the GSEs, the subprime mortgage crisis and related topics. The course will be relevant both to people with an interest in real estate, and those interested in fixed income markets.

On the debt side, we will study features of commercial and residential mortgages, and mortgage math. We will then analyze agency and non-agency mortgage-backed securities, as well as some related instruments, such as CDOs. We will discuss the key factors that drive default risk and interest rate risk on commercial and residential mortgages, and learn the basic principles for the valuation of mortgage-backed securities, incorporating the value of the prepayment option embedded in such securities. We will cover the historical development of mortgage secondary markets, the institutional structure of this sector (e.g. the role of Fannie Mae, Freddie Mac and Ginnie Mae), and the process of securitization. We will also discuss alternative funding sources to securitization, such as covered bonds, syndication, deposit finance and FHLB advances. We will

also discuss the causes and consequences of the financial crisis, which has important implications for both commercial and residential real estate finance.

On the equity side, we will study Real Estate Investment Trusts (REITs), which are the primary traded equity structure used for real estate. This will include a discussion of the legal and institutional framework of the REIT industry, tax issues, and REIT valuation.

Since both debt and equity claims depend fundamentally on the value of the underlying real estate assets, we will also cover the measurement of real estate prices, recent market trends, fundamental determinants of prices, and valuation approaches.

We will also spend some time covering international aspects of real estate capital markets (e.g. covered bonds). Depending on time and class interests, we may also spend time covering other topics, such as real estate investment banking or Case-Shiller housing futures contracts.

Class time will be devoted to a mix of formal lectures, in-class exercises and guest lectures from Wall Street professionals. The course is a mix of qualitative and quantitative work. Students should expect to be doing a fair amount of cash flow modeling in Excel, as well as fixed income mathematics.

## Prerequisites

The only formal pre-requisite for this course is Foundations of Finance. It is helpful to have taken Corporate Finance for this course.

## Readings and Financial Calculator

Since most of the topics studied in the class are not well covered in any single text, there is no required textbook for the class. Primary materials for the course are the lecture notes, plus readings for each class that will be regularly posted on NYU Classes. Some of these readings will be required, others will be optional or background reading for interested students. (This will be made clear on Classes). Other class materials such as assignments, practice exams, course announcements and so on will also be posted on Classes.

Although you will not need to purchase a textbook, you are strongly encouraged to read two books that closely relate to the discussion in class, and which will be covered by assignment questions for extra credit. These books are available on Amazon and in bookstores.

Lewis, Michael, 1989, Liar's Poker, Penguin Books, NY, NY, ISBN 0-393-02750-3. The chapters most relevant to this course are Ch. 5, 6, and 7 (these will be discussed in week 2), but the entire book is recommended. This book gives a clear, entertaining account of the birth of the mortgage-backed securities market.

McLean, Bethany, 2015, Shaky Ground: The Strange Saga of the U.S. Mortgage Giants, Columbia Global Reports, ISBN 978-0990976301. This short book (159 pp.) provides a vivid overview of the history and downfall of Fannie Mae and Freddie Mac, as well as recent developments (including high profile lawsuits by investors against the US government).

For context on the housing boom and the subprime crisis, you are also encouraged to watch the recent blockbuster movie “The Big Short” (Dec 2015), based on the Michael Lewis book with the same title and featuring Christian Bale, Brad Pitt, Steve Carell, and Ryan Gosling.

We will also refer to three Harvard Business School cases during the course, which will be available to purchase in physical and electronic form from the NYU bookstore:

“Mortgage-Backs at Ticonderoga”, HBS Case 205-122, 2005. George Chacko, Peter Hecht, Vincent Dessain, Anders Sjoman.

“Rosetree Mortgage Opportunity Fund”, HBS Case 9-209-088, 2009, Victoria Ivashina, Andre F. Perold.

“Cypress Sharpridge: Raising Capital in a Time of Crisis”, HBS Case 9-310-140, 2010, Lena G. Goldberg, Adam Nebesar.

### **Financial calculator:**

A financial calculator will be required for the course and for exams, to perform basic annuity and present value type calculations. Any financial calculator will do, as long as you understand how to use it. However, I will be using a Texas Instruments: TI - BA II Plus, and will sometimes refer to it in class. [N.B. Students interested in obtaining CFA certification should note that the two approved calculators for CFA exams are the TI - BA II Plus, and the Hewlett Packard: HP 12C.]

### **Optional Reference Materials**

The books listed below are relevant for various aspects of the course, and at various points material from the books will be referred to in the lectures. Interested students who want to gain an in-depth understanding of particular aspects of the course should feel free to consult me about purchasing one or more of the texts below. None of them are required, however.

It should be noted that the texts listed below generally predate the current mortgage crisis, and often the boom in non-agency MBS that preceded it. For this reason, the books are generally a relatively better guide to the agency mortgage market.

#### **Textbooks and technical books**

1. Fabozzi, Bhattacharya and Berliner, “Mortgage-Backed Securities: Products, Structuring and Analytical Techniques”, ISBN 978-0-470-04773-6, Wiley and Sons, 2007.

Well-written overview of mortgage and MBS fixed-income markets, including prepayment, default, valuation, etc.

2. Davidson and Levin, “Mortgage Valuation Models: Embedded Options, Risk, and Uncertainty”, ISBN 978-0-199-99816-6, Oxford University Press, 2014.

State-of-the-art reference on valuation methods for agency and non-agency MBS, emphasizing the relationship with the CAPM and arbitrage pricing theory.

3. Davidson, Sanders, Wolff, and Ching, "Securitization: Structuring and Investment Analysis" ISBN: 978-0-471-02260-2, 576 pages, September 2003.

Covers a range of different securitization markets, not just MBS. Includes a good intuitive discussion of pricing and OAS.

4. Hayre, "Salomon Smith Barney Guide to Mortgage-backed Securities," Wiley and Sons, Inc, 2001.

Salomon Brothers pioneered the underwriting, trading, and modeling of mortgage-backed securities in the 1980s, as described in *Liar's Poker*.

5. Fabozzi, 2006, "Handbook of Mortgage-Backed Securities", 6th Edition, McGraw-Hill Trade, ISBN 0-07-146074-8.

Contains chapters on various aspects of the MBS market, written by industry professionals. While lengthy and broad in scope, it is less useful than (1) as a pedagogical tool for learning about MBS markets.

6. Garrigan and Parsons, 1997, "Real Estate Investment Trusts: Structure, Analysis and Strategy", McGraw-Hill Irwin, ISBN 0-7863-0002-7.

Contains a wealth of institutional information about REITs.

7. Brueggeman and Fisher, "Real Estate Finance and Investments", Irwin 2008, 13th Edition.

8. Poorvu and Cruikshank, "The Real Estate Game: The Intelligent Guide to Decision-Making and Investment", Free Press 1999.

These two books (7) and (8) are useful overall texts on real estate finance and real estate investing (not specifically focusing on real estate capital markets).

### **Popular / general reading**

1. Robert Shiller, 2008, "The Subprime Solution: How Today's Global Financial Crisis Happened and What to Do About It", Princeton University Press, ISBN13: 978-0-691-13929-6.

A short, straightforward account of the causes of the subprime mortgage crisis, as well as a set of policy suggestions. Robert Shiller also wrote the well-known book *Irrational Exuberance*, which predicted the collapse of the internet stock market bubble.

2. Richard Bitner, 2008, "Confessions of a Subprime Lender: An Insider's Tale of Greed, Fraud and Ignorance", Wiley, ISBN 978-0470402191.

A former owner of a mortgage company serving the subprime market explains clearly and in detail the structure of that market, and various incentive problems that helped lead to the crisis.

3. Edward Gramlich, 2007, "Subprime Mortgages: America's Latest Boom and Bust", Urban

Institute Press, ISBN 978-0877667391.

A former Federal Reserve governor discusses the growth in subprime lending, and events that led up to the surge in mortgage defaults that led to the financial crisis.

4. Atif Mian and Amir Sufi, 2014, "House of Debt: How They (And You) Caused the Great Recession and How We Can Prevent It from Happening Again", University of Chicago Press, ISBN: 9780226081946.

New book on the role of housing debt in the Great Recession.

### **Staying Up-to-Date**

You are strongly encouraged to follow real estate finance news, broadly defined. If you encounter an interesting article that you would like to share with the class, please send me an email.

### **Classroom Civility**

Your behavior should respect your classmates desire to learn. Each lecture begins and ends exactly on time. I understand your busy schedules, but try not to come late. Because of the classroom layout, it is disruptive no matter how quiet you are. If you must miss a class or must come late, please let me know by email beforehand.

Laptops are allowed during some classes since we will be using some computer files during the lecture. While laptops have advantages in the classroom, they also have the potential to hamper your own learning experience as well as that of your neighbors. Please restrict your use to the software that we will be using and to the class materials.

The use of iPhones, iPads, cell phones, and similar devices is not allowed. Please turn them off before entering class. Do not engage in side conversations during the lecture. Repeated occurrence of such disruptions will be reflected in the final grade.

### **Grading and Assignments**

The distribution of overall letter grades for the course will reflect Stern's guidelines. Your final course grade will be based on the following:

Assignments: 20% [dropping worst assignment grade]

Midterm quiz: 10% or 30%

Final exam: 60% or 40%.

Class attendance and participation: 10%

Note that there is some flexibility in the grading scheme, i.e. the balance between the midterm and final exam. Your midterm exam will be worth either 10% or 30% of your final grade, depending on how well you do in the midterm relative to the final. I'll correspondingly adjust the weight on the final exam (e.g. if your midterm weight is 30%, your final exam weight is 40%). I will do this adjustment automatically in a way that maximizes your overall grade. The intention

here is to provide some insurance for you in case you “have a bad day” on the date of the midterm or the final exam.

There will be five assignments posted over the course of the semester. Your overall assignment grade will be based on the best four of your five assignments (i.e. you drop your worst score out of the five).

You are encouraged to complete these assignments in a group of up to three people, and submit a single group answer. When you submit your assignment online, please make sure you write the names of all the members of the group on the assignment.

Assignments are generally due on the day before class (Wednesday). Assignments should be submitted by midnight on the due date. Assignment due dates are listed on the syllabus.

The Finance Department guidelines are that grades of “A” and “A-” should be awarded to approximately **35%** of the students in the course.

You should not expect a response to questions regarding assignment, midterm, and final material sent the night before due date. If you would like to contest a midterm, final, or assignment grade; I will look at them within three days of you receiving back the material. I reserve the right to regrade the entire assignment or exam if you contest a grade.

**Late assignments will not be accepted**, as you have the flexibility of not turning in one assignment. You are responsible if another member of your group fails to submit the assignment on time. Please confirm that your group submitted the assignment on time. Assignments should be submitted via NYU Classes.

You are permitted to bring any course notes you like into the midterm and final exams, as well as your financial calculator. You may not use a laptop, tablet, or another device.

### **Academic Integrity**

Integrity is critical to the learning process and to all that we do here at NYU Stern. As members of our community, all students agree to abide by the NYU Stern Student Code of Conduct, which includes a commitment to:

Exercise integrity in all aspects of one's academic work including, but not limited to, the preparation and completion of exams, papers and all other course requirements by not engaging in any method or means that provides an unfair advantage.

Clearly acknowledge the work and efforts of others when submitting written work as one's own. Ideas, data, direct quotations (which should be designated with quotation marks), paraphrasing, creative expression, or any other incorporation of the work of others should be fully referenced.

Refrain from behaving in ways that knowingly support, assist, or in any way attempt to enable another person to engage in any violation of the Code of Conduct. Our support also includes reporting any observed violations of this Code of Conduct or other School and University policies that are deemed to adversely affect the NYU Stern community.

The entire Stern Student Code of Conduct applies to all students enrolled in Stern courses and can be found here: [www.stern.nyu.edu/uc/codeofconduct](http://www.stern.nyu.edu/uc/codeofconduct).

To help ensure the integrity of our learning community, prose assignments you submit to NYU Classes will be submitted to Turnitin. Turnitin will compare your submission to a database of prior submissions to Turnitin, current and archived Web pages, periodicals, journals, and publications. Additionally, your document will become part of the Turnitin database.

### **General Conduct & Behavior**

Students are also expected to maintain and abide by the highest standards of professional conduct and behavior. Please familiarize yourself with Stern's Policy in Regard to In-Class Behavior & Expectations (<http://www.stern.nyu.edu/portal-partners/current-students/undergraduate/resources-policies/academic-policies/index.htm>) and the NYU Disruptive Behavior Policy (<http://www.nyu.edu/about/policies-guidelines-compliance/policies-and-guidelines/bullying--threatening--and-other-disruptive-behavior-guidelines.html>).

### **Students With Disabilities**

If you have a qualified disability and will require academic accommodation of any kind during this course, you must notify me at the beginning of the course and provide a letter from the Moses Center for Students with Disabilities (CSD, 998-4980, [www.nyu.edu/csd](http://www.nyu.edu/csd)) verifying your registration and outlining the accommodations they recommend. If you will need to take an exam at the CSD, you must submit a completed Exam Accommodations Form to them at least one week prior to the scheduled exam time to be guaranteed accommodation.

## Class Schedule

(Note: in addition to required articles, required media articles will also be posted on NYU Classes)

	Date	Material to be covered
1	Sep 25	<p><b>Introduction and real estate price dynamics</b></p> <ul style="list-style-type: none"> <li>• Course outline and introduction</li> <li>• Measurement of commercial and residential property prices</li> <li>• Economic determinants of real estate prices</li> <li>• Structure of commercial and residential mortgage contracts</li> </ul>
2	Oct 2	<p><b>Mortgages math and the mortgage financial system</b></p> <ul style="list-style-type: none"> <li>• Primer on the US mortgage market</li> <li>• Mortgage mathematics (e.g. calculating points, NPV, prepayments etc.)</li> </ul> <p><i>Required Reading:</i></p> <ul style="list-style-type: none"> <li>• <u>Liar's Poker</u>, Ch. 5, 6, 7</li> <li>• Excel mortgage calculations</li> </ul>
	Oct 9	<b>NO CLASS</b>
3*	Oct 16	<p><b>Modelling prepayment risk</b></p> <ul style="list-style-type: none"> <li>• Understanding prepayment risk</li> <li>• Modeling prepayment risk</li> <li>• Cash flow modeling of agency residential mortgage-backed securities (RMBS)</li> </ul> <p><i>*Assignment 1 Due before class</i></p> <p><i>Required Reading:</i></p> <ul style="list-style-type: none"> <li>• Economist article, "Comradely Capitalism"</li> <li>• Powell's article on Housing Reform</li> <li>• Matt Klein's article discussing Powell</li> <li>• Deutsche Bank Prepayment Model</li> </ul>
4*	Oct 23	<p><b>Mortgage valuation, and CMOs</b></p> <ul style="list-style-type: none"> <li>• Estimating expected returns: static yield spreads and option adjusted spreads (OAS)</li> <li>• Understanding CMOs</li> <li>• Cash flow modeling of CMOs</li> </ul> <p><i>*Assignment 2 Due before Class</i></p>



		<p><i>Required Reading</i></p> <ul style="list-style-type: none"> <li>• <u>HBS Case</u>: Mortgage Backs at Ticonderoga</li> <li>• Yields/CMO Excel workbook</li> </ul>
5	Oct 30	<p><b>Modeling residential defaults, and the non-agency MBS market</b></p> <ul style="list-style-type: none"> <li>• Non-agency market structuring (waterfalls etc.)</li> <li>• The subprime crisis</li> <li>• Government responses to the crisis</li> </ul> <p><i>Required Reading:</i></p> <ul style="list-style-type: none"> <li>• “Understanding the Securitization of Subprime Credit”</li> <li>• “Is the Credit Cycle Turning?”</li> </ul>
6	Nov 6	<p><b>Midterm quiz</b> (60 minutes)</p> <p><b>Guest Lecture:</b> TBA</p>
7*	Nov 13	<p><b>Commercial real estate and commercial mortgages</b></p> <ul style="list-style-type: none"> <li>• Introduction to commercial real estate</li> <li>• Structure and performance of commercial mortgages</li> <li>• Commercial Mortgage Backed Securities (CMBS)</li> </ul> <p><i>*Assignment 3 Due before Class</i></p> <p><b>Guest Lecture:</b> TBA</p> <p><i>Required Reading:</i></p> <ul style="list-style-type: none"> <li>• CMBS E-Primer</li> <li>• Commercial Property Outlook</li> </ul>
8	Nov 20	<p><b>CMBS continued, introduction to REITS</b></p> <ul style="list-style-type: none"> <li>• Historical trends in CMBS Market</li> <li>• Introduction to Real Estate Investment Trusts (REITs)</li> <li>• REITs: Tax treatment other benefits</li> </ul> <p><i>Required Reading:</i></p> <ul style="list-style-type: none"> <li>• Stuy Town articles</li> </ul>
9*	Nov 27	<p><b>REITs</b></p> <ul style="list-style-type: none"> <li>• REIT valuation methods</li> <li>• Non-traded REITs</li> <li>• Mortgage REITs</li> </ul>

		<p><i>Required Reading:</i></p> <ul style="list-style-type: none"> <li>• <u>HBS Case</u>: Cypress Sharpridge: Raising Capital in a Time of Crisis</li> </ul> <p><i>*Assignment 4 Due before Class</i></p>
10	Dec 4	<p><b>Real estate derivatives</b></p> <ul style="list-style-type: none"> <li>• CDOs, CDS and synthetic CDOs</li> </ul> <p><b><u>Guest Lecture</u></b>: TBA</p>
11*	Dec 11	<p><b>Innovations and international real estate markets</b></p> <ul style="list-style-type: none"> <li>• Innovations and features of foreign markets</li> <li>• Covered bonds</li> <li>• Private equity investments in single-family homes</li> <li>• Course review and Q&amp;A</li> </ul> <p><i>*Assignment 5 Due before Class</i></p> <p><i>Required Reading:</i></p> <ul style="list-style-type: none"> <li>• JP Morgan Letter to Shareholders</li> </ul>
12	Dec 18	<p><b><u>Final exam</u> [120 minutes]</b></p>

## Information about the MBA Real Estate Specialization

The Real Estate specialization at NYU Stern provides rigorous training in (i) the economics of real estate development and investment, the financing such projects, leasing, and appraisal of buildings, (ii) the pricing/valuation and trading of financial instruments with real estate as the underlying, such Real Estate Investment Trusts (REITS), residential and commercial mortgage-backed securities (MBS), and related derivative and structured finance products such as collateralized debt obligations (CDOs), credit default swaps (CDS), and index products (CDX, ABX, etc.), and (iii) the workings of real estate primary and secondary markets, including the various participants in these markets, their roles, and (iv) the legal, taxation, and regulatory environment. Elective courses can be chosen to emphasize the commercial real estate development process or the investment strategies in real estate capital markets. With an appropriate choice of elective courses, this track provides in-depth preparation for careers in real estate development, real estate brokerage, real estate project investment for private equity firms, family offices, sovereign wealth funds, and careers in real estate finance in the fixed income or equity desks of investment banks (research, sales & trading), hedge funds, and sovereign wealth funds.

*Real estate specialization courses: **three courses** among this list must be taken for the specialization (all courses are 3 unit courses):*

1. Real Estate Primary Markets (**FINC-GB.2329**, co-req: Corporate Finance [FINC-GB.2302](#))
2. Real Estate Capital Markets (**FINC-GB.2339**)
3. Real Estate Transactions (**BSPA-GB.2300**)
4. Real Estate Development and Entrepreneurship (**OPMG-GB.2360**)
5. Real Estate Investment Strategies (**FINC-GB.2341**)
6. Urban Systems (**ECON-GB.3375**)
7. Operations in Panama (**OPMG-GB.2312**)
8. Operations in Entertainment: Las Vegas (**OPMG-GB.2360**, with approved real estate project)
9. At most one course from the list of pre-approved non-Stern courses:  
<http://www.stern.nyu.edu/AcademicAffairs/Specializations/RealEstate/index.htm>

Academic advisor for the real estate specialization: Prof. Stijn Van Nieuwerburgh