

## Syllabus Real Estate Capital Markets – Fall semester AY 2020-2021

### Instructor

Professor: Arpit Gupta

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Office Hours: Monday 8:30 – 9:30pm, or by appointment.

### Teaching Assistant

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Please send questions regarding assignments first to the TA. I am happy to answer questions if you are still confused, or if you have any questions on course material.

### Class Time

The class meets once per week on Monday from 6:30-9:30pm for 12 weeks on Zoom. Our first session (9/21) will meet for the full time period. Subsequent classes will meet 6:30-8:30pm, and I will be available the remainder of the class time for office hours. The remaining hour will be covered through prerecorded videos. The last class is on 12/14 (final exam).

### 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 required to read sections from one book that closely relates to the discussion in class.

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 but the entire book is recommended. This book gives a clear, entertaining account of the birth of the mortgage-backed securities market.

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.

## 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. I will also show how to perform calculations using Excel, and it is also possible to use that for assignments.

## Online Resources: Slack and Zoom

We will use a Slack page throughout the course. Login details will follow through a separate email. **Please use this Slack window to raise questions or offer comments and links to other relevant material—both during and out of class.** Participation in the Slack page will count towards course participation (and will be my main method of judging that).

We will also use Zoom for our lectures. **Please upgrade to the most recent version of Zoom prior to the first class.** All lectures will be recorded and made available both on NYU Classes (along with other prerecorded videos).

To keep track of required materials, I will use the “Lessons” feature in NYU Classes. This will list, for each lesson, the required videos, reading material, and assignments.

## 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 share in the course Slack.

### 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 **two** worst assignment grades]

Midterm quiz: 10% or 40%

Final exam: 50% or 20%

Class attendance and participation: 20%

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 40% 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 10%, your final exam weight is 50%). 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 three of your five assignments (i.e. you drop your worst two scores 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 after 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 Accessibility

If you 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 Student Accessibility (212-998-4980, [mosescsa@nyu.edu](mailto:mosescsa@nyu.edu)) verifying your registration and outlining the accommodations they recommend. If you will need to take an exam at the Moses Center for Student Accessibility, you must submit a completed Exam Accommodations Form to them at least one week prior to the scheduled exam time to be guaranteed accommodation. For more information, visit the CSA website: <https://www.nyu.edu/students/communities-and-groups/student-accessibility.html>

## Coronavirus Implications

I understand that the world has changed and these are not normal circumstances. **I am committed to your education and will do my best to accommodate your individual circumstances.** Please let me know, as soon as possible, if you have any issues with the course that require addressing. I will work with you to make your class experience as smooth as possible.

## Class Schedule

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

	Date	Material to be covered
1	Sep 21	<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 5	<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>
3*	Oct 12	<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 on Oct 12, 6:30pm</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 19	<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 on Oct 19, 6:30pm</i></p> <p><i>Required Reading</i></p> <ul style="list-style-type: none"> <li>• Yields/CMO Excel workbook</li> </ul>
5	Oct 26	<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> <li>• “Story of a House”</li> </ul>
6	Nov 2	<p><b>Midterm quiz</b> (60 minutes)</p> <p><b>Guest Lecture:</b> TBD</p>
7*	Nov 9	<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 on Nov 10, 6:30pm</i></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 16	<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 and other benefits</li> </ul> <p><b>Guest Lecture:</b> TBD</p>

		<p><i>Required Reading:</i></p> <ul style="list-style-type: none"> <li>• Stuy Town articles</li> </ul>
9*	Nov 23	<p><b>REITs</b></p> <ul style="list-style-type: none"> <li>• REIT valuation methods</li> <li>• Mortgage REITs</li> </ul> <p><b><u>Guest Lecture:</u></b> TBD</p> <p><i>*Assignment 4 Due on Nov 23, 6:30pm</i></p>
10	Nov 30	<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> TBD</p>
11*	Dec 7	<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 on Dec 7, 6:30pm</i></p> <p><i>Required Reading:</i> JP Morgan Letter to Shareholders</p>
12	Dec 14	<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>