

## Syllabus Real Estate Capital Markets – Fall Semester AY 2016-17

*This syllabus is subject to future revisions*

### Instructor

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### Teaching Assistants

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### Class Time

The class meets Mondays and Wednesdays from 11am-12:15pm for 15 weeks. The venue is KMC 5-75. The first class is on September 7, and the last class is on December 14. There is no class on October 10 or November 23. There will be an additional class on December 13.

### 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, taking into account 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 3/4), 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.

In addition, we will make reference (either in class or in assignments) to three Harvard Business School cases during the course. A course packet containing these cases will be available to purchase in 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, we 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 many of the texts listed below predate the recent 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 and I will post it on the class web site.

### **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.

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 laptop usage to in class calculations.

The use of Blackberries, 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%

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%). This adjustment will be done automatically by me 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. 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. The assignments are due on Monday before class. Unless exceptional circumstances apply, late assignments will not be accepted. You are responsible if another member of your group fails to submit the assignment on time.

## Honor Code

You are responsible for maintaining Stern's Honor Code which mandates zero tolerance for cheating and plagiarism. Violations of the honor code will be prosecuted with a minimum penalty of failure for the course, as required by code of conduct rules. If you become aware of any violations of the honor code you must take whatever steps are necessary to stop the violators. Per request of the dean, you must include a signed statement at the top of each problem set and exam, indicating that you adhere to the honor code. The statement is: *"I pledge my honor that I have not violated the Stern Honor Code in the completion of this exam/problem set."* It is in your best interest that the market place knows that Stern takes honesty seriously; it adds to the value of your degree.

## Class Schedule (Tentative, will be updated regularly)

Week	Date	Material to be covered
1	Sep 7	<b>Introduction</b> <ul style="list-style-type: none"> <li>• Course outline and introduction</li> <li>• Measurement of commercial and residential property prices</li> </ul>
2	Sep 12, 14	<b>Real Estate price dynamics and mortgages</b> <ul style="list-style-type: none"> <li>• Economic determinants of real estate prices</li> <li>• Primer on the US mortgage market</li> <li>• Structure of commercial and residential mortgage contracts</li> </ul>
3	Sep 19, 21	<b>The mortgage finance system</b> <ul style="list-style-type: none"> <li>• Mortgage mathematics (e.g. calculating points, NPV, prepayments etc.)</li> <li>• Securitization and the funding of residential and commercial mortgages</li> <li>• The role of government: GSEs, FHA, Ginnie Mae</li> <li>• Passthrough securities versus collateralized mortgage obligations (CMOs)</li> </ul>
4*	Sep 26, 28	<b>Mortgage risks and the Agency MBS Market</b> <ul style="list-style-type: none"> <li>• Mortgage risks: (i) interest rate risk, (ii) credit risk, (iii) prepayment risk</li> <li>• Agency MBS pools and the link to the primary mortgage market</li> <li>• Trading, liquidity, and the TBA market</li> </ul> <p><i>*Assignment 1 due by 11am on Sep 26</i></p>
5	Oct 3, 5	<b>Introduction to prepayment risk</b> <ul style="list-style-type: none"> <li>• Understanding prepayment risk and why it matters</li> <li>• Cash flow modeling of agency MBS</li> </ul>
6	Oct 12	<b>Prepayment risk (contd.)</b> <ul style="list-style-type: none"> <li>• Modeling prepayment risk</li> </ul>
7*	Oct 17, 19	<b>Mortgage valuation, and CMOs</b> <ul style="list-style-type: none"> <li>• Estimating expected returns: static yield spreads and option adjusted spreads (OAS)</li> <li>• Understanding CMOs</li> <li>• Cashflow modeling of CMOs</li> </ul> <p><i>*Assignment 2 due by 11am on October 17</i></p>

8	Oct 24, 26	<p><u>HBS Case</u>: Mortgage Backs at Ticonderoga [TBC]</p> <p><b>Mortgage defaults &amp; residential default modeling</b></p> <ul style="list-style-type: none"> <li>• Drivers of mortgage defaults and credit losses</li> <li>• Default modeling for residential mortgages</li> </ul>
9	Oct 31, Nov 2	<p><b>Midterm quiz</b> October 31</p> <p><b>Guest lecturer:</b> Nov 2, TBD</p>
10	Nov 7, 9	<p><b>The non-agency MBS market and the crisis</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> <li>• Conservatorships of the GSEs and the future of housing finance</li> </ul>
11*	Nov 14, 16	<p><b>Commercial real estate and commercial mortgages</b></p> <ul style="list-style-type: none"> <li>• Introduction to commercial real estate</li> </ul> <p><b>Guest lecturer:</b> TBD</p> <p><i>*Assignment 3 due at 11am on November 14</i></p>
12	Nov 21	<p><b>Commercial real estate</b></p> <ul style="list-style-type: none"> <li>• Structure and performance of commercial mortgages</li> </ul>
13	Nov 28, 30	<p><b>Commercial Securities and REITs</b></p> <ul style="list-style-type: none"> <li>• Commercial Mortgage Backed Securities (CMBS)</li> <li>• Introduction to Real Estate Investment Trusts (REITs)</li> </ul>
14*	Dec 5, 7	<p><b>REITs (cont.)</b></p> <ul style="list-style-type: none"> <li>• REITs: Tax treatment other benefits</li> <li>• REIT valuation methods</li> </ul> <p><b>Guest lecturer:</b> TBD</p> <p><i>*Assignment 4 due at 11am on December 5</i></p>

15*	Dec 12, 13, 14	<b>REITS, and Innovations and derivatives in real estate capital markets</b> <ul style="list-style-type: none"> <li>• Innovations and features of foreign markets</li> <li>• Covered bonds, real estate futures</li> <li>• CDOs, CDS and synthetic CDOs</li> <li>• Risk sharing deals by the GSEs</li> </ul> <p><i>*Assignment 5 due at 11am on December 12</i></p>
16	December 21	<b><u>Final exam</u>, 4pm</b>

## Information about the Undergraduate Real Estate Track

The Real Estate Track 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 (RED focus) or the investment strategies in real estate capital markets (REF focus). 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.

### *Prerequisites*

- Stern Business Tools
- Law, Business, and Society
- Foundations of Financial Markets (FINC-UB.0002)

### *Essentials*

- Corporate Finance (FINC-UB.0007, req: Foundations of Financial Markets)
- Real Estate Transactions (MULT-UB.0051)

- Real Estate Primary Markets (FINC-UB. 0039, co-req: Corporate Finance)
- Real Estate Capital Markets (FINC-UB.00 38, req: Foundations of Financial Markets)

*Advanced Electives – Four courses from the following list, of which at least one of the first two courses. The courses denoted by [REF] are more interesting for students who want to specialize more towards a real estate finance specialization, whereas the courses denoted with [RED] are more interesting for students who want to focus on the development, direct investment, or management of property.*

- [RED] Real Estate Development and Entrepreneurship (MULT-UB.0050)
- [REF] Real Estate Investment Strategies (FIN-UB.00XX)
  
- [RED] Urban Economics (ECON-UA 227 – CAS)
- [RED/REF] Financial Statement Analysis (ACCT-UB.0003)
- [RED] Taxation of Individuals (ACCT-UB.0063)
- [REF] Risk Management in Financial Institutions (FINC-UB.0022)
- [RED/REF] Topics in Emerging Financial Markets (FINC-UB.0023)
- [REF] Debt Instruments (FINC-UB.0026)
- [RED/REF] Behavioral Finance (FINC-UB.0029)
- [REF] Equity Valuation (FINC-UB.0041)
- [RED] Topics in Entrepreneurial Finance (FINC-UB 61)
- [RED] Mergers, Acquisitions, and Restructuring (FINC-UB 50)
- [REF] Monetary Policy and the Financial System (ECON-UB 221)
- [REF] Macroeconomic Foundations for Asset Prices (ECON-UB 233)
- [RED] Strategic Analysis (MGMT-UB 18)
- [RED/REF] Negotiation and Consensus Building (MGMT-UB 30)

For more information on the Stern undergraduate track system, please see <http://www.stern.nyu.edu/portal-partners/current-students/undergraduate/academics/tracks/index.htm>

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