

SPECULATION AND HEDGING IN FINANCIAL MARKETS

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Course Description

Financial markets provide investors with a rich set of opportunities to hedge and speculate on a multitude of risks, offering significant potential benefits to asset managers, individual investors and firms exposed to such risks. In this course we develop the framework needed to understand the financial instruments investors can use to trade many macroeconomic and financial risks. We examine a variety of risks including those based on exchange rates, interest rates, commodities, real estate, weather events, systemic risk, crash risk, and volatility risk. We first develop the theoretical framework for pricing derivatives, and then study empirically the characteristics of risk and returns in the different markets. The course will have a substantial empirical component, analyzing the performance of equity-based and derivative-based trading strategies.

Throughout the course we will connect the topics studied with a real-life case. Either we will discuss the case together in class, or I will assign a case as a take-home exercise. Whenever the case is assigned for home, you will work with the actual data of the case to reproduce the main findings.

I will also have four guest speakers come and talk in the course, from SummerHaven, Squarepoint Capital, Dodge & Cox, and the IMF. They will talk about a variety of topics linked to the course and will give you an opportunity to interact with practitioners that deal with risk hedging and speculation in their work (see below for more details on the classes taught by guest speakers).

COVID special instructions

The class will be offered in hybrid mode. For various logistical and fairness reasons, the following arrangements will be taken:

- The midterm and final exams are scheduled for classes 13 and 26 of the course (respectively, **Oct 12** and **Dec 14**), during class time. The exam will be timed: I will send the exam out at 8:30am, and you will scan it and send it back by 9:50am. Depending on the situation, you may or may not be able to use the classroom to take the exam, but you can in any case take the exam online if you wish, during the same time slot. If you are in a time zone where 8:30am is a bad time to take the exam, please get in touch with me beforehand and we'll find a different time for your exam. These rules apply to both the midterm and the final.
- Every year we have several guest speakers, which add a lot to the class. This year, the guest speakers will have to be online. Note that some speakers live in California, and may not be able/willing to give the class at 5:30am. This means that their guest lecture will be scheduled for a different time. It will be recorded so

you will be able to see it even if you can't make it at that new time. I will update you on the timing, and the lecture calendar below notes which classes may be moved to a different time.

- As you can see from the calendar below, the guest lectures have been scheduled for the very end of the course; this allows us to concentrate the in-person classes at the beginning of the semester, leaving the last couple of weeks without in-person teaching, which should help logistically with potential disruptions from Covid and travel during the Thanksgiving and Christmas breaks. Classes that will be taught entirely online (that is, in which I will not be teaching in person in Evans Hall) are marked with * in the syllabus. Note that assuming the Covid numbers remain good, you should still be able to follow all classes (including the ones taught online) from Evans Hall if you wish.
- Please feel free to reach out to me with any concerns/questions/suggestions related to the logistics of the course, as they relate to the Covid situation, as well as your own personal situations. My goal is to make sure you learn the material of the course in the best possible way, and I will be as flexible as possible to make arrangements that allow each of you to achieve that goal.

Class location and times

Class (542-01): MW 8:30-9:50am, classroom 4410

TA sessions/office hours will be held via Zoom, Tuesdays 6pm-7:30pm.

My office hours are by appointment (via Zoom).

Prerequisites

There are no official prerequisites beyond the core. All students (SOM and non-SOM) should be familiar with topics covered in basic investments courses, such as continuously compounded interest rates, stock returns, discounting and the present value formula, as well as the CAPM. In addition, students should be familiar with **basic calculus and regression analysis**.

Homework 0, pre-assigned and due on the first day of class, will be used to assess whether students satisfy the prerequisites. This is the only homework that has to be taken individually (see below).

Finally, students should have a **working knowledge of Microsoft Excel** or other spreadsheet or statistical program to do the assignments.

Material for the Course

The main required reference for the course will be the book:

Robert L. McDonald, *Derivative Markets*, Addison Wesley, 2013, 3rd edition, ISBN 0-321-54308-4

Additional readings will be distributed during the course.

An optional, more technical treatment of some of the course's topics can be found in:

John C. Hull, *Options, Futures and Other Derivatives*, 8th Edition, Prentice Hall, 2011, ISBN 0-13-216484-9

Exams and Problem sets

The course requirements consist of problem sets, a midterm exam, and a final exam. Problem sets (except for homework 0) can be done in groups, with a maximum of 3 students in each group. Each problem set must be turned in at the beginning of class, and will be returned, graded, the following week. No late homework will be accepted (zero score). However, to give you flexibility, I will let you “default” on one homework: the worst problem set will be dropped at the end.

Note: class participation will also count for the final grade. That means, I want to hear your thoughts/experiences/questions in the course.

Students can expect to spend about 6 - 7 hours / week of study outside class.

Grading

Problem sets, midterm, and final are individually scored on a 100 point scale, and count towards the final grade according to the following proportions: 25%, 25%, 40%, respectively. The remaining 10% is allocated for class participation.

Teaching Assistant and Review Sessions

The teaching assistant for this course is Leandro Gomes (leandro.gomes@yale.edu). Every Tuesday at 6pm, Leandro will be available to meet students via Zoom for 90 minutes. During this time, he will first go over the last problem set (if one was due that week), then answer any questions you might have. If no problem set was due, the entire 90 minutes will be standard office hours.

Office Hours

Most questions can efficiently be answered by email. Please, try to ask your question by email first, and you should receive an answer within a few hours from me or the TA. For

clarifying questions this is especially useful, as I can then forward your question to the whole class.

Questions regarding problem sets should be sent directly to the TA. To meet me via Zoom please set up an appointment via email.

Content of the course

NOTE: The following list of classes is **preliminary** and subject to change.

Below you will find a list of the lecture-based classes I plan to cover. In addition to these classes, we'll have:

- One class for the midterm (in-class, on **October 12**)
- One class for the final (in-class, on **December 14**)
- Classes taught by guest speakers:**

Harsha Tummala: Class 21

Robert Turley: Class 22 ** Note, this class will take place at 12:30pm **

Ruchir Agarwal: Class 23

Brandon Bates: Class 24

This is the **preliminary program** -- some lectures may extend for more than one class, and if we have time in the end I might cover additional topics.

Note: * indicates class is *taught online*. Absence of * means I will be teaching it in person in Evans Hall.

Class 1: Introduction to the course

Readings: McDonald, Ch. 1

Homework 0 due at the beginning of class 1

Class 2: Why do prices move? A review

Speculation and hedging with stocks

Classes 3-5: Hedging and Speculation with Futures and Forwards

Readings: McDonald, Ch. 4, 5, 6

Class 6-7: Trading and hedging other risks

Readings: Shiller, Macro Markets

Homework 1 due at the beginning of class 6

Classes 8-9: Introduction to Options and option trading strategies

Readings: McDonald, Ch. 3, 9

Homework 2 due at the beginning of class 9

Class 10: Option Pricing Using Binomial Trees and Risk-Neutral pricing

Readings: McDonald, Ch. 10, 11

Class 11: Option Pricing Using Binomial Trees and Risk-Neutral pricing
(cont.)

Homework 3 due at the beginning of class 11

Class 12: The Black-Scholes-Merton model and dynamic hedging

Readings: McDonald, Ch. 12

***Class 13:** Midterm

Class 14: The Black-Scholes-Merton model and dynamic hedging (cont.)

Readings: McDonald, Ch. 12

Homework 4 due at the beginning of class 14

Class 15-16: The VIX and the pricing of Volatility Risk

Readings: McDonald, Ch. 12

Class 17: American Options and Binomial Trees

Readings: McDonald, Ch. 10

Class 18: Hedging international risks

Homework 5 due at the beginning of class 18

Class 19-20: Debt and Equity as Options

Readings: McDonald, Ch. 16

***Class 21:** **Guest speaker: Jake DeSantis (SummerHaven)**

Homework 6 due at the beginning of class 21

***Class 22:** **Guest speaker: Bob Turley (Dodge & Cox)**

**** Note: this class will not take place at 8:30am but at 12:30pm ****

Homework 7 due at the beginning of class 22

***Class 23:** **Guest speaker: Ruchir Agarwal (IMF)**

***Class 24:** **Guest speaker: Brandon Bates (Squarepoint Capital)**

***Class 25:** Review

***Class 26:** Final