

HARVARD UNIVERSITY: DEPARTMENT OF ECONOMICS

Economics 1723: Capital Markets

Spring 2024
Location: Harvard Hall 101
Tu, Th 1:30pm-2:45pm

Professor Xavier Gabaix
Office hours: Tu 2.45-3pm, Th 2.45-3.30pm and
by appointment
E-mail: xgabaix@fas.harvard.edu

Course Overview

This course is an introduction to asset pricing, the study of finance, financial assets and the “capital markets” in which they are traded. Asset pricing is part of the larger field of financial economics. Other courses in this area include Personal Finance, Economics 70, Corporate Finance, Economics 1745 and Behavioral Finance, Economics 980Z.

The course will meet for lectures on Tuesdays and Thursdays 1.30pm to 2.45pm, and will meet in small sections once a week. Section times will be published soon. The teaching fellows for the course are Peleg Samuels (psamuels@g.harvard.edu) and Lili Vessereau (lvessereau@hks.harvard.edu).

All course materials will be posted on the course website, <https://canvas.harvard.edu/courses/126722>

Prerequisites

Economics 1723 is intended for undergraduates with significant mathematical background and an appetite for technical economic analysis. Prerequisites include intermediate microeconomics at the level of Economics 1010a (or preferably Economics 1011a – Intermediate microeconomics, advanced), regression analysis and statistics at the level of Statistics 100, and a bit of calculus. Some assignments will require data analysis using Microsoft Excel.

Canvas and Ed: Better than emails

We will be using Ed Discussion for class discussion. You’ll access it via the Canvas course web page. The system is catered to getting you help fast and efficiently from classmates, the TA, and the professors.

*Rather than emailing questions to the TF or professor, we **strongly** encourage you to post your questions on Ed.* Ideally, do not use the “anonymous” function. This makes it more like the real world. If you do wish to send an email, please include 1723 in the subject line of all e-mails regarding the course, and cc: the TF and professor for whichever part of the course your email pertains to. Emails should generally be limited for personal matters.

Class Participation

In this course we use Learning Catalytics software to post questions in class, which are answered in real time as an aid to discussion. Class participation will be measured by participation in the learning catalytics exercises (Participation is defined as posting an answer to a question, whether or not the answer is correct).

Homework

Course requirements include nine written homework (HW) assignments. The assignments will be posted and returned on Canvas. Some assignments will be purely analytical while others will be numerical, requiring the use of Excel to process financial data.

- No assignment will be accepted after 01:30pm EST on the due date, just before lecture. Always consult the due date and hour listed **on** the problem set, as some things may change during the semester.
- You are permitted to collaborate on the homework assignments. However, each person must submit a separate write-up. If you choose to work within a group, each person is asked to list the members of the group at the top of the submission.
- Assignments are graded on a check+, check, check- basis.
- Grades for the nine written assignments will be treated equally. To give you some flexibility, the overall assignment grade will be based on your best 6 out of these 9 assignments. In total, the assignments account for 25% of the course grade.

The due dates should be as follows: HW1: 2/6, HW2: 2/13, HW3: 2/22, HW4: 3/22, HW5: 3/26, HW6: 4/2, HW7: 4/9, HW8: 4/16, HW9: 4/23 (but we may announce a change). Deadlines are strictly enforced. We understand that some issues might arise making it difficult to submit a certain assignment – this is why only 6 of 9 assignments are used to calculate your grade.

Exams

The course has a midterm exam and a final exam. The midterm exam will be on 3/5/24. There will be a final exam, which will be held during the final exam week (date TBD). The homework assignments account for 25% of the course grade, the midterm exam accounts for 30% of the grade, and the final exam accounts for the remaining 45% of the grade.

- **MISSED EXAMS:** If you are excused from a midterm exam, the grade weight of the final exam will increase to 75%. To be excused from a midterm exam, you must contact the TA and instructor at least 24 hours before the exam date with compelling reason (we will judge if it is compelling) or submit a medical excuse with a doctor's note; this policy does NOT allow you to simply skip a midterm exam. The usual university policies apply to a missed final exam, which is handled by the registrar's office.
- **REGRADE POLICY:** After an exam is graded and returned to you, you will have the option to request a regrade for a short period following each exam. However, please be aware that we reserve the right to regrade the entirety of your exam. Further, to ensure that graded exams are not tampered with between the time when they are returned to students and submitted for a regrade we will photocopy a random selection of the graded exams.
- **PASS/FAIL POLICY:** We will allow a limited number of students to take the course pass/fail. However, we strongly encourage students to take the course for a letter grade. A letter grade

sends a stronger signal to a prospective graduate school or employer. Pass/fail students must fulfill all course requirements including participation, written assignments, and exams. To apply for this status, please send an email to us stating the reason for the request.

- Exams are closed book, closed notes. You can bring use your own cheat sheet to the exams: one double-sided cheat sheet for the Midterm, and 2 double-sided cheat sheets for the final exam. Cheat sheets need to be handwritten ---they cannot be photo-copies or reproduced in any way. Cheat sheets need to be turned in with the exam.

Textbook and Readings

The textbook for the course is *optional*. However, we recommend you use a recent edition of the textbook Zvi Bodie, Alex Kane, and Alan J. Marcus, *Investments*, 10th, 11th, 12th, or 13th eds, McGraw-Hill Irwin. This book provides additional information and, especially, exercises on the materials covered in class. In addition, this book is a valuable reference on the details of US financial markets and institutions. You'll be fine with an earlier edition (e.g. the 10th edition has the same chapter numbers as later editions).

In reading the text, the materials you should focus on are those pertinent to the material covered in the lecture notes.

A number of journal articles are optional readings and will be made available through the website. Most of these articles (particularly those from the *Journal of Economic Perspectives*) are accessible introductions to a topic. For students who are interested in journal articles written at a professional level, the syllabus includes some more advanced references, marked with square brackets, but these are not required readings. You are only responsible for understanding the results from these articles that are discussed in lectures or sections.

The textbook, the recommended books, and most of the assigned articles are less analytical than the lectures. The technical content of the course is summarized in the lecture notes and other class notes, which will be handed out during the semester.

Sections

The course will meet in small sections once a week at times to be arranged. Sections have three main functions. First, they will occasionally cover background material necessary to understand the lectures, including statistics. Second, they will provide a review of the material covered in recent lectures. Third, they will present solutions to practice problems that are similar to those that will appear in assignments and exams. They may also cover some special topics in additional depth.

Calculators

For Midterms and final exam, you'll need a calculator. (Laptops / Phones / Web sites are **not** allowed). It is nice to have a financial calculator, but not an absolute requirement. If you plan to take other finance classes, you will get good use out of a financial calculator anyways. Standard financial calculators include the HP 10B-II and the TI BA-II Plus (they cost about \$30). You are expected to learn how to operate the calculator on your own.

We hope to make Ec1723 a great learning experience for everyone and look forward to teaching you this semester!

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Course Outline

1. Introduction (Lectures 1-4)

Fundamental ideas of finance: arbitrage, optimality, and equilibrium
Financial markets and instruments
Event trees, state prices, and complete markets
Rates of returns
Present value and internal rate of return
Risk aversion and risk premia
Arbitrage in practice

2. Risk and return (Lectures 5-9)

a. Optimization: Mean-variance analysis and portfolio choice

The mean-variance efficient frontier
The mutual fund theorem
The beta representation theorem
Application: How does Harvard invest its endowment? Do households diversify?

b. Equilibrium: The Capital Asset Pricing Model

Derivation of the CAPM
The security market line
The size, value, and momentum anomalies
Application: Why is the reward for beta so low?

c. Risk Arbitrage: The Arbitrage Pricing Theory and multifactor models

Derivation of the Arbitrage pricing theory
Multifactor models
Application: The disappearing January effect

c. Advanced topics in portfolio choice (covered later in the course)

Hedging nontraded assets
Portfolio choice for long-term investors
Application: Stocks for the long run?

3. Present value relations and efficient markets (Lectures 10-18)

a. Efficient markets, random walk hypothesis, and performance evaluation

The idea of market efficiency

Performance evaluation

Reaction to information and the Law of Iterated Expectations

Applications: Do active mutual fund managers justify their fees? Post-earnings announcement drift; prediction markets

b. Equity valuation

The dividend discount model and the Gordon model

Earnings and equity valuation

Uncertainty, short sale constraints, and equity valuation

Applications: The Fed model; the technology and the housing bubbles

c. The term structure of interest rates

Fixed-income securities

The term structure of interest rates

The expectations hypothesis of the term structure

Application: Inflation-indexed bonds

d. Market microstructure and liquidity

Stale prices and serial correlation

Measuring liquidity

Application: Market manipulation

4. Derivative securities and risk management (Lectures 19-24)

a. Forwards, futures, and swaps

The difference between forwards and futures

Swaps

b. Options

Characteristics of options

Put-call parity

The binomial model and the Black-Scholes model

Contingent claims analysis

Overpricing of index options

c. Risk management and crises

Options and risk management

Risk measurement difficulties

Structured finance

Leverage and amplification mechanisms

Applications: The LTCM crisis; the credit crisis of 2007-2009; the Covid crisis of 2020.

5. Bonus theme: Very modern perspectives

Demand-based asset pricing

Machine learning in finance (time permitting)

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Recommended Readings

Course textbook

The (optional) textbook is:

Zvi Bodie, Alex Kane, and Alan J. Marcus (“BKM”), *Investments*, 10th, 11th, 12th, or 13th ed, McGraw-Hill Irwin.

Recommended books

You may also wish to buy the *Solution manual for Investments*. If you find a concept difficult, you can do a few BKM exercises related to it, and verify your answer in the solution manual. You need to buy it online.¹

In addition, the last page of this document lists some suggestions for further reading.

1. Introduction

BKM Chapters 1 (skim), 2 (sections 1-4) and 3 (sections 2-9).

BKM Chapters 5 (sections 2-9) and 6 (section 1 and Appendix A).

[Mitchell, Mark, Todd Pulvino, and Erik Stafford, 2002, “[Limited Arbitrage in Equity Markets](#),” *Journal of Finance* 57, 551-584.]

¹ To do that: 1. Go to <https://www.mheducation.com/highered/custom/product/9781307746846.html>. 2. Add the book to your cart and pay using a credit card. ([Purchasing a book using a credit card - PDF](#)) 3. Follow the instructions to checkout.

2. Risk and return

a. Optimization: Mean-variance analysis

BKM Chapters 6, 7, and 8.

Harvard Business School Case 9-211-004, “Harvard Management Company (2010).”

b. Equilibrium: The Capital Asset Pricing Model

BKM Chapters 9 and 13.

Baker, Malcolm and Jeffrey Wurgler, 2015, “[Do Strict Capital Requirements Raise the Cost of Capital? Bank Regulation, Capital Structure, and the Low Risk Anomaly](#)”, *American Economic Review Papers & Proceedings* 105, 315-320.

Fama, Eugene F. and Kenneth R. French, 2004, “[The Capital Asset Pricing Model: Theory and Evidence](#),” *Journal of Economic Perspectives* 18(3), 25-46.

c. Arbitrage: The Arbitrage Pricing Theory and multifactor models

BKM Chapter 10.

d. Advanced topics in portfolio choice (covered later in the course)

Hedging nontraded assets

Portfolio choice for long-term investors

Application: Stocks for the long run?

3. Present value relations and efficient markets

a. Efficient markets and the random walk hypothesis

BKM Chapters 11 and 12.

[Wermers, Russ, 2000, “[Mutual Fund Performance: An Empirical Decomposition into Stock-Picking Talent, Style, Transactions Costs, and Expenses](#),” *Journal of Finance* 55, 1655-1695.]

b. Equity valuation

BKM Chapter 18.

Campbell, John Y. and Robert J. Shiller, 2005, “[Valuation Ratios and the Long-Run Stock Market Outlook: An Update](#),” in Nicholas Barberis and Richard Thaler eds. *Advances in Behavioral Finance Vol. II*, Princeton University Press.

c. The term structure of interest rates

BKM Chapters 14, 15, and 5 (section 1).

d. Market microstructure and liquidity

BKM Chapter 3.

4. Derivative securities and risk management

a. Forwards, futures, and swaps

BKM Chapters 22 and 23.

b. Options

BKM Chapters 20 and 21.

[Coval, Joshua D. and Tyler Shumway, 2001, "[Expected Option Returns](#)," *Journal of Finance* 56, 983-1009.]

c. Risk management and crises

Course notes.

5. More recent perspectives on behavioral finance in inelastic markets

Course notes on demand-based asset pricing and the inelastic markets hypothesis.

[Gabaix, Xavier and Ralph Koijen. "[In Search of the Origins of Financial Fluctuations: The Inelastic Markets Hypothesis](#)," Working Paper, 2022]

Suggested Further Reading

Richard Bookstaber, *A Demon of Our Own Design: Markets, Hedge Funds, and the Perils of Financial Innovation*, 2007, Wiley. A readable discussion of modern financial vulnerability.

[Hard] John H. Cochrane, *Asset Pricing*, revised ed., 2005, Princeton University Press. A PhD- level textbook on asset pricing theory.

[Hard] John Y. Campbell *Financial Decisions and Markets: A Course in Asset Pricing*, Oxford University Press, 2017. A modern PhD- level textbook on asset pricing theory.

[Hard math] John C. Hull, *Options, Futures, and Other Derivatives*, 6th ed. 2005, Prentice-Hall. The leading modern text on derivatives, with a practical orientation.

Antti Ilmanen, *Expected Returns: An Investor's Guide to Harvesting Market Rewards*, 2011, Wiley. A comprehensive guide to empirical patterns in asset markets.

Charles Kindleberger. *Manias, Panics, and Crashes: A History of Financial Crises*. A vivid set of stories about bubbles and crashes.

Burton Malkiel, *A Random Walk Down Wall Street*, any ed., Norton.
A classic and fun read about efficient markets.

Michael Lewis, *The Big Short: Inside The Doomsday Machine*, 2010, Norton. An entertaining description of investors who took negative positions on the housing market in the run-up to the crisis.

Roger Lowenstein, *When Genius Failed: The Rise and Fall of Long-Term Capital Management*, 2000, Random House. An intelligent journalistic account of the 1998 financial crisis.

Sebastian Mallaby, *More Money Than God: Hedge Funds and the Making of a New Elite*, 2010, Penguin Press. An insightful analysis of the successes and failures of hedge funds.

Lasse Pedersen, 2015, *Efficiently Inefficient: How Smart Money Invests and Market Prices are Determined*, Princeton University Press. Relates academic finance to investing strategies.

Robert J. Shiller, *Irrational Exuberance*, 2005, 2nd ed., Broadway Books. This book, originally published in early 2000, correctly predicted the end of the technology bubble.

Gregory Zuckerman, *The man who solved the market*. A fun biography of Jim Simons, a mathematician who became a multibillionaire by developing quantitative financial algorithms.