



**Course:** DYNAMIC ASSET PRICING AND EMPIRICAL FINANCE

**Part I:** Dynamic Asset Pricing

**Faculty:** Jordi Caballé (UAB, MOVE, Barcelona GSE)

**Term:** Second Semester

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**Office Hours:** Upon request. Send an e-mail for an appointment.

### Description and Objective:

This part of the course covers the techniques and models of portfolio selection and asset pricing in dynamic economies in both discrete and continuous time and the characterization of the term structure of interest rates. The course will introduce the basic techniques of stochastic calculus, like the Ito's lemma and the Hamilton-Jacobi-Bellman equation, which are needed for continuous-time finance. Finally, the course will present the dynamic arbitrage techniques aimed at pricing derivative securities like options and forward and futures contracts. If time permits, it will also cover the role of asymmetric information and market power in financial markets.

Slides, class notes, and problem sets can be downloaded from the professor's webpage.

### Outline:

#### 1. Dynamic Asset Pricing in Discrete Time.

- 1.1. Dynamically complete markets.
- 1.2. Dynamic valuation by arbitrage: the equivalent martingale probability measure.
- 1.3. Portfolio selection in discrete time.
- 1.4. The Consumption Capital Asset Pricing Model (CCAPM) and the Dynamic CAPM.
- 1.5. Equilibrium valuation in macroeconomic dynamic models.

#### 2. Interest Rates, Forwards, Futures and Options.

- 2.1. The term structure of interest rates in discrete time.
- 2.2. Forward and futures prices.
- 2.3. Option pricing (I): theory of rational option pricing and put-call parity.
- 2.4. Option pricing (II): the binomial approach and the Black-Scholes formula.

### 3. Stochastic Calculus.

- 3.1. Stochastic processes in continuous time and its representation.
- 3.2. Stochastic integrals.
- 3.3. Itô's lemma and statistic properties of Itô processes.
- 3.4. Stochastic optimization in continuous time: the Hamilton-Jacobi-Bellman equation

### 4. Dynamic Asset Pricing in Continuous Time.

- 4.1. Portfolio selection in continuous time
- 4.2. Valuation in continuous time (ICAPM).
- 4.3. Option valuation in continuous time: the Black-Scholes model.
- 4.4. Girsanov's theorem and the equivalent martingale probability measure.
- 4.5. Option valuation with stochastic volatility.
- 4.6. The term structure of interest rates in continuous time.

### 5. Market Microstructure and Asymmetric Information in Financial Markets.

- 5.1. Competitive models with fully revealing prices.
- 5.2. Competitive models of noisy rational expectations.
- 5.3. Models with imperfect competition.
- 5.4. Bid-ask prices (I): inventory costs.
- 5.5. Bid-ask prices (II): adverse selection.

#### References:

- Campbell, J. Y., Financial Decisions and Markets: A Course in Asset Pricing. Princeton University Press.
- Cochrane, J. H.: Asset Pricing. Princeton University Press. Princeton, NJ.
- Duffie, D.: Dynamic Asset Pricing Models. Princeton University Press. Princeton, NJ.
- Ingersoll, J.: Theory of Financial Decision Making. Rowman and Littlefield. Totowa, NJ.
- Pennacchi, G.: Theory of Asset Pricing. Pearson Addison Wesley.

#### Grading:

Students must solve a series of problem sets. Problem sets will have a weight of 20% in the final grade. There will be a final exam, which will have a weight of 80% in the final grade.

**Note:** Some of this year's exercises have appeared on this course previously. Thus, it is possible, even likely, that you might be able to obtain solutions to these exercises that I have handed out earlier. However, I strongly recommend you not to look at these solutions when solving the exercises. By handing in your answers, you declare that the solutions are your own and that they are not based on solutions from previous years. If I catch you cheating, I will give you 0 points from the exercises. Even more significantly, you will suffer a reputation loss within IDEA (and academia in general) by presenting someone else's work as your own. Check out the definition of "plagiarism" and how it is viewed in academic circles if you do not immediately grasp what the consequences of cheating will be.

## **Part II: Empirical Finance**

**Faculty:** Abhay Abhyankar (University of Exeter, UK)

**Term:** Second Semester

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**Web page:** [https://business-school.exeter.ac.uk/about/people/profile/index.php?web\\_id=Abhay\\_Abhyankar](https://business-school.exeter.ac.uk/about/people/profile/index.php?web_id=Abhay_Abhyankar)

**Office Hours:** Upon request. Send an e-mail for an appointment.

### **Description and Objective:**

This part of the course provides an introduction to selected topics and methods in empirical finance that focus on asset pricing and return predictability. An overview of the framework that ties together the topics covered is: Campbell, John, 2014, Empirical Asset Pricing: Eugene Fama, Lars Peter Hansen, and Robert Shiller, Scandinavian Journal of Economics, 116 (3), 593-634.

We begin with an introduction to basic ideas about asset pricing. We then turn to an overview of selected econometric techniques used in empirical tests of asset pricing models. We then provide a brief overview about efficient markets and the “stylized facts” about asset returns that theory seeks to explain including tests using the event study methodology that has wide applications in finance and economics. Finally, we cover some selected aspects from the literature on stock return predictability. The course concludes with presentations by students of recent research on topics covered in the course.

### **Outline:**

#### **1. Introduction to Asset Pricing and Econometric Tests of Asset Pricing Models**

The Basic Pricing Equation and the Expected Return-Beta Representation.  
Time Series and Cross-sectional tests of Asset Pricing Models.  
Overview of current research that uses ‘big data’ methods.

#### *Reference:*

- Cochrane, J, 2005, Asset Pricing, Princeton University Press (Revised Edition)  
Ch. 1 and 2 excluding Asset Pricing in Continuous-Time i.e. 1.8, 1.8.1, 1.8.2.  
Ch. 4: 4.1, 4.2, 4.3, 4.4. Ch. 5: 5.1, 5.2, 5.2.1, 5.2.2, Ch. 6, 8, 9 and Ch. 10, 11, 12, 13.

#### **2. The Efficient Markets Hypothesis and Event Studies.**

We will review the efficient markets paradigm and recent research on “anomalies” like the value-growth and momentum puzzles. We then turn to a test of semi-strong form efficiency: the event study methodology.

#### *References:*

- MacKinlay, A. Craig, Event Studies in Economics and Finance, Journal of Economic Literature, March 1997, 35 (1), 13-39.  
- Lucca, D. and E. Moench (2015), The Pre-FOMC Announcement Drift, Federal Reserve Bank of New York Staff Reports No. 512, July 2013, Journal of Finance, Vol. 70(1), pp. 329-371.

### 3. Present Value Models and Return Predictability.

Review of selected recent work on stock return predictability.

#### *Reference:*

- Rapach, D. and Zhou, Goufo, Forecasting Stock Returns, Handbook of Economic Forecasting, 2013, Vol. 2A, Graham Elliott and Allan Timmermann (Eds.), Amsterdam, Elsevier, pp. 328-383.

#### **Grading:**

This will be based on an Individual Take Home assignment - full details will be provided at the start of the course.

#### **General References:**

Course materials will include lecture notes/slides, review papers and selected recent papers in empirical asset pricing.

#### Textbooks:

The course will rely mainly on Cochrane (2005). However, CLM has some nice material on empirical tests of asset pricing models and on Campbell-Shiller decomposition etc. Pennachi is a nice modern survey of the theoretical foundations of asset pricing. There are excellent Notes available on Prof. John Cochrane's website. For those with an interest in asset pricing – there is no better place than the Coursera course – free on the web- by Prof John Cochrane.

Cochrane, J., 2005, Asset Pricing, Princeton University Press,  
Pennachi, G, 2007, Theory of Asset Pricing, Pearson Publishing.

#### Survey Papers:

These are several excellent surveys of the work on empirical asset pricing and predictability. Copies for individual use are available in some cases on the author's websites.

- Cochrane, J, 2005, Financial Markets and the Real Economy, draft Chapter 7, Handbook of the Equity Risk Premium. (FMRE)
- Ludvigson, S, 2013, Advances in Consumption-Based Asset Pricing: Empirical Tests, (forthcoming in Volume 2 of the Handbook of the Economics of Finance). (CBAPET).

**Note:** This is not an econometrics course and so some familiarity with the basic ideas of OLS/GLS regressions, ML, Large Sample/Finite Sample Inference, Wald/LM and LR tests and GMM estimation etc. at the level of Greene, Hamilton or Hayashi will be assumed. An intuitive and clear exposition of basic ideas is: Wooldridge, J, Introductory Econometrics, (Any Recent Edition), Cengage Learning Custom Publishing.