ICEF, Higher School of Economics Moscow
MSc Programme in Financial Economics
Winter - Spring 2013

Course Syllabus for Financial Economics I (Asset Pricing)

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Objectives of the Course

This course gives an introduction to the economics and mathematics of financial markets. Being the first course in finance within the ICEF Master Programme in Financial Economics, it introduces the students to the relevant modeling techniques for asset pricing. This will be useful for later courses in Corporate Finance, Fixed Income, Derivatives, Portfolio and Risk Management.

Three pricing principles are considered – non-arbitrage, individual optimality, and equilibrium. The first principle is especially useful for pricing derivative instruments (e.g. an option contract) whenever we know (or assume) what the price of the underlying asset (e.g. a stock) is and how it evolves. In order to price the whole universe of financial assets, however, we need to investigate how investors make their investment decisions (individual optimality) and how the coordination of these investors on the financial markets leads to the formation of prices (equilibrium analysis). Many of the models are treated at three different levels – as one-period, multi-period and continuous time models. This is necessary in order to understand the whole variety of models in financial economics. Furthermore, in many cases continuous time models are more tractable and have more elegant solutions than dynamic models in discrete time. Although the focus of the course is on theory, we shall comment on some empirical evidence and on how these theories are used in financial practice.

In my opinion, it is very useful to absorb the ideas and mathematics of financial models by doing small applications on the computer. MATLAB is a convenient programming language for this purpose. We will dedicate one practice session to give you an introduction to MATLAB, and you are required to solve a part of the homework exercises on the computer.

Prerequisites

Microeconomics I (concepts of utility functions and equilibrium), a good understanding of calculus, algebra, and basic probability theory. Beyond that, the course should be self-contained.

Learning Methods

The following methods and forms of study are used in the course

- Lectures (3 hours a week). Your active participation is required – presenting papers that were given for reading, answering questions, and asking questions.
- Practice sessions (1 hour a week). They serve mainly to solve the homework assignments (see next point).
- Written homework assignments, containing paper-and-pencil exercises and applications in Matlab. Doing homework exercises is crucial for understanding and practicing the material.
- Self-study: read the corresponding sections in the lecture notes, the chapters in the textbooks as indicated in the course outline below and journal papers as announced in class.

Readings

Required:

- Lecture notes to be distributed at mief.hse.ru
- Cvitanić, Jakša and Fernando Zapatero, Introduction to the Economics and Mathematics of Financial Markets, MIT Press 2004 [short **CZ**].
- Pennacchi, George, The Theory of Asset Pricing, Pearson Addison Wesley, 2008 [short **P**].
- Required readings of journal papers will be announced in class and at `mief.hse.ru`.

Recommended:

- MacKenzie, Donald, An Engine, Not a Camera – How financial Models Shape Markets, MIT Press, 2006. This is recommended for your background in the history of financial markets and finance theory and will help you to put the models covered in the course into a broader perspective.

Additional:

- Altug, Sumru and Pamela Labadie, Asset Pricing for Dynamic Economies, Cambridge University Press, 2008.
- Back, Kerry, Asset Pricing and Portfolio Choice Theory, Oxford University Press, 2010.
- Brandimarte, Paolo, Numerical Methods in Finance and Economics, Wiley, 2006.
- LeRoy, Stephen and Jan Werner, Principles of Financial Economics, Cambridge University Press, 2001.
- Lengwiler, Yvan, Microfoundations of Financial Economics, Princeton University Press, 2004.
- Neftci, Salih N., An Introduction to the Mathematics of Financial Derivatives, 2nd edition, San Diego Academic Press, 2000 [short **N**].
- Other classical texts such as Huang and Litzenberger (1988), Ingersoll (1987), and Cochrane (2001) can be consulted as well.

Evaluation

Your final grade consists of the following parts:

- *Homework*. Randomly chosen problem sets are marked and account for 15% of the final grade if you turn in ALL assignments minus one at the due date.
- *Participation* in class including the presentation of papers accounts for 10%.
- The *midterm exam* accounts for 20%.
- The rest of the grade (55%) comes from the *final exam*. Exam questions in the midterm and the final exam will be either exercises, similar to homework assignments, or questions on papers that were given for reading.

In order to pass the course, you need to achieve the passing grade of 35% both in the final exam and in total (with the weights given above).

Course Outline

This outline lists the topics to be covered in the course with the corresponding chapters in CZ, P, and N, and gives an approximate time schedule.

Part 1 – Asset Pricing Models and the No-Arbitrage Principle

- Week 1. Introduction: The terminology of financial markets; Bond prices and interest rates under certainty; An example of a simple asset pricing model. CZ 1,2, N 1,2
- Week 2-3 One-period models. Uncertainty, replicating portfolios, Arrow-Debreu securities, absence of arbitrage, market completeness, the Fundamental Theorem of finance.
- Week 4 Multi-period and continuous time models. The Binomial model. Introduction to stochastic calculus. The Merton-Black-Scholes model. CZ 16, 3.1-3.3, 3.6, N 2, 9-12
- Week 5-6. The Basics of Option pricing: Binomial model and Black & Scholes formula. CZ 6-7, P 7-10, N 13

Part 2 – Individual optimality

- Week 7. Individual preferences, utility theory, and risk-aversion. CZ 4.1, P 1
- Week 8. Optimal consumption and portfolio choice: Mean-variance analysis CZ 5.1, P 2
- Week 9-10. Optimal consumption and portfolio choice: The general case. Dynamic programming. CZ 4.2-4.3, P 5, 12

Part 3 – Equilibrium models

- Week 11. Equilibrium fundamentals: Concept of equilibrium, representative agent, existence and Pareto-optimality. CZ 12
- Week 12-13. Consumption CAPM and CAPM in one period and multiple periods. The Lucas model. Asset Pricing Puzzles. CZ 13.1-13.2, P 3.1, 6
- Week 14-15. Continuous time consumption CAPM and Intertemporal CAPM. CZ 13.4-13.5, P 13
- Week 16. Multi-factor models. CZ 14
- Week 17. Review.