

# Financial Economics I (Asset Pricing)

## **Lecturer Part 1: Dmitry Makarov**

Office hours: by appointment

Email: [dmakarov@hse.ru](mailto:dmakarov@hse.ru)

## **Lecturer Part 2: Vincent Fardeau**

Office hours: by appointment

Email: [vfardeau@hse.ru](mailto:vfardeau@hse.ru)

## **Lecturer Part 3: Dimitrios Tsomocos**

Office hours: by appointment

Email: [dimitrios.tsomocos@sbs.ox.ac.uk](mailto:dimitrios.tsomocos@sbs.ox.ac.uk)

## **Teaching assistant: Petr Lukianchenko**

Email: [lukianchenko.pierre@gmail.com](mailto:lukianchenko.pierre@gmail.com)

## *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 and Risk Management.

The course introduces to the two pricing principles: absence of arbitrage and equilibrium based on individual optimality. The first principle is especially useful for pricing derivative instruments (e.g. an option contract) whenever we know (or assume to know) the dynamics of the price of the underlying asset (e.g. a stock). In order to price the whole universe of financial assets, however, we need to investigate how investors choose their consumption and the composition of their investment portfolios (individual optimality) and how the coordination of these investors on the financial markets leads to the formation of prices (equilibrium analysis). Most of the course covers one-period models and dynamic models in discrete time. However, some equilibrium models are presented in continuous time since this makes them more tractable and they have more elegant solutions. Option pricing in continuous time is left for the 2nd year course in Derivatives. 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.

## *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 (24 academic hours per Part). Your active participation is required – presenting papers that were given for reading, answering questions, and asking questions.
- Seminars (10 academic hours per Part). 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 and, needless to say, for passing the exam.
- 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*

### **1. Required:**

- Lecture notes to be distributed at [mief.hse.ru](http://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](http://mief.hse.ru).

### **2. 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.

### **3. 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.
- Danthine, Jean-Pierre and John B. Donaldson, Intermediate Financial Theory, 3rd ed. 2014.
- LeRoy, Stephen and Jan Werner, Principles of Financial Economics, Cambridge University Press, 2001.
- Lengwiler, Yvan, Microfoundations of Financial Economics, Princeton University Press, 2004.
- Other classical texts such as Huang and Litzenberger (1988), Ingersoll (1987), and Cochrane (2001) can be consulted as well.

## *Evaluation*

Your final grade is computed as follows:

- Homework assignments count for 15% of the final grade.
- A midterm exam at the end of Part1 accounts for 25% of the final grade.
- A midterm test at the end of Part 3 accounts of 15% of the final grade.
- A final exam on the material outlined in this syllabus accounts for 45% of the final grade.

Questions on Part 1 account for approximately one third of the final exam grade, questions on Part 2 for two thirds.

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 and P.

### PART 1

#### Basic Concepts in Financial Markets

- The terminology of financial markets; Bond prices and interest rates under certainty. CZ 1,2
- Individual preferences, utility theory, and risk-aversion. CZ 4.1, P 1

#### Contingent Claims, No-Arbitrage Principle and Derivative Pricing

- Uncertainty, replicating portfolios, Arrow-Debreu securities, absence of arbitrage, market completeness. The Fundamental Theorem of finance. Pricing forwards and futures. Bounds on option prices following from the absence of arbitrage CZ 3.6, 6.1-6.2, P 4.3, 7.1
- Binomial model of Option pricing. CZ 3.1-3.2, 6.3, P 7.2-7.3

#### Optimal Consumption and Portfolio Choice

- One-period model. Mean-variance analysis CZ 5.1, P 2
- Dynamic models. Introduction to dynamic programming. CZ 4.2-4.3, P 5

### PART 2

#### Equilibrium Models

- Equilibrium fundamentals: Concept of equilibrium, representative agent, existence and Pareto-optimality. CZ 12
- Consumption CAPM and CAPM. The Lucas model. Asset Pricing Puzzles. CZ 13.1-13.2, P 3.1, 6
- The direct route from mean-variance analysis to CAPM. CZ 13.1-13.2, P 3.1-3.2
- Multi-factor models. CZ 14, P 3.3
- Review of stochastic calculus. CZ 3.3, P 8
- Continuous time consumption CAPM and Intertemporal CAPM. CZ 13.4-13.5, P 12, 13
- Term structure models of interest rates CZ 8.2, 15.1, P 9.2, 13.3, 17.1 (if time permits)

#### PART 1: distribution of hours

Week	Topic	Total hours	Lectures	Seminars	Readings
1.	<b>Basic Concepts in Financial Markets:</b> The terminology of financial markets; Bond prices and interest rates under certainty	5	4	1	CZ 1,2
2.	<b>Basic Concepts in Financial Markets:</b>	5	4	1	CZ 4.1, P 1

	Individual preferences, utility theory, and risk-aversion				
3.	<b><i>Contingent Claims, No-Arbitrage Principle and Derivative Pricing:</i></b>  Uncertainty, replicating portfolios, Arrow-Debreu securities, absence of arbitrage, market completeness. The Fundamental Theorem of finance. Pricing forwards and futures. Bounds on option prices following from the absence of arbitrage	6	4	2	CZ 3.6, 6.1-6.2, P 4.3, 7.1
4.	<b><i>Contingent Claims, No-Arbitrage Principle and Derivative Pricing:</i></b>  Binomial model of Option pricing.	6	4	2	CZ 3.1-3.2, 6.3, P 7.2-7.3
5.	<b><i>Optimal Consumption and Portfolio Choice:</i></b>  One-period model. Mean-variance analysis	6	4	2	CZ 5.1, P 2
6.	<b><i>Optimal Consumption and Portfolio Choice:</i></b>  Dynamic models. Introduction to dynamic programming.	6	4	2	CZ 4.2-4.3, P 5
<b>TOTAL</b>		34	24	10	

**PART 2: distribution of hours**

Week	Topic	Total hours	Lectures	Seminars	Readings
1.	Equilibrium fundamentals: Concept of equilibrium, representative agent, existence and Pareto-optimality.	6	4	2	CZ 12
2.	Consumption CAPM and CAPM. The Lucas model. Asset Pricing Puzzles	6	4	2	CZ 13.1-13.2, P 3.1, 6
3.	The direct route from mean-variance analysis to CAPM	4	3	1	CZ 13.1-13.2, P 3.1-3.2
4.	Multi-factor models	4	3	1	CZ 14, P 3.3

5.	Review of stochastic calculus	6	4	2	CZ 3.3, P 8
6.	Continuous time consumption CAPM and Intertemporal CAPM	4	3	1	CZ 13.4-13.5, P 12, 13
7.	Term structure models of interest rates	4	3	1	CZ 8.2, 15.1, P 9.2, 13.3, 17.1 (if time permits)
<b>TOTAL</b>		34	24	10	

## Financial Economics II -- Corporate Finance

**Lectures:** - Arkaja Chakraverty and Sergey Stepanov (Corporate Finance part)  
- Dimitrios Tsomocos, Saïd Business School (Advanced Asset Pricing part)

### **Abstract**

PLEASE NOTE that this compulsory course consists of two parts: “Corporate Finance” and “Advanced Asset Pricing and Market Microstructure”

The core of the Corporate Finance part is the analysis of investment (capital budgeting) and financing (capital structure) decisions of a firm. We will first discuss the principles and techniques of selecting investment projects. Secondly, we will examine the determinants of the capital structure choices by firms as well as the notion of the optimal capital structure. We will then discuss how to value a company, taking into account its capital structure. We will also analyze how firms decide on their payouts to shareholders and what the optimal payout policy should be. Finally, we will cover initial public offerings, mergers and acquisitions, corporate governance, and risk management.

The Advanced Asset Pricing part is divided into three parts. The first part covers asset pricing by arbitrage and by equilibrium arguments. The second part deals with issues of asymmetric information and the third with the theory and applications of market microstructure. After each part there will be a class/lecture summarising the lectures, developing applications and discussing the problem sets. This course serves two functions. First, it provides students with a thorough coverage of the principles of asset pricing and market microstructure. It introduces students to advanced finance theory that forms the foundation of modern finance. It provides the necessary background to conduct research. Second, the course offers students with hands-on experience of using computable pricing models to analyze and price modern financial instruments such as options and introduces econometric techniques used in market microstructure.

## **Prerequisites**

Financial Economics I (Asset Pricing), Microeconomics

## **Learning Objectives and Outcomes**

The main objective of the course is to present the modern approach to the financial analysis of a company and to teach the principles and techniques of evaluating the most important corporate decisions.

The student should be able to apply professional knowledge and skills acquired while studying the course in practical areas, including academic research, work in financial institutions, industry, state governance.

## **Methods of Instruction**

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

- Lectures (one or two lectures of 80 minutes per week, alternating from week to week).
- Seminars (one seminar of 80 minutes once every two weeks).
- Self-study
- Case studies (4 cases in total). Cases are to be solved in groups of max. 5 people. Each case will be discussed in a session of 80 minutes. You may be asked to present your solutions in class.
- Homework assignments (problem sets) to be solved individually

**Required reading:** Jonathan Berk and Peter DeMarzo, Corporate Finance, 2007, Pearson (or a later edition)

## **Optional reading:**

- Welch, Ivo, Corporate Finance, 4th edition, 2017, available for free at <http://book.ivo-welch.info/read/>
- Hillier, David, Mark Grinblatt, and Sheridan Titman, Financial Markets and Corporate Strategy: 2nd European Edition, 2011, McGraw-Hill.
- Copeland, Thomas E., Weston, J. Fred, and Kuldeep Shastri, Financial Theory and Corporate Policy, 4th edition, 2005, Pearson.
- Tirole, Jean, The Theory of Corporate Finance, Princeton and Oxford: Princeton University Press, 2006.
- T. Copeland and J. Weston (1992), Financial Theory and Corporate Policy, Addison Wesley. A good mixture of theory and evidence.
- J-P Danthine and J. Donaldson (2002), Intermediate Financial Theory, Prentice Hall
- C.- F Huang and R.H. Litzenberger (1988), Foundations of Financial Economics , Prentice Hall
- J. Hull (2003), Options, Futures and Other Derivatives, Prentice Hall.
- J. Ingersoll (1987), Theory of Financial Decision Making, Rowman and Littlefield
- S. E. Shreve (2004), Stochastic Calculus for Finance I: The Binomial Asset Pricing Model, Springer.
- S.F. Le Roy and J. Werner (2001), Principles of Financial Economics, Cambridge University Press.

Other materials and lecture slides will be available at [icef-info.hse.ru](http://icef-info.hse.ru)

## **Grading System and Knowledge Assessment**

### Corporate Finance

Home Assignments: 15%

Cases (including evaluation of presentations): 15%

Midterm test: accounts for 20%

Final exam: 50%

The weights given above combine into your final grade for the course. You need to receive at least 35% at the final exam and 35% in the aggregate in order to pass the course. There is only one re-take for the final exam. There will be no re-take for the midterm test. If you have to skip the midterm test due to a valid documented reason, the final exam will automatically carry 70% weight. If you skip the midterm test for no valid reason, you simply get 0 points for it.

### Advanced Asset Pricing

Mid-term test (100% for this part of the course; 20% of the final grade for the course)

If you have to skip this midterm test due to a valid documented reason, the weight of the mid-term test shifts to the overall mark for the course, i.e.  $\text{final grade} = 100\% \times \text{the mark for the part taught by Stepanov/Chakraverty}$ .

If you skip the midterm test for no valid reason, you simply get 0 points for it, i.e.  $\text{final grade} = 20\% \times 0 + 80\% \times \text{the mark for the part taught by Stepanov/Chakraverty}$ .

The grade for each part (on the 100 point scale) is determined separately; the grades are then aggregated with weights 80% (Corporate Finance) and 20% (Advanced Asset Pricing) to obtain the final grade for the course.

Sample materials for knowledge assessment are available in ICEF Information system at <https://icef-info.hse.ru>.

## **Special Equipment and Software Support**

Laptop, projector, Internet connection

MS Word, MS Excel

## **Course Plan**

### **Corporate Finance**

1. Introduction to corporate finance. Notion of corporation, financial statements and financial ratios
2. Fundamentals of capital budgeting
  - a. Refresher on time value of money, discounting, stocks and bonds valuation, risk and return, CAPM
  - b. Basic investment decision rules (NPV, IRR, payback period, etc.)
  - c. Projects with unequal lives: matching cycle, Equivalent Annual Cost (Benefit) method, replacement problem
  - d. Evaluating a project: forecasting earnings, determining cash flows, computing NPV
  - e. Sensitivity analysis, scenario analysis
3. Capital structure in a frictionless world
  - a. Irrelevance of capital structure

4. Capital structure in real world
  - a. Effect of taxes
  - b. Direct and indirect costs of financial distress
  - c. Trade-off theory, *viz.* static and dynamic
  - d. Case discussion (Blaine Kitchenware)
5. Capital structure and valuation methods
  - a. Direct valuation method, i.e. earning based
  - b. Relative valuation method, i.e. peer based
6. Advanced capital budgeting: real options
  - a. Financial options: notion, properties, pricing (binomial model, Black and Scholes formula, Monte-Carlo simulations)
  - b. Real options: types and examples, valuation of projects with real options
7. Capital structure. Effects of agency problems
8. Capital structure. Effects of asymmetric information
9. Initial public offerings
  - a. Advantages and disadvantages of going public
  - b. Price performance post listing
  - c. Case discussion (Huaneng Power International)
10. Payout policy
  - a. Motivation – information asymmetry
  - b. Ways of rewarding shareholders – dividend and share repurchase
  - c. Impact of tax on payout policies
  - d. Case discussion (Linear Technology)
11. Corporate governance + Case discussion (Seagate Technology)
12. Corporate risk management
  - a. Types of corporate risks
  - b. Benefits and costs of risk management

## **Advanced Asset Pricing**

### **1 : Equilibrium in security markets**

- Consumption-Based Security Pricing / Lucas Model
- First Pass at the CAPM
- Equity Premium Puzzle
- Complete vs. incomplete markets
- Representative vs. heterogeneous agent models

### **2 : General Equilibrium with Incomplete Markets**

- State prices and risk-neutral probabilities
- Spanning
- Constrained inefficiency
- Modigliani and Miller
- Effectively Complete Markets

### **3: Options Pricing**

- Binomial Asset Pricing Model
- Options
- Dynamic completion of the markets
- Cox-Ross-Rubinstein
- Radom-Nikodym Derivative Process
- Exotics
- Numerical Procedures

### **4: C.A.P.M. and A.P.T.**

- Portfolio theory
- Mutual fund, SML, efficiency theorem
- Factor pricing
- A.P.T.

### **5 : Money and Default**

- Liquidity / Cash-in-advance
- Endogenous Default
- Collateral Equilibrium