Microstructure of Financial Markets (Models)

Lecturer: Alexei Boulatov  
Class teacher: Alexei Boulatov  

Course Description

This course covers some of the materials on the microstructure theory of financial markets developed over the last three decades. Theoretical Market Microstructure is intended to develop economic models of financial markets within a “microscopic” approach when one explicitly takes into account a particular market design and types of agents involved in a trading process. One application of the Market Microstructure models is analysis of the impact of market organizational structure on various important market characteristics, such as price efficiency, transaction costs, liquidity, etc., and to construct quantitative indicators of market quality.

The main part of the course is based on original academic research papers on Market Microstructure theory. The emphasis is on the finance models that allow for analytic solutions (analytically tractable.) The goal is to provide students with the tools and basic knowledge required to understand and appreciate original academic papers on market microstructure.

The course material is intended to be technically self-consistent, which means that we review all necessary background mathematical tools. The primary goal is to develop the ability of applying quantitative models and making (correct) calculations to analyze specific problems, rather than on proving general theorems in a rigorous way. In other words, the tilt is towards a "practical theory" course. This course is quantitative and relies on technical skills developed throughout the course.

Prerequisites

The prerequisite for this class are: Graduate standing, and some basic course on Financial Economics, e.g. based on Huang and Litzenberger, Foundations for Financial Economics (HL). Although the course materials are self-contained, the students are recommended to carefully read the HL before taking the course.
Teaching methods

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

• Lectures.

• Paper presentations: students are expected to present and discuss in class some required original papers specified by the instructor. Active participation is required.

• Self-study: preparing for classes, it is important to read the corresponding required original research papers and chapters in the textbooks as indicated in the course outline below.

Course Material

The lecture notes and required original papers contain all required material. The readings of journal papers will be announced in class. In addition, the recommended texts are:


Also recommended for this course are the following supplement references


Grading and Exams

• Class participation including the presentation of papers accounts for 20%.
• The midterm exam accounts for 25%.
• The rest of the grade (55%) comes from the final exam.
  \[ G = 0.2\times G_{cw} + 0.25\times G_{midterm} + 0.55\times G_{exam} \]
• The exact material covered in each of the two exams will be announced in class. Examination is in writing.
  Sample materials for knowledge assessment are available in ICEF Information system at [https://icef-info.hse.ru](https://icef-info.hse.ru)
  All grades are given initially out of 100. The final grades are also transferred to 10 and 5 points grades in accordance with the ICEF Grading Regulations (par.3) available at [https://icef-info.hse.ru/goto_icef_file_29837_download.html](https://icef-info.hse.ru/goto_icef_file_29837_download.html)
Retakes are organized in accordance with the HSE Interim and Ongoing Assessment Regulations (incl. Annex 8 for ICEF). Grade determination after retakes is done in accordance with ICEF Grading Regulations (par. 5) available at https://icef-info.hse.ru/goto_icef_file_29837_download.html

Analytic and technical skills

This course is rather demanding in terms of the analytic skills. Although the course materials are self-contained, you are encouraged to “brush up” your basic knowledge in several areas, including basic analysis, random processes, and linear algebra. Moreover, it is important to have a “hands on” understanding of all required mathematical concepts. This can be achieved by solving specific problems and analyzing the solutions.

Expected learning outcomes

The students are expected to acquire the following skills:
1. Identifying the scientific nature of the problems in the professional field
2. Working with information: to find, evaluate and use information from various sources, necessary to solve scientific and professional problems (including those on the basis of a systematic approach)
3. Conducting research, including problem analysis, setting goals and objectives, identifying the object and subject of research, choosing the means and methods of research, as well as assessing its quality
4. Based on the description of economic processes and phenomena, ability to build theoretical and econometric models, analyze and meaningfully interpret the results obtained

Course Outline

I Introduction

Institutions and market structure.

Lecture notes. DJR, Chapter 1. LH, Chapter 1.

II Information and prices; Rational Expectations Equilibrium (REE)

II.1 Hellwig (1980) model.


Lecture notes. DJR, Chapter 2.

III  Models of strategic trading
   III.1  Auction markets.
   Lecture notes. DJR, Chapter 3.
   Single asset case.

   Admati, A., 1985, *Econometrica*. Extension to single period case with *multiple* assets –
   self-study and presentations.

   patterns. Discretionary liquidity traders – self-study and presentations

III.2 Dynamic strategies.

   Lecture notes.


IV  Information and markets

   Lecture notes.

   **Point: informed equilibrium could be less efficient than the uninformed one**, at least
   for some groups of agents.

V  Liquidity and algorithmic trading

   V.1 Optimal execution
   Lecture notes.

   V.2 Market quality issues
   Lecture notes. DJR, Chapter 10.
VI Models of the limit order book (LOB)
Lecture notes. DJR, Chapter 8.

VI.1 Uninformed liquidity providers

Point: simple model of the LOB allows to incorporate dynamic price impact. This is relevant to optimal execution problems.

VI.2 Informed liquidity providers


Setting: Both liquidity providers and demanders are informed. Endogenous choice of types within a single-period model setting. Non-discriminatory pricing rule.

VII Microstructure models: overview.
Distribution of hours

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<th>#Topic</th>
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<th>Self-study</th>
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<td>Information and Prices; REE</td>
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<td><strong>Models of strategic trading</strong></td>
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<td>2. Dynamic strategies</td>
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