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FE570 Market Microstructure and Trading Strategies

Instructors

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Course Catalog Description

Overview

Prerequisites: Basic concepts of markets, some knowledge of statistics (factor analysis, PCA), probability distributions and time series analysis. Good practical knowledge of a programming language: Python or R.

Introduction

This course offers an overview of the modern financial markets for securities, focusing on equities, but covering also bond markets, and of the main types of traders and order types. The course will introduce market microstructure models used for describing price formation: zero intelligence models, sequential and information-based models, and limit-order book models. The course will introduce several popular trading strategies: trend, momentum and oscillator-based strategies, arbitrage trading strategies, as well as methods for estimating and back-testing the strategies. Students will be required to learn the basics of the R statistical computing language, and to be able to analyze financial data using the models introduced in this course. Students will also use Python to run trading strategies in the SHIFT system.

Relationship of Course to Rest of Curriculum

The course is one of the courses required for the Algorithmic Trading certificate in Financial Engineering (FE).

Learning Goals

1. The course will give an introduction to the financial markets, trading and limit order book.
2. The course will introduce and define the concept of liquidity in financial markets, and models for liquidity of financial markets.
3. The course will introduce the basic empirical facts of the market microstructure, and models of market microstructure: Roll model of trade prices, inventory models, and information-based models.
4. The course will introduce the main types of trading strategies: technical, arbitrage and HFT strategies.

Pedagogy

The course will consist of lectures, in-class exercises, homework, a project and a mid-term exam.

Course Resources

Required Text(s)

- <https://fsc.stevens.edu>
 Harris, Trading and Exchanges: Market Microstructure for Practitioners. Oxford University Press 2002
 B. Schmidt, Financial Markets and Trading: An Introduction to Market Micro-structure and Trading Strategies, Wiley, 2010
 3. Joel Hasbrouck, Empirical Market Microstructure, Oxford University Press, 2007

Required Readings

Sections from the required text, as indicated for each class.

Additional Readings

Selected chapters from these books are provided in Canvas:

1. J.P. Bouchaud, J. Bonart, J. Donier and M. Gould, Trades, Quotes and Prices: Financial Markets under the Microscope, Cambridge University Press, 2018
2. T. Foucault, M. Pagano and A. Roell - Market Liquidity - Theory, Evidence and Policy, 2013

Additional readings will be provided, as needed.

Grading

Grading Policies

Participation/Class challenges: 10%

Assignments: 30%

Midterm exam: 30%

Project: 30%

Total Grade: 100%

Assignments: Assignments will be provided throughout the semester, consisting of problems related to the material taught in the lectures. They are to be handed in on time. No late assignments, without prior approval, will be accepted. There is a project for the course, and a mid-term exam. The total grade is a weighted average of the attendance/participation, assignments, mid-term exam and project.

Grade	Score Range
A	93%-100%
A-	90%-93%
B+	87%-90%
B	83%-87%
B-	80%-83%
C+	77%-80%
C	65%-77%
F	0%-65%

This grading scheme is subject to change based on student outcomes. It may be curved more leniently. It will not be made more difficult.

Lecture Outline

Date	Topic	Reading
Week 1	Introduction to Financial Markets	Harris [1, 3]
Week 2	Modern Financial Markets and Trading Mechanism	Hasbrouck [1,2], FPR [1]
Week 3	Orders, Trades and Data	Harris [4, 6, 7]
Week 4	Empirical Properties of The Micro-structure Data and Liquidity	Harris [19, 20], FPR [2]

Week 5	The Roll Model of Trade Prices	Hasbrouck [3]
Week 6	Volatility Estimation and Forecasting	Reading will be provided
Week 7	Market Microstructure Models I: Zero Intelligence Models	Reading will be provided
Week 8	Mid-term exam	 
Week 9	Market Microstructure Models II: Se-quential and Information-based Models	Hasbrouck [5,6]
Week 10	Market Microstructure Models III: Strategic and Inventory Models	Hasbrouck [7]
Week 11	Market Microstructure Models IV: Limit Order Markets	Hasbrouck [12, 13]
Week 12	Optimal Order Execution	Schmidt [12, 13]
Week 13	Arbitrage Trading Strategies	Schmidt [11]
Week 14	Technical Analysis	Schmidt [10]
Week 15	Project presentation	

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