Computer Science

Market Microstructure (COMP0049)

Description

Aims:
The course is aimed at introducing the student to the functioning of financial markets based on Limit Order Books from a microstructure point of view, and to the resulting non-trivial empirical regularities. The course presents both the main empirical facts in modern financial markets and some of the theoretical methods used to model them. We will discuss the functioning of limit order driven markets, the price impact of orders, the distribution of returns, the liquidity patterns, and the bid-ask spreads, as well as the relationship between these and other related concepts. Further, we will discuss zero-intelligence models to describe the high-frequency fluctuations in financial markets and models addressing the observed long memory of the trade sign process.

Learning outcomes:
On successful completion of the module, a student will be able to:
1. Understand the mechanisms that underpin the functioning of markets with Limit Order Book;
2. Recognize and characterize the main empirical facts emerging in modern financial markets;
3. Understand and characterize the price impact of orders and of their execution;
4. Characterize the relationship between price impact, bid-ask spread, tick size, and liquidity;

Content:
This module provides the student with a structured overview of both the main empirical facts and major theoretical approaches in market microstructure. It will comprise of five main parts:

Introduction to limit order markets:
- The course explains the functioning and historical context of limit order-driven markets and introduces the main concepts as well as regulatory issues;

Key information

Year 2019/20
Credit value 15 (150 study hours)
Delivery PGT L7, Campus-based
Reading List View on UCL website
Tutor Dr Simone Righi
Term Term 1
Timetable View on UCL website

Assessment

- Written examination (main exam period): 85%
- Written examination (departmentally managed): 15%

Find out more

For more information about the department, programmes, relevant open days and to browse other modules, visit ucl.ac.uk
Empirical investigation of financial data:
The course covers the main robust empirical facts found in order driven financial markets, such as the distribution of returns, correlations between price changes and the volatility, the intraday pattern of liquidity and the bid-ask spread, and the long memory of the trade sign process. Simple models for the correlated sign process are discussed;

Price impact:
- This part focuses on the impact of order book events (market order submissions, limit order submissions, and cancellations) on the market price. Different price impact measures are introduced. The theoretical framework for trade sign correlations, impact and price efficiency is discussed. The impact of a trading strategy (meta-order) is introduced and different theories of meta-order impact are presented; The limit order book as a queuing system:
- This part introduces zero-intelligence models to describe the high-frequency fluctuations in financial markets. The so-called Santa Fe model, the Cont and Larrard model and more complex approaches are discussed;

The relationship between impact, the bid-ask spread, the tick size, and liquidity:
- This part of the focus introduces regulatory issues related to limit order books. The most advanced theories which explain the relationship between the spread and impact on small-tick stocks, as well as the liquidity and impact on large-tick stocks, are presented. The course closes with a discussion on the optimal market design;

Requisites:
In order to be eligible to select this module, a student must be registered on a programme for which it is a formally-approved option or elective choice AND must have (i) a UK-equivalent Upper Second Class Honours Degree (or higher) in the fields of computer science, mathematics, statistics, physics, engineering or another similar quantitative subject; (ii) a strong background with high performance in mathematics, probability, statistics and econometrics; (iii) English Language at the UCL Good level.