723-M1040 Security Market Microstructure

The Course Syllabus, Fall 2016

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This course surveys recent contributions in market microstructure theory. Market microstructure is the study of the process and outcomes of exchanging assets under explicit trading rules. With explicitly specified asset trading mechanisms, optimal trading strategies for different classes of traders are identified, and the properties of the resulting equilibrium price and volume are examined.

It will start with a review of the benchmark rational expectations equilibrium (REE) models, where traders are price-takers endowed with differential information, who can submit a demand schedule at each and every trading date. Then we will review the theory of speculation and bubbles, and clarify and role of the no-trade theorem. We shall discuss the possible economic causes of market crash.

The REE models assume that trades are consummated using the textbook Walrasian mechanism, where all traders are present at each and every trading date, and they can submit an infinite number of limit orders.

The real-world trading mechanisms are mostly the combinations of a limit order market and a dealership market. In a limit order market, traders can submit either market or limit orders; a market order ensures certain execution at an uncertain price, and a limit order may result in non-execution, but when executed, it will be executed at the prespecified bid or ask price. In most cases, those who submit limit orders supply liquidity, and those who submit market orders demand liquidity. In a dynamic limit order market, un-executed limit orders are either cancelled or accumulated in a limit order book, and an un-executed limit order displayed in the book is subject to the risk of being "picked off" by better informed traders. The electronic trading systems such as BATS are limit order markets. Unlike the REE models,

where traders are assumed to be non-strategic, it is assumed in models of limit order markets that traders are strategic.

In a dealership market, there are designated dealers or market makers that supply liquidity to public traders. There may be a single dealer (e.g. the "specialist" in the NYSE in the last century) or multiple competing dealers (as in the NASDAQ) in the market. The models for a dealership market can be classified into two categories—the signaling models and the screening models. In the former the (probably better informed) public traders submit orders before the uninformed dealers announce bid and ask prices, and in the latter the uninformed dealers announce their quotes before taking orders from public investors. The former are order-driven models, and the latter are quote-driven models.

After we go over the REE models, we shall first review the dealership models, and then the limit order models. Based on these discussions, we address issues regarding fragmentation and consolidation of securities markets. Consolidation of exchanges has become a prevalent phenomenon recently. We shall also discuss the role and impacts of algorithmic trading—an example is the high frequency trading.

We shall then consider the theories of trading volume. The finance literature suggests that trade can be motivated by either *informational* or *non-informational* motives. Two economic agents may want to trade because they have different endowments, different attitudes toward risks, or different time preferences. These are *non-informational* motives. Two economic agents with the same preferences and endowments may want to trade because they have different pre-trade beliefs about the future price and dividend processes of the traded assets. The differences in the pre-trade beliefs may stem from the heterogeneous prior beliefs about the dividend stream to be distributed by the traded asset, from the different interpretations (*differences of opinion*) about the statistical relationship between the intrinsic value of the traded asset and a (public or private) signal, or from the different private information the agents possess before trading. These are *informational* motives. As will be shown in class, different trading motives tend to result in trades that ex-

hibit different patterns in trading volume.

We shall distribute lecture notes constantly, and refer to the following books regularly.

- *Market Liquidity: Theory, Evidence, and Policy*, 2013, T. Foucault, M. Pagano, and A. Röell, New York: Oxford University Press.

- *Market Microstructure: Confronting Many Viewpoints*, 2012, edited by F. Abergel et al., West Sussex, UK: The John Wiley & Sons.

- *Asset Pricing Under Asymmetric Information: Bubbles, Crashes, Technical Analysis, and Herding*, 2001, M. Brunnermeier, New York: Oxford University Press.

- *Market Microstructure Theory*, 1995, M. O'Hara, Cambridge, Massachusetts: Blackwell Publishers.

Problem sets solving and the performances in the midterm exam and an oral presentation will jointly determine a student's grade. A tentative schedule now follows.

Week 1	Rational Expectations Equilibrium (REE) Models
Week 2	REE Models (continued)
Week 3	Speculation, Bubbles, and No Trade Theorem
Week 4	Speculation and bubbles (continued)
Week 5	Order-driven Mechanisms
Week 6	Order-driven Mechanisms (continued)
Week 7	Quote-driven Mechanisms
Week 8	Limit Order Markets
Week 9	Fragmentation and Consolidation
Week 10	Algorithmic Trading
Week 11	Theory of Trading Volume
Week 12	Theory of Trading Volume (continued)
Week 13	Economic Causes for Market Crash
Week 14	Efficiency Issues of Insider Trading
Week 15	Oral Presentation
Week 16	Oral Presentation
Week 17	Oral Presentation