Market Microstructure & Trading
Universidade Federal de Santa Catarina
Syllabus

Dr. Ramo Gençay, Email: `rgencay@sfu.ca`, Web: `www.sfu.ca/~rgencay`

Objectives:

This is a course on financial instruments, financial markets and trading with an emphasis on topics such as optimal trading strategies for typical trading problems, mechanisms of how information is impounded in prices, mechanisms to improve the information aggregation process, avoidance of market failures, sequential trade models, inventory control and empirical study of dealer inventories, market impact, models of informed and strategic trading, and limit order markets.

The course will study the main theoretical and empirical models used in market microstructure. We will analyze how transaction costs, inventory risk and information asymmetry affect liquidity provision and asset prices.

There will be emphasis on understanding market participants and the trading environment, risks in high-frequency trading, high-frequency statistical techniques, issues surrounding limit order books and trading algorithms.

Required Reading:

The Trading Industry, Chapter 3, Harris.

Orders and Order Properties, Chapter 4, Harris.

Market Structures, Chapter 5, Harris.

Order-driven markets, Chapter 6, Harris.

Brokers, Chapter 7, Harris.

Optional Reading:

(a) What is Market Microstructure about? (Hasbrouck: Chapter 1)
   - i. Investigation of the economic forces affecting trades, quotes and prices.
   - ii. Market microstructure: A survey of micro-foundations, empirical results, and policy implications, Biais *et al.* (2005).
   - iii. Price impact, Bouchaud (2010).

(b) Trading mechanisms, (Hasbrouck: Chapter 2)
   - i. U.S. equity market (Hasbrouck: Appendix)
   - ii. Liquidity fragmentation, Lehalle and Burgot (2009).

(c) Sources for Short-run Price Deviation from Fundamentals? Competitive Liquidity Suppliers Models
   - i. A simple implicit measure of effective bid-ask spread in an efficient market, Roll (1984)'s model (Hasbrouck: Chapter 3)

ii. Order data, quote data (Hasbrouck: Chapter 14)
iii. Estimating the cost of trading, Hasbrouck (2009).
iv. Asymmetric information, O'Hara's sequential model (Hasbrouck: Chapter 5, O'Hara: Chapter 3.4)
v. Bid, ask and transaction prices in a specialist market with heterogeneously informed traders, Glosten and Milgrom (1985) (O'Hara: Chapter 3.3)
vi. PIN model (Hasbrouck: Chapter 6)
vii. Estimating the components of the bid/ask spread, Glosten and Harris (1988) model.
viii. Bid-ask spreads in the inter-bank foreign exchange markets, Bessembinder (1994).
ix. Asymmetric information in the inter bank foreign exchange market, Bjonnes *et al.* (2008).

(d) Inventory Costs

i. Market microstructure, Garman (1976)'s model (O'Hara: Chapter 2.1)
ii. The supply of dealer services in securities markets, Stoll (1978)'s model (O'Hara: Chapter 2.2)
iii. Optimal dealer pricing under transactions and return uncertainty, Ho and Stoll (1981) model (O'Hara: Chapter 2.3)
iv. Empirical studies:
   A. The trades of market makers, Hasbrouck and Sofianos (1993).
   B. Dealers and their inventories, (Hasbrouck: Chapter 11).
   C. Does algorithmic trading improve liquidity, Hendershott *et al.* (2011).

(e) Transitory versus Permanent Component in Price Formation

i. VAR approach, Hasbrouck (1993).

Required Reading:

Why people trade, Chapter 8, Harris.

Informed Traders and Market Efficiency, Chapter 10, Harris.

Order Anticipators, Bluffers and Market Manipulation, Chapter 11-12, Harris.

Dealers, Bid/ask Spreads, Block Traders, Chapters 13, 14, 15, Harris.

Value Traders, Arbitrageurs, Buy-Side Traders, Chapters 16, 17 and 18, Harris

Optional Reading:

(a) Sources for Short-run Price Deviation from Fundamentals? Strategic Liquidity Suppliers Models

i. Continuous auction model, Kyle (1985), (O'Hara: Chapter 4)
ii. Liquidity and asset prices, Amihud *et al.* (2005).
iii. Optimal trade execution and price manipulation in order books with time-varying liquidity, Fruth *et al.* (2011).
iv. The Liquidity Effects of S&P 500 Additions, McDermott and Hegde (2000).

v. Forecasting Prices from Level-I Quotes in the Presence of Hidden Liquidity, Avellaneda *et al.* (2011).

vi. Splitting orders in overlapping markets: A study of cross-listed stocks, Menkveld (2008).

vii. Order splitting (Hasbrouck: Chapter 15)

viii. Order placement, (Hasbrouck: Chapter 15), Harris and Hasbrouck (1996).

ix. Order aggressiveness, Ranaldo (2004).

x. High Frequency Trading and Price Discovery, Hendershott and Riordan (2011).

(b) Market Design

i. Call versus Continuous

A. Trading mechanisms and stock returns, Amihud and Mendelson (1987), Amihud *et al.* (1990).

B. Information acceleration close to opening, Biais *et al.* (1999).

ii. Transparency

A. Transparency helps, Boehmer *et al.* (2005).

B. Transparency can hurt, Gemmill (1996).

C. Transparency and market quality, Chung and Chuwonganant (2009).

iii. Tick Size

A. Less tick size leads to more competitive behavior, Bessembinder (2003).

B. The information content of the limit order book: evidence from NYSE specialist trading decisions, Harris and Panchapagesan (2005).

C. Decimalization, adverse selection, and market maker rents, Bacidore (2001).

D. Less tick size leads to less market depth, Goldstein and A. Kavajecz (2000), Jones and Lipson (2001).

E. Estimating covariation: Epps effect, microstructure noise, Zhang (2011).

iv. Limit Order Markets

A. Survey of limit order markets, Parlour and Seppi (2008).

B. Competition between markets, Parlour and Seppi (2003).

Required Reading:

Liquidity, Volatility, Chapters 19-20, Harris

Internalization, Preferencing and Crossing, Insider Trading, Chapter 25 and Chapter 29, Harris

Optional Reading):

(a) Order Flow

i. Order flow and exchange rate dynamics, Evans and Lyons (2002).

ii. Understanding order flow, Evans and Lyons (2006).

iii. Exchange rate fundamentals and order flow, Evans and Lyons (2007).

iv. Order flow in equity markets, Hasbrouck and Seppi (2001).

(b) Selected Topics

i. Multiple Securities and Multiple Prices, Hasbrouck (2001), (Hasbrouck: Chapter 10)

ii. Realized Volatility: two-scale realized volatility estimator, Zhang *et al.* (2005)

iii. Volatility trading and information diffusion, Ni *et al.* (2008).

SUGGESTED BOOKS:

Trading & Exchanges: Market Microstructure for Practitioners, 2003, L. Harris, Oxford: New York.

Empirical Market Microstructure, 2007, J. Hasbrouck, Oxford University: New York.

Market Microstructure Theory, 1997, M. O'Hara, Blackwell: Oxford.

The Microstructure Approach to Exchange Rates, 2006, R. Lyons, MIT Press.

An Introduction to High-Frequency Finance, 2001, M. Dacorogna, R. Gençay, U. Müller, R. Olsen and O. Pictet, Academic Press, San Diego.

An Introduction to Wavelets and Other Filtering Methods in Finance and Economics, 2001, R. Gençay, F. Selçuk and B. Whitcher, Academic Press, San Diego.

GRADING:

Grading will be based on participation and a written exam.

References

Amihud, Y. and Mendelson, H. (1987). Trading mechanisms and stock returns: Empirical investigation. *Journal of Finance*, **42**(3), 533–553.

Amihud, Y., Mendelson, H., and Murgia, M. (1990). Stock market microstructure and return volatility. evidence from italy. *Journal of Banking and Finance*, **14**(2-3), 423–440.

Amihud, Y., Mendelson, H., and Pedersen, L. H. (2005). Liquidity and asset prices. *Foundations and Trends in Finance*, **4**(1), 269–364.

Avellaneda, M., Reed, J., and Stoikov, S. (2011). Forecasting Prices from Level-I Quotes in the Presence of Hidden Liquidity. *Algorithmic Finance, Forthcoming.*

Bacidore, J. M. (2001). Decimalization, adverse selection, and market maker rents. *Journal of Banking and Finance*, **25**(5), 829 – 855.

Bessembinder, H. (1994). Bid-ask spreads in the interbank foreign exchange markets. *Journal of Financial Economics*, **35**(3), 317–348.

Bessembinder, H. (2003). Quote-based competition and trade execution costs in nyse-listed stocks. *Journal of Financial Economics*, **70**(3), 385–422.

Biais, B., Million, P., and Spatt, C. (1999). Price discovery and learning during the preopening period in the paris bourse. *Journal of Political Economy*, **107**(6 PART 1), 1218–1248.

Biais, B., Glosten, L., and Spatt, C. (2005). Market microstructure: A survey of microfoundations, empirical results, and policy implications. *Journal of Financial Markets*, **8**(2), 217–264.

Bjonnes, G. H., Osler, C. L., and Rime, D. (2008). Asymmetric Information in the Interbank Foreign Exchange Market. *SSRN eLibrary*.

Boehmer, E., Saar, G., and Yu, L. (2005). Lifting the veil: An analysis of pre-trade transparency at the nyse. *Journal of Finance*, **60**(2), 783–839.

Bouchaud, J.-P. (2010). *Price Impact*. John Wiley & Sons, Ltd.

Chung, K. H. and Chuwonganant, C. (2009). Transparency and market quality: Evidence from supermontage. *Journal of Financial Intermediation*, **18**(1), 93–111.

Evans, M. D. D. and Lyons, R. K. (2002). Order flow and exchange rate dynamics. *Journal of Political Economy*, **110**(1), pp. 170–180.

Evans, M. D. D. and Lyons, R. K. (2006). Understanding order flow. *International Journal of Finance & Economics*, **11**(1), 3–23.

Evans, M. D. D. and Lyons, R. K. (2007). Exchange rate fundamentals and order flow. NBER Working Papers 13151, National Bureau of Economic Research, Inc.

Fruth, A., Schoeneborn, T., and Urusov, M. (2011). Optimal trade execution and price manipulation in order books with time-varying liquidity. *ArXiv e-prints*.

Garman, M. B. (1976). Market microstructure. *Journal of Financial Economics*, **3**(3), 257–275.

Gemmill, G. (1996). Transparency and liquidity: A study of block trades on the london stock exchange under different publication rules. *Journal of Finance*, **51**(5), 1765–1790.

Glosten, L. R. and Harris, L. E. (1988). Estimating the components of the bid/ask spread. *Journal of Financial Economics*, **21**(1), 123–142.

Glosten, L. R. and Milgrom, P. R. (1985). Bid, ask and transaction prices in a specialist market with heterogeneously informed traders. *Journal of Financial Economics*, **14**(1), 71–100.

Goldstein, M. A. and A. Kavajecz, K. (2000). Eighths, sixteenths, and market depth: Changes in tick size and liquidity provision on the nyse. *Journal of Financial Economics*, **56**(1), 125–149.

Harris, L. and Hasbrouck, J. (1996). Market vs. limit orders: The superdot evidence on order submission strategy. *Journal of Financial and Quantitative Analysis*, **31**(2), 213–231.

Harris, L. E. and Panchapagesan, V. (2005). The information content of the limit order book: evidence from nyse specialist trading decisions. *Journal of Financial Markets*, **8**(1), 25 – 67.

Hasbrouck, J. (1993). Assessing the quality of a security market: A new approach to transaction-cost measurement. *Review of Financial Studies*, **6**(1), 191–212.

Hasbrouck, J. (2001). One security, many markets: Determining the contributions to price discovery. *Journal of Finance*, **50**(4), 1175–1199.

Hasbrouck, J. (2009). Trading costs and returns for U.S. equities: Estimating effective costs from daily data. *Journal of Finance*, **64**(3), 1445–1477.

Hasbrouck, J. and Seppi, D. J. (2001). Common factors in prices, order flows, and liquidity. *Journal of Financial Economics*, **59**(3), 383 – 411.

Hasbrouck, J. and Sofianos, G. (1993). The trades of market makers: An empirical analysis of NYSE specialists. *Journal of Finance*, **48**(5), 1565–1593.

Hendershott, T., Jones, C. M., and Menkveld, A. J. (2011). Does algorithmic trading improve liquidity? *Journal of Finance*, **66**(1), 1–33.

Hendershott, T. J. and Riordan, R. (2011). High Frequency Trading and Price Discovery. *SSRN eLibrary*.

Ho, T. and Stoll, H. R. (1981). Optimal dealer pricing under transactions and return uncertainty. *Journal of Financial Economics*, **9**(1), 47–73.

Jones, C. M. and Lipson, M. L. (2001). Sixteenths: Direct evidence on institutional execution costs. *Journal of Financial Economics*, **59**(2), 253–278.

Kyle, A. S. (1985). Continuous auctions and insider trading. *Econometrica*, **53**(6), 1315–35.

Lehalle, C.-A. and Burgot, R. (2009). Navigating liquidity, the established liquidity fragmentation affects all investors. CA Cheuvreux.

McDermott, J. B. and Hegde, S. (2000). The Liquidity Effects of S&P 500 Additions. *SSRN eLibrary*.

Menkveld, A. J. (2008). Splitting orders in overlapping markets: A study of cross-listed stocks. *Journal of Financial Intermediation*, **17**(2), 145 – 174.

Ni, S. X., Pan, J., and Poteshman, A. M. (2008). Volatility information trading in the option market. *Journal of Finance*, **63**(3), 1059–1091.

Parlour, C. A. and Seppi, D. J. (2003). Liquidity-based competition for order flow. *The Review of Financial Studies*, **16**(2), pp. 301–343.

Parlour, C. A. and Seppi, D. J. (2008). Chapter 3 - Limit Order Markets: A Survey. In A. V. Thakor and A. W. Boot, editors, *Handbook of Financial Intermediation and Banking*, pages 63 – 96. Elsevier, San Diego.

Ranaldo, A. (2004). Order aggressiveness in limit order book markets. *Journal of Financial Markets*, **7**(1), 53–74.

Roll, R. (1984). A simple implicit measure of effective bid-ask spread in an efficient market. *Journal of Finance*, **39**(4), 1127–1139.

Stoll, H. R. (1978). The supply of dealer services in securities markets. *Journal of Finance*, **33**(4), 1133–1151.

Zhang, L. (2011). Estimating covariation: Epps effect, microstructure noise. *Journal of Econometrics*, **160**(1), 33 – 47. ¡ce:title¿Realized Volatility¡/ce:title¿.

Zhang, L., Mykland, P. A., and Ait-Sahalia, Y. (2005). A tale of two time scales: Determining integrated volatility with noisy high-frequency data. *Journal of the American Statistical Association*, **100**(472), 1394–1411.