Advanced Microeconomics Econ 415-1 (Financial Market Design)

Class Time: Mondays and Wednesdays, 1:30PM – 3:20PM

Location: Kellogg Econ Classroom 3301

Office Hours: by appointment (piotr.dworczak@northwestern.edu)

Instructors: Piotr Dworczak

Understanding financial markets is an important challenge. Recently, there has been a number of issues related to designing financial markets that drew the attention of practitioners, regulators, and academics alike. Examples include optimal trade frequency in the presence of high-frequency trading, the design of financial benchmarks after the Libor scandal, regulation of transparency in over-the-counter markets (TRACE, Dodd-Frank act), stress tests, and the new opportunities and challenges related to the blockchain technology and crypto currencies.

The course reviews a selection of these issues from a theoretical perspective, drawing on a growing body of literature taking a market design perspective to financial markets. We are particularly interested in papers that cross the boundaries between fields and apply insights and techniques from market, mechanism, and information design to questions related to financial markets.

This is a topics course, designed for 2nd and 3rd -year PhD students in economics and finance programs but open to everyone interested in financial markets with the necessary technical background to understand the papers on the reading list. We discuss issues at the intersection of finance and market design, with emphasis on information design (transparency vs privacy of trading mechanisms) and market protocols (centralized exchanges versus over-the-counter markets, frequency of trade etc.)

We focus on recent advances in the topic and present open questions so that interested students can promptly come to the frontier and begin their own research.

Grading

Each student is required to present 1 assigned paper in class (students' preferences over papers will be accommodated to the extent possible), submit a written research proposal, and present the proposal in class. Grading will be based on class participation (discussion, student presentations) and a final paper and presentation (a research proposal). Students are expected to read the assigned papers before class.

Prerequisites

Game theory and Price theory at the 1st year PhD level. Real analysis and probability theory at the level necessary to understand modern research papers on financial markets. Prior exposure to finance, market and mechanism design is recommended but not necessary.

Week 1-2: A selection of workhorse models of financial markets. Information Aggregation.

- Grossman and Stiglitz (1980), ``On the Impossibility of Informationally Efficient Markets," The American Economic Review, Vol. 70, No. 3 (June 1980),
- Milgrom and Stokey (1982), ``Information, trade and common knowledge," Journal of Economic Theory, Volume 26, Issue 1,
- Kyle (1985), ``Continuous Auctions and Insider Trading", Econometrica, 1985, vol. 53, issue 6,
- Glosten and Milgrom (1985), `` Bid, ask and transaction prices in a specialist market with heterogeneously informed traders", Journal of Financial Economics, 1985, vol. 14, Issue 1,
- Rostek and Weretka (2012): "Price Inference in Small Markets," Econometrica, 80, 687–711.
- Vayanos (1999): "Strategic Trading and Welfare in a Dynamic Market," The Review of Economic Studies, 66

Supplementary Reading:

- Bagehot (1971), "The Only Game in Town," Financial Analysts Journal, Volume 27, Issue 2,
- Copeland and Galai (1982), ``Information Effects on the Bid-Ask Spread", The Journal of Finance, Volume 38 No. 5
- Easley and O'Hara (1987), ``Price, trade size, and information in securities markets," Journal of Financial Economics, Volume 19, Issue 1,
- Kyle (1989), ``Informed Speculation with Imperfect Competition," The Review of Economic Studies, Volume 56, No. 3
- Holden and Subrahmanyam (1992), ``Long-Lived Private Information and Imperfect Competition," The Journal of Finance, Volume 47, Issue 1,
- Rochet and Vila (1994), ``Insider Trading without Normality," The Review of Economic Studies, Volume 61, Issue 1,
- O'Hara (2003). Presidential Address: Liquidity and Price Discovery. The Journal of Finance, 58(4), 1335-1354.
- Vives (2011), "Strategic Supply Function Competition with Private Information," Econometrica, 79, 1919–1966.
- Ostrovsky (2012), "Information Aggregation in Dynamic Markets with Strategic Traders," Econometrica, 80, 2595–2649.
- O'Hara (1997), Market microstructure theory. Malden, Mass., USA: Blackwell Business.
- Harris (2002), Trading and Exchanges: Market Microstructure for Practitioners. Oxford University Press

Week 3: High-Frequency Trading, Optimal Frequency of Trade, and Exchange Competition.

- Budish, Cramton, and Shim (2015): "The High-Frequency Trading Arms Race: Frequent Batch Auctions as a Market Design Response," Quarterly Journal of Economics, 130, 1547–1621.
- Du and Zhu (2017), ``What is the Optimal Trading Frequency in Financial Markets?", Review of Economic Studies (2017), 84, 1606--1651.
- Pagnotta and Philippon (2018), ``Competing on Speed," Econometrica, Vol 86, 1067-1116
- Baldauf and Mollner (2018), ``High-Frequency Trading and Market Performance", Working Paper
- Baldauf and Mollner (2018), ``Trading in Fragmented Markets", Working Paper

Supplementary Reading:

- Fox, Glosten, and Rauterberg (2015), ``The New Stock Market: Sense and Nonsense", Duke Law Journal, Vol. 65, No. 2, November.
- O'Hara (2015), ``High frequency market microstructure," Journal of Financial Economics, Volume 116, Issue 2,

- Jones (2013), ``What Do We Know About High-Frequency Trading?", Columbia Business School Research Paper No. 13-11
- Loertscher, Muir and Taylor (2018), ``Optimal Market Thickness and clearing", Working Paper.
- Chao, Chen, and Mao (2017) ``Why Discrete Price Fragments? U.S. Stock Exchanges and Disperses Their Fee Structures," Working Paper

Week 4: Market Fragmentation. Centralized vs Decentralized Trading.

- Malamud and Rostek (2017), ``Decentralized Exchange," American Economic Review 107:3320–3362.
- Babus and Parlatore (2018), ``Strategic Fragmented Markets," Working Paper.
- Yoon (2018), "Endogenous Market Structure: Over-the-Counter versus Exchange Trading," Working Paper (link to be added)
- Wang and Lee (2018), ``Why Trade Over-the-counter? When Investors Want Price Discrimination", Working Paper
- Glode and Opp (2018), ``Over-the-Counter vs. Limit-Order Markets: The Role of Traders' Expertise," Working Paper

Week 5: Price vs Size Discovery. OTC Markets

- Zhu (2014), ``Do Dark Pools Harm Price Discovery?" Review of Financial Studies (2014), 27(3): 747-789.
- Duffie and Zhu (2017), ``Size Discovery," Review of Financial Studies (2017), 30(4), 1095--1150.
- Antill and Duffie (2018) ``Augmenting Markets with Mechanisms," Working paper, Graduate School of Business, Stanford University.
- Duffie, Gârleanu, and Pedersen (2005), ``Over-the-Counter Markets," Econometrica, 73: 1815–1847
- Farboodi, Jarosch and Shimer (2017), ``The emergence of market structure", Working Paper
- Wang (2017), ``Core-Periphery Trading Networks", Working Paper

Supplementary Reading:

- Pancs (2014), "Workup," Review of Economic Design, Springer;Society for Economic Design, vol. 18(1), pages 37-71, March.
- Duffie, Malamud and Manso (2009), "Information Percolation with Equilibrium Search Dynamics", *Econometrica* 2009, Volume 77
- Duffie, Giroux and Manso (2010), "Information Percolation," American Economics Journal: Microeconomic Theory *2010*
- Zhu (2012), ``Finding a Good Price in Opaque Over-the-Counter Markets," Review of Financial Studies (2012), 25(4)
- Janssen, Pichler and Weidenholzer (2011), ``Oligopolistic markets with sequential search and production cost uncertainty," Rand Journal of Economics 2011 (42: 3), pp. 444-470
- Babus and Kondor (2018), ``Trading and Information Diffusion in Over-the-Counter Markets", Working Paper
- Chang and Zhang (2016), ``Endogenous Market Making and Network Formation," Working Paper
- Lauermann and Wolinsky (2016): "Search with Adverse Selection," Econometrica, 84(1), 243–315
- Glode and Opp (2016), "Asymmetric Information and Intermediation Chains." American Economic Review, 106 (9): 2699-2721.
- Duffie (2012). Dark Markets: Asset Pricing and Information Transmission in Over-the-Counter Markets, Princeton University Press.

Week 6: Transparency versus Privacy in OTC Markets

- Asriyan, Fuchs, and Green (2017), ``Information Spillovers in Asset Markets with Correlated Values," American Economic Review
- Fuchs, Öry, and Skrzypacz (2016), ``Transparency and distressed sales under asymmetric information", Theoretical Economics, Vol 11, Issue3.
- Back, Liu, and Teguia (2018), "Signaling in Over-the-Counter Markets: Benefits and Costs of Transparency," Working Paper.
- Cujean and Praz (2015), ``Asymmetric Information and Inventory Concerns in Over-the-Counter Markets", Working Paper.
- Bhattacharya (2016) ``Can transparency hurt investors in over-the-counter markets?" Working Paper.

Supplementary Reading:

- Calzolari and Pavan (2006), ``On the Optimality of Privacy in Sequential Contracting", Journal of Economic Theory, Vol 130, Issue 1.
- Calzolari and Pavan (2006), ``Monopoly with Resale", RAND Journal of Economics, Vol 37, Issue 2.
- Dworczak (2018), "Mechanism Design with Aftermarkets: Cutoff Mechanisms", Working Paper
- Ollar, Rostek and Yoon (2017), "Privacy in Markets", Working Paper
- Dwork (2006), ``Differential Privacy", in ``Automata, Languages and Programming," Springer Berlin Heidelberg, pages 1-12.
- Asquith,Covert, and Pathak (2013), ``The effects of mandatory transparency in financial market design: Evidence from the corporate bond market," Working Paper (empirical)
- Bessembinder and Maxwell (2008), ``Markets transparency and the corporate bond market," The Journal of Economic Perspectives 22, 217–234 (empirical)

Week 7: Financial Benchmarks

- Duffie and Stein (2015) ``Reforming LIBOR and other financial market benchmarks," Journal of Economic Perspectives, 29, 191–212.
- Duffie, Dworczak and Zhu (2017), ``Benchmarks in Search Markets," Journal of Finance (2017), 72, 1983—2044.
- Zhang (2018), ``Competition and Manipulation in Derivative Contract Markets," Working Paper.
- Coulter, Shapiro and Zimmerman (2018), ``A Mechanism for LIBOR," Review of Finance, Volume 22, Issue 2, Pages 491–520

Supplementary Reading:

- Hou and Skeie (2013) ``LIBOR: origins, economics, crisis, scandal and reform," The New Palgrave Dictionary of Economics, Online Edition, edited by Steven N. Durlauf and Lawrence E. Blume.
- Eisl, Jankowitsch, and Subrahmanyam (2014), "The Manipulation Potential of Libor and Euribor," European Financial Management, Vol 23, Issue 4.
- Youle (2013). ``How Much Did Manipulation Distort the Libor?," Working Paper.
- Duffie (2018), "Compression Auctions, With an Application to LIBOR-SOFR Swap Conversion," Technical Note.
- Duffie (2018), ``Notes on LIBOR Conversion," Technical Note.
- Duffie and Dworczak (2018), ``Robust Benchmark Design", Working Paper.

Week 8: Stress tests.

- Goldstein and Leitner (2018), ``Stress tests and information disclosure," Journal of Economic Theory, Volume 177, Pages 34-69,
- Orlov, Skrzypacz and Zryumov (2018), "Design of Macro-Prudential Stress Tests," Workin Paper.
- Inostroza and Pavan (2018), ``Persuasion in Global Games with Application to Stress Testing", Working Paper.
- Inostroza (2018), ``Persuading Multiple Audiences: Disclosure Policies, Capital Requirements, and Liquidity Provision", Working Paper.

Supplementary Reading:

- Bouvard, Chaigneau, and Mota (2015), ``Transparency in the Financial System: Rollover Risk and Crises," The Journal of Finance, 70: 1805-1837.
- Goldstein and Sapra (2014), ``Should banks' stress test results be disclosed? an analysis of the costs and benefits," Foundations and Trends in Finance, 8(1):1–54, 2014.
- Faria-e Castro, Martinez, and Philippon (2015) ``Runs versus lemons: Information disclosure and fiscal capacity," The Review of Economic Studies
- Goldstein and Chong (2016), "Bayesian Persuasion in Coordination Games," American Economic Review, 106 (5): 592-96.

Week 9: Blockchain. Virtual Currencies

- Budish (2018), ``The Economic Limits of Bitcoin and the Blockchain", Working Paper.
- Huberman, Leshno, and Moallemi (2018), ``Monopoly Without a Monopolist: An Economic Analysis of the Bitcoin Payment System," Working Paper.
- Carlsten, Kalodner, Weinberg and Narayanan (2016), ``On the instability of bitcoin without the block reward," in 'Proceedings of the 2016 ACM SIGSAC Conference on Computer and Communications Security', ACM, pp. 154–167.
- Eyal and Sirer (2014),``Majority is not Enough: Bitcoin Mining is Vulnerable", in the the 18th International Conference on Financial Cryptography and Data Security (FC).

Supplementary Reading:

- Nakamoto (2008), ``Bitcoin: A peer-to-peer electronic cash system".
- Susan, Parashkevov, Sarukkai,and Xia (2016), ``Bitcoin Pricing, Adoption, and Usage: Theory and Evidence," Working Paper
- Chiu and Koeppl (2017), 'The economics of cryptocurrencies–bitcoin and beyond', Working Paper

Week 10: Student presentations of research proposals