

Economics 40701 – Topics in Matching and Market Design

Scott Duke Kominers

Logistics

Time. Fridays, 14:00–16:30± ϵ (beginning April 5, 2013)

Location. Social Sciences 401

Office Hours.

- By appointment (skominers@uchicago.edu)

Course Webpage.

- http://scottkom.com/courses/Topics-in-Matching-and-Market-Design_2012-2013/

Teaching Assistant.

- Jörn Boehnke (jboehnke@uchicago.edu)

Overview

Description. This course is a reading seminar on the theory and practice of market design. The first few weeks will introduce the field and its technology; subsequent weeks will discuss recent papers alongside their classical antecedents. In addition to technical content, class discussion will pay special attention to issues of problem identification and formulation, so as to understand what comprises “interesting” work in market design.

Most papers under consideration will be theoretical, although some empirical/engineering work will be discussed. (See below for a list of topics.)

This course is the third course in the 2012–2013 *Market Design* field sequence – it follows Economics 40501 (Price Theory and Market Design) and Economics 40801 (Introduction to Theory-Based Empirical Methods with Applications to Market Design).

Prerequisites. The other courses in the Market Design field sequence, as well as many courses under the “Mathematical Economics” field designation, will provide useful context and technical background. Some understanding of algorithms, complexity, and combinatorics will be invaluable. However, *I do not believe in formal prerequisites*—these observations are made only for the purpose of guidance.

If you are interested in taking the course, and are concerned about the difficulty of the material, please get in touch with me early in (or before) spring quarter. I am inclined to reward individuals for taking risks and stretching themselves.

Requirements. Evaluation will be primarily based upon class participation and discussion. Each student will be responsible for leading at least one discussion session. (Discussion leadership roles will be assigned via a version of the deferred acceptance algorithm, with some priority given in reverse order of academic seniority.) In addition, students will periodically be required to supply comments in advance of discussion, as a commitment device to enforce reading.

A written “idea proposal” exercise will be required as well; details will be established by social choice mechanism (i.e. vote) at the first course meeting.

Topics

Introduction/Overview.

For Class Discussion.

David Gale and Lloyd S. Shapley. College admissions and the stability of marriage. *American Mathematical Monthly*, 69:9–15, 1962.

Alvin E. Roth. The economist as engineer: Game theory, experimentation, and computation as tools for design economics. *Econometrica*, 70:1341–1378, 2002.

Alvin E. Roth. Deferred acceptance algorithms: History, theory, practice, and open questions. *International Journal of Game Theory*, 36:537–569, 2008.

Atila Abdulkadiroğlu and Tayfun Sönmez. House allocation with existing tenants. *Journal of Economic Theory*, 88:233–260, 1999.

Further Reading.

Alvin E. Roth and Xiaolin Xing. Jumping the gun: Imperfections and institutions related to the timing of market transactions. *American Economic Review*, 84:992–1044, 1994.

Alvin E. Roth and Xiaolin Xing. Turnaround time and bottlenecks in market clearing: Decentralized matching in the market for clinical psychologists. *Journal of Political Economy*, 105:284–329, 1997.

Alvin E. Roth. The evolution of the labor market for medical interns and residents: A case study in game theory. *Journal of Political Economy*, 92:991–1016, 1984.

Alvin E. Roth and Elliott Peranson. The effects of the change in the NRMP matching algorithm. *American Economic Review*, 89:748–780, 1999.

The Market Designer's Toolbox.

For Class Discussion.

Fuhito Kojima and Parag A. Pathak. Incentives and stability in large two-sided matching markets. *American Economic Review*, 99:608–627, 2009.

Parag A. Pathak and Tayfun Sönmez. Leveling the playing field: Sincere and sophisticated players in the Boston mechanism. *American Economic Review*, 98:1636–1652, 2008.

Parag A. Pathak and Tayfun Sönmez. School admissions reform in Chicago and England: Comparing mechanisms by their vulnerability to manipulation. *American Economic Review*, 103:80–106, 2013.

John William Hatfield and Paul Milgrom. Matching with contracts. *American Economic Review*, 95:913–935, 2005.

John William Hatfield and Scott Duke Kominers. Contract design and stability in matching markets. Mimeo, Harvard Business School, 2010.

Further Reading.

Hiroyuki Adachi. On a characterization of stable matchings. *Economics Letters*, 68:43–49, 2000.

Eduardo M. Azevedo and Jacob Leshno. A supply and demand framework for two-sided matching markets. Harvard University Working Paper, 2012.

Itai Ashlagi, Mark Braverman, and Avinatan Hassidim. Stability in large matching markets with complementarities. MIT Sloan Working Paper, 2011.

Alexander S. Kelso and Vincent P. Crawford. Job matching, coalition formation, and gross substitutes. *Econometrica*, 50:1483–1504, 1982.

John William Hatfield, Scott Duke Kominers, Alexandru Nichifor, Michael Ostrovsky, and Alexander Westkamp. Stability and competitive equilibrium in trading networks. Stanford Graduate School of Business Working Paper, 2012.

Eduardo M. Azevedo and Eric Budish. Strategy-proofness in the large. Booth School of Business Working Paper, 2013.

Combinatorial Assignment.

For Class Discussion.

Lloyd Shapley and Herbert Scarf. On cores and indivisibility. *Journal of Mathematical Economics*, 1:23–37, 1974.

Aanund Hylland and Richard Zeckhauser. The efficient allocation of individuals to positions. *Journal of Political Economy*, 87:293–314, 1979.

Eric Budish. The combinatorial assignment problem: Approximate competitive equilibrium from equal incomes. *Journal of Political Economy*, 119:1061–1103, 2011.

Eric Budish and Estelle Cantillon. The multi-unit assignment problem: Theory and evidence from course allocation at harvard. *American Economic Review*, 102:2237–2271, 2012.

Further Reading.

Tayfun Sönmez and M. Utku Ünver. Course bidding at business schools. *International Economic Review*, 51:99–123, 2006.

Anna Bogomolnaia and Herve Moulin. A new solution to the random assignment problem. *Journal of Economic Theory*, 100:295–328, 2001.

Qingmin Liu and Marek Pycia. Ordinal efficiency, fairness, and incentives in large markets. UCLA Working Paper, 2012.

Cadet–Branch Matching.

For Class Discussion.

Tayfun Sönmez. Bidding for army career specialties: Improving the ROTC branching mechanism. Mimeo, Boston College, 2011.

Background.

John William Hatfield and Fuhito Kojima. Substitutes and stability for matching with contracts. *Journal of Economic Theory*, 145:1704–1723, 2010.

Tayfun Sönmez and Tobias B. Switzer. Matching with (branch-of-choice) contracts at United States Military Academy. *Econometrica*, 81:451–488, 2013.

Further Reading.

Orhan Aygün and Tayfun Sönmez. Matching with contracts: The critical role of irrelevance of rejected contracts. Boston College Working Paper, 2012.

Orhan Aygün and Tayfun Sönmez. The importance of irrelevance of rejected contracts in matching under weakened substitutes conditions. Boston College Working Paper, 2012.

Signaling in Matching Markets.

For Class Discussion.

Soohyung Lee, Muriel Niederle, Hye-Rim Kim, and Woo-Keum Kim. Propose with a rose? Signaling in Internet dating markets. Stanford University Working Paper, 2011.

Background.

Peter Coles, Alexey Kushnir, and Muriel Niederle. Preference signaling in matching markets. *American Economic Journal: Microeconomics*, 5:99–134, 2013.

Peter Coles, John Cawley, Phillip B. Levine, Muriel Niederle, Alvin E. Roth, and John J. Siegfried. The job market for new economists: A market design perspective. *Journal of Economic Perspectives*, 24:187–206, 2010.

Further Reading.

Günter J. Hitsch, Ali Hortaçsu, and Dan Ariely. Matching and sorting in online dating. *American Economic Review*, 100:130–163, 2010.

Affirmative Action in School Choice.

For Class Discussion.

Scott Duke Kominers and Tayfun Sönmez. Designing for diversity in matching. University of Chicago Working Paper, 2013.

Background.

Atila Abdulkadiroğlu and Tayfun Sönmez. School choice: A mechanism design approach. *American Economic Review*, 93:729–747, 2003.

Fuhito Kojima. School choice: Impossibilities for affirmative action. *Games and Economic Behavior*, 75:685–693, 2012.

Isa Emin Hafalir, M. Bumin Yenmez, and Muhammed Ali Yildirim. Effective affirmative action in school choice. *Theoretical Economics*, 8:325–363, 2013.

Further Reading.

Umut Dur, Scott Duke Kominers, Parag A. Pathak, and Tayfun Sönmez. The demise of walk zones in Boston: Priorities vs. precedence in school choice. Boston College Working Paper, 2013.

Federico Echenique and M. Bumin Yenmez. How to control controlled school choice. Tepper Business School Working Paper, 2013.

Eric Budish, Yeon-Koo Che, Fuhito Kojima, and Paul Milgrom. Designing random allocation mechanisms: Theory and applications. *American Economic Review*, 103:585–623, 2013.

Kidney Exchange Chains.

For Class Discussion.

Itai Ashlagi, David Gamarnik, Michael A. Rees, and Alvin E. Roth. The need for (long) chains in kidney exchange. National Bureau of Economic Research Working Paper 18202, 2012.

Background.

Alvin E. Roth, Tayfun Sönmez, and M. Utku Ünver. Kidney exchange. *Quarterly Journal of Economics*, 119:457–488, 2004.

Alvin E. Roth, Tayfun Sönmez, and M. Utku Ünver. Efficient kidney exchange: Coincidence of wants in markets with compatibility-based preferences. *American Economic Review*, 97:828–851, 2007.

Further Reading.

Alvin E. Roth, Tayfun Sönmez, and M. Utku Ünver. A kidney exchange clearinghouse in New England. *American Economic Review Papers & Proceedings*, 95:376–380, 2005.

Itai Ashlagi and Alvin E. Roth. New challenges in multi-hospital kidney exchange. *American Economic Review Papers & Proceedings*, 102:354–359, 2012.

Itai Ashlagi, Patrick Jaillet, and Vahideh H. Manshadi. Kidney exchange in dynamic sparse heterogeneous pools. Preprint, arXiv:1301.3509, 2013.

Gary S. Becker, Julio J. Elias, and Karen Ye. The shortage of kidneys for transplant: Altruism, exchanges, opt in versus opt out, and the market for kidneys. Becker Friedman Institute Working Paper, 2013.

Spectrum Reassembly.

For Class Discussion.

Paul Milgrom, Lawrence Ausubel, Jonathan Levin, and Ilya Segal. Incentive auction rules option and discussion. Appendix to the FCC's 28-Sep-2012 NPRM on Incentive Auctions, 2012.

Background.

- FCC Staff. The broadcast television spectrum incentive auction: Innovation in policy to ignite innovation for consumers and business, 2013.
- George J. Mailath and Andrew Postelwaite. Asymmetric information bargaining problems with many agents. *Review of Economic Studies*, 57:351–367, 1990.
- Gregory Rosston. Incentive auctions. *Communications of the ACM*, 55:24–26, 2012.
- Scott Duke Kominers and E. Glen Weyl. Holdout in the assembly of complements: A problem for market design. *American Economic Review Papers & Proceedings*, 102:360–365, 2012.

Further Reading.

- Yeon-Koo Che, Phil Haile, and Michael Kearns. Design of the FCC incentive auctions. White Paper, 2013.
- Ian A. Kash, Rohan Murty, and David C. Parkes. Enabling spectrum sharing in secondary market auctions. In *Proceedings of the 6th Workshop on the Economics of Networks, Systems, and Computation (NetEcon)*, 2011.
- Scott Duke Kominers and E. Glen Weyl. Concordance among holdouts. Harvard Institute of Economic Research Discussion Paper, 2012.

General References

Matching.

- Alvin E. Roth and Marilda Sotomayor. *Two-Sided Matching: A Study in Game-Theoretic Modeling and Analysis*. Cambridge University Press, 1990.
- Tayfun Sönmez and M. Utku Ünver. Matching, allocation, and exchange of discrete resources. *Handbook of Social Economics*, 1:781–852, 2009.
- Parag A. Pathak. The mechanism design approach to student assignment. *Annual Review of Economics*, 3:513–536, 2011.
- Royal Swedish Academy of Sciences. Scientific background: Stable allocations and the practice of market design, 2012.

Auctions.

- Peter Cramton, Yoav Shoham, and Richard Steinberg. *Combinatorial Auctions*. MIT Press, 2006.
- Paul Klemperer. *Auctions: Theory and Practice*. Princeton University Press, 2004.
- Vijay Krishna. *Auction Theory*. Academic Press, 2009.
- Paul Milgrom. *Putting Auction Theory to Work*. Cambridge University Press, 2004.
- Noam Nisan, Tim Roughgarden, Eva Tardos, and Vijay V. Vazirani. *Algorithmic Game Theory*. Cambridge University Press, 2007.

Market Design.

- Alvin E. Roth. The art of designing markets. *Harvard Business Review*, 85, 2007.
- Alvin E. Roth. What have we learned from market design? *The Economic Journal*, 118:285–310, 2008.

Recent Discoveries

Matching and Assignment.

- Stephan Lauermaun and Georg Nöldeke. Stable marriages and search frictions. University of Michigan Working Paper, 2013.
- James Schummer and Rakesh V. Vohra. Assignment of arrival slots. *American Economic Journal: Microeconomics*, 5:164–85, 2013.

Market Design.

Sarbartha Bandyopadhyay, Fedor Iskhakov, Terence Johnson, Soohyung Lee, David McArthur, John Rust, Joel Watson, and John Watson. Can the job market for economists be improved? University of Maryland Working Paper, 2012.