ECON 712-010 Session 1: Topics in Advanced Economics  
(Two-sided Matching and Assignment Problems)

January 2015

• Instructor: SangMok Lee
• Class time: Mondays, 5-8PM

1 Outline

The goal of the class is to introduce students to formal modeling in two-sided matching and assignment problems and suggest some interesting directions for future research. We will discuss decentralized matching markets (e.g., the marriage market), matching markets through institutions (e.g., medical labor market and school choice problem), and assignment problems (e.g., housing allocation). The class will focus on theoretical analysis with supplements from empirical studies and lab experiments.


2 Prerequisites

Basic knowledge of Microeconomic Theory, Probability and Game Theory are necessary.

3 Requirements

The final grade will be determined by class presentations, and an individual paper:

1. Class presentations: Each presentation should be approximately 40 minutes (allowing time for discussion). You should summarize the contribution of the paper, detail the main model or result and main arguments, and suggest some questions for further work on the topic. For each presentation, there will be an additional “critical reader”, who is expected to have read the paper particularly carefully and also be prepared to make comments, raise questions, or
suggest further directions on the topic. Everyone is expected to discuss the paper. At the start of each talk I will randomly select a student (other than the speaker or the critical reader) to give a 3-minute summary of the paper.

2. Individual papers (option 1): You should hand a ~15 page (1.5 line spaced, 11 pt font) research paper by the end of semester. This should outline a question, its context in the literature, why it is important, and some preliminary results. If your project is theoretical in nature, you should sketch a model and provide some basic insights from the model. If it is empirical, you should describe precisely the data sources you will be using and empirical techniques you plan to utilize.

3. Two referee reports on recent working papers (option 2): Each report should be 2-3 pages (1.5 line spaced, 11 pt fonts). The reports should start off with a short summary of the articles. You should describe your main 3-4 points in detail and conclude the report with more minor comments. A good referee report not only clearly states the shortcomings of the work, but also lays out constructive, detailed and realistic suggestions for improvement.

4  Textbook

Roth, Alvin E. and Marilda A. O. Sotomayor (1990), Two-Sided Matching: A Study in Game-Theoretic Modeling and Analysis, Cambridge University Press.

5  Topics

5.1  Basic Theory of Two-sided Matching (Jan 14, Wed)

1. Matching with Non-transferable Utilities, Stability and the Gale-Shapley algorithm:

   (*) Roth-Sotomayor (chapter 2)


2. Many-to-one Matching:

   (*) Roth-Sotomayor (chapter 5)

3. Matching with Transferable Utilities (a.k.a. Assignment Game)

   (*) Roth-Sotomayor (chapter 8)

5.2 The Structure of The Set of Stable Matchings (Jan 26, Feb 2)

1. The Structure and Computation of Stable Matchings

(*) Roth-Sotomayor (chapter 3)

2. Linear Programming Approach


3. Lattice, Tarski’s Fixed Point Theorem


4. An Extension to Matching with Contract


5. The Structure of Stable Matchings with Transferable Utilities

(*) Roth-Sotomayor (chapter 8)
5.3 Mechanism Design Aspects of Matching (Feb 9)

1. Stable Matching Mechanisms

2. Strategic Issues
(*) Roth-Sotomayor (chapters 4 and 5)

3. Unraveling

4. Application I: National Resident Matching Program

5. Application II: Public School Choice Programs

6. Applications III: Others.
Sonmez and Switzer (2013) on Cadet-Branch Matching (see the next topic)

5.4 The Interplay Between Theory and Application (Feb 16)

1. The Interplay

2. A Survey and More

5.5 Random Assignment Problems and Applications (Feb 23)

1. Theory
Pycia, Marek, and M. Utku Unver. "Incentive compatible allocation and exchange of discrete resources.” Available at SSRN 1079505 (2014).


5.6 Large Market Models (Feb 23, Mar 2)

1. Large Two-sided Matching
SangMok Lee, Incentive Compatibility of Large Centralized Matching Markets, mimeo.
Itai Ashlagi, Yash Kanoria and Jacob D. Leshno, “Unbalanced random matching markets: the stark effect of competition,” mimeo.

2. Large Assignment Problems
Liu, Qingmin, and Marek Pycia. "Ordinal efficiency, fairness, and incentives in large markets.” mimeo.

5.7 Matching in Related Fields (Mar 2)

1. Empirical Analysis


Fox, Jeremy (2009), Estimating Matching Games with Transfers, mimeo.


(*) Konrad Menzel, “Large Matching Markets as Two-Sided Demand Systems,” Mimeo


2. Lab Experiments


3. Macro/Labor Econ: Search and Matching


Rogerson, Richard, Robert Shimer, and Randall Wright (2005), Search-Theoretic Models of

5.8 Other Recent Topics

1. Affirmative Actions

2. Stability and Efficiency

3. Dynamic Matching Market Games

4. Externalities

5. Matching with Incomplete Information
   To be covered in Session 2 by Prof. Mailath.