

Research in Two-sided Matching Markets

An Experimental Study of Stability and Compromise Market Outcomes

by Federico Echenique



Two-sided matching markets are an important form of economic organization.

Labor markets are simple examples, as are many other markets with clearly delineated buyers and sellers. In some special but important cases, the markets are centrally organized. For example, in the market for medical interns in the US (among other countries), participants can opt to submit matching preferences. A potential intern may state that Hospital 1 is the most-preferred choice; followed by Hospital 2, and so on. Hospitals submit their preferences in a similar fashion. The centralized organization then uses an algorithm to determine who is matched with whom.

emerge (namely, stable or not) as a function of the size of the markets and the preferences of participants. In addition, we test which stable matchings have more prominent drawing power experimentally.

We find that stable matching, the rationale behind centralizing the medical interns market, is a powerful driving force. The vast majority of markets seek to achieve a stable matching. Additionally, there are very interesting selection dynamics among stable matchings: a market will seek out a compromise, a matching that is neither too good for buyers and bad for sellers or vice versa. This selection finding is unexpected as the currently-used centralized algorithms install a match-

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We have studied centralized markets experimentally; and have conducted a collection of experimental studies—initially funded by the Lee Center—of two-sided matching markets. The research is joint with Leet Yariv, Associate Professor of Economics at Caltech, Gabriel Katz (graduate student at Caltech) and Alistair Wilson (graduate student at NYU). In our baseline treatment, there are two groups of agents (a metaphor for firms and workers). Agents can form pairs, obtaining different payoffs from matching with different agents from the opposite group, with very few constraints on their interactions (i.e., in a decentralized fashion). We investigate the predictive power of the theory of stable matching, analyzing the type of matchings that

are best for one side and worst for the other; currently, for the interns market, it is the best for the interns. There are no known efficient algorithms for an intermediate matching, yet markets on their own seek to install one.

We conjecture that the intermediate matching is driven by the symmetry in market position of the two sides. However, experiments in which only one side of the market is allowed to propose a match show, surprisingly, that the intermediate matching is still prevalent.

In a separate set of experiments, we are investigating the institutions used in centralized matching markets. We want to understand what are the incentives facing the agents who participate in these in-

		Stable	O. F.	O. C.	Median	Unstable	Mkt. Stable
8 × 8	Unique	95%				5%	92%
	Two	94%	61%	39%		6%	91%
	Three	95%	11%	16%	73%	5%	72%
	Total	95%				5%	85%
15 × 15		Stable	O. F.	O. C.	Median	Unstable	Mkt. Stable
	Unique	83%				17%	50%
	Three	100%	3%	3%	93%	0%	100%
	Total	89%				11%	80%

The table above shows the main results of the first collections of experiments we have described. The labels “O.F.” and “O.C.” stand for the matchings that are optimal to each of the sides of the market (buyers and sellers). The “median” matching is the compromise between both sides. The two sizes are indicated on the left of the table: 8 or 15 on each side of the market. We also indicate whether there was a unique, two or three stable matchings in the experimental design. Note that there is a median stable matching only when the design has three stable matchings.

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stitutions. Our experiments are designed so that agents in a market follow a specific protocol for arriving at a match; the protocols mimic the mechanics of the real-world matching institutions we study. Our results suggest a significant volume of manipulation on the side of participants and emerging outcomes that are limited in efficiency.

Matching markets have an important role in the economy. They determine such varied outcomes as which student goes to what school, who gets which job, who marries whom, and who buys which house. Our experiments are some of the first to analyze crucial elements determining decentralized and centralized market outcomes. This new experimental platform is designed to complement a range of empirical studies of markets and will offer a controlled way to assess important factors dictating the functioning of different types of markets. We are very active in this direction, and working on many problems that remain open, such as accounting for incomplete information, restricted communication between agents, and many others.

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Read more at: <http://www.hss.caltech.edu/~fede>

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