

Recent Developments in Market Design
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Abstracts

**Bettina Klaus, University of Lausanne & Maastricht University
(with F. Payot)**

Paths to Stability in the Assignment Problem

We study a labor market with finitely many heterogeneous workers and firms to illustrate the blocking dynamics in two-sided one-to-one matching markets with continuous side payments (assignment problems, Shapley and Shubik, 1972). A labor market is unstable if there is at least one blocking pair, that is, a worker and a firm who would prefer to be matched to each other in order to obtain higher payoffs than the payoffs they obtain by being matched to their current partners. A blocking path is a sequence of outcomes (specifying matchings and payoffs) such that each outcome is obtained from the previous one by satisfying a blocking pair (i.e., by matching the two blocking agents and assigning new payoffs to them that are higher than the ones they received before). We are interested in the question if starting from any (unstable) outcome, there always exists a blocking path that will lead to a stable outcome. In contrast to the discrete version of the model (i.e., for one-to-one matching or marriage markets), the existence of blocking paths to convergence cannot always be guaranteed. We identify a necessary and sufficient condition for an assignment problem to guarantee the existence of paths to stability. This result is in line with those of Roth and Vande Vate (1990), Diamantoudi, Miyagawa and Xue (2004), and Chen, Fujishige and Yang (2011).

Flip Klijn, Institute for Economic Analysis (with P. Jaramillo & Ç. Kayi)

Asymmetrically Fair Rules for an Indivisible Good Problem with a Budget Constraint

We want to allocate an object among two agents who have property rights over the object; the dispossessed agent and the owner, and compensate the one who does not get the object. There is also a maximum amount of money available for the compensation. We characterize a family of asymmetrically fair rules that are immune to strategic behavior, guarantee the participation of both agents, and satisfy the budget constraint.

**Scott Duke Kominers, Becker Friedman Institute for Research in Economics,
University of Chicago (with J.W. Hatfield)**

Multilateral Matching

We introduce a matching model in which agents engage in joint ventures via multilateral contracts. This approach allows us to consider production complementarities previously outside the scope of matching theory. We show analogues of the first and second welfare theorems, and, when agents' utilities are concave in venture participation, show that competitive equilibria exist, correspond to stable outcomes, and yield core outcomes. Competitive equilibria exist in our setting even when externalities are present.

Morimitsu Kurino, Maastricht University (with O. Kesten)

On Efficient Lottery Design

There has been a surge of interest in stochastic assignment mechanisms in the recent literature. Contrary to stochastic mechanisms, however, lottery mechanisms are commonly used for the assignment of indivisible goods in real-life. To help facilitate the design of practical lottery mechanisms, we offer a method of obtaining stochastic improvements in lotteries and provide various applications. We find, however, that such improvements can entail ex post welfare losses as well as loss of strategy-proofness. In particular, we show that no strategy-proof mechanism stochastically dominates the widely-used random serial dictatorship mechanism.

Alexey Kushnir, University of Zürich (with J.K. Goeree)

***On the Equivalence of Bayesian and Dominant Strategy
Implementation in a General Class of Social Choice Problems***

We consider a standard social choice environment with linear utilities and independent, one-dimensional, private values. We provide a short and constructive proof that for any Bayesian incentive compatible mechanism there exists an equivalent dominant strategy incentive compatible mechanism that delivers the same interim expected utilities for all agents. We demonstrate the usefulness and applicability of our approach with several examples. Finally, we show that the equivalence between Bayesian and dominant strategy implementation breaks down when utilities are non-linear or when values are interdependent, multi-dimensional, or correlated.

Markus Walzl, Innsbruck University (with C. Kah)

Learning How to Bid in Auctions with Externalities

In the presence of allocative externalities, auctions may exhibit multiple equilibria that can be ranked according to transaction prices. We propose a model with boundedly rational bidders who learn how to bid in these environments. We demonstrate that low as well as high price equilibria can be (unique) stochastically stable states depending on inertia, memory, and sample size of the learning dynamics.

Alexander Westkamp, University of Bonn (with L. Ehlers)

Strategy-Proof Tie-Breaking

We study a general class of priority-based allocation problems with weak priority orders and identify conditions under which there exists a strategy-proof mechanism which always chooses an agent-optimal stable, or constrained efficient, matching. A priority structure for which these two requirements are compatible is called solvable. For the general class of priority-based allocation problems with weak priority orders, we introduce three simple necessary conditions on the priority structure. We show that these conditions completely characterize solvable environments within the class of indifference at the bottom (IB) environments, where ties occur only at the bottom of the priority structure. This generalizes and unifies previously known results on solvable and unsolvable environments established in school choice, housing markets and house allocation with existing tenants. We show how the previously known solvable cases can be viewed as extreme cases of solvable environments. For sufficiency of our conditions we introduce a version of the agent-proposing deferred acceptance algorithm with exogenous and preference-based tie-breaking.
