

Lausanne Matching and Market Design Workshop 2020¹

University of Lausanne, HEC – May, 28th – 29th 2020

All talks will take place on zoom: 30 minutes for each talk, 10 minutes for discussions – please contact bettina.klaus@unil.ch to attend and receive the zoom workshop link.

May 28th 2020

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| 9:45 am – 10:00 am | Meet and greet (as in a real workshop it might be nice to just say hello to participants before getting started). |
| 10:00 am – 10:40 am | Robust Minimal Instability of the Top Trading Cycles Mechanism , Battal Dogan (University of Bristol) joint with L Ehlers |
| 10:40 am – 11:20 am | Stability in matching markets with sizes , David Delacretaz (University of Oxford) |
| 11:20 am -11:30 am | Time to make coffee \ tea etc. and grab a cookie (and perhaps chat a bit) |
| 11:30 am – 12:10 pm | Fair procedures with naive agents: who wants the Boston mechanism? , Dorothea Kübler (WZB Social Science Center & TU Berlin), joint with T König, L Mechtenberg, R Schmacker |
| 12:10 pm – 2:10 pm | Time to prepare and have lunch and stretch legs etc. |
| 2:10 pm – 2:50 pm | Transparency in centralized allocation , Rustam Hakimov (University of Lausanne) joint with M Raghavan |
| 2:50 pm – 3:00 pm | Time to make another coffee \ tea etc. and grab a cookie (and perhaps chat a bit) |
| 3:00 pm – 3:40 pm | Pick-an-object mechanisms , Inácio Bó (University of York) joint with R Hakimov |
| 3:40 pm – 4:20 pm | Menu mechanisms , Andy Mackenzie (Maastricht University) joint with Y Zhou |

¹ The original plan to have this workshop take place at the University of Lausanne. Unfortunately, this isn't currently feasible but we hope to organize similar events in the near future.

May 29th 2020

- 11:00 am – 11:40 am **Dynamic assignment without money: optimality of spot mechanisms**, Julien Combe (CREST - Ecole polytechnique) joint with V Nora and O Tercieux
- 11:40 am – 12:20 pm **The Structure of Equilibria in Trading Networks with Frictions**, Jan-Christoph Schlegel (City, University of London)
- 12:20 pm – 2:00 pm Time to prepare and have lunch and stretch legs etc.
- 2:00 pm – 2:40 pm **Banning the Boston Mechanism in Britain: Effects on School Segregation and Student Achievement**, Camille Terrier (University of Lausanne) joint with P. Pathak
- 2:40 pm – 3:00 pm Time to make coffee \ tea etc. and perhaps chat a bit
- 3:00 pm – 3:40 pm **Robust efficiency for random allocation**, Samson Alva (University of Texas at San Antonio) joint with E J Heo and V Manjunath
- 3:40 pm – 4:20 pm **Strategy-proof exchange under trichotomous preferences**, Vikram Manjunath (University of Ottawa) joint with A Westkamp
- 4:20 pm – 4:30 pm Closing Chat

Abstracts

Robust Minimal Instability of the Top Trading Cycles Mechanism, Battal Dogan (University of Bristol) joint with L Ehlers

In the context of priority-based resource allocation, we formulate methods to compare assignments in terms of their stability as binary relations (on the set of possible assignments) that depend on the preferences and the priorities. We introduce three basic properties, stability preferred, separability, and consistency, that a reasonable stability comparison should satisfy. We show that, for any stability comparison satisfying the three properties, the top trading cycles mechanism is minimally unstable among efficient and strategy-proof mechanisms in one-to-one matching. We establish the robustness of a recent result by Abdulkadiroglu et al. (2019), which uses a particular stability comparison method where an assignment is more stable than another assignment if the set of blocking pairs in the former assignment is a subset of the set of blocking pairs in the latter assignment. Our unifying approach covers basically all natural comparison methods and it includes many *cardinal* stability comparison methods as special cases.

Stability in matching markets with sizes, David Delacretaz (University of Oxford)

Matching markets such as day care, student exchange, refugee resettlement, and couples problems involve agents of different sizes, that is agents who require different amounts of capacity. I study a matching market between agents and objects where the size of an agent is either one or two. Contrary to canonical models, the set of stable matchings may be empty. I identify a trade-off for existence: it is always possible to either bound the instability to a certain number of units per object or to eliminate waste but the existence of a matching that does both is not guaranteed. I develop two fairness criteria that lie on either side of this trade-off: unit-stability bounds the instability and size-stability eliminates waste. I show that size-stability is more desirable than unit-stability from a welfare point of view.

Fair procedures with naive agents: who wants the Boston mechanism?, Dorothea Kübler (WZB Social Science Center Berlin & TU Berlin), joint with T König, L Mechtenberg, R Schmacker

We study preferences over procedures in the presence of naive agents. We employ a school choice setting following Pathak and Sönmez (2008) who show that sophisticated agents are better off under the Boston mechanism than under a strategy-proof mechanism if some agents are sincere. We use lab experiments to study the preferences of subjects for the Boston mechanism or the assortative matching. We compare the preferences of stakeholders who know their own role with agents behind the veil of ignorance and spectators. As predicted, stakeholders vote for the Boston mechanism if it maximizes their payoffs and vote for the assortative matching otherwise. This is in line with the model of Pathak and Sönmez (2008). Subjects behind the veil of ignorance mainly choose the Boston mechanism when the priority at schools is determined randomly. In a second experiment with priorities based on performance in a real-effort task, spectators whose payoff does not depend on the choice of the mechanism are split in their vote for the Boston mechanism and the assortative matching. According to the spectators' statements in the post-experimental questionnaire, the main reason for preferring the Boston mechanism is that playing the game well deserves a higher payoff. These findings provide a novel explanation for the widespread use of the Boston mechanism.

Menu mechanisms, Andy Mackenzie (Maastricht University) joint with Y Zhou

We investigate *menu mechanisms*: dynamic mechanisms where at each history, an agent selects from a menu of his possible assignments. We consider both ex-post implementation and full implementation, for both subgame perfection and a strengthening of dominance that covers off-path histories, and provide conditions under which menu mechanisms provide these implementations of rules. In comparison to direct mechanisms, menu mechanisms offer better privacy to participants; we formalize this with a novel notion of mechanism informativeness. Our results cover a variety of environments, including elections, marriage, college admissions, auctions, labor markets, matching with contracts, and object allocation.

Pick-an-object mechanisms, Inácio Bó (University of York) joint with R Hakimov

We present a new family of mechanisms for implementing object allocation rules. In pick-an-object mechanisms, as opposed to traditional revelation mechanisms in which participants are asked to reveal their preferences over the objects, participants are sequentially asked to choose one from a sequence of menus. New menus never include objects chosen before, and final allocation consists of matching each agent with the last object picked by her. We characterize the allocation rules that can be sequentialized via pick-an-object mechanisms and provide conditions under which they can be implemented under a robust truthful equilibrium. We also show that, while equilibrium strategies are essentially the same, the set of allocation rules that can be implemented in pick-an-object mechanisms supersedes those that can be implemented via obviously strategy-proof mechanisms. Laboratory experiments show that subjects behave more often under the equilibrium prediction when implementing a rule under pick-an-object mechanisms than under their direct revelation counterparts.

Transparency in centralized allocation, Rustam Hakimov (University of Lausanne) joint with M Raghavan

Non-transparency is costly for public allocation schemes. Dissatisfied participants tend to file costly appeals when they doubt the legitimacy of their assignments, and authorities themselves tend to resist the adoption of welfare-improving mechanisms if they are perceived to be non-transparent. We investigate these phenomena by proposing a new interpretation of transparency as the perceived clarity of the underlying allocation procedure. We formulate transparency as a function of the richness of the information acquired by participants through two separate channels: their first-hand experience of the mechanism, and the information communicated by the designer. In theoretical results, we show how transparency may be achieved in terms of these two new information design objectives. As illustration, we identify simple and practical transparent implementations of widely-used rules in house allocation, school admissions and single-object auctions. Our results unite two divergent approaches - the use of dynamic mechanisms and the communication of ex-post cutoffs and dropout prices. Our results are corroborated by a school admissions laboratory experiment, in which we vary the degree of transparency of deferred acceptance environments and use the correctness of subjects' appeals decisions as a novel experimental measure of transparency.

Dynamic assignment without money: optimality of spot mechanisms, Julien Combe (CREST-Ecole polytechnique) joint with V Nora and O Tercieux

We study a large market model of dynamic matching with no monetary transfers, finitely many types of agents and a continuum of agents of each type. Time is discrete and horizon finite. Agents are in the market from the first date and, at each date, have to be assigned items which perish at the end of the current period. We prove, under mild regularity assumptions, that incentive compatible and ordinally efficient allocation rules coincide with spot mechanisms. A spot mechanism specifies "virtual prices" for items at each date and, at the beginning of time, for each agent of a given type, randomly selects a budget of virtual money according to a (potentially non-uniform) distribution over $[0; 1]$. Then, at each date, the agent is allocated the item of his choice among the affordable ones. Spot mechanisms impose a linear structure on prices and, perhaps surprisingly, our result shows that this linear structure is what is needed when one requires incentive compatibility and ordinal efficiency.

The Structure of Equilibria in Trading Networks with Frictions, Jan-Christoph Schlegel (City, University of London)

Several structural results for the set of competitive equilibria in trading networks with frictions are established: The lattice theorem, the rural hospitals theorem, the existence of side-optimal equilibria, and a group-incentive-compatibility result hold without the assumption of quasi-linear utility in transfers. While our results are developed in a trading network model, they also imply analogous (and new) results for exchange economies with combinatorial demand and for two-sided matching markets with transfers.

Banning the Boston Mechanism in Britain: Effects on School Segregation and Student Achievement, Camille Terrier (University of Lausanne) joint with P. Pathak

Countries and cities around the world are increasingly relying on centralized assignment systems to assign students to schools, usually choosing one of the two most common algorithms: the Deferred-Acceptance (DA) or the Boston mechanism. Yet, the Boston mechanism is often criticized for harming disadvantaged families who are less sophisticated and fail to get access to the best schools. This paper investigates the effect of the national ban of the Boston mechanism in England, which was replaced by the DA mechanism in 2008. We use a differences-in-differences approach to analyze the effect of the ban on school composition and on disadvantaged students access to good schools and peers.

Robust efficiency for random allocation, Samson Alva (University of Texas at San Antonio) joint with E J Heo and V Manjunath

We study random allocation mechanism design when only ordinal preference information over sure alternatives is available, and propose a new efficiency requirement for such settings. We say a random allocation is robustly efficient if it is Pareto efficient with respect to every expected utility preference profile over lotteries consistent with the ordinal preference profile over sure alternatives. For object allocation problems, we characterize the family of random allocation mechanisms that satisfy sd-strategy-proofness, non-bossiness, robust efficiency, and neutrality as hierarchies of monarchs or diarchs. The characterized family contains mechanisms that cannot be achieved by randomizing over the family of deterministic mechanisms characterized by Svensson (1999) with the same axioms, the serial priority mechanisms. We characterize the subclass of such randomizations that are robustly efficient by the condition that the Kemeny distance between any pair of priority orders in the support of the lottery defining a random serial priority mechanism must be no greater than one.

Strategy-proof exchange under trichotomous preferences, Vikram Manjunath (University of Ottawa) joint with A Westkamp

We study the balanced exchange of indivisible objects without monetary transfers when agents may be endowed with (and consume) more than one object. We assume that each agent has trichotomous preferences in the sense that she

(A) has a (privately known) set of objects that she finds desirable,

(B) ranks any bundle containing some undesirable objects that she was not already endowed with as unacceptable, and

(C) ranks acceptable bundles by their numbers of desirable objects.

On this domain, we show that there is a class of individually rational, Pareto-efficient, and strategy-proof mechanisms that are also computationally efficient.

In ongoing work, we develop a characterization of the maximal neutral and responsive (to an ordering of individual objects) domain for which the mechanism that we propose maintains its three desirable properties. The maximal domain that we propose is less restrictive than that of trichotomous preferences in that it allows agents to also care (and have private information) about which of their endowed, but not desirable, objects they transfer to others.

We also discuss some interesting non-responsive domains over which our mechanisms are individually rational, Pareto-efficient, and strategy-proof.