

Lausanne Matching and Market Design Workshop 2022

University of Lausanne, HEC – May, 23th – 24th 2022

All talks will take place in person at the **University of Lausanne, Extranef 109**.

May 23th 2022

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| 12:00 – 13:30 | Welcome at Extranef 109 (leaving from there to lunch for speakers at Nino's) |
| 14:00 – 14:45 | A Characterization of the Coordinate-Wise Top-Trading-Cycles Mechanism for Multiple-Type Housing Markets, <i>Di Feng</i> (University of Lausanne), joint with Bettina Klaus and Flip Klijn. |
| 14:45 – 15:30 | Lexicographic Composition of Choice Functions, <i>Vikram Manjunath</i> (University of Ottawa), joint with Sean Horan. |
| 15:30 – 16:00 | Coffee break |
| 16:00 – 16:45 | Core Stability and Strategy-Proofness in Hedonic Games with Friend-Oriented Preferences, <i>Flip Klijn</i> (Institute for Economic Analysis and Barcelona School of Economics), joint with Bettina Klaus and Seçkin Özbilen. |
| 16:45 – 17:30 | Stable partitions for proportional generalized claims problems, <i>Oihane Gallo</i> (University of Lausanne), joint with Bettina Klaus.

Walk back to Lausanne with the option to have an Aperero at the Jetée de la Compagnie (total walking time about one hour). |
| 19:30 | Dinner for speakers at Brasserie Montbenon |

May 24th 2020

- 09:15 – 10:00 **Robust Efficiency for Random Allocation, *Samson Alva*** (University of Texas at San Antonio), joint with Eun Jeong Heo and Vikram Manjunath.
- 10:00 – 10:45 **Self-Censoring in College Applications, *Renke Schmacker*** (University of Lausanne), joint with Rustam Hakimov and Camille Terrier.
- 10:45– 11:15 Coffee Break
- 11:15 – 12:00 **Market Design for Distributional Objectives in (Re)assignment: An Application to Improve the Distribution of Teachers in Schools, *Utku Ünver*** (Boston College), joint with Julien Combe, Umut Dur, Olivier Tercieux, and Camille Terrier.
- Micro Seminar**
- 12:15 – 13:30 **Unpaired Kidney Exchange: Overcoming Double Coincidence of Wants without Money, *Julien Combe*** (CREST - Ecole polytechnique), joint with Mohammad Akbarpour, Yinghua He, Victor Hiller, Robert Shimer, and Olivier Tercieux.
- 13:30 Lunch speakers

Abstracts (in sequence of presentations)

A Characterization of the Coordinate-Wise Top-Trading-Cycles Mechanism for Multiple-Type Housing Markets, *Di Feng* (University of Lausanne), joint with Bettina Klaus and Flip Klijn.

We consider the generalization of the classical Shapley and Scarf housing market model of trading indivisible objects (houses) (Shapley and Scarf, 1974) to so-called multiple-type housing markets (Moulin, 1995). When preferences are separable, the prominent solution for these markets is the coordinate-wise top-trading-cycles (cTTC) mechanism. We first show that on the subdomain of lexicographic preferences, a mechanism is unanimous (or onto), individually rational, strategy-proof, and non-bossy if and only if it is the cTTC mechanism (Theorem 1). Second, using Theorem 1, we obtain a corresponding characterization on the domain of separable preferences (Theorem 2). Finally, we show that on the domain of strict preferences, there is no mechanism satisfying unanimity, individual rationality, strategy-proofness, and non-bossiness (Theorem 3). Our characterization of the cTTC mechanism constitutes the first characterization of an extension of the prominent top-trading-cycles (TTC) mechanism to multiple-type housing markets.

Lexicographic Composition of Choice Functions, *Vikram Manjunath* (University of Ottawa), joint with Sean Horan.

In matching theory, we represent preferences and priorities by choice functions. These choice functions are sometimes taken to be primitives of the model and at other times used as levers that a designer can pull. In contexts where there are competing objectives, each of which is expressed as a choice function, lexicographic composition is a natural way to aggregate them. Lexicographic composition is particularly natural when the competing interests are strategic as it amounts to serial or sequential dictatorship.

When choice functions are aggregated lexicographically, there are often constraints (reflecting policy or feasibility) on combinations that the composed choice functions may select. A salient example is the “matching with contracts” model where two choice functions may not select a contract with the same doctor.

Certain properties of choice functions (substitutability, consistency, and size monotonicity) play an important role in matching. Whether these properties are preserved upon lexicographic composition depends on the constraints. In this paper, we characterize the constraints under which combinations of these properties are preserved.

Core Stability and Strategy-Proofness in Hedonic Games with Friend-Oriented Preferences, *Flip Klijn* (Institute for Economic Analysis and Barcelona School of Economics), joint with Bettina Klaus and Seçkin Özbilen.

We study hedonic coalition formation problems with friend-oriented preferences, i.e., each agent has preferences over coalitions (she is part of) based on a partition of the set of other agents into “friends” and “enemies”. We assume that for each of her coalitions, (1) adding an enemy makes her strictly worse off and (2) adding a friend together with a set of enemies makes her strictly better off. Friend-oriented preferences induce a so-called friend-oriented preference graph where vertices are agents and directed edges point to friends. We show that the partition associated with the strongly connected components (SCC) of the friend-oriented preference graph is in the strict core. We also prove that the SCC mechanism, which assigns the SCC partition to each hedonic coalition formation problem with friend-oriented preferences, is group strategy-proof. Our main result is that on any “rich” subdomain of friend-oriented preferences, the SCC mechanism is the only mechanism that satisfies strategy-proofness and core stability.

Stable partitions for proportional generalized claims problems, *Oihane Gallo* (University of Lausanne), joint with Bettina Klaus.

We consider a set of agents, e.g., a group of researchers, who have claims on an endowment, e.g., a research budget from a national science foundation. The research budget is not large enough to cover all claims. Agents can form coalitions and coalitional funding is proportional to the sum of the claims of its members, except for singleton coalitions which receive no funding. We analyze the structure of stable partitions when coalition members use well-behaved rules to allocate coalitional endowments, e.g., the

well-known constrained equal awards rule (CEA) or the constrained equal losses rule (CEL). For continuous, (strictly) resource monotonic, and consistent rules, stable partitions with (mostly) pairwise coalitions emerge. For CEA and CEL we provide algorithms to construct such a stable pairwise partition. While for CEL the resulting stable pairwise partition is assortative and sequentially matches up lowest-claims pairs, for CEA the resulting stable pairwise partition is obtained sequentially by matching up in each step either a highest-claims pair or a highest-lowest-claims pair. More generally, we also assume that the minimal coalition size to have a positive endowment is $\theta \geq 2$. We then show how all results described above are extended to this general case.

Robust Efficiency for Random Allocation, *Samson Alva* (University of Texas at San Antonio), joint with Eun Jeong Heo and Vikram 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 at a given ordinal preference profile if it is Pareto efficient with respect to every expected utility preference profile over lotteries consistent with the ordinal profile. For object allocation problems, we characterize the family of random allocation rules that satisfy strategy-proofness, non-bossiness, robust efficiency, and neutrality as hierarchies of monarchs or diarchs. The characterized family contains rules that cannot be achieved by randomizing over serial priority rules, the family of deterministic rules characterized by the same axioms (Svensson 1999). The only such randomizations that are robustly efficient are those whose defining lottery over priorities is such that the Kemeny distance between any pair of priority orders in the lottery's support must be no greater than one.

Self-Censoring in College Applications, *Renke Schmacker* (University of Lausanne), joint with Rustam Hakimov and Camille Terrier.

It is a common conception that underconfident students do not apply to selective colleges, even though they may have good admission chances (self-censoring). If underconfidence is more prevalent among female students and students from lower socioeconomic status, this may reinforce existing inequalities. We examine the role of confidence and mechanism knowledge on application behavior in a dynamic matching mechanism (college-proposing DA). Therefore, we conducted a survey experiment with 3,000 participants of the French college admission mechanism Parcoursup. Individuals receive information treatments regarding their rank in the grade distribution and strategic advice regarding the optimal behavior in the mechanism. We match the survey responses with administrative data on actual application behavior. Our preliminary results show that female students and students from low SES are more likely to underestimate their rank in the grade distribution and apply to less selective programs. Our preliminary results show that the grade feedback treatment made the best students apply to more ambitious programs with stronger effects for female students.

Market Design for Distributional Objectives in (Re)assignment: An Application to Improve the Distribution of Teachers in Schools, *Utku Ünver* (Boston College), joint with Julien Combe, Umut Dur, Olivier Tercieux, and Camille Terrier.

Centralized (re)assignment of workers to jobs is increasingly common in public and private sectors. These markets often suffer from distributional problems. To alleviate these, we propose two new strategy-proof (re)assignment mechanisms. While they both improve individual and distributional welfare over the status quo, one achieves two-sided efficiency and the other achieves a novel fairness property. We quantify the performance of these mechanisms in teacher (re)assignment where unequal distribution of experienced teachers in schools is a widespread concern. Using French data, we show that our efficient mechanism reduces the teacher experience gap across regions more effectively than benchmarks, including the current mechanism, while also effectively increasing teacher welfare. As an interesting finding, while our fairness-based mechanism is very effective in reducing teacher experience gap, it prevents the mobility of tenured teachers, which is a detrimental teacher welfare indicator.

Unpaired Kidney Exchange: Overcoming Double Coincidence of Wants without Money, *Julien Combe* (CREST - Ecole polytechnique), joint with Mohammad Akbarpour, Yinghua He, Victor Hiller, Robert Shimer, and Olivier Tercieux.

For an incompatible patient-donor pair, kidney exchanges often forbid receipt-before-donation (the patient receives a kidney before the donor donates) and donation-before-receipt, causing a double-coincidence-of-wants problem. Our proposal, the Unpaired kidney exchange algorithm, uses “memory” as a medium of exchange to eliminate these timing constraints. In a dynamic matching model, we prove that Unpaired delivers a waiting time of patients close to optimal and substantially shorter than currently utilized state-of-the-art algorithms. Using a rich administrative dataset from France, we show that Unpaired achieves a match rate of 57 percent and an average waiting time of 440 days. The (infeasible) optimal algorithm is only slightly better (58 percent and 425 days); state-of-the-art algorithms deliver less than 34 percent and more than 695 days. We draw similar conclusions from the simulations of two large U.S. platforms. Lastly, we propose a range of solutions that can address the potential practical concerns of Unpaired.