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Lausanne Matching and Market Design Workshop 2023

University of Lausanne, HEC – June, 5th – 6th 2023

All talks will take place in person at the **University of Lausanne, Extranef 126**.

June 5th 2023

11:45 – 13:30	Welcome at **Internef 538**, Bettina's office (leaving from there to lunch at 12:00 at the "Banane")
14:00 – 14:45	**Fair Maximum Matching under Dichotomous Preferences**, ***Szilvia Papai*** (Concordia University), joint with Shahidul Islam.
14:45 – 15:30	**Credibility of Group Manipulation in Random Assignments**, ***Mehdi Feizi*** (University of Lausanne), joint with H. Hosseinzadeh Ranjbar.
15:30 – 16:00	Coffee break
16:00 – 16:45	**Shapley-Scarf Housing Markets: Respecting Improvement, Integer Programming, and Kidney Exchange**, ***Flip Klijn*** (Institute for Economic Analysis and Barcelona School of Economics), joint with P. Biro, X. Klimentova, and A. Viana.
16:45 – 17:30	**Robust Efficiency for Random Allocation**, ***Vikram Manjunath*** (University of Ottawa), joint with S. Alva and E.J. Heo.
	If the weather is good, walk back to Lausanne along the lake with the option to have an Apero at the Jetée de la Compagnie (total walking time about one hour).
19:30	Dinner for speakers at Brasserie Montbenon

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June 6th 2023

09:15 – 10:00	**Do Nonstrategic Considerations Matter for Behavior in Games? An Experimental Study Informed by Direct-sum Decompositions of Games**, ***Elena Inarra*** (University of the Basque Country), joint with A. Garcia-Galocha and N. Iriberri.
10:00 – 10:45	**Axioms for Constant Function Market Makers**, ***Christoph Schlegel*** (City, University of London), joint with M. Kwasnicki, A. Mamageishvili.
10:45– 11:15	Coffee Break
11:15 – 12:00	**Incontestable Mechanisms**, ***Inacio Bo*** (University of Macau), joint with G. Caspari and M. Khanna: .
12:00 – 12:45	**Waiting list design, and scalping in housing allocation, *Somouaoga Bonkoungou*** (University of Lausanne), joint with L. Chen and R. Hakimov.
13:30	Lunch at the "Banane"

Abstracts (in sequence of presentations)

Fair Maximum Matching under Dichotomous Preferences, ***Szilvia Papai*** (Concordia University), joint with Shahidul Islam.

In a many-to-one matching problem children have dichotomous preferences over daycares, and daycares have strict priorities over children. Given the limited enrollment capacity of daycares, the main objective is to find a matching mechanism that is fair for children (i.e., does not violate the daycare priorities) and maximizes the number of matched children. We identify a class of mechanisms that are fair and always lead to a maximum matching. We also show that these mechanisms are strategyproof for the children.

Credibility of Group Manipulation in Random Assignments, ***Mehdi Feizi*** (University of Lausanne), joint with H. Hosseinzadeh Ranjbar.

For the random assignment problem, we introduce two notions of weak non-bossiness and collusion-proofness. The former happens in an assignment rule when a misreport of an agent that does not change her assignment does not make any other agent better off. The latter occurs if an assignment rule is immune to any collusion on misreporting preferences as it is either not profitable to form or profitable to betray. We show that for deterministic assignments, group strategy-proofness is equivalent to collusion-proofness. For random assignments, we prove that a rule is group strategy-proof if and only if it is weakly group strategy-proof and weakly non-bossy, and it is collusion-proof if and only if it is strategy-proof and weakly non-bossy. Therefore, though the random priority rule is not even weakly group strategy-proof, it is collusion-proof since it is weakly non-bossy. Moreover, we show that the deferred acceptance rule is neither weakly non-bossy nor collusion-proof, though it is weakly group strategy-proof.

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Shapley-Scarf Housing Markets: Respecting Improvement, Integer Programming, and Kidney Exchange, ***Flip Klijn*** (Institute for Economic Analysis and Barcelona School of Economics), joint with P. Biro, X. Klimentova, and A. Viana.

In a housing market of Shapley and Scarf (1974), each agent is endowed with one indivisible object and has preferences over all objects. An allocation of the objects is in the (strong) core if there exists no (weakly) blocking coalition. We show that for strict preferences the unique strong core allocation "respects improvement": if an agent's object becomes more desirable for some other agents, then the agent's allotment in the unique strong core allocation weakly improves. We extend this result to weak preferences for both the strong core (conditional on non-emptiness) and the set of competitive allocations (using probabilistic allocations and stochastic dominance). There are no counterparts of the latter two results in the two-sided matching literature. We provide examples to show how our results break down when there is a bound on the length of exchange cycles.
Respecting improvements is an important property for applications of the housing markets model such as kidney exchange: it incentivises each patient to bring the best possible set of donors to the market. We conduct computer simulations using markets that resemble the pools of kidney exchange programmes. We compare the game-theoretical solutions with current techniques (maximum size and maximum weight allocations) in terms of violations of the respecting improvement property. We find that game-theoretical solutions fare much better at respecting improvements, even when exchange cycles are bounded, and they do so at a low efficiency cost. As a stepping-stone for our simulations, we provide novel integer programming formulations for computing core, competitive, and strong core allocations.

Robust Efficiency for Random Allocation, ***Vikram Manjunath*** (University of Ottawa), joint with S. Alva and E.J. Heo.

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.

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Do Nonstrategic Considerations Matter for Behavior in Games? An Experimental Study Informed by Direct-sum Decompositions of Games, ***Elena Inarra*** (University of the Basque Country), joint with A. Garcia-Galocha and N. Iriberri.

Experimental studies have shown that Nash equilibrium has clear limitations in regard to its ability to describe how people behave in games. In this paper, we use direct-sum decomposition proposed by Candogan et al. (2011) to decompose any normal-form finite game into the strategic and the nonstrategic components. How does individual behavior react to changes in the nonstrategic component? Nash equilibrium, as any other strategic solution, is invariant to changes in the nonstrategic component. Mutual-Max-Sum, a new solution concept defined in this paper, depends only on the nonstrategic component, identifies the most relevant strategy profile in this component and it is invariant to changes in the strategic component. We design 3x3 games, informed by the direct-sum decomposition of games, to empirically test, whether and when, manipulations in the nonstrategic component affect individual behavior and whether Mutual-Max-Sum is behaviorally relevant. We find that changes in the nonstrategic component affect individual behavior but that Mutual-Max-Sum is mostly behaviorally irrelevant except when it coincides with the Pareto outcome of the game. We conclude that Candogan et al. (2011)'s decomposition is informative about individual behavior in games.

Axioms for Constant Function Market Makers, ***Christoph Schlegel*** (City, University of London), joint with M. Kwasnicki, A. Mamageishvili.

We study axiomatic foundations for different classes of constant-function automated market makers (CFMMs). We focus particularly on separability and on different invariance properties under scaling. Our main results are an axiomatic characterization of a natural generalization of constant product market makers (CPMMs), popular in decentralized finance, on the one hand, and a characterization of the Logarithmic Scoring Rule Market Makers (LMSR), popular in prediction markets, on the other hand. The first class is characterized by the combination of independence and scale invariance, whereas the second is characterized by the combination of independence and translation invariance. The two classes are therefore distinguished by a different invariance property that is motivated by different interpretations of the numéraire in the two applications. However, both are pinned down by the same separability property. Moreover, we characterize the CPMM as an extremal point within the class of scale invariant, independent, symmetric AMMs with non-concentrated liquidity provision. Our results add to a formal analysis of mechanisms that are currently used for decentralized exchanges and connect the most popular class of DeFi AMMs to the most popular class of prediction market AMMs.

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Incontestable Mechanisms, ***Inacio Bo*** (University of Macau), joint with G. Caspari and M. Khanna.

In some allocation problems, there is a priority ordering of agents that must be respected in the matching that is produced, in that an agent cannot have revealed to prefer the assignment given to another agent with lower priority. Otherwise, the affected agent could "contest" the assignment, often legally. Mechanisms that never produce assignments that can be contested are Incontestable Mechanisms. While serial dictatorship is the unique Incontestable direct mechanism, coarser message spaces allow for a wider space of mechanisms. We provide characterizations of incontestable mechanisms for different restrictions on message spaces, evaluate incentives induced by these mechanisms and apply these concepts to a real-life application: the Indian Civil Service allocation.

Waiting list design, and scalping in housing allocation, *Somouaoga Bonkoungou* (University of Lausanne), joint with L. Chen and R. Hakimov.

In this study, we examine the issue of assigning houses to prospective tenants on a waiting list. Our analysis reveals that the First Come, First Served (FCFS) mechanism, where agents' priority for arriving houses is based on waiting time, fosters a scalping behavior, where more patient individuals, aka scalpers, join the waiting list to secure high-value houses to reap profits through re-renting. We distinguished these scalping agents from the real seekers. The latter group is characterized by impatience, as they are willing to accept unmatched houses rather than prolong their wait for a suitable home. We show that an alternative design of randomly allocating a batch of houses to a batch of agents at the top of the waitlist gives real seekers more incentive to wait longer than the FCFS mechanism. The consequence is a redistribution of welfare from scalpers to real seekers, as real seekers are more frequently allocated their matched houses. We also analyze the policy of penalizing rejections of offered houses and show the tradeoff between overall efficiency and the distribution of welfare between scalpers and seekers.