February 12, 2024
2:00pm-3:00pm
KAP 414

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Self-Aware Transport of Economic Agents

Abstract: The paper is concerned with the simultaneous solution of a very large number of optimization problems. One notable aspect of the models studied is that the structure of the optimization problems involved is not given in the outset and is dynamically agreed upon while a large number of optimizers work in an orchestra. Models of this type are instrumental in the domain of macroeconomics and have given rise to the mathematical theory of mean field games. The paper demonstrates that an alternative mathematical formulation may be needed and provides such formulation. The approach it develops was prompted by the surprising discovery that the common strategy, adopted in a large body of macroeconomic research, for producing time-invariant equilibrium in the classical Aiyagari-Bewley-Huggett model fails to achieve its objective in a widely cited benchmark study, with the implication that, contrary to the common belief, a central problem in macroeconomics has been without an adequate solution, save for special cases. It is shown that the intrinsic structure of what is known in economics as "heterogeneous models" exhibits connections across time that existing mathematical techniques cannot capture. By expanding the approach proposed by Dumas and Lyasoff (2012) the paper develops a novel mathematical framework which, among other things, leads to numerically verifiable equilibria in some widely researched, yet still unsolved, concrete instances of heterogeneous models. It provides new insights about the channels through which the cross-sectional distribution of a large population of interacting agents gets transported through time and clarifies the scope of what is commonly referred to as "the approximate aggregation conjecture" (only the population mean matters) of Krusell and Smith (1998) -- still an open problem in macroeconomics.

Zoom Link: USC Math Finance Colloquium

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