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"The equivalence between two-player symmetric games and decision problems"

Abstract

We observe that every two-player symmetric game creates a unique individual decision problem and vice versa. We show that any (finite or infinite) two-player symmetric zero-sum game possesses pure strategy equilibrium if and only if the associated decision problem admits a maximal element. This condition is also necessary and sufficient for the existence of finite population ESS in two-player symmetric games. We provide sufficient conditions for the existence of pure strategy equilibrium which are more general than generalized ordinal potentials and quasi-concavity in two-player symmetric zero-sum games. Notably, we show that a two-player symmetric zero-sum game can be extended to its usual (von Neumann-Morgenstern) mixed extension if and only if the extended decision problem satisfies SSB utility theory axioms. This is somewhat unexpected because while the former assumes transitivity the latter does not.

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