Correlated equilibria in zero-sum games with incomplete information

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Abstract

We study the relation between Nash equilibrium and different notions of correlated equilibrium in the two-player zero-sum games with incomplete information. It is known that in the zero-sum games with complete information the set of payoffs that can be achieved by correlated equilibrium coincides with the Nash equilibrium payoffs (Aumann, 1974; Rosenthal, 1974). We show that in the zero-sum games with incomplete information a similar payoff equivalence holds between Nash equilibrium and the following solution concepts: strategy correlated equilibrium, agent normal form correlated equilibrium, and belief invariant Bayesian solution (Forges, 1993, 2006). The payoff equivalence also holds between Nash equilibrium and communication equilibrium (Myerson, 1982), and the equivalence continues to hold even in the environments where the players can communicate their private information in a partially verifiable way, as long as the players have an option to remain silent (Forges and Koessler, 2005). However, we show that the payoffs under Nash equilibrium are not always the same under non-belief invariant Bayesian solution (Forges, 2006) and Bayes correlated equilibrium (Bergemann and Morris, 2013). We characterize the payoffs under the last two solution concepts and relate our results to the literature on comparison of information structures in the zero-sum games (De Meyer, Lehrer and Rosenberg 2010).

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