Self-similar Beliefs in Games with Strategic Substitutes

Mengke Wang*

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Abstract

In this paper, I study strategic situations where a population of heterogeneous players are randomly matched with each other to play games with strategic substitutes and players have incomplete information about their opponents' private types. I start with the most parsimonious model where players hold type-independent beliefs about their opponents' types. I establish a representation result for this model when analysts observe how the population behaves on an aggregate level. However, in many applications, players' types are affected by common factors. Therefore, we expect players' beliefs to be type-dependent. Moreover, analysts observe that when individuals are randomly matched to play games with strategic substitutes, they report systematically heterogeneous conjectures about their opponents' actions: Players who act more aggressively also conjecture that their opponents would act more aggressively. This not only contradicts the predictions of a type-independent belief model but is also counterintuitive because in games with strategic substitutes, opponents' aggressive behavior discourages players from playing aggressively. I propose a model where players have self-similar beliefs. It captures our intuition that higher types reasonably believe that there are more higher types and rationalizes the experimental observations. Importantly, I find that if beliefs cannot be directly elicited and the only data available to the analyst is play in the games, models with type-independent beliefs and self-similar beliefs have identical behavioral implications for many payoff parameters.

*Email address: mengke.wang@duke.edu