Cooperation/Collusion in Continuous Time: Two Experimental Studies

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Abstract:

We study interactions with different durations and termination rules in a (quasi) continuous-time prisoner's dilemma experiment. We find that cooperation is easier to achieve and sustain with deterministic horizons than with stochastic ones; end-game effects emerge, but subjects postpone them with experience; longer duration helps cooperation. Static theories for continuous-time games cannot simultaneously account for these findings and miss the evolution of behavior across supergames. We propose a simple reinforcement learning model that proves consistent with this evidence. The analysis of strategies and an additional treatment lend further support to the proposed explanation.

In a second experiment, we introduce noise to the (public) signals subjects receive on the opponent's action. It is recognised that imperfect monitoring can make cooperation/collusion difficult for two reasons: either players will be able to hide their defections behind it or the cooperation will fall apart due to false-positives. In particular, if noise comes from Brownian motions (or random walk) and we are close to continuous time, one can prove that all cooperation/collusion falls apart. In this experiment, we test this prediction and confirm it only in part. Our experiment also identifies a new, third reason why imperfect monitoring makes cooperation/collusion difficult: it makes it harder for the subjects to (re)coordinate on cooperative equilibria. While we still lack a comprehensive theory of how subjects coordinate on play, our experiment provides new insights about it.