Continuous Revision Games*

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Abstract

We study situations in which players continuously adjust their state variables, before final payoffs are realized at a pre-determined deadline, according to the final state variables. The state variable processes are perturbed by Brownian noises, and players pay convex adjustment costs to prepare for the final payoff. They maximize realized payoffs, i.e. the final payoffs minus the adjustment costs. We mainly consider two classes of information structures in which players cannot directly observe opponent's behavior. Relying on the recent development in the stochastic calculus method, backward stochastic differential equations, we prove the uniqueness of equilibrium for both cases under mild conditions. Partial differential equations that describe players' equilibrium strategy are derived. We then apply our model to several economic settings and derive a number of novel implications. Furthermore, we use our model to analyze equilibrium selection problem in potential games, and prove that the potential maximizer is selected as frictions vanish.

[Key words: continuous time games, revision games, Cournot competition, dynamic contest, team production, potential games, backward stochastic differential equations]

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