Bayesian Learning with Private Monitoring: Double Merging and Convergence[1]

Yuichi Noguchi

Department of Economics, Kanto Gakuin University

1-50-1 Mutsu-ura Higashi, Kanazawa-ku

Yokohama 236-8501, Japan

E-mail: ynoguchi@kanto-gakuin.ac.jp

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[1]Very preliminary and incomplete. The paper is based on the initial part of my ongoing research on learning to play equilibrium in the repeated game with private monitoring.

Abstract

In this paper, I give a detailed explanation with regard to the initial part of my ongoing research on learning to play Nash equilibrium in the repeated game with (imperfect) private monitoring. First, I argue the basics of Bayesian learning in the (infinitely) repeated game with (imperfect) private monitoring; that is, the formulation of the basic model, the introduction of private probability, prior belief and reduced form, and so on. Further, I discuss "merging under imperfect monitoring." It will turn out that merging under imperfect monitoring is more complicated than under perfect monitoring. Then, I also provide a basic result about the relationships between merging and convergence to Nash equilibrium in the repeated game with private monitoring. Finally, I argue the difficulty of learning to play Nash equilibrium in the repeated game with (imperfect) private monitoring. In particular, I point out a fundamental difficulty peculiar to the (imperfect) private monitoring, and explain how to overcome the difficulty by introducing the "*double merging*" principle. *Journal of Economic Literature* Classification Numbers: C72, C73, D83.

Key Words: Bayesian learning, imperfect private monitoring, prior belief, Kuhn's theorem, merging, convergence, (approximate) Nash equilibrium, double merging.