Characterizing the Social Value of Information*

Takashi Ui† Yasunori Yoshizawa‡

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Abstract

This paper studies the social value of information in symmetric Bayesian potential games with quadratic payoff functions and normally distributed public and private signals. The main results are necessary and suffcient conditions for welfare to increase with public and private information respectively. Using the results, we classify games into eight types with respect to the welfare effects of information and provide a necessary and suffcient condition for each type in terms of the coeffcients of payoff functions. In addition, we obtain the socially optimal information structure in each type. For example, in a class of games in which welfare is the lowest when there is no information, there are three types. In type +I, welfare necessarily increases with both public and private information. In type +II, welfare can decrease, but only with public information. In type +III, welfare can decrease with both public and private information. The socially optimal information structure of type +I and +II is complete information, but that of type +III is incomplete information only with noisy private signals. A Cournot game with linear demand and cost functions is of type +I if the number of players is two, of type +II if it is three, and of type +III if it is greaterthan or equal to four.

JEL classification: C72, D82.

Keywords: incomplete information, optimal information structure, potential game, private signal, public signal, team, value of information.

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†Department of Economics, Hitotsubashi University, oui@econ.hit-u.ac.jp

‡International Graduate School of Social Sciences, Yokohama National University, yoshizawa-yasunori-pc@ynu.ac.jp