

An Asymmetric Oligopoly Game and Information Guidance

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ABSTRACT

Coordinated and efficient distributions of limited resources based self-interested individual decisions are fundamental issues in many areas and still unsolved problems. Recent years, many approaches have been attempted for efficient resource allocations with the principle of the market-oriented mechanism (MOP) based on an oligopoly game. In this paper, we consider an asymmetric oligopoly game in which the interactions among players are asymmetric, and some players have strong influence powers from other players. When asymmetric players compete for capacities, time, space, money, they normally take decisions based on aggregate rather than complete information, the resulting volatile decision dynamics and decision distribution are often far from being optimal. We especially have a situation of winner takes all market in an asymmetric oligopoly game. We consider an oligopoly game with social rules. Each player should pay the tax that is proportional to his payoff. Collected taxes are then redistributed among all players. We show that we can realize an efficient and equitable equilibrium situation with levying the tax rule and the redistribution rule. In this research, we also develop the environment for experimenting of a dynamic oligopoly game so that each player can play the game using the computer network. Especially we report the experiment result, and discuss what kind of information will lead the collective property of a dynamic and asymmetric oligopolistic market to be desirable one. By means of experiments, we will identify ways of information guidance to each player that can considerably improve the overall performance of the market. We especially report the following results:

- (1) Without any information about the current status of the market or with unreliable information, the market becomes to be unstable and inefficient, and each player gets less utility.
- (2) When we present some recommendation for the decision of the next period, this may contribute the market to be more stable and many players get higher utilities.
- (3) The speed of adaptation of each player is sensitive to increase his utility.
- (4) Many players show strong interests to the performances of other players. Many literatures on game theory have been based on the assumption on the best-response rules.

This result implies that, we may need to consider other learning rules such as imitation.