Oligopoly In Partition Function Form*

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Abstract:

This paper offers a framework for examining coalitional formation in Oligopoly using the game theoretic partition function form. Firms producing a homogeneous product and having known capacity limits are examined. In determining whether two coalitions should join together in various scenarios, the results suggest that if the initial number of coalitions producing the optimal quantity not at capacity is less than a determinable number, then the two coalitions should join. A four player example is included.

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I. Introduction and Motivation

Oligopoly models have been studied since Augustin Cournot first introduced his mathematical model in 1838. In more recent years, oligopoly has been modeled in the game-theoretic framework. The two approaches to modeling oligopoly in the game-theoretic framework are the noncooperative and the cooperative. Under the noncooperative approach, the oligopolists act independently and attempt to maximize their own profits while taking into account the actions of their fellow oligopolists. The cooperative approach is based on the assumption that the oligopolists can make binding agreements and collude. Thus, through cooperation, the oligopolists can determine the coordinated policy that will yield the highest profits. The issue to be addressed by the colluding oligopolists and the goal of this paper is the determination of the fair division of profits that should be agreed upon.

In the field of study on oligopoly, the cooperative approach is often regarded as unrealistic. The reason being that there exist antitrust laws preventing legally binding agreements between firms. Therefore, firms cannot enforce their agreements and it is easily shown that it is not in the best interest of any firm in a collusion to keep its word. Thus the agreement cannot be considered believable. In the static, or one period model, this argument is certainly valid and points to the noncooperative Cournot equilibrium as the only realistic outcome. However, the situation changes when time is introduced and the dynamic, or many period, model is analyzed. As Fudenberg and Tirole [1986] comment upon, the historical actions of the firms in the market are observed by each other over time and realistic motivations for adhering to agreements exist. Horizontal mergers also offer a legal single period scenario for study. Therefore, the unrealistic single-period assumption is made and analyzed in this paper.

The partition function form was first introduced in 1963 by Lucas and Thrall. The main consideration of this function form is the partition, or set of coalitions, that the players of the game form. The worth of a coalition is dependent on how the rest of the firms collude. Therefore a coalition can have several worths, namely a worth for each permutation of the players not in the coalition. This