

The prisoner's dilemma in Cournot models: when endogenizing the level of competition leads to competitive behaviors.

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Abstract In resource based economies, regulating the production and export activities have always been an important challenge. Examples in oil and gas show that different behaviors have been adopted ranging from the export monopoly to the complete opening of the export market. This paper tries to explain this multitude of solutions via strategic interactions. When modeling imperfect competition, players are separated in two categories: those who exert market power and those who are competitive and propose the good at their marginal supply cost. Letting a player freely choose whether it wants to exert market power or not when it optimizes its utility is not discussed in the literature. This paper addresses this issue by letting the players choose the level of competition they want to exert in the market. To do so, we analyze the behavior of two countries competing to supply a market with a homogeneous good in an imperfect competition setting. Each country decides the number of firms it authorizes to sell in the market. The interaction between the firms is of a Nash-Cournot type, where each one exerts market power and is in competition with all other firms allowed to sell, whether they belong to the same country or not. Each country optimizes its utility, that is the sum of the profits of its firms. We have studied four kinds of interaction between the countries. The first calculates the closed loop Nash equilibrium of the game between the countries. The second setup analyzes the cartel when the countries collude. The third focuses on the open loop Nash equilibrium and the fourth models a bi-level Stackelberg interaction where one country plays before the other. We demonstrate that in the closed loop Nash equilibrium, our setting leads to the prisoner's dilemma: the equilibrium occurs when both countries authorize all their firms to sell in the market. In other words, countries willingly chose not to exert market power. This result is at first sight similar to the Allaz & Vila (1993) result but is driven by a completely different economic

reasoning. In the Stackelberg and coordinated solutions, the market is on the contrary very concentrated and the countries strongly reduce the number of firms that enter the market in order to fully exert market power and increase the price. The open loop result lies in between: the countries let all their firms sell but market power remains strong. These results suggest that the prisoner's dilemma outcome is due to the conjectural inconsistency of the Nash equilibrium. Finally, in the Stackelberg setting, we give countries the choice of being leader or follower and demonstrate that the counter-intuitive competitive outcome is very unlikely to occur in the market.

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