

A Contribution in Experimental Economics to Characterize the Exert of Market Power in Oligopolistic Markets

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(1) Overview

In the context of recent liberalization of European electricity markets, the use of market power is considered as one of the most critical obstacles for a higher social welfare. Market power is defined in [1] as the ability to alter profitably prices away from competitive levels. Its exercise is an alteration of profitability prices that is maintained for a significant duration [2]. European producers may benefit from an important market power, as most of European electricity markets are oligopolistic, with monopoly (France, Belgium, Greece), duopoly (Spain, Finland, Sweden) or triopoly (United Kingdom). The question that is addressed in this paper is thus: Could the exercise of market power be characterized?

(2) Methods

Experimental economics has been chosen for its ability to take into account human decision making in a complex situation. In the experiment, each subject is a producer, who proposes bids for its production units. These are located in only on of the 2 regions of a power system with a limited inter regional transmission capacity. Subjects' motivation is to maximise their profits. They are thus paid in respect to their virtual earnings. Five subjects are playing in the first zone, but only two or three in the second. The demand is exogenous. An experiment consists of three phases of 30 periods each; during a phase, the demand profile is constant.

(3) Results

Eight experiments were run, leading to a better understanding of how market power is exercised by the duopoly or the triopoly, how it influences the more competitive market and how the demand level impacts its exercise. Although individual behaviours impact price curves, common group behaviours can be characterized.

As the most significant factor, we can mention the convergence between prices on the two markets, while theoretical models (competitive or Cournot) predicted the existence of two different prices. Market power was exercised in every experiment, resulting in price shift from 20 to 100%, depending on the group composition.



Fig. 1: Price evolution during the first two phases of an experiment

(4) Conclusions

We can divide subjects' behaviours into three main classes: leaders, who take risk to raise prices, followers who bid according to their expectation of leaders' decision, and price takers who bid their marginal price whatever the market conditions. Generally, the presence of one leader and several followers is sufficient to observe significant use of market power; its use may become even more important when two or three leaders reach an implicit collusion.

The convergence between the two markets may be attributed to the mitigating effect due to the competitive zone toward the duopoly's market power; quite the opposite, when the duopoly exerts its market power, it makes other producers pivotal and is an incentive for them to raise prices even more. Worse, since production costs are lower in the first zone, competitive behaviour from the duopoly on the second zone can induce market power exercise in the first one.

References

- [1] Mas-Collel, Whinston and Green, *Microeconomic Theory*, 1995
- [2] Steven Stoft, *Power System Economics*, 2002