

Fabien Petit, Yannick Phulpin, Philippe Dessante, Marcelo Saguan
**A CONTRIBUTION OF EXPERIMENTAL ECONOMICS TOWARD
CHARACTERIZATION OF THE USE OF MARKET POWER IN
OLIGOPOLISTIC MARKETS**

Department of Power and Energy Systems, Supelec,
3 rue Joliot Curie, 91192 Gif sur Yvette, France
Fabien.Petit@supelec.fr

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 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?

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 plays the role of a producer who proposes bids for his or her production units. These production units are located in only one of the two regions of a power system with a limited inter regional transmission capacity. The subjects are motivated to maximize their profits by an actual cash dividend that corresponds to their performance. Five subjects play 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.

Results

Ten 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 alter price curves, common group behaviours can be classified.

The most significant observation that can be mentioned is the convergence between prices in the two markets, contrary to theoretical models (competitive or Cournot) which 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: Sample price evolution during the first two phases of an experiment

Conclusions

We can divide subjects' behaviours into three main classes: leaders, who take risks to raise prices, followers who bid according to their expectation of leaders' decisions, 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.

While a convergence between the two markets might have been attributed to the mitigating effect toward the duopoly's market power due to the competitive zone; to the contrary, when the duopoly exerts its market power, it makes other producers pivotal and is an incentive for them to raise prices even more. Moreover, since competitive price is lower in the less concentrated market, price convergence results in a higher use of market power than in the second zone.

References

- [1] Mas-Colell, Whinston and Green, *Microeconomic Theory*, 1995
- [2] S. Stoft, *Power System Economics*, 2002
- [3] S. Robin and C. Staropoli, *Experimental methodology to inform NEI issues*, 2004