Overview

Market design for electricity often initially ignores network congestion within one bidding zone and addresses it in a second, so-called ‘redispatch’ stage. For market participants, any two-stage design offers an opportunity to strategically optimize between the different market stages. In Europe the current debate is how to design a market-based redispatch to integrate new actors, in particular consumers, given increasing levels of congestion (ACER 2021, CEER 2021, ENTSO-E 2021, Palovic et al. 2022). Strategic bidding may occur if market players anticipate congestion in their region and manipulate bidding to exploit this congestion.

In this paper, we study the precise incentives for gaming with respect to competitive conditions in the market with a formal model. We propose that depending on competition, the expected profits of gaming can be negative and link the range of expected gaming loss to a so-called reference bidder, reflecting competitive conditions in the market. Thus, we provide the theoretical framework for authorities and empirical works to assess the potential of market-based as opposed to administrative redispatch. Based on this theoretical framework we also discuss how several potential remedies can increase the risk of the gaming strategy and can thereby reduce the practical potential for gaming.

Methods

We study the precise incentives for inc-dec gaming with respect to competitive conditions on the market with a formal model. To the best of our knowledge, the literature lacks a formal representation of the effect of competition on the incentives of gaming in redispatch or flexibility markets. As a consequence, it has been controversial to what extent competition mitigates the incentives for gaming. To close this gap, we focus on the incentives of a single potential gamer and draw up a profit function including probabilities of selection which in both markets depend endogenously on the gamers own bid as well as exogenously on a normally distributed reference bid. The gamer needs to outbid the reference bidder to be scheduled in the market.

Results

The range where expected profit of gaming is negative is critically determined by competitive conditions in the market in both and particularly the second market stage. The stronger the competition in the market, the less likely gaming will be. The role of the reference bidder is critical. The gamer has to outbid this reference bid; and if the reference bid is high, the profit margin for the gamer will be low. We distinguish three different types: 1. strong reference bidders, 2. weak reference bidders and 3. the special case of facilities that are exclusively required for congestion relief, which is basically equivalent to a situation without reference bidders. The presence of a strong reference bidder makes gaming unlikely and a weak reference bidder facilitates gaming.

Furthermore, we note that even where gaming is possible, remedies may mitigate the problem and that system operators could be authorized to execute these remedies. Exploiting the insights from the formal model, we discuss several remedies which affect the incentives for gaming, such as long-term contracting of a weak reference bidder, use of alternative flexibility options by the network operator and occasional random calls in the local market.

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2 We do not model a game-theoretical equilibrium between several strategic bidders.
Conclusions

Gaming in electricity markets with market-based redispatch involves risks. These depend on the expected profits of the strategy and the risk of unsuccessful gaming. With strong competition or in a well-designed market the potential for gaming can likely be contained. However, it requires careful empirical analysis of the real market situation to assess the potential threat. The assessment can differ regionally: in some regional markets the incentives for gaming will be strong, whilst in others they are not. Therefore, adequate market design may differ regionally. With the presented analysis, we provide the theoretical framework for authorities and ex-post empirical works to assess the potential of market-based as opposed to administrative redispatch and also to design markets for local flexibilities.

References


