

Recurring Market Splitting and Bidding Behaviour in the German-Austrian Electricity Balancing Market

Christian Spindler, University of Vienna, Faculty of Business, Economics and Statistics, Phone +43 4277 38181, E-mail: christian.spindler@univie.ac.at

Oliver Woll, Centre for European Economic Research, Phone +49 621 1235305, E-mail: woll@zew.de

Overview

In July 2016 the electricity secondary reserve markets of Austria and Germany have been merged, the latter perfectly competitive and the former an oligopoly with 6-10 participants. This led to increased competition and – as predicted by standard economic theory – to converging as well as to decreasing prices, especially in Austria. However, starting in autumn of the same year, the market experienced unexpected short-term price spikes for positive as well as for negative secondary control energy, ranging e.g. from below 100 EUR/MWh to more than 10 000 EUR/MWh, with single bids of up to 86 000 EUR/MWh (APG 2017a).

As this threatened the benefits of merged markets, the Austrian regulating authority introduced price caps at 3 000 and -500 EUR/MWh for positive and negative secondary control energy, respectively, and a rule to publish by name any participant bidding at prices higher than 10 000 EUR/MWh. These quickly established measures merely serve to reduce the final costs for secondary reserve and fight the symptoms, but they do not remedy possible faults in the underlying market design which obviously incentivises this bidding strategy.

The purpose of this paper is to gain insight into what drives market participants to offer their production capacity at such high prices. Some explanations focus e.g. on external factors such as higher gas prices in the colder months increasing the participants' costs, or low prices in the day-ahead electricity market leading to low opportunity costs for bidding into the secondary reserve market. We focus, on the other hand, on the setup of the market as a weekly one-sided pay-as-bid auction, where the actual merit order used for deciding which participant gets called depends on whether the transmission lines between Austria and Germany are congested or not. If the transmission capacity does not suffice, the market is split up and the participants in Austria again face the oligopoly setting. We argue, that rational market participants should endogenize this market splitting and adjust their bidding strategies depending on the probability of such a split occurring. I.e. we try to answer the question whether the current market inherently incentivizes the bids observed.

Methods

In the first part we analytically derive a single participants' optimal bidding decision when also taking into account that at any time of the bidding period, the market may change from perfect competition to an oligopoly. In so doing we build upon two strands of literature: first, on contributions on auctions and mechanism design comparing uniform price with pay-as-bid auctions (Cramton and Stoft 2007, Fabra et al. 2006, Heim and Goetz 2013); and second, on analyses of the interplay of the transmission grid and market power. Cardell et al. (1997), Willems (2002), and Younes and Ilic (1998) or more recently Mirza and Bergland (2015) e.g. show different bidding strategies of participants in the day-ahead market depending on whether the transmission grid is congested or not.

Using an event study approach in the second part, we use actual bidding data from July 2016 to December 2017 (APG 2017b) to find empirical evidence regarding whether the participants' adjust their bidding strategies when the market was split in the relevant bidding period. This also allows us to disentangle two effects on the final prices: first, the merit-order effect which is based on whether the German bids are taken into account in Austria, and second, the oligopoly-effect of reduced competition in the – then – smaller Austrian market. To account for possible confounders, we also check whether the regulatory changes mentioned above have an effect on the bidding behaviour.

Results

A first look at actual bids seems to indicate an incentive for strategic behaviour by bidding disproportionately high prices of more than 75 000 EUR/MWh even though it is very unlikely to also be selected by the market operator.

As expected, the higher the probability of a market split to occur during a bidding period, the closer the bid will be to the oligopoly solution. Regarding the actual bidding data, preliminary results are still inconclusive as additional confounding effects, like e.g. the effect of the price caps introduced, need to be eliminated.

Conclusions

The results of merging markets and thereby introducing (more) perfect competition are well known. However, we show that market participants adjust their strategies if there is a positive probability of the market – even temporarily – returning to the former oligopoly structure in one of the markets. I.e. rational market participants should endogenize this probability in their optimal bidding strategies.

Also, the secondary reserve market gains importance as the share of intermittent renewable energy sources in the electricity mix increases. Hence, if the splitting of the Austrian and German secondary reserve market is used to strategically adjust or increase actual bids in the weekly pay-as-bid auctions, this may lead to large welfare losses as these costs are borne by the general public. Changing the market setup from pay-as-bid to a uniform-pricing auction may, for example, serve as a remedy which addresses the problem at its root.

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