

THE IMPACT OF THE PUBLICATION OF UNPLANNED POWER PLANT NON-USABILITIES ON INTRADAY ELECTRICITY PRICES: EMPIRICAL EVIDENCE FOR GERMANY AND AUSTRIA

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Overview

The process of energy market liberalization in Europe and the growth in the supply of electricity from intermittent renewable energy sources (RES) led to a significant increase in trading activities on the day-ahead and intraday markets for electricity in Germany and Austria. Not least due to European Commission objectives, i.e. the proclamation of the Energy Union, the various national markets should be integrated through mechanisms, such as market coupling in the day-ahead market and the intraday cross border trading, in order to facilitate the flow of electricity between the different European jurisdictions. As these arrangements rely on trustable price signals, well-functioning markets should operate with an unbiased information set, which reflects the supply and demand side fundamentals and is not distorted by abuse of market behavior. For this reason, the European authorities implemented a monitoring framework to detect and prevent market manipulations as this is an essential component of confidence building among market participants and energy consumers. These regulations cover the submission and publication of data in electricity markets (SPDEM) and are supported by the Regulation on Wholesale Energy Market Integrity and Transparency (REMIT). The main tasks of REMIT are the prohibition of insider trading and market manipulations. Moreover, many organized market places request its participants to be compliant with self-imposed code of conducts and refrain from any influence of price formation.

This paper investigates the impact of the publication of unplanned power plant non-usabilities on risk premia in Germany and Austria. It contributes to the development of a better REMIT understanding as there is a need to further clarify the relevant publications of urgent market messages and their impact on the continental electricity market. We use price data from the European Power Exchange (EPEX) day-ahead and continuous intraday market as well as market messages concerning unscheduled power plant non-usabilities. Every unplanned non-usability of 100 MW or more and of at least one hour in duration has to be reported by the facility operator and is published online at the European Energy Exchange (EEX) transparency platform. We analyze whether possible delays in publishing this information lead to different estimates of the impact of unplanned non-usabilities on intraday prices.

Daskalakis and Markellos (2009) use data of the German-Austrian intraday market and analyze whether risk premia are affected by emission allowance prices. Hagemann (2015) shows that supply-side shocks have different price effects in the German-Austrian intraday market. Unlike the day-ahead auction market, prices on the continuous intraday market are determined by the pay-as-you-bid principle. Hence, upper studies use a volume weighted average price as a proxy for the “actual” intraday price. However, comparisons of risk premia between the day-ahead and the intraday market might lead to measurement errors, because it is not known at what specific time the trade took place (Viehmann, 2011).

For this purpose, we use a new price index for the intraday market which is the volume weighted average price of the last three trading hours before delivery. This index is superior than the volume weighted average price as the majority of all trades take place during these hours. Hence, we are able to avoid the measurement problem as described by Viehmann (2011).

Methods

We calculate ex-post risk premia with price data of the EPEX day-ahead and continuous intraday market from June 2015 to June 2016. Our dataset is comprised of approximately 1,600 messages regarding unscheduled non-usabilities of more than 100 MW including information about the respective power plant type, the duration and magnitude of the outage, and its publication timestamp. Following Hagemann (2015) and Lazarczyk (2016), we identify all possibly influenced trading hours and calculate the sum of the missing capacities. In order to identify the average effect of unplanned power plant non-usabilities on intraday electricity prices, we conduct several OLS regression analyses.

First, we regress risk premia on the sum of all published missing capacities. Note, that the content of all messages may only influence intraday prices. Moreover, we include a vector of control variables (RES forecast error, load forecast error, electricity import, electricity export) and a vector of dummy variables to control for time-specific effects as electricity demand fluctuates over different periods.

Second, we segregate the content of the published missing capacities in further explanatory variables in order to get a better insight on market reactions. For this purpose, we identify the lag structure of every initial market message and assign them to the quarter-hourly categories 0-15, 15-30, 30-45 and 45-60. All published messages with a time lag of more than 60 minutes are summarized in a separate variable. We assume no time lags for any updates of initial market messages and isolate them in a particular variable as well. In the last step, we assign the missing capacities to the respective power plant types pumped storage, nuclear, lignite, hard coal and natural gas.

Results

Every regression consists of more than 8,600 hourly observations and explains around 35% of the variance. The coefficient of the sum of published missing capacities in our basic model points to a negative impact on the hourly risk premium. Holding the day-ahead price and all other variables constant, the average intraday price increases by 1.4 €/MWh if the market messages indicate an increase of power plant non-usabilities of 1 GW.

Furthermore, our results suggest that only messages published within a 30 minutes time lag are relevant for the market. Likewise it is to be noted that updates of the initial message are processed in the continuous intraday market. However, messages published later than 30 minutes after the physical power plant non-usability have a positive, but not significant impact on the intraday price. Additional regressions with different time lag structures confirm the critical threshold of 30 minutes. Hence, we conclude that messages published within a time lag of 0-30 minutes after the beginning of the event are relevant for the market, but not messages issued later than 30 minutes.

Conclusions

Taking everything into consideration, our results suggest that unplanned power plant non-usabilities have a significant positive impact on the intraday price. Most important drivers of prices are market messages which are published within a 30 minutes time lag after the physical power plant non-usability. Our results point to no significant influences of messages with longer delays. Hence, over 20% of the published messages contain no significant information to influence intraday prices. This implies that for a large share of public announcements the price driving trades may be executed before the market is being informed about an unplanned outage. Consequently, the main objectives of REMIT are violated. Furthermore, we show that only messages relating to hard coal and natural gas power plants may lead to price increases. Policy makers should therefore increase transparency among market participants by introducing a real-time updated market messages framework.

References

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