The need for and benefits of intra-day auctions - evidence from Germany

Karsten Neuhoff, Nolan Ritter

Aymen Salah-Abou_el-Enien, and Philippe Vassilopoulos

## The need for and benefits of intra-day auctions
- evidence from Germany

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Short-term electricity trading in CWE</td>
</tr>
<tr>
<td>2</td>
<td>Impact of intraday auctions on liquidity of markets</td>
</tr>
<tr>
<td>3</td>
<td>Impact of intraday auctions on depth of market</td>
</tr>
<tr>
<td>4</td>
<td>Impact on reference price for derivative products</td>
</tr>
<tr>
<td>5</td>
<td>Impact on flexibility brought to market</td>
</tr>
<tr>
<td>6</td>
<td>Impact on security of system operation</td>
</tr>
<tr>
<td>7</td>
<td>Allocation &amp; pricing of cross-zonal transmission capacity</td>
</tr>
</tbody>
</table>
Timeline of trade at EPEX

- Coupled Day-Ahead Hourly auction
- Start of Intraday nominations
- EPEX SPOT Intraday Quarterly Call auction
- EPEX SPOT Continuous Quarterly Intraday
- EPEX SPOT Continuous hourly Intraday
- 45mn before delivery

Trading process:
- 12pm
- 2:30pm
- 3pm
- 4pm

Purpose:
- Hourly optimization
- Quarterly optimization
- Quarterly and hourly Continuous Re-balancing
Impact of intraday auctions on liquidity of markets

- 2014, EPEX introduced a uniform price auction for 15 min. products
- Otherwise, the market structure remained identical
- Identification of causal effects of the newly implemented auction:
  - Compare observations within 90 days before and after the implementation
Matching outcome

Similarity of variables by matching stage

(a) Wind generation

(b) Change in wind generation
Matching outcome

Similarity of variables by matching stage

(a) Solar generation

(b) Change in solar generation
Matching outcome

Similarity of variables by matching stage

(a) Total load

(b) Change in total load
Impact of intraday auctions on liquidity
Conclusion on liquidity and efficiency

- 3pm auction reduced trade of 15 min. products in the continuous market
- However, the trade volume at the auction overcompensates the reduction in continuous trading
- Thus, the auction increases total trade volume

- In case that trading is more beneficial compared to producing, rational market participants chose to trade.
- All else equal, increases in the trading volume indicate increases in market efficiency.
Order book depth on the 15min continuous intraday market
Aggregated supply and demand in early 2015 auctions

Supply at 3,000 Euro

Demand at 3,000 Euro

Supply at -3,000 Euro

Demand at -3,000 Euro
Bid-offer curve of the 15mn auction

Auction March 15, 2015: 1200 to 1215 CET
- In 5% of the transactions the basis risk is more than 86 €/MWh.
- Referenced to an index based on continuous trading, it is not possible to fully hedge one's positions.
Matching a simple 3MW hourly order with hourly, half-hourly or quarterly order combinations.
Ensuring secure system operation

- Penetration of algorithmic trading in intraday exchanges
  -> higher trading speeds, turnover rates, order-to-trade ratios

- More than 100,000 intra-day orders per day in Germany

- Risk of backlogs and ultimately secure operation
Number of automated trading applications almost doubled

Moving average of Bid/Ask-Spreads using 15 observations

-> automated traders do not improve the bid/ask spread
Pricing of T capacity in continuous trading difficult
- ex-ante set price inhibits efficient trades / can violate T
- ex-post set price – trading risk limits arbitrage

Allocating T capacity on first come first serve (for free)
- gives scarcity value to traders not consumers
- inefficient use of scarce resource in flow based approach

-> Politics changed as robots captured margins from traders
The need for and benefits of intra-day auctions - evidence from Germany

1. Intraday auctions enhance liquidity of markets
2. Intraday auctions enhance depth of market
3. Intraday auctions provide reference price for derivatives
4. Intraday auctions enhance secure system operation
5. Intraday auctions allow efficient use and pricing of T

-> Agree on multi-part bids for full flexibility

-> This allows for standing orders and attractive frequency