Redesigning automated market power mitigation in electricity markets

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Motivation

- Market regulators typically screen for market power (and its abuse)
- Some regulators go beyond and mitigate non-competitive auction bids to competitive reference levels (marginal cost proxies)
- Issue: Marginal cost are private information of suppliers

Research questions

1. How can plant-specific reference levels be derived at reasonable effort for the market operator?
2. What potential for welfare transfers and welfare gains do these mitigation mechanisms have?

Automated mitigation procedure (AMP)

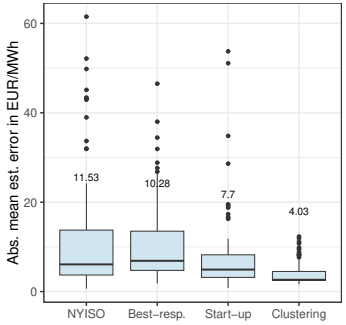
- Benchmark for AMPs are U.S. markets (NYISO, CAISO, MISO etc.)
- Four-step procedure
  1. Screening for market power (pivotal supply situation)
  2. Conduct threshold (excess pricing)
  3. Impact threshold (relevant market price impact)
  4. Non-competitive bids are mitigated to reference levels
- Reference level should reflect a competitive bid level $\Rightarrow$ marginal cost

Reference level calculation

Approach	NYISO (Benchmark)	Best-response	Start-up	Clustering	MC engineering estimate
Calculation	Rolling 90-day mean of past bids	Response function to residual demand and forward contracts	Rolling 90-day mean of past bids	Rolling 90-day mean of past bids	Bottom-up calculation (fuel, heat rate, policy cost etc.)
Input price adjustment	Yes	Not applicable	Yes	Yes	
Excl. start-up cost	–	Not applicable	Yes	Yes	
Plant clusters	–	Not applicable	–	Yes	
Intuition	Current practice Issues ..Distorted by start-up cost ..Strategically manipulatable	Hortaçsu and Puller (2008), Klemperer and Meyer (1989), and Wolak (2000, 2003, 2007)	Reguant (2014)	Brown and Eckert (2022) and Shawhan et al. (2011)	

Precision of reference levels

Application to hourly auction data of the Iberian day-ahead market (for coal & gas plants)

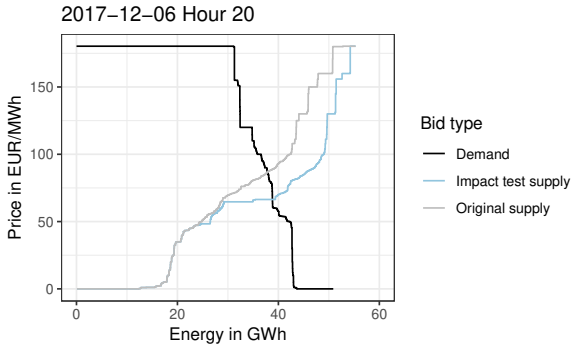


Estimation error in absolute terms.
Sample period 01.04.2017–31.03.2018.

Simulation

Simulation of AMP with all 4 reference level calculations

- Conduct test
- Impact test
- If both fail:
  $\rightarrow$ Mitigation to reference level



Failed impact test in the Clustering approach for the 20th hour (19:00-20:00) of a Thursday in December, leading to mitigation.

Welfare implications of preferred Clustering approach

Robust welfare gains

- 0.83-1-01 % welfare gain per mitigated hour (vs. 0.57-0.42 % in NYISO)

Decomposition of welfare gains

- Only Clustering approach with true productive efficiency gains
- 13,060 € productive efficiency & 17,800 € allocative efficiency gains per mitigated hour

Substantial welfare transfers

- Supplier surplus – 46-54% (per mitigated hour)
- Buyer surplus + 26% (per mitigated hour)

Conclusion

- Potentials to increase precision of detection and mitigation of noncompetitive bidding
- Simulation shows substantial potential for welfare transfers and dead-weight-loss decreasing efficiency gains
- Detection and mitigation of market power abuse especially important in markets with large windfall profits (renewables, gas price crisis)
  → European Commission (2022) and Graf et al. (2021)

Thank you!

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Published paper

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