

Course notes for EE394V

Restructured Electricity Markets: Market Power

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Market power mitigation

Outline

- (i) Price and offer caps,
- (ii) Texas two-step,
- (iii) Pay-as-bid versus market clearing prices,
- (iv) Long-term contracts,
- (v) Limitations on changing of parameters,
- (vi) FTR ownership rules,
- (vii) Demand response,
- (viii) Summary.

6.1 Price and offer caps

- Offer cap is a limit on maximum offer price.
- Price cap is a limit on maximum allowed price in market.
- Aimed at preventing large excess transfers of wealth:
 - large transfer of wealth occurred in some of the homework cases,
 - limitation on offer price would have reduced transfer.
- Inherent compromise in energy-only market such as ERCOT:
 - set low enough to prevent large excess transfer of wealth,
 - set high enough to allow for competitive (high) prices under scarcity to provide sufficient incentives for investment.

6.2 Texas two-step

- The ERCOT ECI test focused on identifying the “competitive” and “non-competitive” transmission constraints.
- This information will be used in the “Texas two-step” in the ERCOT nodal market:
 - (i) perform offer-based economic dispatch considering the “competitive” constraints but ignoring the “non-competitive” constraints, and then
 - (ii) use resulting LMPs to set offer caps for second offer-based economic dispatch that considers all the transmission constraints.
- Rationale:
 - when there is not region-wide scarcity, the first step prices will be low, setting low offer caps, while
 - when there is scarcity, the first step will set higher offer caps, allowing prices to rise when supply is tight,
 - so offer caps modulate to allow high prices when appropriate from a scarcity perspective.

Texas two-step, continued

- Criticisms:
 - In absence of demand response, not clear that prices will be set at appropriate level in presence of scarcity.
 - ECI test is unreliable indicator of market power.

6.3 Pay-as-bid versus market clearing prices

- Pay each accepted offer equal to its offer price instead of paying all accepted offers the clearing price.
- Criticisms:
 - As discussed in equilibrium analysis, “revenue equivalence theorem” suggests that equilibrium prices will be similar with the two pricing rules:
 - changing the pricing rules will result in a change to the offers.
 - Need for each market participant to forecast clearing prices has negative implications for efficiency of economic dispatch.

6.4 Long-term contracts

- Reduces profit from offering at prices that are different from marginal generating cost.
- Significant role in mitigating market power, but joint equilibrium between forward and “spot” markets not completely understood theoretically in context of offers into an electricity market.

6.5 Limitations on changing of parameters

- Some parameters of generators do not change rapidly:
 - offer rules that allow such parameters to be changed often will tend to increase market power.
- Allow only occasional change in offered start-up costs, minimum-load costs, and ramp-rates.
- Allow only a single set of offers (or heat rates) for all hours in day-ahead market.

6.6 FTR ownership rules

- Analysis of transmission, equilibrium, and transmission rights.
- FTR options and obligations owned by a generator in “sinking” direction increase market power compared to no FTRs:
 - these FTRs *increase* exposure of generator to LMP at its bus, amplifying its market power,
 - have no price risk hedging role.
- FTR options and obligations owned by a generator in “sourcing” direction either decrease or have no effect on market power:
 - these FTRs reduce exposure of generator to LMP at its bus, reducing its market power,
 - hedge price risk exposure.
- Similarly, FTR options and obligations owned by demand in “sourcing” direction increase market power.
- FTR options and obligations owned by demand in “sinking” direction either decrease or have no effect on market power.
- Rules on FTR ownership could be crafted to discourage ownership of market power increasing FTRs that have no hedging role.

6.7 Demand response

- Most importantly of all, demand response can mitigate market power:
 - observed theoretically in Cournot and supply function equilibrium framework,
 - observed empirically in homework.
- Also provides the most reliable signal to the market about demands' needs for electricity!
- Demand curve for reserves “adds” to price responsiveness of demand for energy.

6.8 Summary

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- (v) Limitations on changing of parameters,
- (vi) FTR ownership rules,
- (vii) Demand response.