Too Many Prices?
Virtual Bidding, Scheduling Requirements and Strategic Behavior in Multi-Settlement Markets

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Outline and Summary

• Multi-period (multi-settlement) Markets
• Strategic behavior and multi-settlement
  – underbuying, “arbitrage,” and implicit virtual bidding
• Corrective Measures and Safeguards
  – scheduling requirements
    • can increases rigidities in markets
  – convergence bidding
    • can provide elasticity to markets
Multi-period (*Multi-settlement*) markets

- Day-ahead and Real-Time Markets for producing power at a given time and place
  - “same” product
  - rules of market can lead to differing performance requirements on generators, consumers
- if all goes well prices are roughly the same *on average*
- Transactions costs, inconsistent market design, or strategic behavior could lead prices to chronically differ
Figure 1: No Strategic Buying
– all expected demand bought forward

\[ P_f \]

\[ q_f = D_{\text{forecast}} \]

\[ S \]

\[ D \]

\[ E(P_s) \]

\[ 0 \]

\[ Q_{\text{spot}} \]

Spot supply curve
Causes of Chronic Price Differences

• Inconsistent market rules
  – CAISO – more zones DA than RT
• Incentives of market participants
  – NYISO example
• Strategic Behavior
  – strategic “under-buying” or “under-scheduling”
• *If RT market accurately reflects market conditions, then we want forward markets to accurately reflect expectations about that RT market*
  – *i.e. prices should be roughly equal on average*
Figure 2: Strategic Buying w/ no supply reaction
– forward purchases and prices reduced
Figure 3: Strategic Buying w/ reaction by sellers
– forward demand and supply shifts in, prices equilibrate
Economics of Trading Between Markets

• Large Buyers (or Sellers) may want to reduce purchases (sales) in DA market to lower (raise) prices on the larger share of their volume
  – trade the rest in real-time

• If net position (i.e. net short or long) in the DA market is small, there should not be much incentive to influence prices
  – i.e. forward contracts limit incentive to influence prices

• If price differences are predictable, firms can trade on them (buy low, sell high) and hope to not influence prices
Figure 4: Strategic Buying w/ no supply response and monopoly “arbitrage” (“implicit virtual bidding”)
– forward purchases and prices reduced, but traders do not eliminate price differences (eg don’t kill the golden goose)
Possible Responses

• Penalize such trades
  – penalties for scheduling deviations
  – 95% scheduling rule
  – other charges on RT transactions

• Allow such trades, but make them explicit
  – *i.e.* “virtual” or “convergence” bidding
  – trading pressure is directed into channels that do not impact physical reliability
Scheduling Requirements

• If trading in the real-time market is very expensive, strategic trades will be discouraged
  – measurement issues – 95% of what?

• In order to make such restrictions effective, they would likely also discourage “legitimate” usage of the real-time market
  – outages, surge in demand, more supply at interties
Summary

• Strategic trading between DA and RT markets is a potential concern
  – one that is mitigated by extensive forward energy contracting

• Rigid scheduling requirements can limit such trading, but also create other costs and consequences
  – the cure could be worse than the disease

• Virtual or convergence bidding can mitigate the negative consequences of such trades and provide other potential benefits
  – mitigate potential concerns with position limits