MARKET POWER AND MARKET MAKERS

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Trading in Forward Markets

- **Framework:**
  - OTC broker market
  - Exchanges: e.g. Enron Online; ICE

- **Markets**
  - Energy market
  - Capacity market
  - FTR market

- **Term**
  - Daily
  - Longer term

- **Participants**
  - Sellers of energy from assets
  - Buyers of energy for load
  - Traders
Market Power

- Definition: Raise market price above competitive level
  - Profitability
  - Duration/Sustainability
- Method 1: Physical withholding
- Method 2: Economic withholding
  - Offer price $>$ Competitive price
  - Export when export price $<$ internal price
- Method 3: Transmission related
  - Create congestion
Competitive Price

• Competitive price in day ahead and real time spot markets is a function of:
  – marginal cost
  – opportunity cost (including optionality)
  – risk
  – scarcity

• Competitive price in forward markets is a function of:
  – Expected spot price
  – Expected fundamentals (including risk)

• Competitive price
  – Testable in day ahead and real time markets
  – Difficult to test in forward markets
Trading and Market Power Examples

- Capacity market
- Day ahead energy market and FTR market
- FTR market and information
- Bilateral OTC energy markets
Trading and Market Power in Capacity

- Trading can enhance/create pivotal position in market
- Use of pivotal position to exercise market power
- Exercise of market power in PJM daily markets
- Relationship between market power in capacity credit markets and market power in bilateral OTC capacity credit markets
- Relationship between price expectations derived from market power in PJM daily markets and market power in bilateral forward markets
- Role of physical position
- Capacity market subject to exercise of market power via trading strategies
  - Actual exercise of market power a function of incentives
- PJM made changes to market rules to reduce incentives to exercise market power in PJM daily capacity credit markets
Capacity Market Dynamics

- Daily and monthly markets
- Penalty payment if LSE is deficient
- Capacity can be sold within or outside PJM
  - Firm energy
  - Relative prices
- Marginal cost of capacity
  - Direct costs close to zero for daily capacity
  - Opportunity cost: external energy markets (firm, LD)
- Inelastic demand
  - Function of forecast load
Supply and Demand

Figure 2: PJM Unforced Capacity, Total LSE Obligation, Net PJM Position
One Supplier and Residual Demand

Figure 8: Entity1 Supply and Residual Demand

MW

Date

10/00 11/00 12/00 1/01 2/01 3/01 4/01

-2,500 -2,000 -1,500 -1,000 -500 0 500 1,000 1,500 2,000 2,500

Entity1 Offers  Residual Demand
Daily Capacity Prices

Figure 1: Daily Capacity Credit Market Clearing Price

<table>
<thead>
<tr>
<th>Date</th>
<th>Clearing Price ($/MW-Day)</th>
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<tbody>
<tr>
<td>10/1/00</td>
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Legend:
- Red line: Daily Capacity Capacity Credit Market Clearing Price
Prices and Market Comparison

Figure 4: Daily Capacity Credit Market Prices and Value of Exporting Firm Energy From Daily Forwards
October 2000 through April 2001
Daily and Monthly Prices

Figure 11: January 2000 Through September 20, 2001
Daily vs Monthly Capacity Credit Market Performance

- Daily CCM (MW)
- Monthly CCM (MW)
- Wtg Avg Price Monthly ($/MW)
- Wtd Avg Price Daily ($/MW)
Trading and Market Power in Energy

- Trading in PJM day ahead energy market:
  - Financial offers/bids: increment/decrement bids.
- Trading in PJM monthly FTR market
- Combination used to exercise market power
- FTR position taken on a radial path
- Financial offers and bids in day ahead market used to create congestion on the path
- Congestion makes FTR position valuable
- Typically in radial portion of transmission system
- No physical positions
- PJM introduced rule which eliminates incentive to engage in this behavior
Incs/Decs/FTRs

Thermal rating 60 MW

A

60 MW

B

40 MW FTR

LMPDA = $25

10 MW INC

LMPDA = $25

INC VALUE -$0

DEC VALUE -$250

FTR VALUE $1,000

NET VALUE $750

LMPDA = $25

10 MW DEC

LMPDA = $50

LMPRT = $25
• Transmission outage/derating posted after close of monthly FTR market: reduced flow on a path(s)
• Asymmetric access to information possible
• Incentives to gain access to information
• Purchase of FTR in PJM monthly FTR market on path(s)
• Congestion makes FTR position valuable
• No physical positions
• PJM made rule changes to remove the incentives to engage in this behavior
Transmission Outage/FTRs

Thermal rating 60 MW
Thermal rating 50 MW

A

50 MW

B

40 MW FTR

LMPDA = $25
LMPDA = $25
LMPDA = $25
LMPDA = $50

FTR VALUE $1,000
Trading and Market Power in Energy

- Trading in OTC bilateral energy market
- Liquidity
  - Number of trades
  - Number of participants
  - Relative size of participants
- Potential size of positions
  - Credit
  - Assets
- PJM West Hub is relatively liquid
- Into Cinergy, Entergy are relatively liquid
- Other trading points less liquid
- Impact of active balancing market as constraint
- Test: compare day ahead prices with daily forwards
Trading Volumes: PJM and North

Daily Trading Volumes for Selected Hubs 2001

Date

Number of Deals

NEPOOL EAST_NYPP_ZONE_G EAST_NYPP_ZONE_J WEST_NYPP_ZONE_A PJM_WEST
Trading Volumes: PJM and West

Daily Trading Volumes for Selected Hubs 2001
Results of Trading

- Arbitrage between DA and RT markets
- Arbitrage between short term and long term markets
- Potentially value FTRs based on expected congestion
- Potentially value energy based on expected spot market/fundamentals including market power
- Leverage existing asset-based market power
- New opportunities for market power
- Hedging/risk transfer
- Development of more efficient forward markets
- More liquid: more players; more trades
- Less ability to game
- More reflective of expected fundamentals
IF YOU HAVE QUESTIONS

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