Can derivative trading create market power in physical spot markets?

January 24, 2002

Bill Balson
Gordon Rausser
Questions

• How do trading activities interact with hard assets and real markets to create, extend, or limit market power?

• Can brokers and traders who deal only with derivative contracts exercise market power in the electricity market?

• Can traders exercise market power in the trading market?
Three different cases can be distinguished:

<table>
<thead>
<tr>
<th>Market Power?</th>
<th>Physical spot market</th>
<th>Derivative market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spot price affects</td>
<td>Spot price affects</td>
<td>Corners &amp; squeezes</td>
</tr>
<tr>
<td>derivatives</td>
<td>derivatives</td>
<td>can cause forward price to affect spot</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Method</td>
<td>Withholding physical supply from the market</td>
<td>Take open position that requires more delivery than is available</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevention</td>
<td>Limits on physical market share</td>
<td>Limits on open positions (% physical)</td>
</tr>
</tbody>
</table>

January 24, 2002

Charles River Associates
A reliable forward curve is the critical input for all derivative pricing.

- **Illiquid derivative market**
  - cash price and forward price are related by models and trader expectations
  - swap pricing ties forward prices to cash prices

- **Liquid derivative market**
  - forward prices can co-evolve through separate market forces
  - market revealed forward prices
  - swap prices relatively unaffected by cash market
Physical and derivative markets have different purposes and pricing structures.

• Purposes of a physical spot market
  – Prompt delivery
  – Balance physical supply and demand
  – Bidding maximizes profit over delivery horizon
    • \( B^* = \text{Max} \{ p(B) \times v(B) \} \) (I.e. my bid is chosen to maximize the expected payoff)

• Purposes of forward and derivative markets
  – Future rights and obligations
  – Price discovery
  – Hedging
  – Balance flows of orders to buy and sell
  – Bidding maximizes expected changes in future prices
    • \( B^* = \text{Min} \{ B_m, B_f \} \) (I.e. my bid is the lesser of current market and my forecast)
Essential features of derivative markets do not have physical market analogs.

- Mark to market – the market value of the derivative is known at the end of each day
- Symmetry – the value of a swap can change either direction
- Margin – changes in market valuation can require immediate cash payments
- Leverage – financial contracts can have very high leverage ratios
- Volume – contract volumes can exceed physical volumes by 5-30 fold
- Replication - derivatives can be combined to replicate the financial outcomes of other derivatives
- No arbitrage – prices of any three derivatives must satisfy triangular equality of their value to avoid arbitrage
Derivative trading intended to manipulate spot prices would be excessively expensive relative to the benefits.

- Creates speculative position rather than balanced risk book
- Mark-to-market rules can trigger large loss
- Margin requirements can trigger immediate losses in seeking future payoffs
- Relative trading ratios mean more order flow in the futures is needed to impact market than in the spot market
What makes a well-functioning derivative market?

- **Liquidity**
  - High transactional volumes
  - Order flows and execution efficiency
- **Price transparency**
  - Immediate, public distribution of settlement prices
- **Credit checking and margining**
  - Mark to market and forward price risk
- **Trader motivations**
  - Traders who require immediacy
    - Hedging, book balancing
  - Traders who supply immediacy
    - Market makers
- **Position limits**
  - Prevent squeezes by limiting position sizes to % of supply
Essential activities of derivative trading may appear to be similar to manipulation.

- Delta hedging – practice of continuously rebalancing a portfolio to maintain low instantaneous price risk
  - buying as price increases, selling as price declines
- Volatility trading – practice of trading in the risk of future price changes
  - Sell a high priced option, delta hedge in the forward market, and buy back the option when volatility reverts
  - I.e. keeping a balanced risk book requires trader to continuously trade on both sides of the markets as price alternately advances and retreats