

Great Expectations

Expectations and the Economics of Market Power
Manipulation

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The Issues: Expectations About the “Delivery End Game”

- Most analysis of market power manipulation looks at the “delivery end game,” but futures markets are forward looking and trading takes place continuously prior to expiration
- How do market participants learn about how the end game will play out?
- How does this impact the behavior of prices prior to expiration?

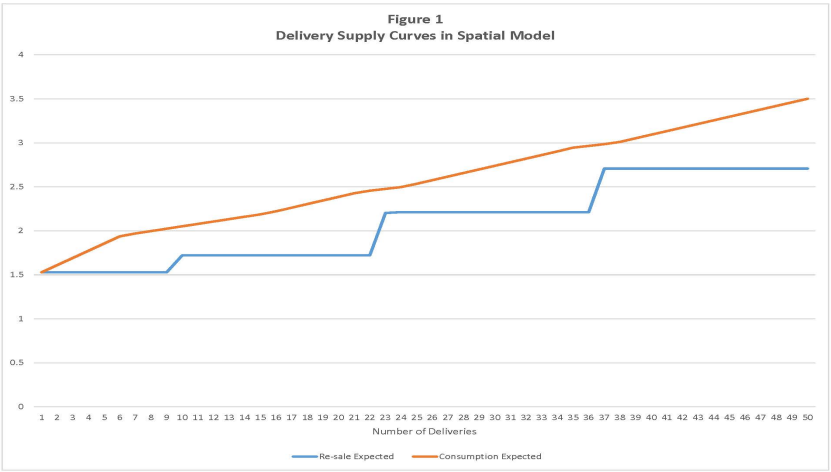
- Earlier work has modeled strategic interactions prior to the end game: Cooper and Donaldson (1992), Pirrong (2011)
- Basic issue: liquidations reduce long's market power, leading shorts to defer liquidation (a free rider problem)
- Pirrong (2011) shows that if (a) there are large shorts, and (b) shorts receive a signal about a possible manipulation prior to expiration, there may be a liquidation prior to the end game
- A large short internalizes some of the externalities, and can make the long a mutually beneficial, efficiency enhancing offer that the long accepts with positive probability
- Where does the signal come from?
- Order flow during the liquidation period

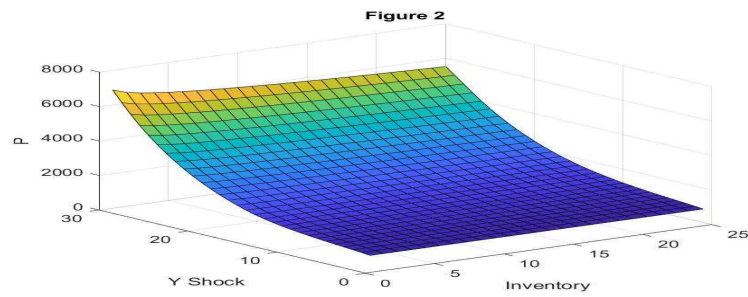
The Issues: How Do Expectations Affect Market Power?

- Market power manipulation involves a long taking excessive deliveries, but longs can take deliveries for legitimate reasons
- Pirrong (1993) shows that the delivery supply curve (which determines market power) depends on expectations regarding the long's intentions
- Can a long enhance his market power by deceiving shorts regarding his intentions?

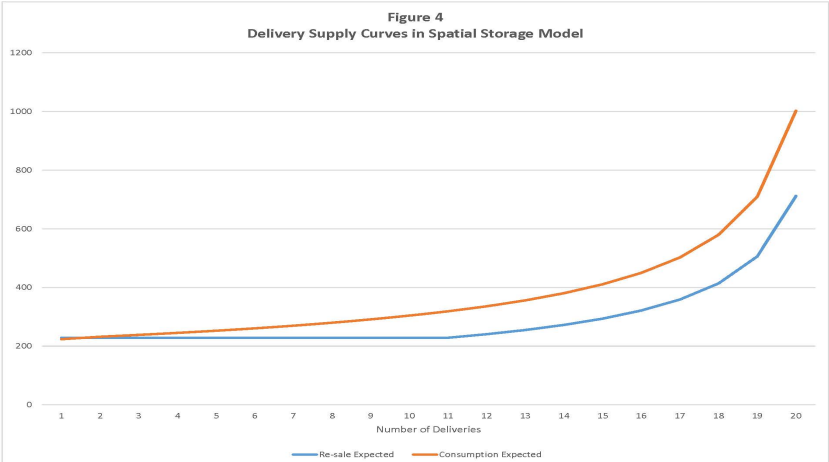
Expectations and the Delivery Supply Curve

- Pirrong (1993) shows that the marginal cost of deliveries (i.e., the delivery supply curve) depends on market participants' expectations on what the party accepting delivery will do with the deliveries
- If they *know* it is a manipulation, and the long will re-sell what is delivered, the delivery supply curve is perfectly elastic up to the supply in the delivery market because deliveries up to this quantity have no impact on consumption
- If they believe that the long will consume instead, delivery supply curve slopes up for any positive quantity due
- Examples: Spatial market, storable commodity, storable spatial commodity





Delivery Supply Curves: Spatial Storage Economy



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Great Expectations

Exploiting Uncertainty to Enhance Market Power

- Market participants are uncertain about whether a long standing for delivery will consume the commodity, or is a manipulator who will sell the commodity after delivery
- Two types of long, both with a position X
- A “strong stopper” values the commodity at \bar{P} . A “weak stopper” values the commodity at $\underline{P} < P_c < \bar{P}$
- Shorts believe the probability that a long is a strong stopper (high-valuation type) is p_H
- The long chooses to sell futures positions at \bar{P} , or at P_c . That is, a long submits an offer to sell X contracts at a price of \bar{P} or competitive price P_c
- Competitive shorts choose the number of deliveries to make. The positions not closed by delivery are liquidated at the long’s offer price
- The high-value long consumes what is delivered. The low-value long resells it for net proceeds of $P_c - \tau$ per unit

Delivery Supply Curve Given Uncertainty About the Long's Type

- $MC(Q)$ is the marginal cost of delivery when the long consumes what is delivered
- If both types demand \bar{P} , shorts have no information about the long's true type, and estimate the expected marginal cost of delivery as:

$$MC^*(Q) = p_H MC(Q) + (1 - p_H)P_c$$

They choose Q^* such that:

$$\bar{P} = MC^*(Q^*)$$

- That is, they choose the number of deliveries so that the opportunity cost of delivery (repurchasing a futures contract at price \bar{P}) equals the expected marginal cost of delivery, where the expectation is taken over the long's type

- A weak stopper can mimic a strong stopper and submit an offer of \bar{P} to sell his X contracts
- This can be an equilibrium under alternative assumptions about out-of-equilibrium beliefs
- I consider two sets of out-of-equilibrium beliefs: (a) shorts believe a long who offers P_c is a weak stopper with probability 1, and (b) shorts believe a long who offers P_c is a weak stopper with probability $1 - p_H$

Equilibrium Under First Set of Beliefs

- The payoff to the high-value type when offering \bar{P} is $X\bar{P}$: he gets Q^* units of the commodity which he values at \bar{P} and resells the remainder of his futures position $X - Q^*$ at a price \bar{P}
- Strong stopper's payoff when offering P_c is $P_c(X - Q_c) + Q_c\bar{P} \leq X\bar{P}$
- Thus, the high-value long has no incentive to defect from the pooling equilibrium
- The low-valuation long's payoff from pretending to be a high-valuation type is:

$$\Pi_{L,H}(\tau) = (X - Q^*)\bar{P} + Q^*(P_c - \tau)$$

- his payoff from bidding honestly is:

$$\Pi_{L,L} = P_c(X - Q_c) + Q_c(P_c - \tau) = P_cX - Q_c\tau \leq XP_c$$

- If $X > Q^*$, $\Pi_{L,H} > \Pi_{L,L}$

- Under the second set of beliefs, shorts deliver $\hat{Q} < Q^*$ where

$$MC^*(\hat{Q}) = P_c$$

because the opportunity cost of delivery is liquidating a futures contract at a price P_c

- Strong stopper bids \bar{P}
- The low-value type's payoff from offering P_c is:

$$\Pi_{L,L} = P_c(X - \hat{Q}) + \hat{Q}(P_c - \tau) = P_cX - \hat{Q}\tau$$

- Critical value of $\tau^* > 0$ such that (a) $\Pi_{L,H}(\tau^*) = \Pi_{L,L}$, (b) $\Pi_{L,H}(\tau) > \Pi_{L,L}$ for $\tau < \tau^*$, and (c) $\Pi_{L,H}(\tau) < \Pi_{L,L}$ for $\tau > \tau^*$

- If there are some longs who place a high value on the commodity and will consume what is delivered to them, a low-value long can exercise market power by mimicking the strong stopper
- The long exercises market power because (a) he is able to liquidate some of his futures position at a price higher than the competitive price, and (b) he takes excessive deliveries
- Thus, misrepresentation of demand (“sheep in wolves clothing”) facilitates manipulation
- Pooling equilibrium more likely the larger p_H and X
- Manipulation of this type (a) inflates the expiring price, (b) reduces the basis, (c) increases the nearby-deferred spread, but (d) also increases the deferred futures price
- The last result distinguishes this type of manipulation from one in which shorts *know* the long will corner

A Crucial Policy Implication

- Manipulation via misrepresentation of demand allows a long to exercise market power even when his position is smaller than deliverable supply
- Existing US manipulation law requires a finding of “ability to cause an artificial price,” and precedents identify a position in excess of deliverable supply as a *necessary condition* for such ability
- The model implies a position in excess of deliverable supply is *not* a necessary condition
- Change in law in 2010 banning “manipulative contrivances or devices” could address this problem
- Recent Kraft case alleged a “false signaling” manipulation: this case settled, so there is still legal uncertainty about whether the deliverable supply condition is still necessary

- The models illustrate that expectations have decisive effects on market power manipulation
- Order flow during the liquidation period of a futures contract provides information on the number of deliveries, and this allows market participants to anticipate manipulations before they actually occur
- Thus, price distortions are likely to precede the “delivery end game,” and will appear during the liquidation period
- Uncertainty about the motives for a long standing for delivery can create market power
- Given such uncertainty, long can exercise market power with a position smaller than deliverable supply because shorts make deliveries based on their expectations regarding whether the long will consume what they deliver
- These models shed considerable light on historical manipulations, and have important policy implications

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