

Detection of Collusion in Auction Markets

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Introduction

Auctions are an important market trading institution.

They can be an effective price discovery process.

They can also be an efficient allocation mechanism.

But if sellers are at an information disadvantage, they may be vulnerable to price manipulation.

Thus bidding rings can corrupt the process.

There will be a welfare loss relative to the non-cooperative outcome if potential gains from trade are foregone.

E.g., if average bid prices are low, and potential sellers opt out of market;
or if the auction outcome is inefficient

How to determine when collusion is present?

Seek to inform either antitrust policy or optimal auction design.

It is often fruitful to describe the factors that inhibit collusion.

Adopt the perspective of the participants in the scheme.

Most bidding rings encounter typical cartel operational problems.

The manner in which a conspiracy deals with these problems can facilitate detection.

There is no general detective prescription.

Individual circumstances suggest lines of inquiry.

Case studies are inevitable.

Outline:

Focus on five potential cartel problems.

1. Detection by antitrust authorities, or by the auction designer
2. “Secret price cutting” (Unilateral defection or cheating)
3. Entry
4. Reconciliation of disparate interests
5. Responding to new circumstances

Describe each in turn, and provide examples.

1. Detection by antitrust authorities, or by the auction designer

Easiest case: “Finking” by a dissident ring member, or an ex-employee.

“Race to the courthouse” incentives created by US Corporate Leniency, or Amnesty, Program, as redesigned in 1993.

Under this program, the first to confess, and only the first, receives lenient treatment (offset, to some degree, by its degree of participation in the conspiracy).

Example: Sotheby’s and Christie’s

Christie’s was an equal partner in scheme, but the firm and its executives received much lighter penalties

E.g., Taubman of Sotheby’s served jail sentence.

Side payments or direct communication between conspirators reduce the chances of there being a dissident, but raise the likelihood of being caught and convicted.

Example: Archer Daniels Midland and the lysine and citric acid conspiracies.

In an auction market, the victim can redesign rules.

E.g., raise minimum bid;

or favor firms not participating in ring, if known.

A bidding ring may submit phony, or complementary, bids, that by design are lower than the serious bid submitted by the ring, to create the appearance of competition.

Example: Highway construction contracts (Porter & Zona, JPE 1993, Bajari & Ye, REStat 2003)

Long Island (NY) Highway Paving Contracts: Complementary Bids

Subset of firms (plus union leaders) met prior to the auction.

Low bid privileges assigned at meetings.

Other conspirators often submitted complementary bids.

How does this behavior manifest itself?

Idea: Exploit non-inclusiveness of cartel, plus presence of phony bids.

Split data in two dimensions:

(1) Cartel vs. non-cartel (those not present at meetings).

(2) Low bid from group vs. higher bids.

Serious bids should depend on costs.

Don't have good contract-specific information.

Look at rank distribution of bids within two groups, and test whether the low bidder is determined by same process as the ranking of higher bids.

Accept for non-cartel firms, do not accept for cartel.

The order of the bids submitted by non-conspirators is related to cost measures (capacity, utilization rate).

Lowest conspirator bid likely to be submitted by the firm with the lowest cost.

The ranking of higher cartel bids is unrelated to the cost measures.

2. “Secret price cutting” (Unilateral defection)

Usual cartel enforcement problem: static incentive to deviate (No honor among thieves).

Agreement must be self-enforcing, as contracts not enforced by courts.

If firms interact repeatedly, can sustain agreement by threatening defections with future punishment.

Requires rapid, sure and severe responses to suspected cheating.

A role for trade associations in disseminating information.

Or government mandates for pricing “transparency”

Punishment? Legal cartels can use fines.

Corn syrup: compensate rivals for foregone market share at agreed-upon cartel price.

If no recourse to fines, a ring can punish non-compliance by expelling the deviator from the ring, or by dissolving the ring.

LA trash haulers used local price wars to target punishment.

No incentive to deviate in second price (SPSB) or English auctions, if the designated cartel bidder has the highest valuation.

SPSB: If the designated ring bidder has the highest valuation, and bids this amount (the dominant strategy under private values), the other ring members cannot gain from deviating.

The more potential bidders who refrain from bidding, the lower the expected price paid by the designated ring bidder if it wins.

English auction: The designated bidder only needs to outbid other submitted bids.

In multi-unit simultaneous ascending auctions, punishment recourse is within the auction itself.

Example: FCC spectrum auctions

In multi-unit uniform price auctions, limit gains from deviation by pricing infra-marginal units low, via “hockey stick” bidding.

Auction designer can combat by employing a downward sloping demand curve (Kremer & Nyborg, LiCalzi & Pavan, McAdams).

US Timber Auctions (Baldwin, Marshall & Richard, JPE 1997)

In an English auction, collusion can reduce the bid necessary to win. If the ring is a subset of the potential bidders, the winning bid is affected only if the two highest valuation bidders are ring members. Then the winning bid is no longer the second highest valuation.

The extension to first price sealed bid auctions would be more complicated (as bidding value is no longer a dominant strategy).

Collusion is more difficult; may need shill bids for proper incentives.

Designated bidder bids higher than optimal against outsiders, to keep other ring members from defecting.

A second shill bid, just below the high ring bid, dissuades the designated bidder from bidding lower.

Thus complementary bids may do more than create the appearance of competition (Marshall & Marx).

3. Entry

If cartel earns above normal profits, it invites entry.

Legal restrictions on entry, sanctioned and/or enforced by the government, can limit the entry of potential competitors.

Examples: restrictions on foreign competition, minimum qualification requirements.

Illegal sanctions: In industries dominated by organized crime, other (non-pecuniary) threats deter entry.

Another response is predatory pricing, to drive out entrants, to limit their scale, or to lower acquisition costs.

Asymmetries in information or payoffs can act as a barrier to entry.

Example: OCS drainage auctions (Hendricks & Porter, AER 1988).

But a non-inclusive cartel can be easier to detect, as outsiders can serve as a standard of comparison.

Example: Ohio school milk auctions (Porter & Zona, RAND 1999)

Offshore Drainage Auctions: Information as an Entry Barrier

Oil and gas lease is drainage if there has been prior exploration (drilling) on other leases in the area.

Firms that have explored neighboring leases have an informational advantage over firms with access only to seismic data.

Their numbers (N) limited by the number of tracts previously sold.

Despite relatively high overall returns, there is less entry (fewer bids are submitted) than on wildcat leases, where information is symmetric.

Neighbors earn high profits, non-neighbors barely break even.

If neighbors bid competitively, non-neighbors should not enter.

Yet non-neighbors do bid, and their bids are independent of N .

High neighbor bid is independent of N , average bid is decreasing, contrary to predictions of competitive bidding models.

When several neighbors bid, ex post profits are higher.

Suggests collusion, not competition, and occasional submission of complementary bids.

Ohio School Milk Bidding in the 1980s

Bidder payoff asymmetries, based on plant locations, matter, as processed milk is costly to ship.

The three Cincinnati dairies bid both near their plants and well beyond their local territories.

Their more distant bids tended to be lower.

Other dairies' bids increase with distance from a school district to their closest plant.

The Cincinnati dairies' bidding is consistent with territorial allocation of nearby school districts, where they were the lowest cost potential competitors, and more competitive bidding in distant districts.

The effect of collusion is to relax a constraint on bids by removing the most competitive rivals.

An "inverted price umbrella," consistent with a local monopoly constrained only by more distant rivals.

4. Disagreements over division of the spoils

Many cartels have internal political problems.

Arise from differences in costs, capital, customer bases, discount rates, etc.

Examples: OPEC, US agricultural marketing agreements.

Often see disputes between smaller and larger participants, as small free ride on the less competitive behavior of the large (Cave & Salant, AER 1995).

Cartel problem is to divide the spoils and allocate shares.

There can be a problem of adverse selection:

If there is private information, each member argues for a big share.

An efficient solution maximizes cartel profits, subject to participation and information revelation constraints.

An imperfect solution is a territorial assignment:

by region,

by point in time (GE/Westinghouse electrical conspiracy in the 1950s),

by incumbency (NY trash hauling),

by pure randomization (e.g., identical bids).

Caution: geographic specialization, bid rotation, and low client turnover are not inconsistent with competition.

In FCC DEF block spectrum auctions, territorial division achieved within the bidding process (Cramton & Schwartz).

Simultaneous ascending bid procedure with bidding open on all licenses throughout the auction.

Eligible firms could switch between licenses.

Trailing digits on bids communicate future intentions, send signals.

The auction rules could require fixed bid increments.

Another imperfect solution is to keep market shares stable.

School Milk Auctions: strong vs. weak cartels (Pesendorfer, REStud 2000)

Strong cartel distinguished by ability to make side payments.

Allegations of side payments in Florida ring, not Texas.

With large enough number of contracts to bid on, a weak cartel can be approximately efficient (use ranking mechanism to assign low bidding privileges).

But market shares will be more stable in a weak cartel, to maintain internal discipline. There are efficiency losses from not allocating to the low cost firm.

Market shares more volatile in Florida (especially in revenues).

In knockout mechanism, ring members bid for the right to be the designated representative in the seller's auction.

Efficient if highest value member wins.

Often employed by bidding rings.

In IPV setting, knockout out can be efficient, incentive compatible, and balance budget (Graham & Marshall, Mailath & Zemsky, McAfee & McMillan).

Example: Long Island highway construction.

Rare Books at Ruxley Lodge: Ex Post Knockouts.

Book dealers in England circa 1900.

The ring held a series of knockout auctions with successively smaller subsets of dealers.

Larger and more experienced dealers stayed longer in the knockout process.

Participants in knockout auctions shared the price increases over prices in the previous round (as in recent stamp auction rings (Asker, AER 2010)).

The original seller received less than 20 percent of the final settlement prices.

Why did larger ring members conspire with the smaller members?

More expensive to outbid them at the original auction, than to share some of the gains.

But share only enough to buy the loyalty of the smaller dealers.

In a pure common value auction, a ring's internal allocation problem is simpler, as all members value the item identically.

Can adopt equal division rules.

Ring members then have less incentive to misrepresent their information.

But the incentives to deviate may be greater.

Participation constraint may bind, as knockout auction encourages aggressive bidding, given the option value of learning other ring members' information, especially on marginal items.

A bidder with favorable information may be able to acquire the object with a lower bid in the seller's auction.

Example: OCS joint bids (Hendricks, Porter & Tan).

Joint bids are more common on high value tracts, and when the number of potential bidders is large.

A cartel also faces a moral hazard problem, because of the incentives to free ride on the information acquisition of other ring members.

5. Responding to New Circumstances

As market conditions change, a cartel may have to adjust its prices and its internal allocation rules.

With communication, can continually update terms and conditions.

How to coordinate absent direct communication?

One solution is price leadership or advance price change notification, both a crude form of voting.

Uniform and stable prices are consistent with both competition and collusion.

Absent cost data, how to distinguish?

The two can have different comparative static implications.

Example: US Forest Service timber sales (Athey, Levin & Seira)

Both English and First Price (FPSB) formats employed; suppose mills collude in English auctions, but not FPSB, and loggers are competitive.

Estimate competitive model for FPSB, compare predictions from competitive and (efficient) cartel models for English.

An Open Issue

Arguably, illegal agreements are distinguished by communication.

But what is the role of communication?

In a legal cartel with side payments, communication may be in the spirit of mechanism design, where allocations and payments are functions of internal messages.

But communication also plays a role in dispute mediation, and more general design of rules, contracts and institutions.

Example: the Sugar Institute (Genesove & Mullin AER 2001).

Absent binding contracts, communication can play many roles.

E.g., in a repeated game, communication affects renegotiation after disruptions, and hence may limit the severity of punishments, especially if punishments entail collective sacrifice.

(McCutcheon, JPE 1997; Farrell)

How does communication affect market outcomes?

Is it obvious that per se prohibition is beneficial?

Whinston “Lectures on Antitrust Economics,” MIT Press 2007

Other Design Issues

Three other forms of auction market manipulation:

1. Sotheby's and Christie's

Collusion among auctioneers to raise service fees.

2. eBay

Sellers unilaterally submit phony bids on their own items, in attempt to obtain higher prices.

Also, groups of sellers can inflate their rankings by giving each other glowing reviews for service and product quality.

These activities may be fraudulent, rather than antitrust violations.

3. Corruption of the auctioneer by some bidders, when the auctioneer is an agent for the seller.

E.g., in a sealed bid auction, a bidder could bribe the auctioneer to reveal the other bids.

These concerns also affect auction design.