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bidding rings

A bidding ring is a collection of bidders who collude in an auction in order to gain greater surplus by depressing competition. This entry describes some typical bidding rings and provides an introduction to the related theoretical and empirical literature.

When bidders in an auction collude in order to diminish competition between themselves, and hence earn greater surplus, the resulting cartel is often referred to as a bidding ring. The act of colluding in an auction is often referred to as 'bid rigging'. Bidding rings are illegal in most jurisdictions. In the USA, for example, a bidding ring is a violation of the Sherman Act and is punished by fines for both individuals and firms, and by jail time for those individuals involved.

Canonical examples of bidding rings include the 'Electrical Conspiracy' in the 1950s, in which 29 suppliers of industrial electrical generators and equipment colluded in first price sealed bid procurement auctions (Smith, 1961; McAfee and McMillian, 1992). This ring used a bid rotation scheme in which each ring member was allocated a phase of the Moon. The phase of the Moon at the time of the auction determined which of the ring members had the right to bid, free from competition from other members of the ring. Another example, this time in an ascending price auction, and involving an explicit sidepayment system, was the ring adopted by 81 book dealers in the auction of the library of Ruxley Lodge in 1919 (Freeman and Freeman, 1990) and Porter (1992)). After buying up the contents of the library free from internal competition, the ring members met in a sequence of knockout auctions which reallocated the contents of the library to those ring members who valued them the most. (A knockout auction is an auction conducted among ring members.) Participation in the knockouts became more restricted as the sequence progressed. The proceeds of each knockout were shared equally among participants, thus generating a system of sidepayments that increased with the participation (and presumably importance) of each ring member (Graham *et al*. (1990) describe similar cartels).

Importantly, many examples exist of bidding rings with many members, providing counterexamples to the common presumption that collusion is prohibitively difficult in markets with large numbers of participants.

The theoretical literature on bidding rings tends to focus on how the ring can allocate bids and transfers to its members in a way that is incentive compatible and extracts the greatest surplus for the cartel, given a series of institutional features. These institutional features include: the format of the auction; whether explicit sidepayments are feasible; the interdependence of bidders' private information (e.g. common values (CV) vs. independent private values (IPV)); the extent to which ring members are *ex ante* symmetric; the extent to which the mechanism should be budget balancing (i.e. whether within-ring transfers net to zero); and whether the ring faces competition from outside bidders. All of these features can affect the form of mechanism used by the ring to coordinate bidding and allocate surplus. The enforcement of the obligations arising from the ring mechanism is most often attributed to repeated game strategies (Athey and Bagwell, 2001).

In an IPV environment the central challenge facing the ring is getting each ring member to reveal their valuation for the object at auction. The problem is that the bids and within-ring transfers will often depend on the valuations ring members report to the ring. This potentially gives ring members incentives to misreport their valuations in the hope of gaining a greater share of the collusive surplus.

In IPV first price sealed bid auctions, McAfee and McMillian (1992) show that without explicit sidepayments the best an (all-inclusive) ring can do is to randomize over which ring member wins and for every ring member to merely bid the reserve price. As they point out, this closely resembles the phases of the Moon scheme used in the 'Electrical Conspiracy'. Such a scheme must lead to inefficient allocations and hence diminishes social welfare. Where sidepayments are feasible and ring members are *ex ante* symmetric the optimal ring mechanism can be implemented using a first price sealed bid knockout auction prior to the auction. The winner of this knockout gets the right to bid in the auction and the revenue raised in the knockout is shared equally among the ring members.

Knockout auctions also feature centrally in the theory of collusion in IPV ascending price auctions (see Mailath and Zemsky (1992) for characterization results). Graham *et al.* (1990) depart from the standard mechanism design approach, investigating the use of the Shapely value to allocate sidepayments to ring bidders. Despite the fact that such a payment scheme can lead to somewhat perverse bidding incentives, the scheme they describe mirrors both the Ruxley Lodge example above and the ring described in Asker (2009).

In common value settings the central issue is information aggregation. Hendricks *et al.* (2008) point out that the ring can increase aggregate surplus by providing a way to aggregate bidders' signals of the underlying value of the object. However, some bidders may prefer a non-cooperative auction, as the ring's sidepayment scheme can lead bidders with lower signals to benefit at the expense of bidders with higher signals. They provide conditions under which *ex post* efficiency, budget balance and individual rationality are incompatible elements of an indirect mechanism.

Empirical work on bidding rings suffers from the difficulty of getting high-quality data on what is an illegal, and hence secretive, activity. The majority of empirical papers on bidding rings consider the statistical detection of bidding patterns consistent with cartel activity. A smaller body of work examines how bidding rings are structured and the extent to which they appear to distort market outcomes.

The statistical detection of bidding rings proceeds by writing down a model of the suspected ring and then comparing the observed bidding pattern to that of the modelled ring and a non-collusive benchmark. For instance, Porter and Zona (1993) examine bidding in highway paving contracts on Long Island, comparing the rank distribution of bids submitted by (known) ring and non-ring bidders. They find the order of the less competitive ring bids is not explained by capacity utilization rates, whereas the order of less competitive non-ring bids is explained by the respective firms' capacity utilization rates. They interpret this as being consistent with the operation of the bidding ring. Bajari and Ye (2003) propose a similar detection scheme.

The few papers that have studied the structure of known cartels and their impact on market outcomes have found that cartels come surprisingly close to implementing optimal mechanisms. Pesendorfer (2003) examines bidding rings in first price sealed bid auctions for contracts to supply school milk in Florida and Texas using data collected during the prosecution of the rings. The Florida ring used a market division scheme while the Texas ring used an system of explicit side-payments. Pesendorfer draws inferences about the underlying structure of the rings from observed bidding data and concludes that the rings were using mechanisms that were close to optimal. Asker

(2010) also uses data collected during a prosecution, this time from a ring operating in ascending price auctions for collectable stamps. Asker concludes that the ring captures 72% of the surplus generated by the theoretically optimal ring and, interestingly, imposes damages on both sellers and competing bidders (by pushing prices above competitive levels at times and also by introducing inefficient allocations).

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See also

<xref=A000223> antitrust enforcement;
<xref=A000217> auctions (theory);
<xref=C000552> cartels;
<xref=C000210> collusion

Uncited References

Mailath and Zemsky, 1991; Pesendorfer, 2000.

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