Graham & Marshall (87) #9

Collusive Bidder Behavior at Single-Object Second-Price & English auctions

Between Silk and Cyanide, Leo Marks, Harper Collins, London, 1998.

Marks & Co. were kings of the book ring. They were one of the five leading firms of antiquarian booksellers who never bid against each other in the auction rooms. One member of the ring would be allowed to buy a book for a nominal sum, say £100. As soon as the auction was over the five conspirators would hurry to their nearest safe-house – usually a Lyons tea shop – and conduct a private auction. If one of them bought the book in question for £500, the £400 profit would be divided in cash amongst the other four. This process was called a 'knock-out', and Frank Doel once blew an entire operation.

A famous heart specialist named Evan Bedford instructed him to bid up to £300 for an edition of Harvey's *De Motu Cordis*, the earliest printed book on the circulation of the blood, which was coming up for auction at Hodgson's. Too busy with his own Harley Street salesroom to attend the auction himself, he telephoned Frank at home late at night demanding to know why the book had been sold to another dealer for £200 when he'd authorized Frank to bid three. Frank confided that it had been sold in the knock-out for £650. The irate physician immediately undertook to have the whole question of the book ring raised in the House of Commons, which caused cardiac arrest amongst its five participants.

Stylized facts about real rings:

1) They exist and are stable

2) They eliminate competition among ring members at the main auction, yet ensure that no non-ring bidder or main auctioneer will get object at a price below max value of ring members.

Ring appoints sole bidder to represent them at the main auction

3) Benefits are shared by ring members

4) Rings have open membership
after the main auction, object is sold at a secondary auction among ring members — the knockout.

Difference between knockout price & main auction price is the shared gain.

5. Auctioneer responds strategically to the ring's existence.

6. Rings try to conceal their existence from main auctioneer by setting higher reserves, and by lift-lining (taking bids off the wall).

Simple Model, Simple Case: Second-Price PAKT

i) IPV, risk neutral
ii) distribution of values F, common knowledge
iii) Identity of winning bidder & price paid are common knowledge (main auction)
iv) Membership of ring known only to ring members

PAKT Mechanism

Pre-main auction:

1. appoint ring center, who pays P to each ring member

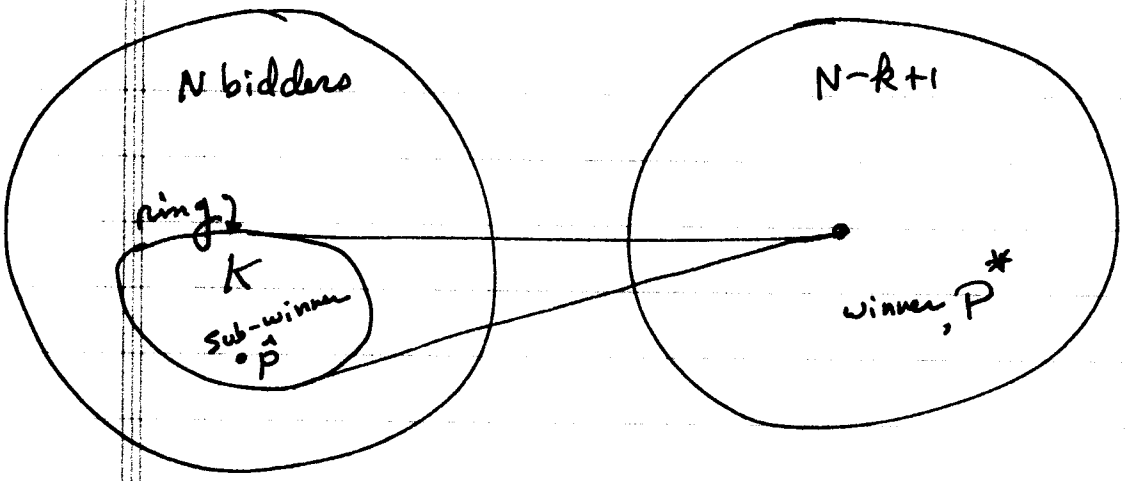
2. Each ring member submits a sealed bid to ring center his highest reported bid

3. winner is advised to submit ~~the winning~~ (~~second price at pre-auction~~) at the main auction; other ring members submit meaningless bids

4. If the winner at the sub-auction – call her the sub-winner – wins also at the main auction, she pays:

   - main auctioneer second highest at main auction
   - ring center

$$\max\left[\text{Second highest at ring} - \text{Second highest at main},\ 0\right]$$



main auction, second highest price P^*

If sub-winner wins main auction,

- pays P^* to main auction
- pays $\underbrace{\max(\hat{P}-P^*, 0)}_{\delta}$ to ring center

∴ each member of ring gets on average $\dfrac{E[\delta \text{ [redacted]}]}{k}$

ring center receives and pays $E[\delta$ [redacted]$]$,
so her ~~expected~~ surplus/loss $= 0$.

& sub-winner pays second highest of all bids if winner.

PAKT Properties: I. truthful bidding in pre-auction, & following the recommendation of ring center is a SBNE & weakly dominant strategy. → (incentive-compatible)

II. Voluntary participation is advantageous (rational)

III. Efficient (buyer with highest value gets item)

Proof I. equivalent to 2nd price auction (Vickrey)

II. if ring doesn't win, gets P
if ring wins but bidder doesn't, gets P
if ring wins & bidder wins main auction, gets object for 2nd price (OK), & gets P.

III. since equivalent to 2nd price auction.

How does (main) auctioneer respond?

The following are straightforward calculations using order statistics:

auctioneer compensates

Lemma 1 Given size of ring K, the optimal reserve $S^*(K)$ [maxing revenue] is an increasing fctn. of K. $(1 \le K \le N)$

ring is secretive to auctioneer

Lemma 2 Given size of ring K, expected payoff to a ring member is a decreasing fctn. of reserve price. $(2 \le K \le N)$

ring is expansive

Lemma 3 Given value of reserve price, expected payoff to a ring member is an increasing fctn. of size of ring K.

Theorem SBNE if ring membership is open is

$K = N$

S^* optimal for this, equivalent to a single bidder w. value drawn from $[F(v)]^N$, distr. of highest of N, & 2nd price — that is, a take-it-or-leave-it offer at S^*, accepted iff $v > S^*$.