Information Concentration in Common Value Environments

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INFORMS 2013

Motivation

In a common value auction, should the auctioneer allow some bidders to share information and submit joint bids?

- Mergers in auction markets
- Joint exploration of oil fields
- Subcontracting in supply chains
- Syndicated bids in IPOs

Conjectures

> “*In common value auctions, mergers and conspiracies can have pro-competitive effects due to the information sharing among merging parties or conspirators . . . an anticompetitive effect cannot be assumed.*
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> “*Depending on . . . whether the bidding can be characterized as a private value auction or a common value auction—a reduction in the number of bidders may or may not lead to a reduction in competition.*
>
> — *NERA Website*

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Somehow, conjectures passed into folklore...

- Court Decisions
- Antitrust Guidelines
- Government Procurement Guidelines

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Joint bidding leads to higher industry concentration
and higher information concentration

- Net effect “depends" ?

Previous Results

In private value auctions

- Symmetry-inducing mergers may be pro-competitive
  Thomas 2004, Dagen and Richards 2006, Cantillon 2008
- Mechanistic response may offset some merger effects
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In common value auctions

- Fewer bidders decreases the winner's curse
- More information increases bids
- Higher industry concentration increases bids
  Krishna & Morgan 1997, Pinske & Tan 2005

Previous Results

- Mergers can increase revenue under suboptimal auction mechanisms
  DeBrock & Smith 1983, Mares & Shor 2012
- Mergers can increase revenue when information is sufficiently improved
  Matthews 1984, Persico 2000, Bergemann & Valimaki 2002, Mares & Harstad, 2003
- But otherwise...
  - In an average value auction, symmetric mergers reduce revenue
    Mares & Shor 2008
  - In a symmetric maximum value auction,
    increased industry concentration reduces revenue
    Bulow & Klemperer 2002, Mares & Harstad 2003

We hold information constant, allow for asymmetry, and assume optimality.

Theoretical Challenges

- Multidimensional Signals
  - call into question existence of equilibria in auctions (Jackson 2009) and incentive compatible mechanisms (Armstrong & Rochet 1999)
  - overcome by imposing symmetry and specific value functions (Goeree & Offerman 2002, DeBrock & Smith 1983, Krishna & Morgan 1997, Mares & Shor 2008)
- Asymmetry
  - Common auction formats are not optimal
  - Creates fairly complicated information “spillovers"
  - Requires a mechanism design approach

Model

- A seller of an indivisible item faces m risk-neutral buyers
- Bidders posses $n \geq m$ signals. Signal X_i has distribution F_i
- The vector of signal realizations is denoted by $\mathbf{s}$
- A buyer's value function is given by $V_i(\mathbf{s})$
- An information profile $A = (A_1, \ldots, A_m)$ is a partition of n

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Standard Symmetric Auction Model

$$m = n \qquad A_i = \{i\} \qquad F_i \equiv F \qquad V_i(\cdot) \equiv V(\cdot)$$

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- The seller determines a mechanism, $\eta = (p_i(\hat{\mathbf{s}}), \xi_i(\hat{\mathbf{s}}))$

$\hat{\mathbf{s}}$: buyers' reports

p_i : allocation probability

ξ_i : payment

Research Question

What is the impact of coarser information partitions on a seller's revenue ?

- For example:

$$A = \{\ A_1\ ,\ A_2,\ A_3, \ldots, A_n\}$$
$$A' = \{\ A_1 \cup A_2,\ A_3, \ldots, A_n\}$$

- Is the seller better off under A' than under A?

Scalar Mechanisms

- Assume that buyer 1's information can be summarized by a scalar sufficient statistic $\phi_1(\mathbf{s}_1)$

$$\phi_1(\mathbf{s}_1) \geq \phi_1(\mathbf{s}_1') \Leftrightarrow V_j(\mathbf{s}_1, \mathbf{s}_{-1}) \geq V_j(\mathbf{s}_1', \mathbf{s}_{-1})$$

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- For each mechanism η, construct a scalar mechanism η'

  • depends only on a scalar signal from buyer 1

  • averages allocation probabilities and payment functions across equivalent types

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- Therefore:
  The seller can maximize revenue using only scalar mechanisms

Revenue Effect

- Consider a pure common value auction, $V_i(\cdot) \equiv V(\cdot)$
- V admits sufficient statistic representations for all players and information profiles
- $\partial_i V > 0$, $\partial_{ij} V \geq 0$, regularity condition on virtual valuations

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All mergers decrease revenue

- Even among smaller firms
- Even if seller responds strategically

Revenue Effect: Sketch of Proof

Compare revenue in $A = \{ A_1 , A_2, A_3, \ldots, A_n\}$

to revenue in $A' = \{ A_c = A_1 \cup A_2, A_3, \ldots, A_n\}$

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- Consider an optimal mechanism $\mu^{A'}$ in A'
- In A, create a mechanism μ^{A}:
  - identical to $\mu^{A'}$ for $i \geq 3$
  - never allocates to or collects payments from bidder 1
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- $\mu^{A'}$ under A' is revenue equivalent to μ^{A} under A
- μ^{A} under A is incentive compatible
- Since player 1 receives no allocation, μ^{A} is not optimal

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In finance, a euphemism for joint bidding

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In finance, a euphemism for joint bidding

> *"In the course of mounting their "indiscriminate" . . . attack on the syndicate system, the plaintiffs accuse the banks of having "frequent communications among themselves" . . . the sharing of information.*
>
> *It is ludicrous to suggest that communications within a syndicate violate the antitrust laws.*
>
> — *Amicus Brief, Robert Bork et al.*

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> “*Syndicates . . . should be treated as procompetitive joint ventures for purposes of antitrust analysis.*
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If I had been a Supreme Court justice, it might have been 7–2.