Industry Concentration
In Common Value Auctions

Theory & Evidence

Vlad Mares

Mikhael Shor

Olin School of Business, Washington University, St. Louis
&
Owen Graduate School of Management, Vanderbilt University

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Marseille

Motivation

General Principle:

Greater industry concentration is socially undesirable

Common Value auctions

Greater industry concentration (and the resulting decrease in competition) is inexorably linked to an increase in the precision of value-estimates associated with a reduction in the winner's curse.

- Greater certainty about value means higher bids
- Less competition means lower prices

Goal: Disentangling these effects

Industry Concentration in Common Value Auctions

Diminished number of bidders mitigates the winner's curse

- Pinkse and Tan, 2000
- Bulow and Klemperer, 2002
- Hendricks, Pinkse, and Porter, 2003

Information concentration leads to more informed estimates

- DeBrock and Smith, 1983
- Hendricks and Porter, 1992

Better information possessed by others leads me to bid higher

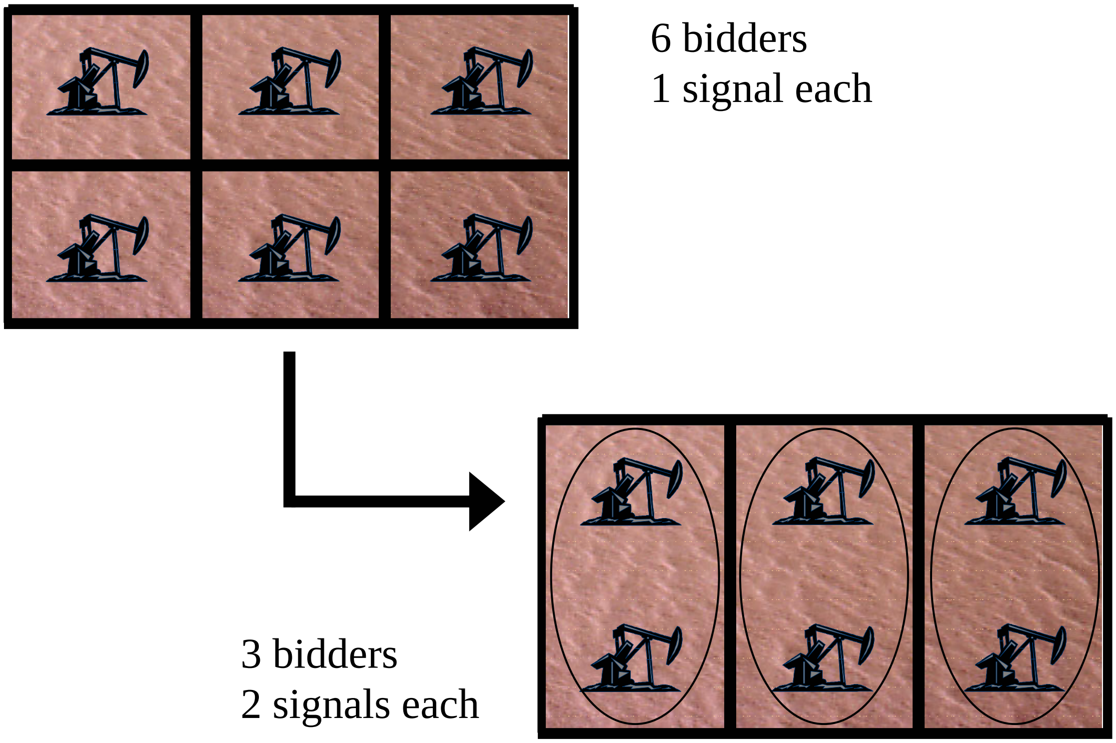
- Krishna and Morgan, 1997

Bidders derive optimistic estimates of others' information

- Mares, 2001

Industry Concentration in Common Value Auctions

Example of industry concentration



The amount of information does not change,
its allocation does:

> m agents each receive k signals $X_i \sim X$, $\quad n = k\,m$
> Greater concentration is a reduction in m (increase in k)

Average value auction

$$V = \frac{1}{n} \sum_i X_i$$

Define $\beta_{m,X}(x)$ as the bidding function with m bidders and $X_i \sim X$

Decomposing Effects of Industry Concentration

Isolate effects of greater industry concentration

- Competition Effect
  How does bidding change with fewer bidders?

- Information Pooling
  How does bidding change with better information?

Extend some existing results to first-price auctions

Characterize equilibrium behavior

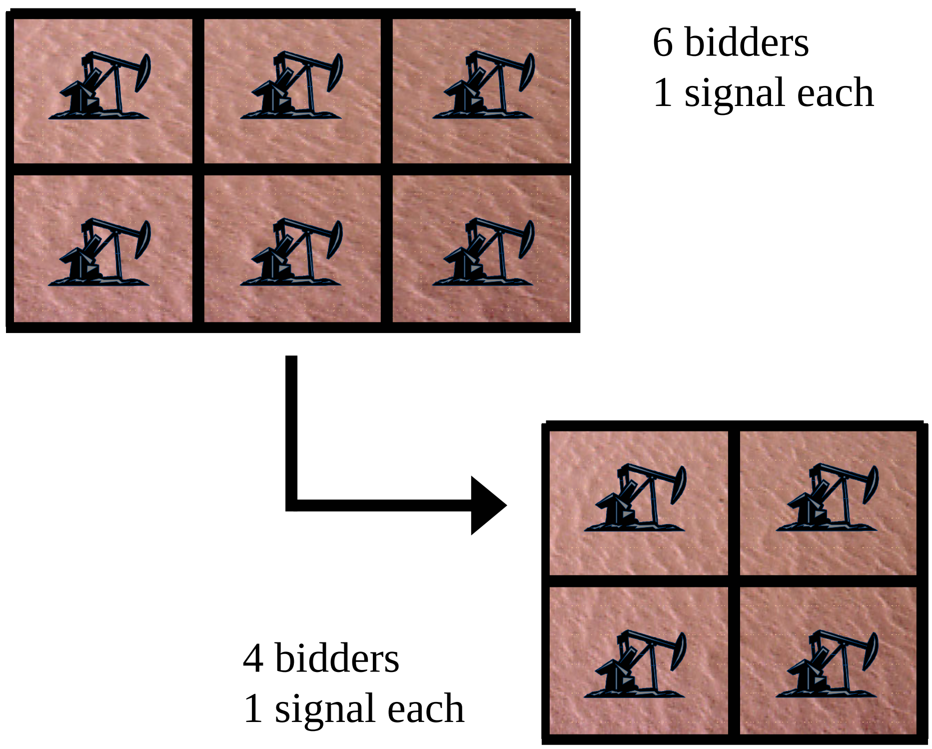
- Equilibrium Bidding
  How does bidding change with greater industry concentration (both of the above)?

Determine effect of industry concentration on revenue

- Revenue Result
  What is the impact of the above on revenue?

Examine robustness of results in economics experiments

Competition Effect



Lemma 1:

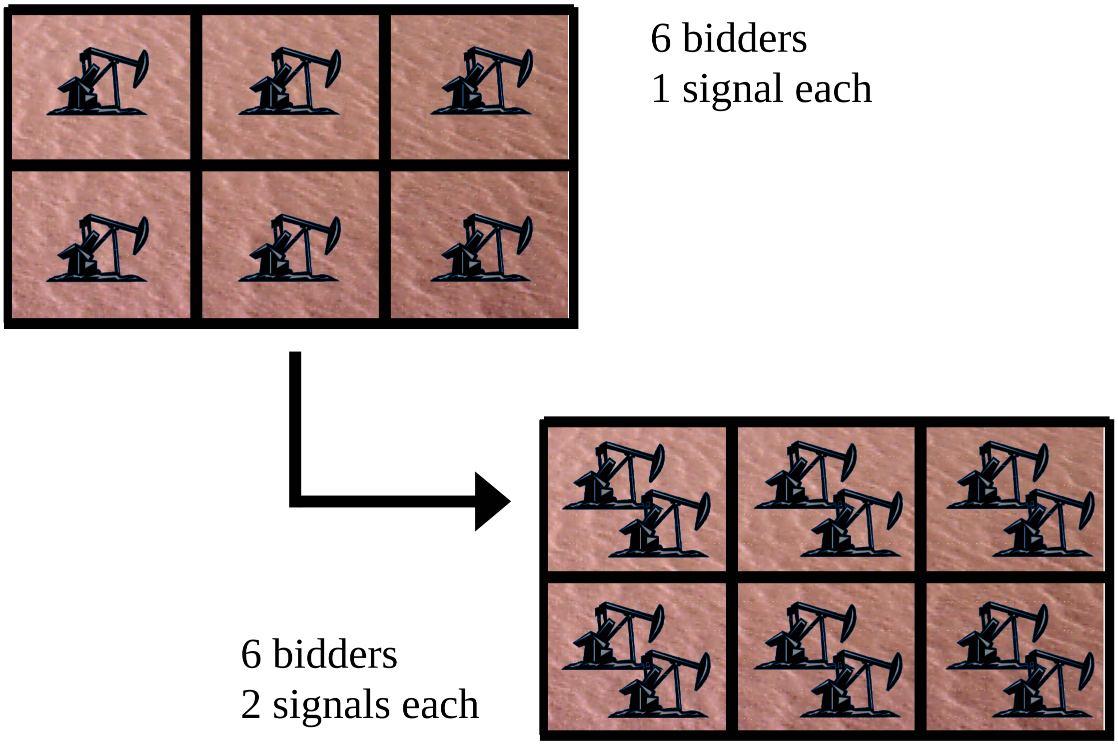
In 2nd price auctions:

the bidding function, $\beta_{n,X}(x)$, is decreasing in *n*.

In 1st price auctions:

the bidding function, $\beta_{n,X}(x)$, is unimodal in *n*.

Information Pooling



Assume the density of X is log-concave

Define $\overline{X}_k = [\, X_1 + \ldots + X_k \,] / k$

Lemma 2:

In 2nd price auctions:

the bidding function, $\beta_{n,\overline{X}_k}(x) \geq \beta_{n,X}(x)$

In 1st price auctions, there exists a t , t' ($t \leq t'$) such that:

$\beta_{n,\overline{X}_k}(x) \geq \beta_{n,X}(x)$ for $x \leq t$

$\beta_{n,\overline{X}_k}(x) \leq \beta_{n,X}(x)$ for $x \geq t'$

Lemma 2

$Y \prec_{LC} X \iff$ Y is more precise than X in the log-concave order

Claim:

If $\quad Y \prec_{LC} X$

and $\quad E[Y] = E[X]$

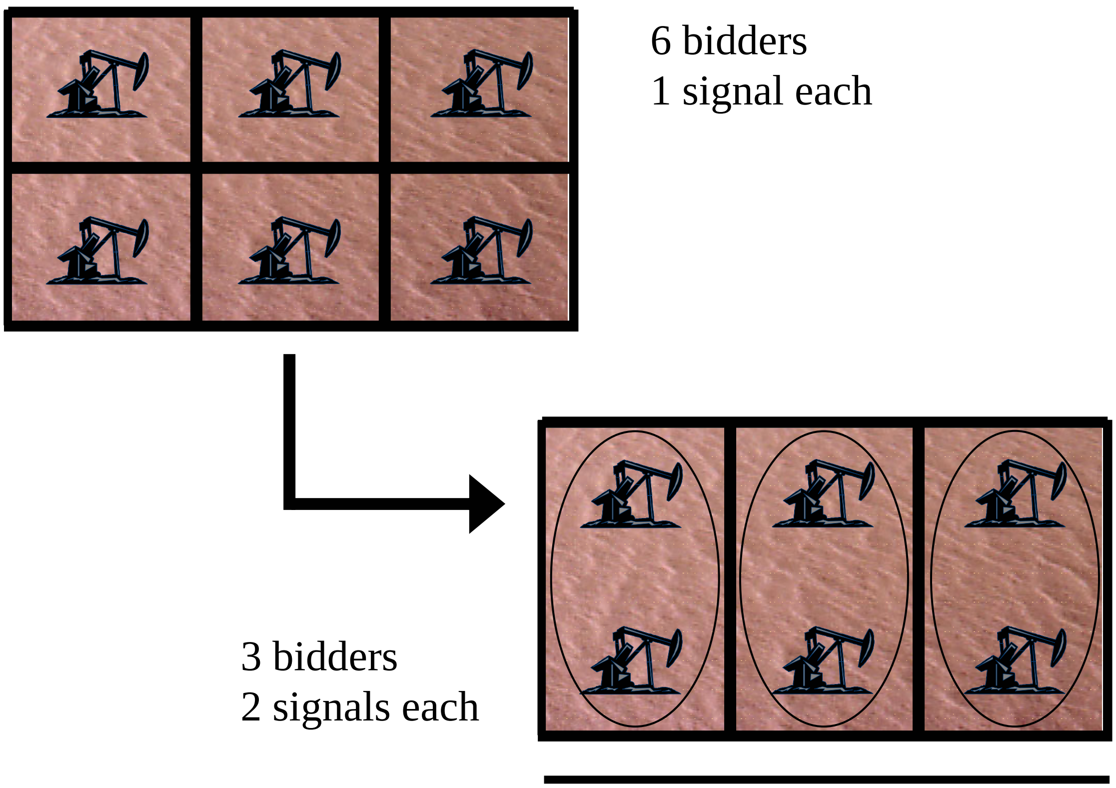
then $\quad E[Y \mid Y < s] \geq E[X \mid X < s] \;\; \forall s$

Note:

$\overline{X}_k = [X_1 + \dots + X_k] / k$ is more precise than X

$E[\overline{X}_k] = \mathrm{E}[X]$

Equilibrium Bidding



Assume the density of *X* is log-concave

Theorem 1:

In 2nd price auctions:

the bidding function, $\beta_{m,\overline{X}_k}(x) \geq \beta_{km,X}(x)$

In 1st price auctions, for a fixed *k* and high enough *n*,

there exists a *t* , *t'* ($t \leq t'$) such that:

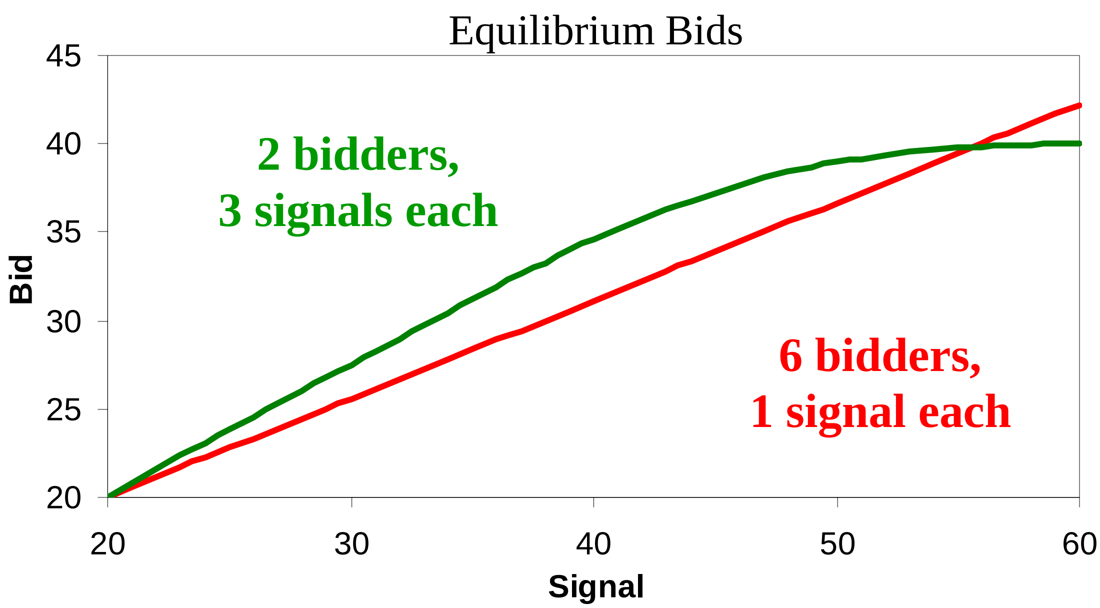
$B_{m,\overline{X}_k}(x) \geq \beta_{km,X}(x)$ for $x \leq t$

$B_{m,\overline{X}_k}(x) \leq \beta_{km,X}(x)$ for $x \geq t'$

Bidding is more aggressive with greater industry concentration

Equilibrium Bidding

Example of First Price Auction
Consider X~U[20,60]



Expected Revenue

Theorem 2:

In average value auctions,
greater industry concentration reduces expected revenues

The greater aggressiveness of bids in more concentrated industries does not offset the reduction in the number of bidders

Experimental Evidence

Winner's curse is pervasive
People fail to bid according to theory in common value auctions

Goal of experiments:

NOT to see if people bid as predicted
BUT to see if comparative static results still obtain

Design:

102 MBAs recruited
All subjects had classroom training and auction experience

X~U[$20,$60]
In all cases, $n = 6$.

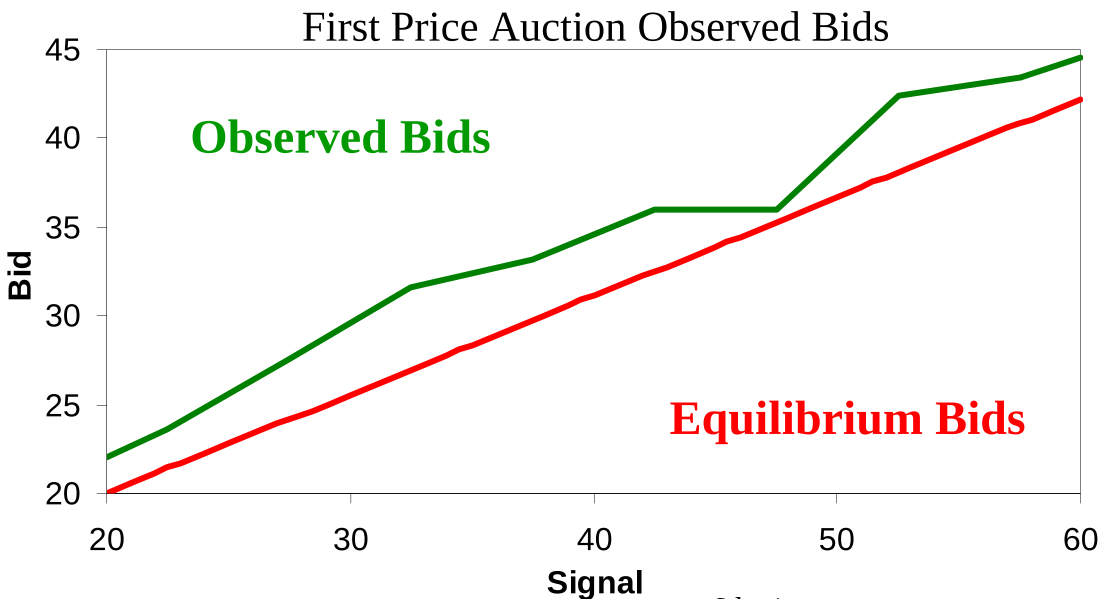
Three treatments:

$m = 6, k = 1$ (6 bidders, 1 signal each)
$m = 3, k = 2$ (3 bidders, 2 signals each)
$m = 2, k = 3$ (2 bidders, 3 signals each)

Two conditions:

First and second price auctions

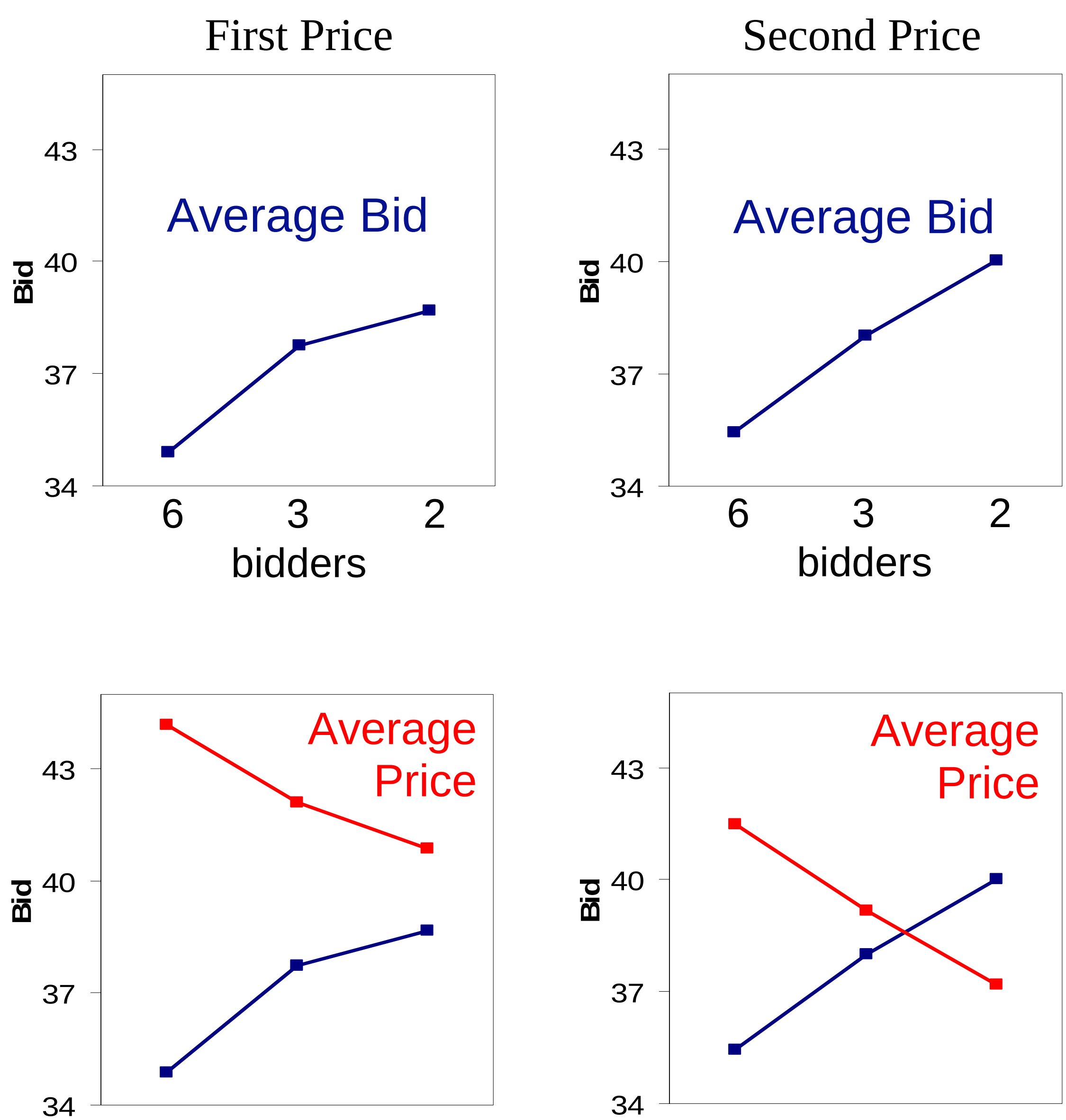
Bidders Fall Prey to the Winner's Curse



m=6,k=1
Bids averaged among 10 intervals

On average, winning bidders paid $44 for a field worth $40

But Comparative Static Results Still Obtain



Conclusions

Industry concentration in average value auctions follows traditional IO intuition

- Confirmed both by theory and experiments
- Greater concentration leads to lower revenues

Average value framework good early example

- Equilibria may fail to exist in many auction specifications
- May not be equilibria with multiple signals

Future directions

- Endogenous information acquisition
- Asymmetric settings