Auction Experiments

“Winner’s curse”
sometimes the winner of a common value auction discovers that he has bid too much.

Could this be happening systematically? (Not in equilibrium.)

Data from auctions of drilling rights for oil
(these are easier to deal with than construction/procurement bidding, because of the complexity of the revision procedures in so many construction/procurement institutions…)

Capen, E.C., R.V. Clapp, and W.M. Cambell 1971,
“Competitive Bidding in High-Risk Situations,”

It was easy for economists to look at an article urging oil companies to bid less, and conjecture that the answer could be found in cartel theory, rather than in the failure of equilibrium.
Bidding for pennies—typically first price auctions

(Bazerman, Max H. and William F. Samuelson [1983], “I won the auction but don’t want the price,” Journal of Conflict Resolution 27, 618-634)

This kind of demonstration makes the phenomenon very vivid—often the high bidder is one of the people with the highest estimates of the value of the prize. That is, often the high bidder is someone who has overestimated the value of the prize. If the bid isn’t sufficiently discounted (from the estimated value) to take account of this fact, it can easily be over the true value.

That is, at equilibrium, a player has to look at his estimate and ask “what is the true value of the prize, assuming that my estimate is the highest estimate among the n bidders?”

It’s hard to get a close look at this process in the penny auction, because we don’t know much about how estimates are formed.
Bidding for artificial commodities: true value $x$ drawn from a known distribution on $[y, z]$; bidders receive samples drawn from a known distribution on $[x-e, x+e]$.


Looked at winner’s curse

in varying size groups (need to think about how to design the experiment to deal with losses, and bankruptcy…)
Large groups suffer more from the winners’ curse than small groups.

### Table 2 — Profits and Bidding by Experiment and Number of Active Bidders:

| Auction Series (No. of Periods) | No. of Active Bidders | Average Profits with Strategic Discounting (standard error of mean) | Average Actual Profits (t-statistic) | Average Profits Under RNNE (standard error of mean) | Profits as a Percentage of RNNE Prediction | Percentage of Auctions Won by High Signal Holder | Percentage of High Bids $E[\theta_0 | \theta_1 = x_1]$ |
|--------------------------------|-----------------------|---------------------------------------------------------------|--------------------------------|-------------------------------------------------|-----------------------------------------------|-----------------------------------------------|------------------------------------------------|
| 6 (3)                          | 3–4                   | 3.25 (1.51)                                                   | 3.73 (2.70)$^b$                 | 9.51 (1.70)                                      | 39.2                                           | 67.7                                          | 22.6                                          |
| 2 (18)                         | 4                     | -.75 (1.07)                                                   | 4.61 (4.35)$^c$                 | 4.99 (1.03)                                      | 92.6                                           | 88.9                                          | 0.0                                           |
| 3 small                        | 4                     | -3.82 (2.40)                                                  | 7.53 (2.07)                     | 6.51 (2.65)                                      | 115.7                                          | 78.6                                          | 14.3                                          |
| 7 small                        | 4                     | -1.12 (1.56)                                                  | 5.83 (3.35)$^c$                 | 8.56 (2.07)                                      | 68.1                                           | 63.2                                          | 10.5                                          |
| 8 small                        | 4                     | -2.24 (1.05)                                                  | 1.70 (1.56)                     | 6.38 (1.21)                                      | 26.6                                           | 84.6                                          | 39.1                                          |
| 1 (18)                         | 5                     | -1.90 (0.85)                                                  | 2.89 (3.14)$^c$                 | 5.19 (.86)                                       | 55.7                                           | 72.2                                          | 27.8                                          |
| 3 large                        | 5–7                   | -5.19 (.55)                                                   | -2.92 (-1.49)                   | 3.65 (.62)                                       | -80.5                                          | 81.8                                          | 63.6                                          |
| 7 large                        | 6                     | -10.11 (.96)                                                  | 1.89 (1.67)                     | 4.70 (1.03)                                      | 40.2                                           | 72.2                                          | 22.2                                          |
| 4 (25)                         | 6–7                   | -10.03 (.105)                                                 | -.23 (-.15)                     | 4.78 (.92)                                       | -4.8                                           | 69.2                                          | 46.2                                          |
| 5 (26)                         | 7                     | -8.07 (1.04)                                                  | -.41 (-.44)                     | 5.25 (1.03)                                      | -7.8                                           | 42.3                                          | 65.4                                          |
| 8 large                        | 7                     | -11.04 (1.35)                                                 | -2.74 (-2.04)                   | 5.03 (1.40)                                      | -54.8                                          | 78.6                                          | 71.4                                          |

* Tests null hypothesis that mean is different from 0.0.

$^b$ Significant at 5 percent level, 2-tailed t-test.

$^c$ Significant at 1 percent level, 2-tailed t-test.
with public and nonpublic information the experimental results identified different comparative statics for public information, when the winner’s curse is present, and when it is not.

(Equilibrium predicts that public information should raise seller revenue, and this seems to be happening in groups that have learned to avoid the winner’s curse, but not in those that have not.)

Specifically, Kagel and Levin announce the lowest signal (and that was common knowledge).

In small groups (3-4) where there was less winners curse, the public announcement of the lowest signal increases revenues.

In large groups, announcement of the public signal decreases revenues.

This allows the off shore oil data to be interrogated in a new way, by looking at drainage and wildcat tracts. (A drainage tract is next to one that has already been drilled; a wildcat tract has no wells drilled yet that help determine the quantity of recoverable oil.)
Subsequent experiments:

2\textsuperscript{nd} price auction separates the information issue from the strategic issue—overbidding in first price common value auctions involves both information uncertainty (about the value) and strategic uncertainty (about how others are bidding; e.g. if they are at equilibrium or suffering from the curse themselves.

Winner’s curse goes up as variance of estimates increases, number of players increases.

How about professional bidders?


They compared student subjects with construction executives.

The fact that student subjects experience the winners curse does of course not allow us to conclude that there is a winners curse in oil field data. Nor does the fact that experienced bidders suffer the winners’ curse in abstract (and unfamiliar) laboratory auctions.

But of course, if even naïve subjects in an abstract environment had intuitively avoided or quickly learned to avoid the winners’ curse, that would have changed how likely we think it is to find the winner’s curse in the field.
You can also look at asymmetric information in this environment:


Insider information is of course a very big deal in bidding on drainage leases in offshore oil auctions—there’s a big industrial espionage business…😊

Of course the strategic issues can be studied in isolation from the information issues by looking at private value auctions. There’s some overbidding there, too (compared to risk neutral Nash equilibrium.)

One line of explanation of this phenomenon supposed that all bids were in fact at equilibrium, and then estimated risk aversions from the resulting bids.

Experiments with third price auctions, and with binary lottery games, helped to show that something else is going on…

Third price auctions: If someone is risk averse, they should bid below the RNNE. However, only auctions with 5 bidders are these results obtained, but with 10 bidders, the opposite is the case.