Strategic Implications of Uncertainty Over One's Own Private Value in Auctions

Eric Rasmusen, erasmuse@indiana.edu. June 23, 2002
Php.indiana.edu/∼erasmuse. Php.indiana.edu/∼erasmuse/papers/auction.pdf.

Things to Explain

1. Why bidders would like to know how much other bidders are going to bid.

2. How other bidders can benefit when an uninformed bidder learns his value more precisely.

3. How improved buyer information on the value of the object hurts the seller.

4. Why bidders update the bid ceilings they submit during the course of an auction such as those on Ebay and Amazon that uses proxy bidding.

5. Why bidders use "pre-emptive bids", bidding early in auctions rather than later.

6. Why bidders use "sniping"— the practice of submitting bids at the last minute.

The Model. The two players in an auction are both risk- neutral and have private values which are statistically independent and distributed over the same support $[0, z]$, on which the densities are strictly positive. Bidder 1 has value u distributed according to the atomless density $f(u)$. Bidder 2 has value v distributed according to the atomless density $g(v)$. Bidder 1 knows neither u nor v. At any time he may, unobserved by Bidder 2, pay c and learn u after additional time δ has passed. Bidder 2 knows v, but not u.

We will look at three sets of auction rules: a sealed-bid second-price auction, an Amazon auction, and an Ebay auction. In each, a player submits his "bid ceiling", but the winner pays the second-highest bid ceiling submitted. The Amazon auction has a "soft deadline," ten minutes after the last bid ceiling update. The Ebay auction has a "hard deadline": at a preannounced time.

If Bidder 1 is "naive" he is not aware that Bidder 2 is present at the auction,i.e. he assigns probability zero to that event.

Example 3. Let Bidder 1 have a private value u uniformly distributed on [0, 100]. He can take 5 minutes and pay amount 5 to discover his value precisely if he wishes; otherwise, his estimate is 50. Bidder 1 is naive. Let Bidder 2 have a value v of either 10 or 60, with equal probability.

Bidder 1 will submit a bid ceiling of 50. Bidder 2 will submit a bid ceiling of 10 if $v = 10$, and timing will not matter. If $v = 60$, though, he should wait until within 5 minutes of the deadline and submit a bid ceiling of 60. He will win at a price of 50, for a payoff of 10.

What if Bidder 2 were to submit a bid ceiling of 60 earlier? Bidder 1's payoff from paying 5 to discover u would be $-5 + .6(0) + .4[(Eu|u > 60) - 60] = -5 + .4(80 - 60) = -5 + 8 = 3$, compared to a payoff of 0 from not discovering his value and retaining his bid ceiling of 50. Thus, Bidder 1 would pay to discover his value and with probability .4 he would increase his bid ceiling to more than 60 and win the auction. $\pi_2 = .6(60 - 50) + .4(0) = 6$, less than the 10 Bidder 2 would get from delaying his bid submission and sniping.