

Chapter 25: Auctions and Auction Markets

Learning Objectives

Students should learn to:

1. Distinguish between a private value auction and an auction in common values.
2. Explain the different auction mechanisms:
 - a. Ascending-bid (English) v. descending-bid (Dutch)
 - b. Open outcry v. sealed bid
 - c. First price v. second price
3. Explain why bidding your valuation is a dominant strategy in second-price, private-values auctions.
4. Describe the Revenue Equivalence Theorem results:
 - a. Equivalence of English and second price sealed-bid auctions
 - b. Equivalence of Dutch and first price sealed-bid auctions
 - c. Equivalence of all four types of auctions
5. Explain the winner's curse.
6. Construct a bidding strategy that avoids the winner's curse.
7. Discuss anticompetitive bidding practices and the way auction design may mitigate cooperation among bidders.

Lecture Hints

Spend two fifty-minute long lectures on this chapter.

Lecture 1:

1. Private values v. common values
2. Types of auctions
 - i) English: ascending-bid, open outcry
 - ii) Dutch: descending-bid, open outcry
 - iii) Sealed bid first price
 - iv) Vickrey: sealed bid second price
3. Bidding your valuation as a dominant strategy in a Vickrey auction
4. Equivalence of Vickrey and English auctions
5. Equivalence of Dutch and first price sealed bid auctions

Lecture 2:

1. Revenue Equivalence Theorem
2. The winner's curse
3. Avoiding the winner's curse by shading your bid
4. Anticompetitive bidding strategies and public policy

Suggestions for the Instructor:

1. This chapter can be a fun finale for the course. There are lots of good examples in the news of these models in action, so you can encourage a topical discussion.
2. Many auctions have elements of common values and private values. It can help students to discuss specific examples. Some challenging examples would be:
 - a. A rare bottle of 1896 French wine: if the bidders are collectors or consumers who are only interested in possessing the bottle, then the auction more closely resembles private values: each bidder's value is determined by the utility he or she derives from owning or drinking the bottle, the information is known with certainty to the bidder and the value is not affected by the values of any other potential owners. On the other hand, if the bidders are wine merchants or dealers in rare collectibles, their valuation is not determined by any private pleasure from the wine, but is determined by the resale value of the bottle. Since the amount for which it could be resold is uncertain but could (in theory) be the same for any owner, these bidders would be operating in more of a common values framework.
 - b. An uncut 2-carat flawless diamond: the diamond is more likely to be bid on by resellers of some form – jewelers, diamond cutters, etc. An uncut diamond would be a very unusual purchase for an individual consumer, so private values are less likely in this market. However, to the degree that different bidders are not all able to command the exact same price in the resale market, we will see a mix of common and private values. Valuations are still uncertain, just as in common values, but *expected* values may be somewhat idiosyncratic, due to different artisan's talents, so this has a bit of the flavor of private values.
3. It helps to build up to the Revenue Equivalence Theorem with the two subordinate equivalence results to help students keep the rules of the different auctions straight.
4. Be sure to point out that the Revenue Equivalence Theorem applies only to private values auctions.
5. Make sure to emphasize that to find the optimal bid to avoid the winner's curse, the bidders must know that all their imperfect information (noisy signals) comes from the same distribution and that the distribution is known (uniform in this case).

Solutions to End of the Chapter Problems:

Problem 1

As before, the desired strategy is to bid the value of the next highest valuation bidder: this allows you to pay the lowest price that still wins the auction. Since we don't know the other bidder's valuations, we need to estimate the next highest valuation, assuming that your valuation is the highest. If we assume the values of the other 19 bidders are uniformly distributed from $[0, 200]$, then the average value of the highest draw in many samples of 19 draws is $\frac{19}{20}(200) = 190$. So, your optimal bid is \$190.

Problem 2

(a) If $N = 25$, the bids are higher under a private values framework:

$$\frac{v(N+1)}{2N} = v \frac{26}{25(2)} = v \frac{26}{50} < \frac{N-1}{N} v = v \frac{24}{25}$$

So, if you expect lots of buyers, to the extent that you can keep them focused on their own valuations instead of worrying about resale potential, you will steer the auction toward private values and higher bids. Further, from the Revenue Equivalence Theorem, we know that an auction in private values has the same expected revenue regardless of the type of auction, so any auction design would be fine for a large number of bidders, if they don't worry about resale.

(b) If $N < 4$, the expected revenue from a common values auction begins to exceed that of the private values auction. If you have a small number of bidders, you would get higher bids if they are worried about the resale value of the house and are treating the auction as one in common values. If you have an auction in private values, the type of auction design matters. An ascending bid English auction causes bidders to reveal information to each other about their valuations, which makes them less concerned about the winner's curse, so they will bid higher than in a sealed bid auction.

Problem 3

Since these restrictions are presumably designed to protect the buyers from paying too high a price, this restriction has two effects. First, in the case of low numbers of offers, we know from part (b) that the seller would like to influence the bidders to think about how others might value the property so that they will think about common values and bid higher. If the seller is not allowed to talk about other bids, this may mitigate the buyer's concern about resale value. Second, in the case of a high number of bidders, we know from part (a) that the seller would like to influence the bidders to think in private values or at the very least would prefer an open outcry auction to a sealed bid format. Again, by forcing the seller to keep the bids private, the auction more closely resembles a sealed bid than an open outcry and the buyers will shade their bids more out of concern about the winner's curse.

Problem 4

The English ascending auction has the advantage that it provides information and, hence, a sense of legitimacy for the winning bid. Effectively, that bid is just the minimum bid increment above the next highest bid so that the winner has a sense that the price she paid is not too far above what someone else would have paid and therefore, not an outrageous amount. This also encourages participation, but that is a double-edged sword as the winner's curse intensifies with the number of bidders. However, especially when the number of bidders is relatively small as is the case here, ascending auctions have the disadvantage that the communication they permit both facilitate collusion and also permit identification of any asymmetries in value. That is, ascending auctions tend to reveal quickly an "almost common value" asymmetry with the result that the advantaged bidder can win the auction with a very low bid. Sealed bid auctions are less vulnerable to both of these problems. Hence, an English auction is held initially to establish a solid price floor. Then the top two bidders are asked to compete in a sealed bid format to avoid any collusion and minimize exploitation of the asymmetry that gives one bidder an advantage.

Problem 5

This is just the winner's curse in action. When the job is an unfamiliar one, the painter has to make a guess as to his costs, as do all of his rivals. When he wins the job, it is likely because he had the most optimistic estimate of costs—one that is too low, in fact. As a result, he often loses money in these situations.