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# Dominance and the Second Price Auction

- A central question in economics: how are prices set.
- In monopoly the question is how much money can the monopolist extract from buyers?
- A common method of price setting is to sell items by means of an auction.

## ***Types of Auctions***

- English auction-announced bids, sold to highest bidder at the price bid (oral, first-price)
- Sealed bid (first-price)
- Descending bid
- Sealed bid second price – each buyer submits a single bid at the same time, sold to highest bidder at the second highest bid.
- Sealed bid second price = English auction – why?

## ***A Simple Sealed Bid Second Price Auction Model***

a single item is to be auctioned.

value to the seller is zero.

*two buyers*

value  $v_i > 0$  to buyer  $i$

possible values 2 or 4

“independent private values”

(compare: common value auction – oil field)

each buyer submits a bid  $b_i$  equal to one of the possible values

the item is sold to the highest bidder at the second highest bid

## *Solution*

suppose that the second highest bid is  $\hat{b}$  and that there are  $M$  ( $=1,2$  obviously) winning bidders

then a winning bidder gets  $\frac{v^i - \hat{b}}{M}$

all other players get 0

## ***Dominance***

*weak dominance* never a lower payoff no matter what the opponent does, and sometimes a higher payoff

*strict dominance* a higher payoff no matter what the opponent does

*admissibility*: never use a weakly dominated strategy

## ***Application of Weak Dominance to Second Price Auction***

the strategy of bidding  $b_i = v_i$  weakly dominates all other strategies

Calculate utility. Let  $\hat{b}$  be the bid by the other player.

Your value = 2	Bid 2	Bid 4
$\hat{b} = 2$	0	0
$\hat{b} = 4$	0	-1

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Your value = 4	Bid 2	Bid 4
$\hat{b} = 2$	1	2
$\hat{b} = 4$	0	0

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## ***Theory of Second Price Auctions***

The highest valued buyer wins the auction and pays the second highest value.

- What happens with many possible values? Bids? More bidders? [discussed in section]
- What happens in a first price auction?
- Can the seller design an auction that gathers more revenue?

If the seller knows the buyers values, then he should just charge the highest value (minus a penny, perhaps): this yields more revenue

- What happens when the seller does not know in advance what the buyer values will be.

Theory of choice under uncertainty, to be discussed later in the course



## ***BDM Mechanism***

This ticket is worth \$2.00 to you.

You can sell it.

Name your offer price.

A price will be posted shortly

**The posted price was drawn randomly  
between:**

**[\$ 0 and \$ 6 ]**

If your offer price is **below** the posted price  
then you sell your ticket at the posted price.

If your offer price is **above** the posted price  
then you do not sell your ticket but you do  
collect the \$2.00 value of the ticket.

You can view the posted price after you  
have named your price.

## *Price Posting*

Indicate the appropriate amount .

My offer price is **below** the posted price.

Pay me the posted price of \$\_\_\_\_\_.

My offer price is **above** the posted price.

Pay me \$ 2.00.

## *The Becker DeGroot Marschak (BDM) Mechanism*

- Willingness to pay versus
- Willingness to accept

Buy low sell high?

Widely used, for example in public goods surveys: how much would you pay to avoid pollution; how much would we need to pay you

Endowment effect?