

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.

- English auction—announced bids, sold to highest bidder at the price bid.
- Sealed bid second price auction—each buyer submits a single bid at the same time, sold to highest bidder at the second highest bid.
- These are the same.

A Simple Auction Model

a single item is to be auctioned.

value to the seller is zero.

$i = 1, \dots, N$ buyers

value $v_i > 0$ to buyer i .

each buyer submits a bid b_i

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

suppose the bids are b_1, \dots, b_N

suppose that the second highest bid is \hat{b} and that there are M winning bidders

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

all other players get 0

Weak 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 highest bid by the other players.

	bid $v_i + x$	bid v_i	bid $v_i - x$
$\hat{b} + x < v_i$	$v^i - \hat{b} > 0$	$v^i - \hat{b} > 0$	$v^i - \hat{b} > 0$
$v_i = \hat{b} + x$	$v^i - \hat{b} > 0$	$v^i - \hat{b} > 0$	$\frac{v^i - \hat{b}}{M} > 0$
$\hat{b} < v_i < \hat{b} + x$	$v^i - \hat{b} > 0$	$v^i - \hat{b} > 0$	0
$\hat{b} = v_i$	0	0	0
$\hat{b} - x < v_i < \hat{b}$	$v^i - \hat{b} < 0$	0	0
$\hat{b} - x = v_i$	$\frac{v^i - \hat{b}}{M} < 0$	0	0
$v_i < \hat{b} - x$	0	0	0

Theory of Second Price Auctions

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

- 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.

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