Auctions, I

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Auction Types

- Ascending auctions (English)
- Descending auctions (Dutch)
- Vickrey Auctions
- Multi-unit Auctions
- Others to be covered later
  - Combinatorial auctions
  - Spectrum auctions

Auction goals

- Maximize revenues for auctioneer.
- Reward bidder with the highest valuation for the product.

Ascending (English) auctions

- All bidders are initially *active.*
- Start price and increment are fixed.
- At each stage of the bidding:
  - Auctioneer calls out last price + increment
  - Zero or more bidders may become inactive
  - If at least 2 bidders are still active, auction proceeds to the next stage.
  - If only one auctioneer is active, then he wins at the current price.

Ascending auction example

- John's willing to pay $50 for item A.
- Jill's willing to pay $40 for item A.
- Mary's willing to pay $45.
- Start price = $30, increment = $10.
- $30: John,Jill, Mary active.
- $40: John, Jill, Mary active
- $50: Only John is active => WINS and PAYS $50.

Descending auctions

- All bidders are initially *inactive.*
- Start price and decrement are fixed.
- At each stage of the bidding:
  - Auctioneer calls out last price - decrement
  - If at least one bidder says yes, then the first bidder to respond wins at the current price.
  - Else auctioneer proceeds to the next round.

Descending auction example

- John's willing to pay $50 for item A.
- Jill's willing to pay $40 for item A.
- Mary's willing to pay $45.
- Start price = $60, increment = $10.
- $60: John,Jill, Mary inactive.
- $50: John active
- John WINS and PAYS $50.

Observations

- In both cases, the person willing to bid the most wins.
- In both cases, the winner pays the current (winning) price.

Vickrey auctions

- Same as ascending auction except for one difference.
- Winner pays the amount bid by the 2nd highest bidder.

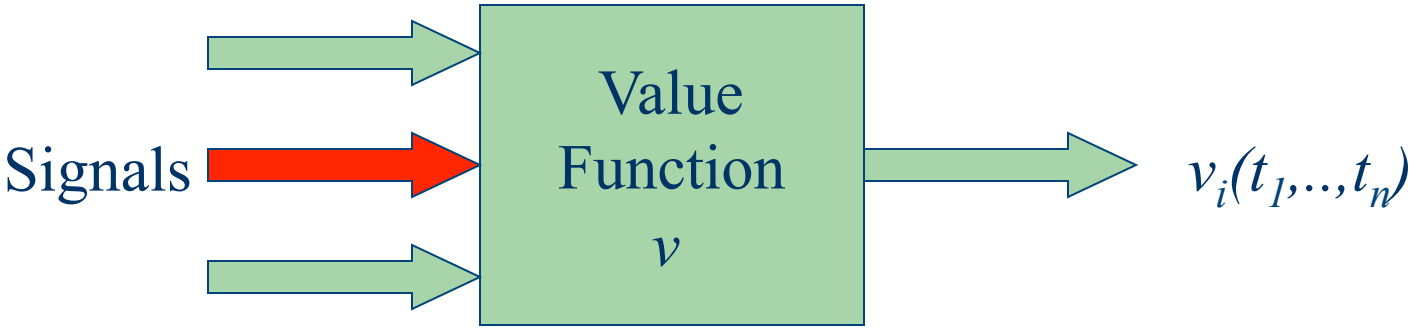
Vickrey auction example

- John's willing to pay $50 for item A.
- Jill's willing to pay $40 for item A.
- Mary's willing to pay $45.
- Start price = $30, increment = $10.
- $30: John,Jill, Mary active.
- $40: John, Jill, Mary active
- $50: Only John is active => WINS and PAYS $40.
- (If the increment had been $5, John would have paid $45).

Private/Public values

- *Private value model:* Each bidder knows the value he places on the commodity. But he does not share this with others.
- *Pure common-value model:*
  - The item has a single value.
  - But different bidders have different perceptions of what that value is.

General model



t_i is the private signal of bidder i

Models

- Pure private model: $v_i(t_1,..,t_n) = f(t_i)$ for some function f.
- Pure common value model: $v_i(t_1,..,t_n) = v_j(t_1,..,t_n)$ for all i,j.

Bidding in Vickrey auctions

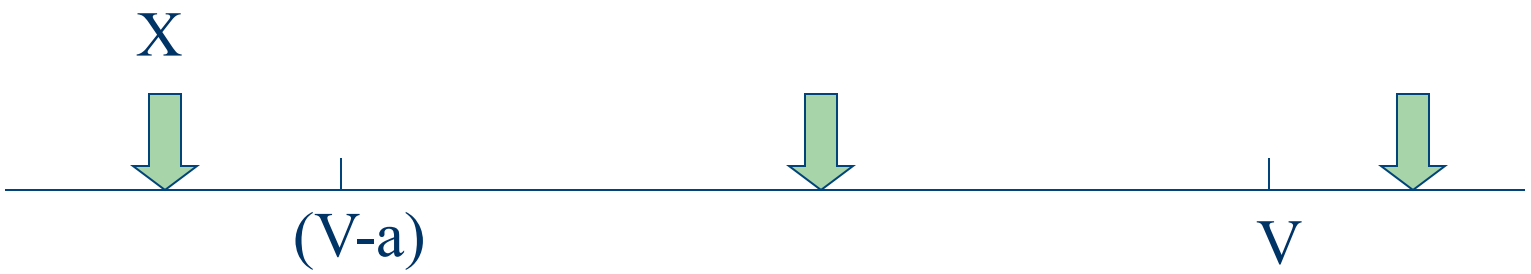
- Suppose my private value is V.
- What should I bid?

Bidding in Vickrey auctions

- Suppose my private value is V.
- What should I bid?
- **V.**

Why?

- Suppose I bid (V-a).
- Let the value of the highest bidder (other than mine) be X.
- Three cases:



Vickrey auction bid analysis

- Case I: X < (V-a). In this case, I win and pay X. Had I bid V, I'd still have won and I'd still have paid X. So no benefit to me to bid V in this case.
- Case 2: X > V: In this case, I lose, and I'd have lost even if I'd bid V. The outcome does not change if I bid (V-a).
- Case 3: (V-a) < X < V. In this case, I lose. Had I bid V, I'd have won and still paid less than my true value.

Multiunit auctions

- One item, but lots of identical units for sale.
- E.g. 35 identical Rolex watches.
- Rules:
  - Auctioneer calls out a price per unit (e.g. $500 per watch).
  - Bidders specify how many units they want (e.g. 5 watches).
  - As the unit price goes up, bidders cannot increase the units they want.
  - All bidders can hear the other bidders.

Example multiunit auction

- Player 1: Has $3000.
- Player 2: Has $2500.
- Number of watches being sold: 6.
- Starting price: $500 per watch.
- Bid Increments: $100.
- Auction proceeds as follows.

Example auction

Price/unit	Player 1's bid	Player 2's bid
$500	6	5

Example auction

Price/unit	Player 1's bid	Player 2's bid
$500	6	5
$600	5	4

Example auction

Price/unit	Player 1's bid	Player 2's bid
$500	6	5
$600	5	4
$700	4	3

Example auction

Price/unit	Player 1's bid	Player 2's bid
$500	6	5
$600	5	4
$700	4	3
$800	3	3

Net Result

- Auctioneer's revenue: GREAT.
- He takes in $4800.
- But the bidders did no reason intelligently !!!!!
- Each knows something about the other's budget and interests.

End of Round 1

- Player 1 knows Player 2 does not want to spend more than $2500. Why?
- Player 2 knows Player 1 does not want to spend more than $3000.
- Both players know that demand (6+5=11 Rolexes) exceeds supply (6).
- By bidding as they just did, they both lost money. A better bidding approach would have been for *both* players to recognize that.
- Notice that the bidders never speak to each other. They are only drawing inferences from events they are entitled to know about.

A better way of bidding

Price/unit	Player 1's bid	Player 2's bid
$500	6	5
$600	3	3

Why is this good?

- Player 1 is safe. He knows he can't get more than 3 Rolexes anyway (as long as Player 2 really wants Rolexes).
- So he can sit tight with his bid for 3 Rolexes. Player 2 has no choice but to compromise.
- If Player 2 reasons the same way, then both can save dollars.

Outcome

- Suppose each bidder can resell the Rolexes for $1000.
- Player 1's profit is now $400 x 3 = $1200.
- Same for Player 2.
- Auctioneer in trouble: His revenues are just $3600 not $4800 as before.
- Can build a game tree for this.