

Auctions.

Assumptions:

- each participant has a **private price**, which is the highest price for which he is willing to buy the auctioned object
- each participant's objectives are getting the object for no more than the reserve price and paying as less as possible
- participants do not have the same private price and do not know about each other private price

Pareto efficiency means that the auction winner is the participant with the highest private price, otherwise the auction would not have been an efficient tool. Suppose the winner W is not the participant with the highest private price H: W could sell the item to H for a price between their private prices and both would be more satisfied.

Profit maximization means that the final price is the highest private price of all participants.

English auction.

Mechanics: participants openly make higher bids with increments equal to the bid increment (fixed by the auctioneer) until a bid is not incremented anymore.

Winner: the last bidder.

Price: the last bid, which corresponds to the second last offer + bid increment.

Basic strategy: offer up to your private price.

Pareto efficiency: yes.

Profit maximization: generally no, unless the winner's private price = second private price + bid increment.

Dutch auction.

Mechanics: auctioneer starts from a very high price and decreases it by bid increments until a participant makes an offer.

Winner: the first bidder.

Price: the price at which the offer has been made.

Basic strategy: as soon as the price reaches your private price, make the offer.

Alternative strategy: wait for your offer that the price is lower than your private price.

Pareto efficiency: yes if the participant with the highest reserve price follows basic strategy, otherwise generally no.

Profit maximization: yes if the participant with the highest reserve price follows basic strategy, otherwise for sure no.

Sealed-bid auction.

Mechanics: participants make a single secret offer.

Winner: the participant with the highest offer.

Price: the highest offer.

Basic strategy: offer your private price.

Alternative strategy: offer less than you private price.

Pareto efficiency: yes if the participant with the highest reserve price follows basic strategy, otherwise generally no.

Profit maximization: yes if the participant with the highest reserve price follows basic strategy, otherwise for sure no.

Vickrey auction.

Mechanics: participants make a single secret offer.

Winner: the participant with the highest offer.

Price: the second highest offer.

Basic strategy: offer your private price.

Alternative strategy: offer more than you private price (since you do not pay what you offer).

Pareto efficiency: yes if all participants follow basic strategy, otherwise generally no.

Profit maximization: for sure no if the winner follows basic strategy, otherwise even more than profit maximization can be reached.

Information asymmetry in English auction.

If only one expert participant has a clear idea of the object's value and the others do not (are non-experts), there is an information asymmetry, as for example in oil drilling licenses. While for non English auction non-experts have no hope of making a reasonable and competitive offer, in an English auction non-experts can look at the behavior of the expert and try to guess his private price. There is a paradox here: non-experts can increase expert's offer by a bid increment, but the expert will continue to offer until he reaches his private price and therefore the last non-expert to increase his bid will end up paying too much for the object. Therefore non-experts are doomed to fail. On the other end, if non-experts do not participate, the expert will offer a low price, thus making non-experts' participation convenient.