

When talking about auction, it's important to know that what are the nature of the good and the different bidding rules. Different combination of goods and bidding rules could bring an outcome of significant difference.

There are two types. The first one is private- value auctions, this is when different people have different value on the same good in an auction. The bidders do not know the other bidders' valuation on the good, although they may have some rough idea.

An example of it will be an art painting, it may worth a lot more to a paintings collectors then to a stamp collector. The other type is the common- value auctions, the worth of the item will be essentially the same to every bidder, but difference bidder may have difference estimate on the value of the item. An example will be an auction of a drilling right of a land for oil. The amount of oil is fixed, but bidders need to rely on professional research to tell them the estimate amount of oil that present.

There are also different types of bidding rules. The English auction, also know as first price ascending bids, starts with a reserve price (the lowest price the seller is willing to sell the item), bidders successively offer higher prices, and then each bid must exceed the previous bid by an minimal bid increment. When no participant is willing to increase his or her bids more, the item will be awarded to the last bidder who put the bid, he's also the highest price bidder. Dutch auction is the reverse of the English auction, the auctioneer will starts with a high price, and then gradually decrease the price until someone place a bid. Seal- bid is when each bidder writes down their bids on a piece of paper, all the bids were collected and the item will goes to the person will the highest bid. Vickrey auction (or second price sealed bid auction) is like seal-bid auction, the good is awarded to the highest bidder, but he only pay the second highest price.

Whether or not an auction will becomes revenue equivalence depend on the attitudes toward risk and their beliefs about the value of the item. The risk- neutral bidders only care about their own expected value of the item, that value may come from some research that he had obtained and certain level of uncertainty arise but this type of bidders tend to ignore it. Independent estimate bidders didn't care about other people's bid valuation and concentrate on his own valuation on the item. If these conditions holds, sellers are expected to be indifference which type of method to use. This revenue equivalence result does not mean that all the auctions will raise the same revenue for every item sold, but that the auctions will raise the same result on average over the course of numerous auctions. In all 4 types of auction, the item will goes to the person with the highest valuation on the product and he will pay on average the second highest value.

In an auction, a second price sealed bid can give the outcome of first price ascending bid auction only when the bidders in the second price sealed auction bids on their true value. According to Vickrey, the optimal strategy for the second price seal auction is to bid on their true value. We can see this in an example. Suppose that your valuation of an item in an second price seal bid auction is 100, apart from bidding on your true value of 100 (v), you can chose to either bid over it or below it. Assume you would like to bid over your true value, so your bid is b , three situations can occur. Firstly, your rival may bid below your true value and u is awarded with the item. Actually, you will still gets it even you didn't overbid. The second situation would be that your rival bids more that your true value of the item but less than your bid value, in this case, you will be force to buy the item for more than it's worth to you. The higher you

over bid, the more it's risky to you. The third situation would be your rival bids more than your bid value and you didn't get the items. In this case, you won't get it anyway if you bid on your true value. Apart from overbid, the other thing you can do is underbid, again, three situations can occur. Firstly, your rival's bid is lower than your bid, so you will get the item, but you will still get it if you bid on your true value. The Second situation would be that your rival bids more than your bid value but less than your true value, you didn't get your item, but you would have got it if you had bid on your true value. The third situation will be that your rival's bid is even higher than your true value, you don't get your items and it doesn't matter if you bid on your true value. If you didn't bid on your true value on a second price sealed-bid auction, you risk yourself falling into the second situation of both cases, make a loss or lose the chance of getting the product at your true valuation. Truthful bidding is never worst and sometime better, this is why true bidding is the dominant strategy in a second price sealed auction.

If everyone is bidding his or her true value in a second price sealed bid auction, we can see equivalence quite easily with the English ascending auction. In the English ascending once the price reaches the maximum value of the second highest price, that bidder will drop out, and the highest – valuation bidder will get the item for a minimum bid increment more, which is a relatively small amount. In both case the bidder with the highest valuation will be able to get the item at the second highest price.

A second price sealed bid auction and the English ascending auction are most desirable when the sellers believe that correlated estimate exist. It is possible that when bidders are making a decision for their bidding value, they not only consider their own true valuation but also the other valuation of the other bidders as well. If they believe that their valuation are quite similar, either both very high or both very low, the estimate of the value are said to be positively correlated. The problem of this is that, in a first price sealed auction, there will be a temptation for the bidders to shade down their bid even more than they would in the absence of correlated beliefs. A second price sealed bid auction encourages truthful bidding as we seen before, and the English ascending auction will have the same effect. An English ascending auction is also desirable if there are only two bidders who both have very high valuation of the item and pushing the price up. However, if on one the bidder have a much lower valuation than the other one, we say that the bidder valuations are negatively correlated, in this case, the Dutch or First- price sealed auction will be more desirable. One of the factors need to be taken into account in designing auction, in this case, for mobile- phone licenses is the possibility of collusion. If there are only a few bidders, it's possible that they can collude among themselves. By submitting one high bid and a much lower second highest bid in an second price sealed auction, they can defeat the system and get the item at that much lower second highest price. This highlights that importance of having a reserve price, because it can also prevent other situation such as bidders in the same auction have very different valuation on the item, an English ascending auction or a second price sealed bid auction will risk to make the seller sell the item at a much lower price than the true value of the highest bidder.

Also, if the items in auction are related and it's clear that some bidders would like to obtain the item as a group, it would be better is the seller put them in auction as one item. Because if the seller break down the items one by one and put them in difference auction, the bidder interested in it may not want to bid for the item anymore in the fear that he will lost one of the bid, which will greatly reduce the value of the item to this bidder as a whole. However, if the seller is certain that there will be

a large number of bidder each would like only a part of the item, it will be more profitable for the seller to sell the item in pieces.

Finally, it's possible that sellers of the item have some private information related to the value of the item, they may want to conceal it from the bidders. The problem is, if the bidders know that the seller is concealing information, they will automatically expect it to be an unfavourable factor, which in turn reduce their valuation on the item. Even the information is an unfavourable one, seller might be better off to disclose it since the bidders' belief might be much worse.

Difference auction have difference characteristic, generally, we can say that second price seal bid auction and English ascending auction will bring the same outcome—highest valuation bidder get the item at the second highest price. More advance mathematical techniques are needed to prove that revenue equivalence can be extended to Dutch and first price sealed bid auction, but the intuition should be clear.

The main advantage of the second price seal bid auction is that it encourage bidders to bid on their own value, which maximise utility for both seller and buyer. When bidder is risk- neutral or independent estimates, it doesn't matter which type of auction to use since it's revenue equivalence and in all 4 types of auction, the item will goes to the person with the highest valuation on the product and he will pay on average the second highest value. Additional care needs to be taken when deciding bidding rules to avoid the problems of correlated estimate and collusion. When items are related, seller has to decide a way to put it in the auction without reducing its attractiveness to the bidders.