Asian Journal of Business Management 6(2): 76-84, 2014
ISSN: 2041-8744; e-ISSN: 2041-8752

Submitted: January 31, 2012 Accepted: April 07, 2012 Published: May 15, 2014

Conceptual Approach to Effect of Information Asymmetry on Auction and Bidding

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Abstract: This study examines the theoretical effect of information asymmetry on auction and bidding. The study indicates the significant impact of information asymmetry on the price the winner pays in an auction process. The impact varies from one form of auction to the other. In sealed-bid auction, the more informed party has a much higher marginal expected return than the uninformed competitors. The probability of loser's curse is markedly higher than the probability of winner's curse among uninformed participants that have high private value in English auction. Since bidders are more affected by information asymmetry, it is recommended that bidder should seek for information on goods of interest and also ensure that inspection is carried out on prospective purchases before the auction commences in order to reduce the negative effect of information asymmetry on bidder.

Keywords: Auction, common value, lemon market, reserve price, winner's curse

INTRODUCTION

The design and conduct of auctioning instructions have occupied attention of many people over thousands of years. The word 'auction' is derived from the Latin word *auctus* meaning 'increase'. One of the earliest reports of an auction was given by the Greek historian Herodotus, who described the sale of women to-be wives in Babylonia around the fifth century B.C. During the closing year of Roman Empire; the auction of plundered booty was common. In china, the personal belongings of deceased Buddhist monks were sold at auction as early as the seventh century A.D. An auction is defined as a public sale of goods or property in which prospective purchasers bid until the highest price is reached (Anonymus, Year). Auctions have long been a common way of selling diverse items such as works of art and government securities. In recent years, the importance of auction in consumer markets has increased through the ascendancy of eBay and other Internet auctions. At the same time, the use of auctions for transactions between businesses has expanded greatly, most notably in the telecommunications, energy and environmental sectors and for procurement purposes generally (Ausubel, 2006).

In the United States in the 1980's, auction account for an enormous volume of economic activity. Every week, the US treasury sells billions of dollars of bills and notes using sealed-bid auction. The department of the interior sells mineral rights on federally-owned properties at auction. Throughout the public and private sectors, the purchasing agents solicit delivery-price offers of product ranging from office supplies to specialized mining equipment; sellers auction antiques and artwork, flowers and livestock, publishing rights and timber rights, stamps and wine.

Presently in Nigeria, the bond auction (bond market[1]) seems to offer better investment opportunities following the collapse of the stock exchange market over the last one year. Bond auctions have continued to record over subscription. According to Bangudu (2011), at the reopening of a three-year Federal Government's bond auction this year using Dutch auction method, the central bank of Nigeria offered N20billion; a total of N51.36billion was subscribed; an oversubscription of 156.8%.

The literatures on information economics[2] and auction theory provide two competing theoretical perspectives (Akerlof, 1970; Kagel and Levin, 1986; Koeplin *et al*., 2000). One perspective indicates that when information about a target is scarce, the target will have both the motivation and the capability to manipulate information to sell itself at the highest price, which increases the risk of buying a "lemon" from the acquirer perspective (Akerlof, 1970). In contrast, the other perspective argues that when information about the target is poor, the target will have less tradability. Facing limited competition for the target, the acquirer could impose a deep price discount in purchasing the target and actually get a relative "bargain" (Koeplin *et al*., 2000).

Under perfect markets, the price of any productive asset should reflect the expected discounted value of future dividends. Under informational asymmetry, this

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valuation breaks down and prices no longer reflect fundamentals (Greenwald and Robert, 1983; Choo and Jean, 2004). If information is symmetric, then clearly the conditions necessary for adverse selection are not met. Buyers and sellers share a common information set and competitive markets will ensure that prices correctly reflect the fundamentals. If information is asymmetric, then adverse selection[3] is possible, but not proven (Dionne *et al*., 2009). According to Akerlof (1970), four necessary conditions are needed for adverse selection. First and foremost, one party to the sale should be more informed than the other. Second, the quality of the product or service being sold should be valuable to both parties. Third, price should not be set by the more informed party. Finally, uncertainty should not be completely dissipated by extra-trading arrangements, such as warranties or litigation practices.

In practice, the bidder deals with different types of information: information about the seller and information about the good (as provided by the seller and as gathered from the bidder's own experiences). Seller-rating mechanisms offer natural measures for reputation, but information about a good is challenging to quantify. As a result, while a growing empirical literature has exploited seller reputation in online auctions and focused on information asymmetry between bidders and sellers as a barrier to trade, the role of product information and the price effects of uncertainty over the value of a good due to information dispersed over all auction participants has largely been ignored (Pai-Ling, 2005).

The study is aimed at throwing light on the theory of auction and bidding; identify the different types of auction and the effect of information asymmetry on auction as well as the consequences of information asymmetry on auction and bidding.

Forms of auction: Depending on the timing of the decisions (sequential or simultaneous bids) and the amount that the winner is required to pay, auctions can be classified into four basic types (Milgrom, 1989; Baye, 2003; Klemperer, 2003): English, first-price sealed bid, second-price sealed bid and Dutch.

- **English (ascending, progressive, open, oral) auction**: It is a method of selling an item which begins with the first bid being requested by the auctioneer and ends when the bids reach an uncontested peak. The item is sold to the highest bidder, provided that the bid is not less than the seller's reserve price.
- **Dutch (descending) auction**: It is a method of selling which consists of an auctioneer inviting a bid much higher than what is regarded as likely to be acceptable to the buyers. The starting price is gradually reduced until a buyer shouts 'mine' and accepts the item at that price. In Holland, an automated method is used for such auctions: the buyers face a 'clock' with prices on its face and a pointer moves gradually counterclockwise from the higher to the lower prices.
- **The first-price auction:** It is a method of selling whereby the buyers submit sealed written bids with the item going to the highest bidder. This method is used weekly by the US Treasury when it issues its short-term securities and also by Scottish solicitors for the sale of houses.
- **The second-price auction:** It is a sealed-bid auction in which the buyer making the highest bid claims the object, but pays only the amount of the second highest bid. This arrangement does not necessarily entail any loss of revenue for the seller, because the buyers in this auction will generally place higher bids than they would in the first-price auction.

Why are goods sold at auction: There are several reasons why goods may be sold at auction and it is important to know why the goods are being sold and where they came from, this information can be found by consulting with the auctioneers before the sale or it may be stated in the catalogue of lots relating to that auction sale. One of the following may apply (Anonymus, Year):

- The goods are being sold to raise cash to pay of debtors if the previous owner has gone into liquidation, receivership or bankruptcy.
- The goods are being entered in the hope of a dealer making a profit from their sale.
- The goods are being sold by the owner to create space for new stock.
- The goods are surplus to the owners' requirements due to new stock being acquired.
- The goods have been part of a leasing agreement and the term of lease has ended and the goods are not required by the leasing company who are now the legal owners.
- The goods will not sell any other way due to poor demand or over supply.
- The goods may be part of an illegal consignment and have been confiscated by an official department who now wish to dispose of them.
- The goods may have been stolen and the previous owner cannot be traced by the appropriate authorities.
- The goods may be government department or armed forces surplus stock due to being out of date or over stocked.

Auctionable goods: Virtually anything can be sold at auction here are some examples of goods that can be auctioned (Anonymus, Year):

- **Antiques:** Furniture, Jewelry, Antiquities (Artifacts) Clocks and Watches
- **Fine art:** Paintings and Sculptures

- **Collectibles:** Stamps, Coins, Books, Postcards, Medals, Print (China and Glassware) and Memorabilia
- **Leisure:** Caravan and Camping (Marine, Aviation and Sports Goods)
- **Property:** Houses (Flats, Commercial Premises, Studios and Warehouses), land and Workshops.
- **Household:** Furniture, Appliances (Fridges, Freezers, Washers, Dryers, Electrical Goods - Hi-Fi's, T.V's and Videos) Clothing, Carpets, Beds and Garden Equipment
- **Consumables:** Foodstuffs, Wines, Spirits and Beers
- **Office:** Equipment, Furniture, Consumables and Telecommunication Equipment
- **Computer:** Home Systems, Business Systems, Parts and Peripherals. Others are Printers, Scanners and Modems
- **Transport:** Cars, Vans and Commercials, Trucks and H.G.V., Motorcycles, Vintage and Motor Parts
- **Industrial plant and machinery:** Contractors Plant and Machinery, Engineering Machinery, Printing, Chemical and Fabric Equipment, Commercial Catering Equipment, Stock Materials, Scrap Materials and Equipment
- **Agricultural:** Buildings, Machinery and Tools, Livestock and Vehicles
- **Government:** Armed Forces, Government Department, Stock-Seized and Confiscated

Forms of auction and accruable revenue: An important issue explored by auction theorists is revenue generation resulting from each auction type. According to Azasu (2006), the revenue equivalence theorem provides the answer by stipulating that the English, Dutch and sealed bid auctions yield exactly the same expected profit for every bidder valuation (bid) and the same expected revenue for the seller with independent private values. Milgrom and Weber (1982) argued that where this independent private value assumption is relaxed, the ability of the auctioneer to extract incremental profits is dependent upon a stronger concept of affiliation.

For instance, if the price paid by the buyer can be more effectively linked to exogenous variables that are affiliated with the bidder's private information, the bidders are worse off and the seller is better off. Thus, if the seller has information about the object that would materially increase the bidder's valuation, then revealing such information is beneficial to the seller in that bidders will offer higher bids, resulting in a higher selling price, allowing the seller to extract the bidder's surplus (Milgrom, 1989, as cited in Azasu, 2006).

Efficient pricing is important in attracting new and existing investors and may be enhanced by the quality of information disclosed to the market. A relationship exists between asset pricing and information quality (Kang, 2004). It is expected that the quality of decision (output) is a reflection of the quality of information (input). The capital market to act as a catalyst for economic growth and development will depend, among other things, on the quality of market information available to investors. The ultimate is achieving information efficiency because each type of information asymmetry induces market inefficiency (Rosser, 2001; Oluba, 2008; Murray, 2008). The value of information may be determined by the quality of the decision made by the investors using the information.

ROLE OF INFORMATION ASYMMETRY IN DECISION MAKING

According to Wikipedia, the Free Encyclopedia (2011), in economics and contract theory, information asymmetry deals with the study of decisions in transactions where one party has more or better information than the other. This creates an imbalance of power in transactions which can sometimes cause the transactions to go awry, a kind of market failure in the worst case. Examples of this problem are adverse selection, moral hazard and information monopoly.

Information asymmetry models assume that at least one party to a transaction has relevant information whereas the other (s) do not. Some asymmetric information models can also be used in situations where at least one party can enforce, or effectively retaliate for breaches of, certain parts of an agreement whereas the other (s) cannot. In adverse selection models, the ignorant party lacks information while negotiating an agreed understanding of or contract to the transaction, whereas in moral hazard the ignorant party lacks information about performance of the agreed-upon transaction or lacks the ability to retaliate for a breach of the agreement. An example of adverse selection is when people who are high risk are more likely to buy insurance, because the insurance company cannot effectively discriminate against them, usually due to lack of information about the particular individual's risk but also sometimes by force of law or other constraints.

Two previous empirical studies of auctions demonstrate the significant impact of information asymmetry on the price the winner pays. Hendricks and Robert (1988) conclude that information asymmetry between the participants in auctions on drainage tracts for oil and gas decreases the price paid by the winner when the player's valuation is limited to the common value of the good. Conversely, Dionne *et al.* (2009) contend that information asymmetry drives an increase in the price paid by the winning bidder of a slave auction when the valuation includes a common component and a private component. Thus, information asymmetry should have a real impact on the auction bids and should influence the premium paid during a transaction.

Information asymmetry in sealed-bid auctions: The theoretical literature on sealed-bid auctions with information asymmetry began with Wilson (1967). He analyzed the sealed-bid auction with information asymmetry when the good is valued uniquely according to its common value (absence of private value). The common value includes the elements that are pertinent for all participants that appraise the good at auction. Thus, in terms of common value, the players weigh the same elements (such as productivity or profits) but may value the object differently.

Information asymmetry exists because one participant holds more precise private information on the value of the good. Wilson (1967) showed that the more informed party has a much higher marginal expected return than the uninformed competitors. Wevebergh (1979), Milgrom and Weber (1982) and Engelbrecht-Wiggans *et al*. (1983) revisit the problem and propose a different version of the equilibrium premium. They predict that the informed participant's anticipated profit is generally positive, whereas the expected profits of the other players are zero. The fear of the winner's curse (winning by bidding a too high price) prevails among uninformed players. Informed participants can then win the auction at a lower price. Hendricks and Robert (1988) test this main prediction of the theoretical literature on sealed bid auctions with common value in a context of information asymmetry. Their analysis of auctions of drainage tracts for oil and gas between 1959 and 1969 indicates that companies adjacent to the tract being sold hold superior information because of the exploration they do on their own land. They are therefore better informed than the other firms. The empirical results strongly support the prediction of the theoretical model. The returns of more informed firms are positive while those of less informed firms are negligible.

Information asymmetry in English auctions: The influence of information asymmetry in English auctions has also intrigued researchers. Hernando-Veciana and Michael (2004) analyze an English auction with information asymmetry and distinguish common value from private value. They study the uninformed participants' behavior during the auction when the party that holds privileged information is present. They conclude that the uninformed bidder's strategies are mainly dictated by the interaction between the winner's curse[4] and the loser's curse (losing by bidding too low). The uninformed participant may deduce that the informed player remains active because the common value is high. Thus, the former remains at the auction to avoid the loser's curse.

Conversely, the uninformed participant may believe that the informed bidder remains in the auction because he has high private value. In this case, the uninformed bidder leaves to avoid the winner's curse. The authors argue that the probability of loser's curse is markedly higher than the probability of winner's curse among uninformed participants that have high private value.

Uninformed bidders protect themselves from the loser's curse by submitting aggressive offers when an informed competitor is present. Informed players must then bid a large amount to discourage the other participants and win the auction. Dionne *et al*. (2009) extend the empirical model developed by Hong and Matthew (2003) and derive the empirical implications of the presence of an informed participant in an English auction with private and common value. In their model, the informed player makes an overall valuation because the common value cannot be distinguished from the private value. Dionne *et al*. (2009) conclude that the presence of an informed participant prompts more aggressive offers by uninformed players. They also confirm the competition-dampening impact of informed bidding (Engelbrecht-Wiggans *et al*., 1983) in a special case of their model where private values are on average zero. They conclude that private valuation contributes significantly to the enhancing effect of the winning bid. Dionne *et al*. (2009) test their theoretical predictions on a sample of slave auctions in Mauritius between 1825 and 1834. They hypothesize that a familial relationship between the buyer and seller grants the buyer privileged information about the slave. Their results are consistent with the auction model when private valuations are taken into account because the equilibrium price is higher when the informed player wins the auction.

In the pure common value context (in either English or sealed-bid auctions), the presence of information asymmetry between the participants lowers the price paid by the informed player if that player wins the auction, because of the winner's curse. Inversely, in English auctions with common and private value, information asymmetry may raise the price paid by the informed player if that player wins the auction, when the loser's curse prevails. The presence of private value along with asymmetric information therefore seems to influence the results considerably.

Benefits of privileged information: Information asymmetry between the bidders at an auction seems to influence the price paid by the winner considerably. If the target object at an auction is a complex good such as a company, the participants probably use disparate information to evaluate the target, which will affect the premium paid by the buyer. Several recent studies show that information asymmetry is manifested in a company when its ownership structure includes blockholders[5] and diffused shareholders (Heflin and Kenneth, 2000; Brockman and Xuemin, 2009; Jun-Koo and Jin-Mo, 2008; Edmans, 2009). These shareholders have an advantage when appraising the performance and the fair value of the target.

The consequences of information asymmetry in auction: The information asymmetry theory (Akerlof, 1970) states that in a product market if a seller has more information about the quality of goods and the buyer face high uncertainty in verifying the product quality, the buyer will rationally discount the price to protect from overpayment in case of buying a "lemon".[6] In response, the seller may find it feasible and profitable to signal product value credibly. If not, the seller could reject the price and exit the market or accept the low price and behave opportunistically by offer lower quality products. The latter is a classic example of "adverse selection". As a result, the buyer may still end up buying a "lemon" despite the rational price discount or it will choose to exit the market. Therefore, high information asymmetry will in theory lead to adverse selection and the potential breakdown of market transactions.

Consistent with the lemons problem, recent evidence shows that fewer cross-border acquisitions occur in countries with poor financial information disclosure (Rossi and Volpin, 2004). Strategy research suggests that information asymmetry exacerbates the difficulty of evaluating the value of targets' resources as well as the potential synergies (Barney, 1988). But little is known how exactly information asymmetry affect acquirer's return.

The risks of buying a "lemon": According to Akerlof (1970) 'market for lemons[7]' theory, high information asymmetry will lead to adverse selection, where unattractive sellers are more likely to be on the market than attractive ones and buyers are likely to bear high risks of buying market "lemons". By the same token, in the international acquisition setting, "if suitable contractual or institutional remedies for this information asymmetry problem are lacking, the acquirer bears a significant risk of failing to capture value from the deal, because of the risk of overpayment or from incurring excessive transaction costs during due diligence and negotiation processes" (Reuer *et al*., 2004).

Auction theory yields a similar prediction (Kagel and Levin, 1986) when the bidder has poor information on the true value of the target. The winner of a sealed-bid auction[8] of unknown common value tends to overestimate the true value of the auction object the most, resulting in overpayment and the "winner's curse" (Giliberto and Varaiya, 1989; Wilson, 1967). Recent studies on experimental economics show that higher information asymmetry leads to greater valuation uncertainty and subsequently larger estimation error. Since the winning bidder is the one with the highest positive estimation error, greater information opacity leads to more severe overpayment (Goeree and Offerman, 2002). Taken together, it is reasonable to expect that when buying a target embedded in an opaque information environment, the acquirer will bear a higher risk of overpayment and subsequent lower returns.

Milgrom and Weber's general symmetric value theory and model: General auction model for risk-neutral bidders is a hybrid of the independent private values model and the common value model, as well as a range of intermediate models which can better represent, for example, the auction of a painting. Despite its generality, the model yields several testable predictions. First, the Dutch and first price auctions are strategically equivalent in the general model, just as they were in the private values model. Second, when bidders are uncertain about their value estimates, the English and second-price auctions are not equivalent: the English auction generally leads to larger expected prices. One explanation of this inequality is that when bidders are uncertain about their valuations, they can acquire useful information by scrutinizing the bidding behavior of their competitors during the course of an English auction. That extra information weakens the winner's curse and leads to more aggressive bidding in the English auction, which accounts for the higher expected price.

A third prediction of the model is that when the bidders' value estimates are statistically dependent, the second-price auction generates a higher average price than does the first-price auction. Thus, the common auction forms can be ranked by the expected prices they generate. The English auction generates the highest prices followed by the second-price auction and, finally, the Dutch and first-price auctions. This may explain the observation that "an estimated 75%, or even more, of all auctions in the world are conducted on an ascending-bid basis" (Cassadyr, 1967).

Consider an auction in which n bidders compete for the possession of a single object. Each bidder possesses some information concerning the object up for sale:

Let $X = (X_1,\ldots, X_n)$ be a vector, the components of which are the real-valued informational variable (or value estimates, or signals) observed by the individual bidders.

Let $S = (S_1,\ldots, S_m)$ be a vector of additional real-valued variables which influence the value of the object to the bidders.

Some of the components of S might be observed by the seller. For example, in the sale of a work of art, some of the components may represent appraisals obtained by the seller, while other components may correspond to the tastes of art connoisseurs not participating in the auction; these tastes could affect the resale value of the object. The actual value of the object to bidder i - which may, of course, depend on variables not 'observed by him at the time of the auction-will be denoted by:

$V_i = u_i(S, X)$.

The following assumptions are made:

Assumption 1: There is a function u on R^{m+n} such that for all i,

$u_i(S, X) = u(S, X_i, (X_j)_{j \neq i})$.

Consequently, all of the bidders' valuations depend on S in the same manner and each bidder's valuation is a symmetric function of the other bidders' signals.

Assumption 2: The function u is nonnegative and is continuous and nondecreasing in its variables.
Assumption 3: For each i, E (Vi) $<\infty$.
Assumption 4: f is symmetric in its last n arguments.
Assumption 5: The variables $S_1, \ldots, S_m, X_1, \ldots, X_n$ are affiliated.

A general definition of affiliation[9] is given below. For variables with densities, the following simple definition will suffice. Let z and z' be points in $R^{m+n.}$ Let z V z' denote the component-wise maximum of z and z' and let z A z' denote the component-wise minimum. The variables in the model are affiliated if, for all z and z', $f(z \vee z')\, f\,(z \wedge z') \geq f\,(z)\, f(z')$.

Roughly, this condition means that large values for some of the variables make the other variables more likely to be large than small. The inequality (2) is called the "affiliation inequality" (though it is also known as the "FKG inequality" and the "MTP, property") and a function f satisfying (2) is said to be "affiliated." Some consequences of affiliation are discussed by Karlin and Rinott (1980) and Tong (1980) and related results are reported by Milgrom (1981) and Whitt (1982).

Reserve prices and entry fees: Reserve price is the minimum price a seller will accept; the maximum a buyer will offer.

Reservation prices commonly occur in auctions while entry fee is the amount that each person that wants to take part in bidding is expected to pay. Reserve prices and entry fees are devices commonly used in auctions and are believed to raise the seller's revenue. According to Milgrom and Weber (1982), it is straightforward to adapt the equilibrium characterization theorems to accommodate reserve prices. In the first-price auction, setting a reserve price r above $v(\underline{x}, \underline{x})$ simply alters the boundary condition and the symmetric equilibrium strategy becomes:

$$b^*(x) = r.L(x^*|x) + \int_{x^*}^{x} v(\alpha, \alpha)\, dL(\alpha|x) \quad for\ x \geq x^*$$
$$b^*(x) < r \quad for\ x < x^*$$

where $x^* = x^*(r)$ is called the screening level and is given by:

$$x^*(r) = inf\{x \,|\, E(v_1\ x_1 = x, Y_1 < x) \geq r\}$$

It is important to note that when the same reserve price r is used in a first-price, second-price auction, or English auction, the same set of bidders participates. Thus, in the second-price auction with reserve price r, the equilibrium bidding strategy is:

$b^*(x) = v(x, x)$ *for* $x \geq x^*$
$b^*(x) < r$ *for* $x < x^*$

With a fixed reserve price, one can again show that the English auction generates higher average prices than the second-price auction, which in turn generates higher average prices than the first-price auction. The introduction of a reserve price does not alter these important conclusions.

More subtle and interesting issues arise when the seller has private information. If he fixes a reserve price and then reveals his information, he will generally affect x^* and hence change the set of bidders who are willing to compete. In the information revelation theorems, it is assumed that the reserve price was zero, so that revealing information would not alter the set of competitors.

Given any reserve price $\bar{r}$ and realization z of X_0, let $x^*(\bar{r}\,|z)$ denote the resulting value of x^*. It is clear from expression (10) that x* is decreasing in $\bar{r}$ and maps onto the range of X_1. Hence, there exists a reserve price $r = r(z\,|\bar{r})$ such that $x^*(r|z) = x^*(\bar{r})$; the authors call $r(z|\bar{r})$ the reserve price corresponding to z, given $\bar{r}$.

When both a reserve price r and an entry fee e are given, the authors more generally define the screening level $x^*(r, e)$ to be:

$$x^*(r,e) = inf\{x \,|\, V_1 - r)\, 1\{Y_1 < x\} | X_1 = x) \geq e\}$$

It is not always true that the set of bidders who will choose to pay the entry fee and participate in an auction consists of all those whose value estimates exceed the screening level. In a first-price auction, an entry fee might discourage participation by some bidder with a valuation x well above $x^*(r, e)$ if he perceives his chance of winning $[F_{Y1}(x|x)]$ as being slight.

If the set of bidders who participate at equilibrium in an auction with reserve price r and entry fee e does consist of those with valuations exceeding $x^*(r, e)$, then we say that the pair (r, e) is regular for that auction. The next result shows that among regular pairs with a fixed screening level, it pays to set high entry fees and low reserve prices, rather than the reverse.

From the foregoing, the model with risk-neutral bidders, the English, second-price and first-price auctions can be ranked by the expected prices they generate. Also, they succeeded in showing that in the

English and second-price auctions, the seller benefits by establishing a policy of complete disclosure of his information.

Risk aversion: A risk averse person chooses assets with little risk of either capital loss or an uncertain return. Risk aversion can be expressed in different ways, including the choice of only very safe assets, e.g. government bonds, or the diversification of an investment portfolio. Many investors associate high risk with a high return. With independent private values and risk aversion, the first-price auction leads to higher prices than the second-price auction.

The reporting information to the bidders has two effects. First, it reduces each bidder's average profit by diluting his informational advantage. The extent of this dilution is represented by the second inequality in the proof. Second, when bidders have constant absolute risk aversion, reporting information raises the bidders' average willingness to pay.

CHALLENGES IN AUCTION THEORY

The use of auctions in the conduct of human affairs has ancient roots and the various forms of auctions in current use account for hundreds of billions of dollars of trading every year. Yet despite the age and importance of auctions, the theory of auctions is still poorly developed.

Milgrom and Weber (1982) identified some challenges in auction and bidding, according to them; one obstacle to achieving a satisfactory theory of bidding is the tremendous complexity of some of the environments in which auctions are conducted. For example, in bidding for the development of a weapons system, the intelligent bidder realizes that the contract price will later be subject to profitable renegotiation, when the inevitable changes are made in the specifications of the weapons system. This fact affects bidding behavior in subtle ways and makes it very difficult to give a meaningful interpretation to bidding data.

Another basic issue is whether the non cooperative game formulation of auctions is a reasonable one. The analysis that we have offered seems reasonable when the bidders do not know each other and do not expect to meet again, but it is less reasonable, for example, as a model of auctions for timber rights on federal land, when the bidders (owners of lumber mills) are members of a trade association and bid repeatedly against each other.

The theory of repeated games suggests that collusive behavior in a single auction can be the result of non cooperative behavior in a repeated bidding situation. That raises the question: which auction forms is most (least) subject to these collusive effects? Issues of collusion also arise in the study of bidding by syndicates of bidders. Why do large oil companies sometimes join with smaller companies in making bids? What effect do these syndicates have on average prices? What forces determine which companies join together into a bidding syndicate? Another issue that has received relatively little attention in the bidding literature concerns auctions for shares of a divisible object. Wilson (1979) indicates that such auctions involve a host of new problems that require careful analysis. Much remains to be done in the theory of auctions.

CONCLUSION

The study is the theoretical approach to the effect of information asymmetry on auction and bidding. Information asymmetry models assume that at least one party to a transaction has relevant information whereas the other (s) do not. The study has been able to bring together the existing literatures in providing a platform for measuring the effect of information asymmetry on auction and bidding. The study did not only identify the forms of auction but also enunciate the effect of information asymmetry on each form of auction. The complex nature of the environment in which auctions are conducted is identified as the obstacle to achieving a satisfactory theory of bidding.

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End notes:

1 A market which raises long-term capital for governments and firms through bonds bearing a fixed rate of interest, as well as arranging the trading of issued bonds.

2 Information economics or the economics of information is a branch of microeconomic theory that studies how information affects an economy and economic decisions.

3 A problem of insurance arising when the insurer does not know whether or not an insured person is at risk, with the consequence that the same premium is charged, irrespective of whether that individual is likely to claim.

4 Paying more for an item than its value. This is measured by the difference between a winner's bid and the next lower bid in a single unit auction.

5 Blockhoder is the owner of a large amount of a company's share.

6 The term is used to describe used cars

7 The market for used cars of less than average quality: the famous example used by AKERLOF to illustrate ASYMMETRIC INFORMATION.

8 Not a true auction. Confidential bids are submitted and opened only at a predetermined place and time.

9 A general treatment of affiliation requires several new definitions (Milgrom and Weber, 1982). First, a subset A of $\Re^k$ is called increasing if its indicator function 1_A, is nondecreasing. Second, a subset S of $\Re k$ is a sublattice if its indicator function I_S is affiliated, i.e., if z V z' and z ^ z' are in S whenever z and z' are. Let $Z = (Z_{1,} \ldots, Zk)$ be a random k-vector with probability distribution P. Thus, P(A) = Prob (Z $\in$A). We denote the intersection of the sets A and B by AB and the complement of A by $\overline{A}$. Definition: Z1,…, Zk are associated if for all increasing sets A and B, P(AB) $\geq$ P(A)P(B).