



Auctions, Haggling, and Fixed Prices: A Survey of Recent Literature

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Abstract

We provide a survey of recent experimental and empirical literature on exchange mechanisms: auction, haggling, posted-price, and hybrid auctions. We provide a description of competing exchange mechanisms, explain their roles, highlight their uses and strengths, and outline some strategic implications of the various structures for buyers and sellers.

1 Exchange Mechanisms

1.1 Overview

An exchange between buyers and sellers involves six tasks: (1) determining the list of potential buyers (or sellers); (2) finding the best exchange mechanism;¹ (3) finding the best exchange partner; (4) structuring the deal and agreeing on a common price; (5) implementing the agreement, which involves payment, delivery, and possibly designing a customized exchange mechanism; and (6) monitoring performance and service. The “best” exchange partner is not only based on the price, but also trustworthiness, reliability, and the prospects of repeated interactions.

There are two ways to find exchange partners: by locating the marketplace or by locating the exchange partners themselves. Exchange partners can be found in settings analogous to a souk or bazaar; this can be a physical place, like the New York Stock Exchange, or an electronic auction house, such as eBay.

The tasks associated with exchange come with a price tag: (1) the search cost that is associated with finding exchange partners and finding the best exchange; (2) the negotiation cost that is associated with finding the best partner and structuring the deal; (3) the cost of time and effort that is associated with curbing any opportunistic behavior from partners; (4) the costs that are associated with implementing the agreement; and (5) the cost that is associated with monitoring performance.

With any exchange, one party may walk away with a lion’s share of the benefits of the deal, but both sides will be convinced that they are doing better than they might do dealing with someone else.

In market-based exchanges, an item is sold to the party that is willing to pay the most for it. The decision to pay a high price can be based on an item’s intrinsic value, personal sentimental valuation, or “irrational exuberance.” There is strong evidence that markets can sometimes reflect, and even magnify, collective optimism or pessimism over the value of certain items. However, a market cannot continue to attract participants if only the irrational win, there must be some rational value in the items being sold.

1.2 Role

The seller is typically uncertain of the value that potential buyers attach to the item being sold, i.e., the maximum price each buyer is willing to pay. Otherwise, the seller could simply offer the item to the buyer with the highest willingness to pay at or just below the price this buyer is willing to pay. Thus, a mechanism is needed to determine price. An exchange is a mechanism to determine the market price of an item at a particular point in time.

¹ Best mechanism refers to benefits to exchange parties, not from a social allocative efficiency perspective.

In this survey, we only consider situations where a single item is being exchanged.

1.3 Overview of Types

1.3.1 Haggling

This is an exchange mechanism where only one buyer and one seller bargain, or haggle, to reach an agreed-upon price.

1.3.2 Fixed-price Mechanism

This mechanism allows the seller to set the price, the buy price, at which the item may be purchased at any time while the item is listed for sale on a website. At the buy price, the seller typically commits to selling one unit. But sellers can also specify the number of available units and volume discounts, if any.

A merchant selling his or her own products/services as well as online listing stores such as eBay Stores use this format.²

2 Auctions

The word auction is derived from the Latin *auctus*, which means increasing (incrementing).

Auctions have been used for thousands of years to determine the value of a variety of items. They were used circa 500 B.C. to sell wives in ancient Babylon and the Roman emperor's crown in 193 A.D.³

To analyze auctions, the auction forms and the valuation environment must be taken into account. See Appendix A as it applies to domain names.

2.1 Common Auction Forms

Auctions are classified according to the method of submission of bids, method used in deciding who the winner is, and the final price paid by the winner. For a survey of the alternative forms and the literature, see Pinker et. al. (2001) and de Vreis and Vohra (2002).

2.1.1 English Auction.

In an ascending bid auction – which is also called an English auction - bidders in an electronic marketplace enter⁴ ascending prices. Bidding is open for all participants to view. The winner is the highest bidder at the end of the auction period; the winner pays the bid price.

² <http://pages.ebay.com/storefronts/seller-landing.html>.

³ R. Cassady (1967), *Auctions and Auctioneering*, University of California Press, Berkeley, CA.

⁴ In physical auction formats, an auctioneer “calls” prices.

This is the most common type of auction. Lucking-Riley (2000) reports that 121 of the 142 Internet auction sites surveyed in 1998 used this format.

2.1.2 Dutch Auction.

This is the descending price counterpart of the English auction. The auctioneer calls out descending prices from the opening price that is set high enough that no bid is expected. The price is lowered until a bid is made. The first bidder wins the auction and pays the bid price.

2.1.3 First-price Sealed Bid Auction.

Under the sealed-bid auction, each interested buyer submits a bid without knowing who else is bidding or how much. The winner is the highest bidder and the item is sold at the highest bid price.

2.1.4 Second-price Sealed Bid Auction (also known as Vickery auction).

This is a slight variation over the first-price sealed bid, whereby the price paid by the winner (with the highest bid) is that of the second-highest bid.

In the Lucking-Riley (2000) survey of 142 sites, seven sites used a first-price and eight used a second-price setting.

2.1.5 Hybrid Auctions.

This option allows sellers on auction sites to offer a hybrid of an auction format and a fixed-price format to create a new pricing structure.

EBay introduced its posted price format⁵ in 2000 under the name “Buy-it-Now” auction. It was adopted by 45% of eBay’s U.S. auctions in its first year and accounts for 29% of gross merchandise sales in 2003.

On eBay, this option commits the seller to sell the item immediately to any buyer who accepts the posted price and thus ends the auction early. When the “Buy-it-Now” option is exercised, the listing is automatically removed.⁶

EBay requires that sellers select the price only at the opening of an auction - before any bids are submitted.

⁵ Yahoo, which introduced this option earlier, refers to it as “Buy Now” and, unlike eBay, allows it to be added even after bidding starts.

⁶ In the Yahoo version, this option remains in effect throughout the auction.

2.2 Valuation Environments

In situations where the value of an item is derived from its use, one can plausibly assume that at the time of bidding each bidder knows the value of the item to her, but not to other bidders, and this value is independent of how other bidders value the item. This situation is called one of **privately known value** or **private value**.

In many situations, the bidder himself does not know the value of the item at the time of auction. He may have only an estimate such as one from a consultant or an appraiser. Thus, the value to a bidder might be affected by information available to others. This situation is called **interdependent value**. One such situation is when the bidder views the auctioned item as an investment for future resale. A special case of this situation in which the value, although unknown at time of bidding, is the same for all bidders, is called one of **common value**.⁷

2.3 Popularity of Auctions

Online auctions have a number of appealing features including transparency⁸ of bidding, simplicity of the rules that can yield revenue-maximizing outcome to a seller,⁹ and transaction efficiency through lowered search costs.¹⁰

Not all objects can be successfully sold through online auctions. There are markets, where eBay, for instance, admits it hasn't achieved much success. Several years ago it formed a real-estate category for selling homes and other property. When eBay entered into residential real estate, there was already a reasonably transactionally efficient market through multiple-listing services - a computerized system that brokers have long used to list homes for sale.

Sotheby's also had to terminate its online auction service.

2.4 Listing Fee

A higher listing fee by the auction site induces sellers to set a lower reserve price, and thus, improves the chance of selling. The data supports this hypothesis as 54% of eBay auctions result in a sale, while 38% of Amazon auctions result in a sale, and only 16% of Yahoo! Auctions result in sale.

⁷ For example, the stock market is considered a common value market, as the value of a stock is the sum of discounted cash flows. Investors can have different valuation because of differences in their estimate of cash flows and their risk. In the coin collectors' market, resellers and speculators have different opinions of how much a coin is worth as their opinion might diverge as to how much a rare coin purchased now can be sold for in the future.

⁸ Except for sealed-bid, which could be the reason for their unpopularity.

⁹ And yields benefits to buyers in a procurement auction.

¹⁰ An auction's design also has a social impact through, what economists call allocative efficiency. Allocative efficiency looks at the auction result from an aggregate society's perspective. Efficient exchange means that the winner of an auction is the bidder with the highest *ex post* valuation of the object. Cason et.al. (2000) find that allocative efficiency is lower under haggling, due in the most part to lost mutually beneficial trades.

2.5 Information Provided by Seller

When listing an item, the seller provides information about the item, such as description and picture, terms of payment and shipping, duration of the auction, a minimum first bid (or equivalently, a starting price), whether to enter a private reserve price (or equivalently, a minimum price), and possibly a link to their own “home page” on the web, which can be a source of further information for the buyer. The seller can also specify a “Buy-it-Now” price.

2.6 End of Bidding

eBay auctions have a fixed ending or hard-ending time set by the seller, who can choose one, three, five, seven, or ten days duration. Yahoo has adopted a “soft-ending” rule by extending the auction for 5 minutes. In this case an auction would end only if there is no activity in last 5 minutes.

Also, on eBay an auction ends when Buy-It-Now option, if present, is exercised.

2.7 Proxy bidding

This is a feature of auctions only. It works as follows:

Assume an item is listed on an auction with a highest bid of \$5,000. Suppose the bid increment is \$100, which is typically set by the auction house, to outbid the competitor. If you place a proxy bid of, say, \$6,000, the auction automatically will submit a bid of \$5,100, just enough to make you the highest bidder. Now suppose a competitor submits a \$5,200 bid. The auction automatically submits a \$5,300 bid on your behalf. The process continues until a competitor outbids you. However, you will be notified by email to give you a chance to update your bid.

Proxy bidding¹¹ plays two roles: it allows for asynchronous bidding and provides a solution to the snipping problem under private value.¹²

2.8 Dominance of eBay

The dominance of eBay is to a large extent due to network effects, whereby the more buyers visit a Website, the more sellers do also, and the more sellers list, the more buyers go.

¹¹ It can be shown that under private values, proxy bidding allows bidders: (a) to act as if they were participating in a Vickery auction, (b) to submit a bid that is their true value, and (c) need to bid just once.

¹² Another solution to snipping, adopted by Yahoo, is the “soft-ending” rule noted above. However, this is not a very good solution, as it takes away an important advantage of online auctions – that bidding can be “asynchronous.”

Market Share	
Auction Site	%
eBay	60
yahoo	28
Amazon	6
Other	6

Hall (2001), Digital Dealing

On any given day, there are, on average, more than 12 million items listed on eBay across 18,000 categories. In 2003, eBay members were involved in \$24 billion in sales, a 60% increase from previous year. There were 94.9 million registered users in 2003, a 54% increase from the previous year. Total listings in 2003 were 292 million, up from 195 million in 2002.¹³

2.9 Abuse

There is the threat of auction abuse from bidders and sellers. Bidders can engage in snipping, reserve price shilling, and abuse of the proxy-bidding feature.

One potential abuse by bidders is snipping. The hard end-time, as in eBay, creates an incentive to place a bid at the very end, thus, preventing anyone else from responding.

Another source of abuse, as pointed out by Kauffman and Wood (2005), is reserve price shilling.¹⁴ Here a bidder shills to avoid paying auction house fees, rather than to drive up the price of the final bid. They point out that sellers may be motivated to enter a shill bid in order to drive up an auction's final price.

In proxy bidding, bidders might have an incentive to put in a false high bid that is then retracted. This decreases competition, allowing the bidder to win the auction at a low price.

On the other hand, sellers' potential abuse comes through bid shilling¹⁵ whereby the seller tries to bid up the price. Of course, the seller runs the risk of winning himself. This is where the seller's reputation matters, and thus, the importance of the rating system on eBay. This source of abuse also means that bidders are unlikely to trust auctions organized directly by the seller.

3 Strategies

3.1 *Is there an optimal time length for an auction?*

Lucking-Reiley et al. (2000) find evidence that the length of an auction has a significant and, on average, a positive effect on price.

¹³ Ebay's 2004 4th Quarter report. Available on line at <http://investor.ebay.com>.

¹⁴ This type of shilling is also discussed in the section related to the winner's curse.

¹⁵ Shilling is considered criminal fraud in the United States and elsewhere and can be punishable by a jail term or heavy fine.

3.2 When To Bid or not to Bid the Last-Minute.

There is empirical evidence of a flurry of bids that arrive the last few seconds on auctions that last a few days. A study of 240 eBay antique auctions conducted by Roth and Ockenfels (2002) finds that 89 had bids in the last minute and 29 in the last ten seconds. Comparable findings are reported by Bajari and Hortacsu (2003) and Schindler (2003).

However, there does not seem to be a dominant explanation of the practice. Thus, there is no simple recommended strategy to follow. Hence, I will present four explanations put forth by different researchers.

The first explanation that comes to mind is that of tacit collusion. Ockenfels and Roth (2004) put forth such a theoretical model. On the other hand, studies by Hasker et. al. (2003), Bjari and Hortacsu (2003), and Shindler (2003) don't support this hypothesis.

A second model is based on the presence of naïve bidders. Ku et al. (2003) provide evidence collected through surveys of bidders on emotional bidding. Ockenfels and Roth (2004) postulate that naïve bidders don't understand the proxy-bidding mechanism and thus, attempt to outbid their competitors. They also demonstrate that last-minute bidding is a best response by rational bidders against naïve bidders. Last minute bidding by rational bidders is also supported by a controlled experiment setting conducted by Ariely et al. (2003).

A third explanation is based on the notion of common value, outlined above. In such an environment, by bidding early, a bidder provides imperfect signal information on the common value. Signals can cause bidders to update their beliefs about the true value of the item. Such a theoretical model is developed by Bajari and Hortacsu (2003). They find evidence from eBay auctions that supports their model of common value. Ockenfels and Roth (2004) also report more evidence of last minute bidding in eBay antique auctions than in eBay computer auctions, arguing that antique auctions are more likely to possess a common value element than computer auctions.

Wang (2003) provides a fourth justification when sellers list identical items simultaneously.

3.3 Using Secret Reserve

Potential buyers know when a private reserve price exists, but do not know its value until someone bids above it.

Some of the reasons for using this option are: (a) in common value auctions, this might be a device to hide the seller's own valuation and (b) it might encourage bidding to start at low prices and gradually increase so as to reduce the winner's curse.

Li and Tan (2000) developed a model, which shows that with a secret reserve price, the seller may significantly increase his revenue in an independent private value first-price

auction, but in English and second-price auctions, the seller should be indifferent between setting a secret vs. observable reserve price.

Using data on the second-price auction model of eBay coin auctions, Bajari and Hortacsu (2003) find that, at its optimal level, a secret reserve price yields the seller on average 1 percent additional revenue. On the other hand, Katkar and Lucking-Riley (2000) conducted experiments that secret reserve price auctions yielded, on average, approximately 8.6 percent less revenue. They also reported that secret reserve price auctions reduced the probability of a sale. However, they point out that their experiments ignore potential strategic benefits of secret reserve prices. For example, by setting a very high secret reserve, a seller may first screen out the bidders with the highest valuations for the object, then later contact them, away from eBay, to run a private transaction for which he does not have pay eBay sale commission.

Anderson et. al. (2004) point out that buyer comments suggest that the practice of using a high private reserve price is annoying to buyers and as a result, they may avoid the auction. Using a high starting price is just as effective as high private reserve and is more transparent.

3.4 *Avoiding The Winner's Curse*

A winner's curse is defined as a bidder feeling regret after winning an auction because of overpaying for an item.

There are two types of information associated with the Winner's Curse that have been studied: certainty of value by bidders and experience of bidders. Bidders are less likely to submit high bids when they are uncertain about the true value of the item and are more aggressive when bidding when they are more certain of its value. Ow and Wood (2004) find buyers with more experience tend to pay more than inexperienced buyers for the same item. They argue that buyers develop trust in the online auction market and this trust is reflected in a willingness to pay more.

Experiments by Coy (2000) and Kagel and Roth (1995) demonstrate the existence of this phenomenon among inexperienced bidders. However, empirical studies by Bajari and Hortacsu (2003) and Yin (2003) are inconsistent with experimental evidence. Their work suggests bidders on eBay understand the winner's curse, especially on items that face the common value feature and make bid adjustments to take into account the winner's curse.

Thus, in deciding what to bid, the bidders must take the winner's curse into account.

3.5 *Incorporating Information from Bidding Progress*

Kaufman and Wood (2005) point out that a "premium bid," a bid much higher than the current bid, should act as a signal to other bidders that an item is valuable. This should tend to drive up the final bid.

It is possible, at least, ex post, to differentiate such bidders from a reserve price shill, as the latter tend to drop out of the bidding early. Kaufman and Wood (2005) show that bidders who make premium bids drop out, on average, 4.64 days before the auction ends, while other bidders drop out, on average, 1.85 days before the auction ends. They point out that premium bids usually are entered in the middle of an auction and are usually not the winning bid.

3.6 *To or Not To Buy-It-Now.*

Wang et al. (2004) show that the Buy-it-Now format benefits buyers and can increase the expected profits from an auction if bidders' participation costs are substantial. These costs include the opportunity cost of waiting for the auction to close and the transaction cost associated with bidding. Obviously, this format defeats itself if sellers set a buy-it-now price that is too high, as no one will use it.

Anderson et al. (2004) find that different types of sellers pursue systematically different hybrid strategies. For example, in their sample two high volume sellers always use a combination of Buy-it-Now and low starting price, while the many less frequent sellers use an array of pricing strategies -- especially new sellers. They point out that even after controlling for sale volume, the heterogeneous strategies persist. They also find that sellers in their sample do not set the starting price to equal the Buy-it-Now price, thus suggesting that sellers use Buy-it-Now to provide a quick sale to impatient buyers.

Reynolds and Wooders (2003) postulate two reasons why a Buy-it-Now auction might yield greater revenue for the seller. The first is that offering a buy price many reduce the riskiness of bidders. For instance, a bidder whose value exceeds the buy price has to weigh the benefits of potentially winning the auction at a price lower than the buy price and the potential of losing to another bidder if that bidder accepts the buy price or if he is outbid. The second is that with the Buy-it-Now format the seller might be able to exploit impatient bidders who are willing to pay a premium for an immediate acquisition.

Campbell and Levin (2002) show that under interdependency of value, posted prices may outperform the best standard auction, as the posted price reduces the winner's curse.

3.7 *Setting Minimum Bid*

Bajari and Hortacsu (2003) find a negative relationship between the number of bidders and the minimum bid.

3.8 *Is Reputation Important?*

The most important concerns for buyers are the inability to inspect the merchandise and concern over delivery; e.g., eBay sellers are not required to divulge their identity. Also there are few repeat transactions between buyers and sellers. A study of eBay by Resnick and Zeckhauser (2001) reveals that within a five-month period fewer than 20 percent of transactions were between repeated buyer-seller pairs.

Reputation of listing site is very important. Pennington et al. (2003) show that guarantees can lead to increased system trust and increased perceived vendor trust. This leads to an increase in the purchase intent of the buyer. That is why, for example, eBay removes and sometimes identifies suspected sellers.

EBay provides a record of comments about the sellers, so that sellers have the potential to develop and maintain reputations. Potential buyers have access to these comments.

3.9 Haggling vs. Centralized Markets

Centralized markets,¹⁶ as Kugler et al. (2003) point out, protect “weak traders”¹⁷ from paying high prices and protect sellers from accepting low prices. Conversely, under direct negotiations in a decentralized market, weak buyers are likely to pay relatively high prices and weak sellers are forced to accept low prices. They find that weak traders opt for trading in the centralized market. They also cite supporting evidence from a study by Morton et al. of cars that are purchased online and off-line.

3.10 Haggling vs. Mixed-price Models

Cason et al. (2000) find that the seller’s price is higher and stickier under haggling than under posted price.

¹⁶ Exchange mechanisms can be classified into two types: decentralized and centralized markets. A decentralized market has no single physical location where all trades occur. There are a number of decentralized mechanisms. The “haggling” market, or direct negotiations between buyers and sellers, is the decentralized market that is considered here. Kugler et.al. consider a sealed-bid double-auction as their centralized market mechanism. The Nasdaq, an Over The Counter (OTC) financial market, is an example of a decentralized market. The New York Stock Exchange (NYSE), on the other hand, is a centralized market.

¹⁷ Weak buyers are those who have a high willingness to pay, compared to “strong” or “tough” buyer types who can only transact in a more limited range of possible prices. Weak sellers are those with low production cost.

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