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Experts and Amateurs: The Role of Experience in Internet Auctions

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Abstract

The use of auctions as a pricing mechanism has grown dramatically over the last few years. The introduction of electronic auctions has significantly widened the pool of consumers who participate in auctions and increased the number of companies attempting to sell their products in an auction format. Previous empirical research on auctions has focused almost exclusively on the behavior of professional bidders in high stakes common value auctions or the behavior of students in laboratory experiments. We collect data on a large number of electronic auctions, across four product categories, to explore the behavior of consumers bidding in a real marketplace. In particular, we focus on the role experience plays in their bidding behavior to uncover whether consumer learning drives the bidding process towards outcomes described in the theoretical literature on auctions. We find that experience does indeed lead to behavior which is more consistent with theory although the proportion of experienced bidders who behave in a manner inconsistent with theory remains quite large.

Key words: auctions, electronic commerce, consumer behavior

Introduction

An enormous amount of economic activity takes place using an auction as the basic pricing mechanism. Auctions are used extensively for selling financial instruments, most notably the periodic auctions for U.S. government debt in the form of U.S. Treasury obligations. They have also become the standard pricing mechanism for, among others, valuable pieces of art, rights to cut timber on government controlled land, oil-drilling rights, and broadcast spectrum rights.

Until very recently, auctions largely have been confined to items which are both valuable and relatively unique. The reasons for the scarcity of auctions in consumers' everyday purchase activity are straightforward. While auctions do offer the seller the benefit of selling an item to the bidder who values it the most, it does so in a way that can be very costly to the buyer and seller alike. Some of the more popular auction types require all potential buyers to be physically present for the auction, while others require

written bids to be submitted and evaluated by the seller. In short, auctions generally create significant transaction costs during the buying process and hence tend to make little sense when relatively inexpensive, standardized items are being sold. For this reason, we do not observe grocery retailers conducting auctions for boxes of laundry detergent.

Within the last couple of years, auctions have made dramatic inroads into the market for consumer goods. This increase has been spurred by the growth of Internet-based auctions. Internet-based auctions now account for an estimated four billion dollars in commercial activity, with that figure expected to grow 500% over the next three years (*Business Wire*, 1999). Internet, or electronic, auctions have two distinct advantages over traditional auction formats. First, they provide the seller with a much larger pool of potential bidders hence drive up the expected sale price of the item. Second, the electronic format dramatically decreases the transaction costs of an auction. Bidders need not be physically gathered into one place for the auction and potential bidders may bid over an extended, often several days, time horizon instead of being constrained to a short time interval. Both of these advantages have encouraged the explosive growth of electronic auctions.

The goal of this research is to explore whether the game-theoretic equilibrium implications of auction theory provide a reasonable description of consumer behavior in real auction markets. In particular, we focus on the role of past auction experience in governing behavior. We ask whether experience drives bidding behavior closer to or farther from outcomes predicted by auction theory. We focus on the normative predictions of auction theory regarding when during the auction the bidder should place a bid and how many times during the auction a participant should submit a bid. To this end, we collect data on a large number of electronic auctions, across four product categories, to explore the behavior of consumers bidding in a real marketplace.

1. Prior Research on Auctions

Economists have spent a great deal of intellectual energy probing the theoretical implications of various auction mechanisms and examining bidder behavior given different mechanisms. Research on the theory of auctions has focused primarily on three models, the independent private value model due to Vickrey (1961), the symmetric common value model evolving out of the early works of Rothkopf (1969) and Wilson (1969), and the asymmetric common value model of Wilson (1967; 1969). The central difference between models which assume independent private values (IPV) and those which assume a common value (CV) lies in the way bidders determine their own individual valuation of the item. In an IPV setting, each bidder knows the value of the item to themselves with certainty and this value may vary across bidders. Bidders gain no additional information about their private valuations by observing the bids of others. Conversely, in CV models, the 'true value' of the item is the same for all bidders *ex post* because the true value of the item is determined through resale or some kind of exploitation using a commonly held technology, such as cutting timber or discovering oil. However, this true value is not known

with certainty *ex ante* and must be estimated by each of the bidders. Each bidder draws an observation of the item's value, which is distributed with error around its true value. Ignorance of the true value leads to the problem of 'winner's curse,' in which the winner of the auction is the individual whose draw indicates the highest value. This is a 'curse' because the winner's draw is likely to be greater than the true value. Also, because of this uncertainty, bidders can gain information through observing the bids of others. In a significant integrative work, Milgrom and Weber (1982) show that each of these models can be nested in a more general model they term an 'affiliated value' model. Cataloging the numerous papers in auction theory is beyond the scope of this paper. Readers interested in a good overview of auction theory are referred to McAfee and McMillan (1987), and Milgrom (1989).

The marketing literature too has contributed to auction theory. Rothkopf (1991) considers the equilibrium implications of allowing the winner to withdraw her winning bid and argues that under some circumstances allowing this seemingly surreptitious behavior is beneficial. Greenleaf, Rao, and Sinha (1993) analyze the strategic interplay between the auction house and the seller through the use of price guarantees. They show that while price guarantees often work to the advantage of the seller and to the detriment of the auction house the auction house may still prefer to offer a relatively modest price guarantee to attract additional business.

There have been a few experimental studies examining the possibility that participants learn about auctions through repeated play. Kagel (1995) reported on a series of experimental auctions where subjects who repeatedly participated in English auctions improved their performance as they gained experience. Ruström (1998) also concludes that real-time learning in auctions significantly affects subject behavior. In a comparatively direct test of learning, Phillips, Battalio, and Kogut (1991) report that one-half of participants do not ignore sunk costs in a single-shot auction for a lottery ticket, while only 20% do not ignore sunk costs after repeated play. While there is not an overwhelming amount of evidence about learning in auctions in the experimental economics literature, what evidence exists points to the conclusion that participants do learn through repeated play, but that many participants still make systematic bidding errors after many repetitions (Andreoni and Miller 1995).

There is an extensive body of research on the empirical analysis of auction data.[1] The empirical literature on auctions has focused almost exclusively on the behavior of professional bidders in high stakes auctions. It has been assumed that these bidders, often with millions of dollars in potential profits contingent on the auction's outcome, are sufficiently financially motivated to fully understand the game even in the absence of previous auction experience. In short, this literature assumes that greed makes people quick learners.

The auction market for consumer products poses a unique set of challenges to researchers. Bidders that enter this market are generally not professional buyers. Previous experimental and empirical work in auctions has not adequately addressed how we might expect non-professional bidders to behave in the market for common consumer items, and how behavior may change as consumers gain more experience in this rapidly expanding marketplace.

2. Data on Bidding in Electronic Auctions

To examine how consumers bid in auctions we collected bidding data from the on-line auction house 'eBay.' As of this writing, eBay is the largest on-line auction house with an estimated 5.6 million registered users and 2.5 million items currently up for auction (*PR Newswire* 1999). Specifically, we collected bidding data from 535 auctions spanning four product categories. These auctions represented all auctions for the chosen categories which commenced between March 15, 1999 and April 15, 1999. The categories for which data were collected included hand-held power drills, men's neckties, desk-top staplers, and Rookwood Pottery vases. The market for hand-held power drills and men's neckties contained a very large number of auctions. In order to provide some balance in the number of auctions collected for each product type we restricted our data collection in the category hand-held drills to those drills marketed under the brand name 'DeWalt.'[2] For men's ties, we collected data only on those ties sold under the brand names 'Giorgio Armani' and 'Ermenigildo Zegna.' Both of these brands are Italian and are relatively high priced fashion neckties.

Each of the products put up for auction were available for bidding during a seven day auction period. For each auction, we collected data on

1. The number of unique bidders
2. The total number of bids submitted
3. The maximum bid each unique bidder submitted[3]
4. The time, measured to the second, this maximum bid was submitted
5. The experience level of each bidder as measured by the number of previous auctions in which he/she has participated and actually won the item.[4]

2.1. eBay's Auction Format

The auction mechanism used by eBay is a hybrid of the English and second-price sealed bid (Vickrey) auctions. In an eBay auction, bidders submit a maximum bid which remains hidden from other bidders. The highest outstanding bid is set to the second highest bidder's maximum value plus some bid increment specified by the auction house. The auction house automatically adjusts the highest outstanding bid as new bids enter. The bidder with the highest hidden maximum bid at the end of the auction wins the item and pays a price equal to the second highest bidder's maximum bid plus the bid increment. The secrecy of the maximum bid is indicative of a second price sealed bid auction, while the sequential nature of the bidding process is indicative of an English auction. This auction mechanism is most clearly understood by a simple example. Consider the hypothetical bid sequence set out in Table 1.

In this example, bidder 1 opens bidding in this auction with a maximum bid of \$20. Since the reservation bid, set by the seller, is \$10 the highest outstanding bid is set to $\$10 + \$1 = \$11$. The second bidder, upon observing an outstanding bid of \$10, enters a maximum bid of \$15. Since this maximum bid is below that of the first bidder the first

Table 1. Hypothetical eBay Bid Sequence

Bid Number	Maximum Bid (hidden)	Highest Outstanding Bid	Reservation Bid	Bid Increment
1	\$20	\$10	\$10	\$1
2	\$15	\$16		
3	\$30	\$21		
4	\$25	\$26		

bidder remains the high bidder in the auction. However, since \$15 > \$10 the new highest outstanding bid is adjusted to \$15 + \$1 = \$16. Thus, while the second bidder is not the highest bidder, her bid has effectively increased the highest outstanding bid. The third bidder then enters with a bid of \$30. He has the highest maximum bid, is hence the leading bidder in the auction, and the highest outstanding bid moves up to \$20 + \$1 = \$21. Finally, bidder 4 enters with a bid of \$25. She is not the high bidder, but moves the maximum outstanding bid to \$25 + \$1 = \$26. The auction ends with bidder 3 winning and paying the second highest maximum bid plus the bid increment.

While this hybrid auction mechanism is common on eBay, it is not unique to eBay. For example, by using the 'Bidmaker' feature on the auction site 'OnSale' the bidding procedure becomes completely isomorphic to that of 'eBay.' The 'BidAgent' feature on the site 'WebAuction' operates in same manner.

2.2. Summary Statistics

Table 2 provides summary statistics for the auction data in each of the four categories examined. Note that the range of bidder experience in each of the chosen categories extends from those with no auction experience to those with a great deal of auction experience.

2.3. Equilibrium Bidding Strategies

The auction mechanism just described requires bidders to make two decisions. First, as is true in all auctions, the bidder must decide how much to bid for the item. In this context

Table 2. Summary Statistics of Auctions

	Pottery	Neckties	Drills	Staplers
Number of Auctions	215	114	62	144
Mean Winning Bid	\$415.57	\$22.80	\$123.64	\$19.48
Range of Winning Bids	\$40.00–\$11,000.00	\$6.00–\$56.99	\$16.00–\$242.50	\$0.99–\$102.00
Mean Number of Bidders	6.94	3.98	8.25	2.87
Range of Number of Bidders	1–19	1–9	1–17	1–9
Mean Experience Level of Bidders	30.77	37.11	13.69	52.65
Range of Experience Level of Bidders	0–490	0–883	0–742	0–666

this means an individual bidder must determine their hidden maximum bid. The auction mechanism examined here is a second-price auction, the winning bidder pays the second highest bidder's maximum bid plus a bid increment. Vickrey (1961) showed that the unique Nash equilibrium strategy in a second-price auction where private values are known with certainty is for each bidder to bid their true reservation value for the item under consideration. In short, any bid below this amount is strictly dominated by a bid of the reservation value, since bidding the reservation value will provide a greater probability of winning the item yet not affect the actual price paid conditional on a winning bid. Bidding above the reservation value is not optimal because, while it does raise the probability of winning the item, this increased probability of winning occurs only in the region where the actual price paid by the winning bidder would be above their reservation value.

The second decision a bidder must make is when to place a bid. Under the assumption of independent private values, the bidder knows the value of the item to themselves with certainty and that value is not related to other bidders' valuations, bidders will be indifferent to the timing of their bids. However, as Milgrom and Weber (1982) point out, bidders often may be uncertain about their own private valuations. One reason this uncertainty may arise is because an item has a common value component whose value must be estimated by the bidder. When this is the case, bidders may acquire useful information by scrutinizing the bids of their competitors. Bidders will realize that early bids transmit information about the value of the item to their competitors (Jeitschko 1998: Haile 1997). Because of the capability of bids to reveal valuable information, it is quite transparent that in the case of uncertain private values the bidder's optimal strategy, in the absence of any costs associated with bidding at a particular time, is to bid at the last possible moment. This strategy weakly dominates bidding at any other time. It strictly dominates bidding at any other time if there exists uncertainty in the private values and is strategically equivalent to bidding at any other time if private values are known with absolute certainty. Thus, for the auction mechanism described in (2.1), the Nash equilibrium bidding strategy is for each bidder to place a single bid equal to their maximum willingness-to-pay at the last possible moment of the auction. It is notable that if all bidders follow their equilibrium strategies this auction mechanism reduces to a second-price sealed-bid auction because all bidders will bid simultaneously at the last moment and without knowledge of any other bids. We will see momentarily though that this is not a reasonable characterization of the actual bidding process.

3. Hypotheses

Studying learning in an experimental auction setting is difficult for two reasons. First, the economic incentives offered by researchers are generally not as great as the incentives one would expect to find in a real marketplace. Second, successive rounds of an experiment are often performed with no more than a brief time interval separating the decisions of the participants. This short interval may not allow participants to internalize, and learn from, what they have observed in previous rounds. We expect that with real market data, where the time compression issues are nonexistent and the economic incentives sufficient to

affect behavior, consumers are more likely to learn optimal behavior. Thus, as the Nash equilibrium suggests, we expect that more experienced bidders will be more likely than less experienced bidders to bid during the final moments of the auction. Formally,

H1: The likelihood of a bidder bidding in the final moments of an auction will be positively related to their past auction experience.

In (2.3) we argued that bidding at the end of an auction weakly dominated bidding at any other time during the auction. Strategic dominance was weak rather than strong because if all bidders know their private valuations with certainty then they are indifferent over the continuum of times they might bid. Two of the products we chose to analyze, relatively expensive men's neckties and Rookwood pottery, were chosen precisely because Milgrom and Weber (1982) suggested that for these types of products there may well be a common value component as well as a private value component. Milgrom and Weber (1982) argue that for items where there might be some 'prestige value of owning an item which might be admired by others' or items that may be resold later at an unknown price, valuations may change as bidding evolves.

Beyond its affective capacity, a necktie is a completely useless article of clothing. It derives its value from the owner's enjoyment of its aesthetic qualities and through the potential that it will be viewed favorably by people with whom the owner associates or wishes to associate. In this context, previous bids provide information to the potential bidder about the likely acceptance and admiration of others. A piece of art, like Rookwood pottery, may exhibit the same 'prestige value' as well. In addition, those who purchase art may consider its resale value when forming their bids. Again, previous bids provide information about the item's potential resale value and hence it is costly for bidders to reveal their valuations before the ending moments of the auction.

Bidding during the last moments of the auction can also be costly in a different sense. This behavior requires participants to be physically located at an Internet-capable computer at the time the auction is scheduled to end. Given that eBay auctions end at all times of the day and night it may be inconvenient or impossible to satisfy this requirement. Thus, the bid timing behavior we would expect to observe in these auctions is a balance between the costs associated with revealing private information early with the inconvenience costs of the Internet access requirement. When an item has no common value component, and hence little information is obtained by observing the bids of others, bidders have a decreased incentive to suffer the inconvenience of ensuring that they place a bid during the final moments of the auction. At the level of the data, this implies that as bidders gain experience they are more likely to bid in the last moments of an auction for an item where there is both a private value and common value component, but may not be more likely in situations where valuations are purely private. Formally,

H2: For items in which there is a common value component as well as a private value component, the impact of experience on the propensity to bid later will be more pronounced than in auctions for items with purely private valuations.

The auction mechanism described here allows bidders to place multiple bids in the same auction. A bidder, upon observing her bid superceded by a competitive bid, may choose to place another bid on a given item. If more experienced bidders form bidding strategies that are consistent with those auction theory would suggest, they will realize that bidding early and updating at a later time is likely to convey information to other potential bidders, information which may serve to raise the final price of the item. Thus, we hypothesize, that more experienced bidders will be less likely than less experienced bidders to place multiple bids in the same auction.

H3: More experienced bidders will be less likely than less experienced bidders to place multiple bids in the same auction.

Following the same arguments given for H2, if there is a common value component we would expect the effect forwarded in H3 to be more potent.

H4: For items in which there is a common value component as well as a private value component, the impact of experience on the propensity to bid a single time, and avoid bidding multiple on occasions, will be more pronounced than in auctions for items with purely private valuations.

We note that there are other meaningful things, beyond the game theoretic equilibrium, that bidders may learn through repeated play. In the context of on-line auctions, where similar products are repeatedly auctioned, more experienced bidders may develop more accurate priors of the bid necessary to win the item. Further, experience may allow bidders to more accurately project how often certain commonly auctioned items will in fact be auctioned. The extant research in auction theory has not formally dealt with these important institutional considerations of on-line auctions.

4. An Empirical Analysis of Bidding Behavior

In order to explore the impact of experience on bid timing we divided bidders into five groups based on their previous auction experience. Bidders whose experience placed them in the lowest quintile were grouped together as were those in the next quintile and so forth. We then calculated the proportion of bids which occurred during the last minute of the auction for each experience group and for each of the four items under consideration. When examining these results, it helps to keep in mind that the proportion of bids one would expect to occur in the last minute of the auction purely by random chance is about .01%. Table 3 provides the results of this analysis and also indicates the mean probability of a given bid winning an auction conditional on the bidder's experience group.

To provide more direct evidence for Hypotheses 1 and 2 we pooled the data across all auctions and performed a logit regression in which the dependent variable indicated whether a bid was placed during the last 60 seconds of an auction (value = 1) or at some other time (value = 0). We constructed the variables *Experience* as the natural log of the

Table 3. Bid Timing: Percent of Bids Submitted in the Last Minute of the Auction

	Pottery	Neckties	Drills	Staplers	Aggregate	Win%
Experience < 20%	1.2% (167)*	1.3% (80)	0.0% (142)	2.4% (41)	1.2% (430)	12.3% (.108)**
20% ≤ Exper < 40%	2.0% (345)	2.8% (108)	2.5% (159)	0.0% (66)	2.1% (678)	15.3% (.130)
40% ≤ Exper < 60%	3.3% (330)	3.3% (91)	1.0% (100)	7.6% (92)	3.6% (613)	17.0% (.141)
60% ≤ Exper < 80%	6.6% (335)	5.8% (87)	4.6% (65)	6.1% (98)	6.2% (585)	21.0% (.166)
80% ≤ Experience	8.3% (315)	16.1% (87)	0.0% (46)	5.2% (116)	8.2% (564)	26.8% (.196)

* total number of bids in parentheses
** variance of the estimate

experience level of the bidder and *Common* as a dummy variable taking the value one for auctions in which there is a common value component in the products (Ties and Pottery) and zero in the case of purely private values (Drills and Staplers). We used *Common* to construct the interaction variable *Experience* ∗ *Common.* This interaction term will allow us to more formally test whether a common value component significantly moderates the effect of experience on last-minute bidding (Hypotheses 2). The logit transformation of the estimated model is given below. The values in parentheses are the standard errors of the parameter estimates.

$$\Pr(\text{LastMinuteBid}) = \underset{(.200)}{-4.107} + \underset{(.078)}{.274} * \textit{Experience} + \underset{(.067)}{.138} * \textit{Experience} * \textit{Common}$$

Two conclusions stand out from Table 3. First, in aggregate, more experienced bidders are more likely than less experienced bidders to place their bids during the final minute of the auction. The 'Aggregate' column of Table 3 shows that while 1.2% of the least experienced bidders bid during the final minute, 8.2% of the most experienced do.[5] For the most experienced bidders, the proportion of last minute bidding is more than 800 times what random chance would predict. Last minute bidding behavior increases monotonically as experience level increases. This finding supports Hypothesis 1.

Second, the increase in last minute bidding behavior among the more experienced bidders is more pronounced for the type of items Milgrom and Weber (1982) argued would be more likely to have a common value component and hence prone to uncertainty in valuations. In particular, for Pottery and Neckties we observe monotonic increases in last minute bidding behavior as experience rises. Likewise, the estimated regression indicates that last minute bidding increases in bidder experience and that this effect is more potent for items in which there is a common value component. This supports the second hypothesis.

Hypotheses three and four focus on the equilibrium prediction that bidders should place a single bid and not multiple bids in the same auction. We expect this behavior to be followed more closely by those bidders with more experience. Following earlier arguments, we would also expect this behavior to be more pronounced for the items in which there is a common value component. The data contains information on the number of bids

placed in the auction and the number of bidders. However, the data do not contain information on the amount and timing of specific bids except for the last bid submitted by an individual. Thus, we know the mean number of bids per bidder submitted in an auction, but we cannot track multiple bids at the individual level. To explore the equilibrium predictions related to the number of bids placed, we divided the 535 auctions in our dataset into those where the mean experience level of bidders in a particular auction was above the mean calculated across all auctions and across all categories and those where the mean experience level was below the aggregate mean. To control for the fact that auctions with very few or very many bidders may exhibit different average experience levels we compute the mean experience level of auction participants by the number of bidders the auction contains. For example, the mean experience level for bidders participating in an auction composed of five bidders is about 36 while in auctions composed of fifteen bidders the mean experience level is slightly greater than 19. Thus, for each auction we can compute whether the mean experience level of bidders in that particular auction is above or below the mean experience level of bidders in auctions with the identical number of bidders. If more experienced bidders are more likely to follow Nash equilibrium bidding strategies we would expect that auctions characterized by more experienced bidders would contain more instances of bidders placing single rather than multiple bids. We would also expect this effect to be stronger in auctions of items with a common value component.

Table 4 provides the mean number of bids placed per bidder in auctions characterized by bidders with above and below average experience. We can draw two conclusions from Table 4. First, there is evidence that for items in which there is a common value component more experienced bidders are less likely than less experienced bidders to submit multiple bids in the same auction. This is consistent with Hypothesis 4. However, for items with purely private valuations (Drills and Staplers) we see no indication that more experienced bidders are more likely to follow the weakly dominant Nash equilibrium strategy. Thus, while experience appears to have an impact, it has so only for products where the strategy of placing a single bid is strongly dominant.

5. Discussion, Limitations, and Directions for Future Research

Our empirical analysis provided three interesting conclusions regarding the ability of auction theory to describe consumer behavior. First, when strategic dominance is strong,

Table 4. Average Number of Bids Submitted per Bidder

	Pottery	Neckties	Drills	Staplers	Aggregate
Auction Exhibits Above Mean Experience	1.79 (.06)**	1.43 (.10)*	2.04 (.35)	1.54 (.08)	1.65 (.05)
Auction Exhibits Below Mean Experience	2.09 (.08)	1.66 (.10)	1.72 (.07)	1.49 (.10)	1.80 (.05)

Standard deviations of the estimates in parentheses.
* significant at .10 level.
** significant at .05 level.

more experienced bidders are more likely than less experienced bidders to follow Nash equilibrium bidding strategies. The data support the idea that as bidders gain experience they learn bidding strategies which are more likely to be successful. Second, when strategic dominance is weak, experience has a weaker impact on behavior. Finally, our results also point to the conclusion that most nonprofessional bidders do not bid in a manner consistent with game-theoretic predictions.

In developing the equilibrium predictions for the eBay auction framework we considered only the benefits, not the costs, of possible bidding strategies. To execute a 'last-moment' bidding strategy, the bidder to must have access to an Internet-capable computer when the auction ends. Certainly this may be difficult under some circumstances. We do not have access to data that would allow us to construct proxies for the cost of different strategies. However, it is reasonable to believe that if such cost information was known, a greater proportion of bidders might be found to be bidding in manner consistent with Nash equilibrium predictions. As such, the data provides evidence for the hypotheses but does not allow a formal test of the hypotheses.

The results of this research highlight certain market opportunities. There are clear market opportunities for Internet-based companies that provide price information to auction participants. Knowledge of outside alternatives is valuable to individuals as they construct bidding strategies. Companies such as CNET Shopper.com and PriceSCAN.com have made inroads into this marketplace, but considerable room remains for innovative price information agents.

Our knowledge of consumer behavior in auction markets is quite limited. As the market for Internet-based auctions expands, it becomes increasingly important for us to understand the bidding behavior of auction participants.

Notes

1. See Elyakime, Laffont, Loisel, and Vuong (1997) for an overview of previous empirical research on timber auctions; Porter (1995) for a review paper on auctions for oil drilling rights; and Cramton (1998) for research on broadcast spectrum rights.
2. DeWalt is a brand name used by The Black & Decker Co.
3. As will be subsequently explained, bidders may revise earlier bids.
4. eBay encourages sellers to provide positive feedback about buyers if they pay for the item purchased in a timely fashion. Bidders receive one 'point' for positive feedback. Because sellers are loathe to deal with buyers who have significant negative feedback, the points assigned to a given buyer are a reasonable proxy for the number of auctions won by the buyer.
5. These percentages are significantly different at the $p = .01$ level.

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