Effects of Seller-Supplied Prices on Buyers' Product Evaluations: Reference Prices in an Internet Auction Context

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A field experiment investigated the impact of two external reference points under the seller's control on the final price of an auction. When an item's seller specified a high external reference price (a reserve price), the final bid was greater than when the seller specified a low external reference price (a minimum bid). When the seller provided both high and low reference prices, the reserve influenced the final bid more. The low reference price led to a lower outcome compared to when the seller did not communicate any reference price. The number of bidders influenced outcomes in the absence of seller-supplied reference prices.

Pricing researchers agree that consumers form internal reference prices about items and that those standards influence their purchase behavior (e.g., Monroe 2003; Winer 1986). Many studies have shown that a marketer-supplied description of a price promotion serves as an anchor for a buyer's formation of a new reference price. Although those findings are well established in a promotional context, one might question whether they could be replicated in a more dynamic environment. In an auction context, seller-supplied reference prices might have little or no impact because other buyers supply pricing cues and those prices are subject to change. Replicating previous laboratory research on reference prices in real-life auctions would provide valuable assurance of the robustness of seller-supplied reference price effects.

Pricing research emphasizes that consumers compare an item's sale price to a reference point or standard when arriving at their own valuation of the item (Della Bitta, Monroe, and McGinnis 1981; Monroe 1977). In a promotional context, they compare the sale price to the higher, advertised price (e.g., regular price, list price). The fixed gap between the two makes the difference easy to estimate. Sometimes the difference between the sale price and reference price is even calculated for the consumer (e.g., regular price is $4, on sale for $3, your savings is $1).

In an auction, however, this gap varies as a function of the current bid price in relation to the minimum bid requirement or lowest price at which the seller is willing to sell the item (i.e., the reserve price). Bidders in an Open English auction have the opportunity to start with a lower bid than their estimate of the item's value and can revise their estimates of the item's value based on information about others' bids. Sellers can supply a reference price by communicating a minimum amount that the buyer must bid to participate—typically a low reference price. Another, generally higher reference price can be communicated by setting a reserve price that the final bid must meet or surpass for the deal to be consummated. The seller-supplied reference prices serve as static anchor points regarding the value of that specific item up for sale in a volatile price environment. This dynamic and ever-changing pricing environment arguably makes it harder for the consumer to judge the relative difference between price cues and the reference or standard supplied by the seller because this difference is in a state of flux. Further, the changing number of price cues makes it difficult to put the appropriate weight on each cue.

Moreover, in an auction context, static, seller-supplied reference prices may have less credibility and little influence when consumers have the additional price information that other consumers provide when bidding for an item. In a

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typical promotional context only the seller supplies information regarding the value of an item. In Open English auctions both the seller and other consumers can communicate price information, which a bidder can input into his or her value function. Other consumers' bids determine whether the final sale price is greater than the minimum amount set by the seller.

In sum, our aim is to replicate in an auction context, the effect of seller-supplied reference prices on buyers' valuations of the product in the behavioral pricing literature. We examine the impact of high and low seller-supplied reference prices, as well as the effect when both are present and both are absent, on the final auction outcome. An auction context raises the possibility that a seller-supplied reference price has no effect on the auction when other consumers influence the market price.

EXTERNAL REFERENCE PRICES IN AUCTIONS

As noted, in general, the larger the gap between the sale price and the advertised reference price (e.g., regular price, suggested list price, etc.), the greater the perception of value resulting in an enhanced willingness to buy (Urbany, Bearden, and Weilbaker 1988). A consumers' internal reference price (the consumer's expectation about the usual price for the product in the marketplace) moves in the direction of the typically higher advertised reference price, indifferent to whether that price is perceived as plausible or implausible (Compeau and Grewal 1998; Monroe 2003). Hence, the net effect of including an advertised reference price is to increase the consumer's internal reference price. This brings about a greater perception of a bargain and a resulting enhanced probability of purchase. Auctions present a different context in which to examine seller-supplied reference prices because those prices are equal to or less than the final sale price and because other bidders influence the final auction outcome.

Effects of Seller-Supplied Reference Prices in Auctions

One kind of seller-supplied reference price is a reserve price—the price that the final bid must meet for the deal to be consummated. A reserve price can be either private (unknown to the bidder until it is reached) or public (known to the bidder from the beginning of the auction). Both types of reserves have been discussed in auction research (Greenleaf and Sinha 1996), but the public reserve is of interest in our study. A private reserve may have no impact on a bidder's reference price since it is an unknown quantity. A public reserve, however, can more easily serve as an external reference price. It signals an informal value of worth that the seller places on the merchandise by indicating the lowest price for which the seller is willing to part with the goods.

If increasingly higher reference prices lead to significantly higher value perceptions on behalf of consumers (e.g., Grewal, Monroe, and Krishnan 1998; Urbany et al. 1988), then a higher reserve price in an auction should be a more favorable anchor for the seller than the lower minimum bid price. Hence, the presence of a reserve price as a single cue should increase the average selling price compared to when a lower minimum bid is a single price signal. Thus:

H1: Auctions with only a high price signal (reserve price) result in higher final prices than do auctions with only a low price signal (minimum bid).

When a seller simultaneously provides two reference prices—a low minimum bid and a high reserve price—one possibility is that a consumer's reference price is an average of the two. However, research about semantic cues suggests that the reserve price will have more impact than the minimum bid price. The type of semantic cue used to describe the savings influences the impact of external reference prices (Lichtenstein, Burton, and Karson 1991). People interpret the numerical information encompassed in a price in light of its meaning (Biswas and Blair 1991). The reserve price provides more meaningful information than the minimum bid when both are present because it is the way sellers publicize the lowest price at which they are willing to sell the merchandise. In the absence of a reserve price, the minimum bid is the lowest price at which the seller is willing to sell the item. When both public reserve price and minimum bid are present, the minimum bid may not add much information to the buyer's perception of the seller's valuation of the item. The reserve price remains the lowest selling price for the seller.

Some empirical evidence from the negotiation literature supports the notion that the reserve influences the final price more than the minimum bid. In a laboratory study of MBAs negotiating over the selling price of a fictitious house, White et al. (1994) found a dominant reference point effect. When given multiple price cues (e.g., aspiration prices, prevailing prices), only one, the reservation price, accounted for the explanation of significant variance in the outcome. Negotiators seemed to simplify the decision-making process by focusing on the bottom line limit of an acceptable outcome. In an auction, the reserve is that limit.

H2: Auctions with a reserve price and a minimum bid result in higher final outcomes than those with only a minimum bid, but result in similar final outcomes to those with only a reserve price.

The Presence of a Minimum Bid

Whereas the first two hypotheses deal with effects of high versus low seller-supplied reference prices, our final hypothesis examines effects of the presence and absence of a low seller-supplied reference price. Open English auctions lacking seller-supplied reference prices still provide bidders with another type of external reference price—the bids of others. Research shows that bidders often look to other bid-

ders for information about how to behave in an auction environment (see Dholakia and Soltysinski 2001).

As external reference prices, others' bids differ from seller-supplied prices on several dimensions. Most important, others' bids increase numerically in a temporal fashion in an English auction. In contrast, the seller-supplied reference prices are static and are typically publicized in some manner so that they can be accessed throughout an auction. Further, only one seller supplies reference prices in an auction but many people can bid, increasing the number of persons supplying bidder reference prices. Numbers can be important since social psychological research shows that increasing the number of people espousing an opinion increases the extent to which an individual conforms to that opinion (for a review, see Latane [1981]).

Whereas the effects of others' bids as reference prices may tend to increase auction outcomes, that effect may be reduced when sellers specify only a minimum bid. A minimum bid may limit the number of bidders by setting a higher hurdle for participating in the auction, while decreasing potential bidders' internal reference prices by providing a lower price anchor. Auctions that lack a minimum bid permit a low initial bid and so involve relatively little risk for the bidder. Once one bid is placed on the auction the probability of a second bid dramatically increases. Dholakia and Soltysinski (2001) report a tendency for new bidders to gravitate toward, and bid for auction listings, with one or more existing bids, ignoring comparable or more attractive auction listings with no bids in the same product category (the "herd behavior bias").

In contrast, auctions with a minimum bid preclude a very low entry bid and also provide a static, low reference price. The starting point of a negotiating process can serve as signal for value, influencing subsequent offers and counteroffers (Kristensen and Garling 1997). As bidding in an auction progresses, the bid price increasingly exceeds the minimum bid (or external reference price). Prior research on the effect of price promotions has shown that a low-priced promotion decreases the consumer's internal reference price (Compeau and Grewal 1998; Urbany et al. 1988). Hence, auctions with a minimum bid should lead to a lower perception of value and a reduced purchase price relative to the absence of the minimum bid anchor.

H3: Auctions without seller-supplied price signals attract more bidders and have a higher final outcome than auctions requiring only a minimum bid.

We manipulated the presence of seller-supplied reference prices in actual auctions. That methodology provides a naturalistic setting to examine effects of reference prices when consumers bid on objects for which they may spend their own funds. Our data are behavioral, including the final price, the number of bidders, and the number of bids per bidder.

METHOD

The study was conducted by manipulating the objects for sale and the auction conditions for 192 auctions conducted on eBay from 2000 through 2001. The experimental design was a $2 \times 2 \times 2$ factorial, in which the presence or absence of either a minimum bid or reserve price for the item up for bid was manipulated. The type of product was also manipulated, so that half the auctions involved U.S. coins and the remainder involved foreign coins. The dependent measures were the final price for the item, the number of bidders, and number of bids per bidder.

Our auction lots were placed within the Collection/Lots subcategory of coins within eBay. All the auctions completed during our study were genuine in that an object was placed on sale and was delivered to the buyer who bid the highest price (as long as the reserve requirement was met). The particular items were always either a quantity of U.S. wheat pennies (pennies produced between 1909 and 1958) or a mix of foreign coins from different countries with different denominations and dates. In three of the 192 auctions conducted, the bidding ended without a winning bidder because the reserve price was not attained (these findings are included since the dependent variable is the final bid price, not price paid).

The coins were described in identical terms either in terms of weight (e.g., 1 lb. of wheat pennies; one pound of foreign coins) or count (144 wheat pennies; 112 foreign coins). The following week's auction involved identical lots except that the poundage and count were doubled (e.g., 288 wheat pennies). Therefore, within a given experimental condition, eight different auctions could be held (e.g., foreign or domestic; count or poundage; small lot or large lot). On a week-to-week basis, each of the four experimental conditions was randomized. The sequence was repeated six times, resulting in 48 completed auctions per experimental condition.

eBay auctions are a hybrid of an Open English auction and a second-price (sealed bid) auction. A bidder can submit a bid to eBay, which allows the bidder to automatically top lower bids by the minimum required increment without the other bidders being aware of the true bid amount. Only the identity of the bidders and the current winning price were shown to buyers. Nondisclosure of a given bidder's maximum bid is identical to a sealed bid second-price auction, whereas the sequential nature of the auction is indicative of an English auction. The bidder who wins the auction is the one who has the highest hidden bid when the auction ends. That bidder pays a price that is equal to the second highest bid plus the bidding increment. The eBay auction can be considered open because each bidder's bid is revealed to other bidders and potential bidders as the auction progresses.

To arrive at a realistic minimum bid and reserve price for each of the different auctions, 20 pretest auctions were completed without a reserve or a minimum bid. Ten were conducted for either the 1-lb. envelope of wheat pennies or its count equivalent. The other 10 auctioned the 1-lb. envelope of foreign coins or its 112-count equivalent. The results were then analyzed to determine a reasonable price to set the reserve and minimum bid for each type of coin.

The reserve was set at 65% of the final average price

TABLE 1

MEANS WHEN THE PRESENCE OF A RESERVE PRICE AND A MINIMUM BID WERE MANIPULATED

	No reserve price		Reserve price	
Dependent measure	No minimum (no reference price)	Minimum (low reference price)	No minimum (high reference price)	Minimum (two reference prices)
Final price ($)	6.43[a]	5.06[b]	5.79[a]	5.88[a]
	(2.34)[a]	(1.63)[b]	(2.30)[a]	(2.33)[a]
Highest final price ($)	12.75	10.25	14.50	15.50
Lowest final price* ($)	2.75	2.00	2.76	3.13
Number of bidders	5.73[a]	3.21[b]	3.33[b]	2.58[c]
	(1.62)	(1.18)	(1.46)	(1.13)
Bids per bidder	1.67[a]	1.42[b]	1.32[b]	1.34[b]
	(.56)	(.48)	(.33)	(.69)
Bids by winner	1.27[a]	1.65[b]	1.17[a]	1.17[a]
	(1.03)	(.98)	(.43)	(.47)
% of bidders bidding only once	91[a]	71[b]	92[a]	88[a]
First bid amount ($)	1.65[a]	3.46[b]	3.51[b]	4.38[c]
	(1.65)	(1.39)	(1.84)	(1.10)
Amount of winner's first bid ($)	5.91[a]	4.47[b]	5.49[a]	5.66[a]
	(2.39)	(1.56)	(2.11)	(2.22)
Entry order of winner	6.15[a]	3.69[b]	3.42[b]	2.98[b]
	(2.53)	(2.15)	(1.65)	(2.46)
N	48	48	48	48

NOTE.—Standard deviations are in parentheses.
[a]Significant differences across conditions on the same measure.
[b]Significant differences across conditions on the same measure.
[c]Significant differences across conditions on the same measure.
*The lowest possible final price is $.01 when no minimum price is specified and $2.00 when a minimum price is specified, regardless of the presence or absence of a reserve. The average minimum bid across foreign and domestic lots was $2.44, whereas the average reserve was $4.25.

observed in the pretest for each type of coin, and the minimum bid was set at 57% of the reserve. Hence for the 1-lb. lot of pennies and its count equivalent, the reserve was set at $3.50 (with a minimum bid of $2.00), whereas for the 1-lb. lot of foreign coins and its numerical equivalent, the reserve was set at $5.00 with a minimum bid of $2.88. When auctions involved double quantities of coin, the minimum bids and reserve prices were doubled. The 1 lb. of unsearched foreign coins with minimum bid and reserve was described as follows: "One pound of unsearched foreign coins in a manila envelope. The coins come from many different nations. Minimum bid is $2.88 with a reserve price of $5.00. Postage and handling is $3.50." Unsearched is a coin collector's label meaning that the owner has not sifted through the coins to find and remove more valuable dates. Hence, the actual value of an unsearched quantity of coins is unknown, both to buyer and seller.

Once the bidding begins, eBay mandates the bidding increment as a function of the current bid price of the item. Bidding is allowed below the reserve, but not below the minimum bid. When each of the auctions ended (after 72 hr.), we determined unobtrusively the number of unique bidders (ranged from one to 10), the total number of bids (ranged from one to 20), and the final price for each item (ranged from $2.00 to $15.50) by clicking on the bid history icon from the auction page itself. Only the actual bid amounts entered by bidders are recorded and analyzed, as opposed to bids amounts made automatically by eBay on behalf of the bidders.

RESULTS

The effects of seller-supplied reference prices were analyzed primarily using a 2 × 2 analysis of variance. Coin type (foreign vs. domestic) and the number of coins offered (e.g., 144 pennies vs. 288 pennies) were not analyzed as separate variables. For the analyses, the final price of the larger quantity of coins was halved so the means refer to the same quantity of coins.

The results indicate that seller-supplied reference prices influence the final price of the item. There was a significant main effect for the minimum bid, which was qualified by a minimum bid by reserve price interaction ($F(1, 188) = 4.33$, $p = .04$, $r = .15$; and $F(1, 188) = 5.56$, $p < .05$, $r = .17$), respectively. Hypothesis 1 was examined by comparing the mean final price when only a reserve was present to the mean final price when only a minimum bid was provided (see table 1). As predicted, a pairwise contrast shows that the presence of only a high reference price (reserve), led to a significantly higher final price than when a low reference price (minimum bid) was given (M's = \$5.79 vs. \$5.06; $F(1, 188) = 2.91$, $p < .08$, $r = .12$).

Consistent with hypothesis 2, the reserve price has a greater impact on the final price than the minimum bid when both are present (see table 1). The reserve price has a similar influence on the final price regardless of the presence of a minimum bid (M's = \$5.88 with minimum bid vs. \$5.79 without minimum bid, NS). When the reserve price is accompanied by a minimum bid, the final price is significantly

higher than when only a minimum bid is present (M's = \$5.88 vs. \$5.06; $F(1, 188) = 3.64$, $p < .06$, $r = .14$). These findings support the semantic cue literature.

As predicted by hypothesis 3, the absence of a seller-supplied reference price led to a significantly higher final price than when a low reference price was given (M's = \$6.43 vs. \$5.06; $F(1, 188) = 10.25$, $p = .001$, $r = .23$). Consistent with hypothesis 3, more people bid when the seller did not supply a reference price than when the seller supplied only a minimum bid (table 1). An analysis of variance of the number of bidders reveals significant main effects for the minimum bid, reserve, and interaction ($F(1, 188) = 68.90$, $p < .0001$, $r = .52$), and ($F(1, 188) = 58.77$, $p < .0001$, $r = .49$), and ($F(1, 188) = 19.26$, $p < .0001$, $r = .30$).

A mediation analysis with the number of bidders as the mediator variable and final price as the dependent measure suggests that the number of bidders in the auction was related to the auction outcome. The unmediated model (col. 1 of table 2) shows a significant direct effect of minimum bid on final price ($\beta = -1.38$, $p < .002$) and a significant interaction effect between reserve and minimum bid ($\beta = 1.46$, $p < .019$). Regressing reserve and minimum bid on the number of bidders (col. 2) reveals a significant coefficient for both a straight effect of reserve and minimum bid on the number of bidders ($\beta = -2.4$, $p < .0001$, and $\beta = -2.52$, $p < .0001$) and a significant interaction between minimum bid and reserve ($\beta = 1.77$, $p < .0001$). Finally, the mediated model (col. 3) shows that number of bidders fully mediate minimum bid, as the coefficient for number of bidders is significant ($\beta = .60$, $p < .0001$), and the coefficients for both minimum bid and the interaction between minimum bid and reserve are not ($\beta = .14$, $p = .767$, and $\beta = .39$, $p = .515$, respectively). The number of bidders also mediates the effect of reserve on the final price, but not as fully as for minimum bid ($\beta = .80$, $p = .095$).

The additional measures focused on the bids per bidder and the amount initially bid for the item in an attempt to clarify the above results. An ANOVA shows a significant main effect for the number of bids per bidder when a reserve is present ($F(1, 188) = 8.04$, $p < .005$, $r = .20$), qualified by a minimum bid by reserve interaction ($F(1, 188) = 3.06$, $p < .08$, $r = .13$). The absence of any seller reference price elicits more bids per bidder compared to each of the other conditions ($M = 1.67$ vs. 1.42; $F(1, 188) = 5.13$, $p < .02$, $r = .16$); ($M = 1.67$ vs. 1.32; $F(1, 188) = 10.51$, $p < .001$, $r = .23$); and ($M = 1.67$ vs. 1.34; $F(1, 188) = 9.20$, $p < .003$, $r = .22$). The number of bids per bidder does not differ when the seller provides a price (see table 1). The contrasts suggest that information from the seller in the form of a reference price reduces the number of bids per bidder.

Despite the greater number of bids per bidder in the absence of a seller-provided reference price, few winners in this condition revised their initial bids in response to the greater number of competitors (see table 1). Bidders were significantly more likely to rebid only in the minimum bid–no reserve condition. Those results suggest that the number of bidders does not increase the final price paid through a bid revision process.

The mean amount of the first bid also sheds light on the process leading to differences in the final price. The higher final price paid when more bidders participate may occur because some bidders join the auction later, having used the number of bidders as a cue to the item's value. That pattern is suggested by examining the mean amount of the first bid for all bidders across conditions and examining the mean amount of the first bid for just the winner across conditions (see table 1). The mean first bid was lowest when the seller did not provide a reference price, slightly higher than the minimum bid when a minimum bid was required, and slightly lower than the reserve when there was a reserve and no minimum bid. Although the first bid was significantly lower in the absence of a seller-supplied reference price than in the other conditions, the mean amount of the winner's first bid was the highest, and significantly higher than in the minimum bid–no reserve condition. Those differences suggest that the winner entered into the auction later than the other bidders. This is confirmed in the last row of table 1

TABLE 2

MEDIATION ANALYSIS SHOWING THE EFFECT OF THE NUMBER OF BIDDERS ON THE FINAL PRICE

	Unmediated model final price	Mediator number of bidders	Mediated model final price
Intercept	6.43	5.73	2.98
	$p < .0001$	$p < .0001$	$p < .0001$
Reserve price	−.64	−2.40	.80
	$p = .145$	$p < .0001$	$p = .095$
Minimum bid	−1.38	−2.52	.14
	$p = .002$	$p < .0001$	$p = .767$
Reserve × minimum bid	1.46	1.77	.39
	$p = .019$	$p < .0001$	$p = .515$
Number of bidders	. . .	. . .	.60
			$p < .0001$
N	192	192	192
Pr > *F*	$p = .021$	$p < .0001$	$p < .0001$

as the winner enters the bidding significantly later when the seller does not supply a reference price.

DISCUSSION

Our field experiment indicates that the significant impact of seller-supplied reference prices can be generalized to an auction environment characterized by dynamic prices and buyer-supplied signals. When the seller provided a higher as opposed to lower reference price, the final amount bid for the item significantly increased (hypothesis 1). This finding is consistent with research in the behavioral price literature, which shows that as the level of an advertised reference price increases in a comparative price advertisement, consumers' purchase intentions increase (Compeau and Grewal 1998; Urbany et al. 1988). To provide additional evidence to support hypothesis 1, we conducted a second series of auctions following similar procedures as in our first study. Only two seller-supplied reference prices were given, a high reserve that was the same as the reserve in our first study ($n = 16$) and a low reserve that was the same price as the minimum bid ($n = 16$). Consistent with hypothesis 1, the final price for the high reserve was greater than that for the low reserve ($M = \$5.96$ vs. \$5.05; $F(1, 30) = 3.11$, $p < .08$, $r = .13$).

When sellers provide both types of reference prices, only the reserve price seems to influence the final auction outcome (hypothesis 2). The auction outcome whenever the reserve is present is similar. Those results replicate previous research conducted in other contexts—reference price research conducted largely in the context of advertised price comparisons and the dominant price effect conducted in the context of negotiation research (cf. White et al. 1994).

A low seller-supplied price anchor in the form of a minimum bid led to significantly lower final bid outcomes relative to when the seller did not offer a price anchor (hypothesis 3). The winner appears to have used the number of previous bidders as a cue to the item's value (cf. Dholakia and Soltysinski 2001). The greater number of bidders when the seller provides no reference price completely mediates the effects on the final price. In contrast, the early bidders in this condition appear to have used the absence of a seller-supplied reference price as a cue to a low value. The mean first amount bid was less than half that of the other conditions. Those initial bidders appear to adhere to their original assessment of the item as being of relatively low value, in that 91% of them bid only once. However, the greater number of bidders attracted to the low-priced auction compared to other auctions also attracts latecomers who may feel more certain about a higher value for the item due to the sheer number of other bidders. Table 1 shows that the winning bidder places the sixth bid, on average. Further, the mean first bid of that Johnny-come-lately winner in the no-price anchor condition is higher than the final price in the minimum bid–no reserve condition ($M = \$5.91$ vs. \$5.06; $F(1, 94) = 4.12$, $p < .04$, $r = .15$).

In sum, the high final price when the seller provides no reference price seems to be due to the auction attracting a different kind of bidder, one that is drawn to the herd's activity, rather than causing the early bidders to revise their valuations. Using the number of others as a cue to value without considering the auction conditions that might have attracted many bidders is consistent with previous research. Research shows that negotiators often fail to consider their opponents' motivations (e.g., Neale and Bazerman 1983).

Previous research has found that an increase in the number of bidders leads to higher final auction prices (e.g., Bazerman and Samuelson 1983). However, in our study a greater number of participants did not always lead to higher prices. A reserve price without a minimum bid significantly increased the number of bidders in the auction compared to a reserve price with a minimum bid ($M = 3.33$ vs. 2.58) but did not significantly influence the final price ($M =$ \$5.79 vs. \$5.88). Those differences in the reserve conditions may be explained by a minimum bid leading bidders to initiate the bidding process at a higher point ($M = \$4.38$ vs. \$3.51). Yet, the reserve price sets the dominant anchor on the value of the item, consistent with hypothesis 2.

Our research is limited in that we considered only two levels of seller-supplied reference prices. Future research may examine a broader range of prices to shed light on potential contrast and assimilation effects. We also examined only the public form of the reserve price, whereas most eBay auctions that include reserves do not reveal them to the seller. The scarcity of public reserve auctions may be due to the fact that the market may have efficiently realized that there is little advantage in offering a public as opposed to private reserve. The inferences and attributions that consumers make in a comparison of a public versus private reserve is therefore a ripe area for future research, which would likely have to be conducted outside of a field environment. Appropriately, another disadvantage of our research is that only tentative conclusions can be made about individual bidders' internal reference prices and beliefs because the naturalistic setting precludes the same degree of control as a laboratory experiment.

The results also may reflect bidders' self-selection into different types of auctions. Our bidders chose to bid on a given auction, and many were experienced eBay bidders, based on feedback records. One might expect that such experience would make them more confident of their own internal reference price and less sensitive to external price signals and to the number of bidders. Yet, they appear to be influenced by external prices and the numbers of bidders, possibly because of the difficulty in ignoring such signals when the auction begins.

Additionally, snipers (bidders who bid in the last second to win a lot) may be more motivated to enter auctions in which no price signals inhibit their behavior. In fact, our explanation for the auction outcome in the absence of seller-supplied reference prices is consistent with that notion. The outcome is the same as when the seller stated a reserve price, yet the number of bidders, the number of bids per bidder, the winner's first bid, and the entry order of the winner are different. Those differences seem to suggest that

the final bidders are often attracted to those auctions for a different reason. Identifying those individual differences, as well as examining the kinds of inferences influencing reference prices, is an interesting avenue for future research.

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