Examining Interdependencies between Seller's and Buyer's Strategies in Online Auctions: (The Case of Seller's Choice of Auction Duration)

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ABSTRACT

In online auction research, sellers' and buyers' strategies have been largely examined as separate research streams and the interdependencies inherent in their strategies to understanding price premium and buyer behaviors have not been adequately explored. This deficiency is a serious limitation since an integrative approach could build the conceptual bridge necessary to provide sellers with a deeper understanding of how to achieve desired auction outcomes. Consequently, the present study integrates these two perspectives by proposing that seller auction duration strategy impacts bidders' strategy, their winning likelihood, and their financial outcomes. Results from cluster analysis and ANCOVA support our model, showing that different auction durations attract different types of bidders. Auctions with shorter durations were found more attractive to those buyers attempting to keep monitoring cost low, while longer durations appeared to be more attractive to those benefitting from observing other bidders' actions. The paper concludes with implications for research and practice.

Keywords

Online Auctions, Seller Strategies, Buyer Strategies, Price Premium

INTRODUCTION

Because online auctions follow a distinct set of rules and dynamics that can be leveraged in diverse ways, strategies can be effective means for sellers to achieve such desirable outcomes as price premiums, and they can be equally effective for buyers to increase their likelihood of winning an auction or gain a higher surplus. Accordingly, significant research in the area of online auction markets has focused on the outcomes associated with buyer and seller strategizing. Research on sellers' strategies has primarily examined what strategies sellers can use to generate price premiums. This research stream has found that such strategies as auction duration, opening price, and reserve price can readily increase the final sales price in online auctions if leveraged effectively by sellers (e.g., Reynolds et al., 2009). Since sellers can directly control these factors on such major online auction marketplaces as eBay, research on this topic has made significant contributions to practice by helping sellers understand how to leverage these factors under their control. However, this research domain has fallen short of explaining why exactly different strategies yield such desirable outcomes as price premium.

Similarly, research on buyers'/bidders' strategies has resulted in a significantly improved understanding of buyer behavior in online environments. Perhaps most significantly, buyers have been categorized according to their bidding strategies into five bidder classes, namely early evaluators, middle evaluators, opportunists, sip-and-dippers, and participators (Bapna et al., 2004). These bidder classes are results of a cluster analysis that employed three bidders' characteristics, including their number of bids, time of entry (TOE), and time of exit (TOX). Bapna and his colleagues (2004) conducted a cluster analysis on two multi-itemed auction samples – one from the year 1999 and the other from the year 2000.

Early evaluators are bidders who place only one bid during the early stages of an auction. This one bid usually corresponds to the maximum amount these bidders are willing to pay. Accordingly, early evaluators make an early evaluation of their utility function of the auctioned item and end their bidding activities early. Middle evaluators evaluate their utility of the auctioned item in the middle of an auction and, correspondingly, submit their one maximum bid at that time. These two bidding strategies imply that the bidders can assess the true market value of the auctioned items. Early and middle evaluators may also bid more than required since they place their maximums bids relatively early in the auction. Overall, their bidding strategy attempts to minimize the time costs associated with the continuous monitoring of an auction (Bapna et al., 2004).

Interestingly, middle evaluator is the only bidder class that appears in the 1999 sample and later disappeared in the 2000 sample.

In contrast to evaluators, opportunists are bidders placing their bids late in an auction, with corresponding costs and benefits. Instead of minimizing their monitoring costs, opportunists strive to maximize their chances of winning an auction. Similarly, sip-and-dippers (S&D) are bidders who bid twice during an auction. They place an early bid to evaluate their competition and subsequently revise their bids to at the end of an auction to win the item (Bapna et al., 2004). Finally, bidders classified as participators are those that are engaged in the bidding process throughout the entire auction; they enter an auction early and stay until the end, supposedly because – much in contrast to early and middle evaluators – they gain satisfaction from the bidding process. Participators were claimed pay the lowest final auction prices since they continuously monitor the auction and, therefore, only bid the minimum amount required (Bapna et al 2004). By classifying bidders into such profiles with distinct strategies according to specific goals, research on buyer strategizing has significantly advanced our understanding of how bidders can maximize their expected utility or minimize their time commitments. However, it remains unclear what auction-related factors motivate bidders to adopt certain strategies and not others.

Although seller and buyer strategizing in online auctions have similar implications, prior research has treated these concepts largely in isolation (e.g., Bapna et al., 2004; Ockenfels & Roth, 2006; Reynolds et al., 2009). In consequence, seller and buyer strategizing have evolved as largely distinct research streams. These two approaches to understanding price premium and buyer behavior can and should be integrated, for three reasons. First, such integration could build a conceptual bridge to provide sellers with a deeper understanding of how to achieve desired auction outcomes. Second, such an integrative approach would yield a more sophisticated understanding of the interdependencies involved in the bidding process and more detailed and specific explanations of why bidders adopt their respective strategies. Finally, such a comprehensive and unified approach could yield a stronger theory with greater explanatory power (Kuhn, 1970). Consequently, this study examines *whether seller's auction duration strategies impacts bidder's strategies and their associated outcomes*.

To examine the interdependencies between seller and buyer strategizing, the paper proceeds as follows. The next section will develop a research model indicating that seller auction duration strategy impacts which strategy buyers adopt, the winning likelihood of that strategy, and the final auction price for this strategy. Thereafter, the methodology will be explained, followed by the results from our data analysis. Finally, we offer implications for research and practice.

THEORETICAL DEVELOPMENT

The following paragraphs develop hypotheses that probe our research topic. We selected our constructs to be consistent with past research on seller and buyer strategies. One of the seller's strategies that has been under a microscope in past research is auction duration (e.g., Bajari & Hortascu 2003; Lucking-Reiley et al., 2000; Reynolds et al., 2009) and it has consistently demonstrated its positive impacts on price premiums. Research in the domain of buyer strategies has focused on the strategy buyers adopt (i.e., evaluators, opportunists, S&D, and participators), the winning likelihood of the adopted strategy, and the final price paid for it (e.g., Bapna et al., 2004; Ockenfels & Roth, 2006; Roth & Ockenfels, 2002). Figure 1 manifested our research model.

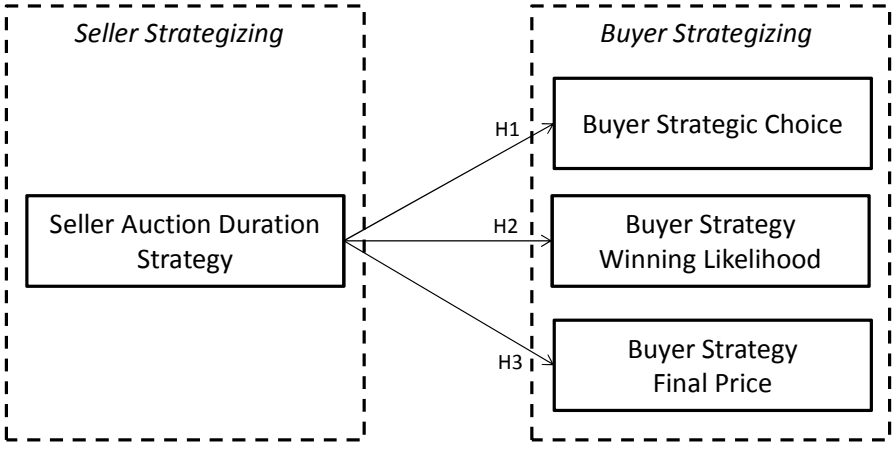

Figure 1. Research Model

The auction duration sellers select may significantly alter the nature of an auction so that it is associated with different buyer goals and motivates the adoption of different buyer's strategies. More specifically, since different buyer's strategies are associated with different goals and objectives (i.e., the primary goal of evaluators (both early and middle) is the minimization of monitoring cost (Bapna et al., 2004), the primary goal of opportunists and S&D is the maximization of the chance of winning an auction, and the primary goal of participators is the maximization of any accrued surplus), the auction duration selected by sellers may draw different buyer classes because it changes buyers' goals. In other words, the pathway between seller auction duration strategy and buyer strategic choice may correspond to the goals buyers have in entering an auction. For example, as an auction becomes shorter, monitoring costs decrease proportionally as less time has to be invested to monitor the item. In seven-day auctions, buyers wishing to continuously monitor an item would have to invest up to seven times as much monitoring time as in one-day auctions. This aspect may make the evaluator strategy more effective and beneficial for buyers in shorter auctions. Similarly, as auction duration changes, the importance of the buyer goals of winning the auction and generating surplus may change, rendering the corresponding strategies differently effective. Formally:

H_1: Different sellers' auctions strategies are associated with different buyer strategic choices.

Since different buyer strategies are associated with different times of bidding during an auction and since the auction duration selected by sellers may impact the effectiveness of timing, seller auction duration strategy may result in different winning likelihoods of specific buyer strategies. In other words, the pathway between seller auction duration strategy and buyer strategy winning likelihood may correspond to bid timing, that is, when the bids are placed during an auction. For example, since S&D generally bid early to evaluate the competition and, then, revise their bids later on (Bapna et al., 2004), shorter auction durations may decrease the effectiveness of this strategy in terms of winning likelihood. More specifically, in a more compressed auction, less opportunity exists for leveraging competition-related knowledge since there is only a short time span between the initial and the final bid. The closer these two bids are placed together in time, the less opportunity exists for the buyer to learn about the auction context and to make an informed decision about the revised bid. By contrast, longer auction durations provide a greater opportunity for active participation and for leveraging competition-related knowledge since more time elapses between the initial and the final bid. Thus, longer durations allow for a more informed and careful revision of the initial bid, increasing the winning likelihood for sip-and-dippers. Similarly, as sellers select different auction durations, the effectiveness of the timing associated with evaluators, opportunists, and participators may change in terms of these strategies' winning likelihoods. Thus, the auction duration a seller selects may impact the likelihoods of specific buyer strategies to win the corresponding auction. Formally:

H_2: Different seller auction duration strategies are associated with different winning likelihoods of different buyer strategies.

The auction duration strategy sellers adopt may also impact the extent to which different buyer strategies can result in differential auction prices. Sellers wanting to generate more variation in the final auction prices may choose a shorter bidding strategy due to stronger competitive dynamics in shorter compared to longer auctions (Haruvy & Popkowski Leszczyc, 2010). For example, although potentially counterintuitive, impatience plays a greater role in shorter compared to longer auctions (Kwasnica & Katok, 2007), implying a higher opportunity cost of time. This cost may lead evaluators to bid significantly more in shorter auctions than they would in longer ones, resulting in a greater variation in final auction prices for shorter compared to longer auctions. Furthermore, increased bidding activity as a result of excitement or competitive arousal in shorter auctions, known as frenzy, may also result in more variation of bidding amounts among buyer strategies (Haruvy & Popkowski Leszczyc, 2010). Moreover, in longer auctions one can often observe a "bidding drought" that generally occurs in the middle of an auction and may create homogeneity among the buyer strategies in terms of bidding amounts (Bapna et al., 2008). When different buyer strategies show different amounts of price variation between different auction durations, the same buyer strategy (e.g., evaluator) may also yield different price premiums between different auction durations. For example, evaluators may bid significantly more in longer than in shorter auctions since the one early bid they place has to survive over a longer period of time. Formally:

H3a: Price Premium differs among different bidder strategies.

H3a-1: Price Premium in auction with shorter duration differs among different bidder strategies.

H3a-2: Price Premium in auction with longer duration differs among different bidder strategies.

H3b: Price Premium differs between shorter and longer Auction Durations for the same buyer strategy.
H3b-1: Evaluators in different auction durations produce different price premium.
H3b-2: Opportunists in different auction durations produce different price premium.
H3b-3: S&D in different auction durations produce different price premium.
H3b-4: Participators in different auction durations produce different price premium.

METHODOLOGY

To examine the interdependencies between auction sellers' and buyers' strategies, we collected live iPad auction data from eBay. We chose iPad due to its mass popularity that facilitates the data collection process. To ensure a fair comparison of price premium across bidder strategies, we focused only on new iPad with 16 GB and Wifi features. Two computer programs were developed – one to monitor eBay auctions with a title containing the keyword of iPad and the other to go to eBay after the auctions ended and download HTML files containing auction information. The data collection lasted approximately for five weeks between April and May 2010, rending an initial sample of 11,290 auctions. Many of these auctions are not new iPad but rather its accessories, used iPad, or bundled items. These auctions were eliminated from the sample. Auctions that ended prematurely and ended with buy-it-now option were also excluded, rendering an immediate sample of 890 auctions.

Of the immediate sample, we focused only on auctions with duration of 1 and 7 days for two reasons. First, the larger gap of these two durations allows us to observe the interdependency between auction sellers' and buyers' strategies more clearly. Second, they are the most popular durations found in our samples (60.3%). Of these samples, 427 are 1-day auctions and 90 are 7-day auctions. We used an approach offered by Ba and Pavlou (2002) to calculate auction price premium. To do so, an average total price which includes auction final price and shipping fee was calculated. We found average total price of $590.29, $586.88, and $593.55 for all immediate auctions, 1-day auctions, and 7-day auctions, respectively.

There are a total of 3,256 bidders in the 1-day sample and 767 bidders in the 7-day sample. We adopted a hierarchical cluster analysis to classify these bidders and employed three factors suggested by Bapna et al. (2004) as input variables, including number of bids, TOE, and TOX. TOE and TOX are the number of elapsed seconds between the auction's end time and the time that the first bids and final bids were placed, respectively. Hence, bidders that placed a single bid will have identical values of TOE and TOX. Number of bids for each bidder is however derived from the bid history pages provided by eBay. To identify an appropriate number of bidder classes in each sample, we used a guideline suggested by Hair et al. (1998). The analyses revealed 9 and 7 bidder classes in the 1-day and 7-day auction samples, respectively (See Table 1).

DATA ANALYSIS AND RESULTS

At a glance, one may observe some commonalities and heterogeneities between the bidder profiles in the two samples (See Table 1). Firstly, opportunists appear to be a more effective winning strategy. More than half of the auctions in our samples were won by opportunists (55.04% in 1-day auctions and 66.67% in 2-day auctions). Secondly, opportunist is a dominating strategy in 7-day auctions while evaluators are the most adopted technique in 1-day auctions. Upon a closer examination, our study discovered that timing of bids helped further segregate some bidder classes such as the 3 groups of evaluators found in 1-day auctions, including early, middle, and late evaluators and the 2 groups of evaluators in 7-day auctions, including early and middle evaluators. Similar segregating effect from bid timing can also be observed in the participator groups. This effect was however not found for S&D bidder class. S&D are made up approximately 9% of all the bidders in both samples. The two bidder classes that are unique to the 1-day auctions are late evaluators and middle2 participators (See Table 1). Table 1 also summarized descriptive statistics of average number of bids, average TOE, and average TOX of all bidder classes found in this study. Note that the statistics of TOE and TOX are shown in the unit of minutes.

Bidder Groups	1-Day Auctions				7-Day Auctions			
	Number of Members	**AVG $_{\text{Number of Bids}}$ (S.D.)**	**AVG $_{\text{TOE}}$ (S.D.)**	**AVG $_{\text{TOX}}$ (S.D.)**	**Number of Members**	**AVG $_{\text{Number of Bids}}$ (S.D.)**	**AVG $_{\text{TOE}}$ (S.D.)**	**AVG $_{\text{TOX}}$ (S.D.)**
Early Evaluators	508	1.00	21.87	21.87	135	1.00	155.35	155.35
	(15.56%)	(0.00)	(2.02)	(2.02)	(17.60%)	(0.00)	(13.32)	(13.32)
Middle Evaluators	382	1.00	12.10	12.10	60	1.07	66.41	65.91
	(11.70%)	(0.00)	(2.81)	(2.81)	(7.82%)	(0.25)	(25.76)	(25.00)
Late Evaluators	426	1.00	4.56	4.56	n/a	n/a	n/a	n/a
	(13.05%)	(0.00)	(1.48)	(1.48)				
Opportunists	842	1.00	0.60	0.60	311	1.00	6.11	6.11
	(25.79%)	(0.00)	(0.65)	(0.65)	(40.55%)	(0.00)	(7.72)	(7.72)
Sip & Dippers	314	2.02	2.26	1.44	74	2.00	6.21	4.61
	(9.62%)	(0.14)	(2.77)	(1.67)	(9.65%)	(0.00)	(6.87)	(5.28)
Early Participators	282	2.62	21.54	20.30	59	2.76	156.08	141.27
	(8.64%)	(0.84)	(2.54)	(3.49)	(7.69%)	(0.92)	(13.65)	(23.05)
Middle Participators 1	84	8.98	16.39	11.97	38	7.66	117.47	59.95
	(2.57%)	(4.61)	(7.60)	(8.66)	(4.95%)	(3.36)	(57.26)	(60.24)
Middle Participators 2	249	2.69	12.70	8.86	n/a	n/a	n/a	n/a
	(7.63%)	(0.99)	(5.13)	(3.71)				
Late Participators	178	3.75	2.75	1.42	90	3.17	29.20	16.66
	(5.45%)	(0.91)	(2.77)	(1.86)	(11.73%)	(0.88)	(36.49)	(20.79)
Total Bidders	3,265				767			

Table 1: Cluster Analysis Results in 1-Day and 7-Day Auctions

To compare bidder distribution across the two samples, we aggregated bidder groups into the four common bidder classes reported by Bapna et al. (2004). The aggregated groups are shown in Table 2. A Chi-square test was performed and it indicated a significant difference in bidder distribution across the two samples ($X^2 = 106.94$: $X^2_{.05,\ 3} = 7.815$), rendering a support to H_1. A post-hoc analysis revealed that the distribution of evaluators and opportunists are the main causes to this finding. Approximately, 40.31% and 25.79% are evaluators and opportunists in 1-day auctions, respectively – as opposed to 25.42% and 40.55% in 7-day auctions. There is no significant difference in the distributions of S&D and participators across the two auction samples.

Bidder Classes	1-Day Auctions		7-Day Auctions	
	Number of Bidders	**Number of Auctions Won**	**Number of Bidders**	**Number of Auctions Won**
Evaluators	1,316 (40.31%)	47 (11.01%)	195 (25.42%)	3 (3.33%)
Opportunists	842 (25.79%)	235 (55.04%)	311 (40.55%)	60 (66.67%)
Sip & Dippers	314 (9.62%)	84 (19.67%)	74 (9.65%)	10 (11.11%)
Participators	793 (24.29%)	61 (14.29%)	187 (24.38%)	17 (18.89%)

Table 2: Aggregated Groups of Bidders

One of the prime objectives of this study is to test the difference in the success of different bidding strategies across different auction durations. We capture bidding success in two forms, including winning likelihood and price premiums. Table 2 and Table 3 show distribution of price premium and winning likelihood across different bidder classes. Our data demonstrated a significant difference in winner distribution across 1-day and 7-day auctions. Although opportunist is the most effective winning strategy, we found a larger proportion of auctions won by this strategy in the 7-day sample (66.67%) when compared to only 55.04% of auction won by the same strategy in the 1-day auction sample. Winner distribution of other bidder classes also differs across two auction durations. Like opportunists, participators won a larger percentage of auctions in the 7-day sample. Evaluators and S&D are however more effective in winning auctions with shorter duration (1-day). A Chi-square test result confirmed this finding ($X^2 = 11.72$: $X^2_{.05,\ 3} = 7.815$) and provided a support to H_2.

Bidder Groups	1-Day Auctions				7-Day Auctions			
	Number of Auctions Won (% of Auctions)	**Number of Winners (% of Bidders)**	**Average Total Price**	**Average Price Premium**	**Number of Auctions Won (% of Auctions)**	**Number of Winners (% of Bidders)**	**Average Total Price**	**Average Price Premium**
Early Evaluators	4 (0.94%)	4 (0.79%)	$587.00	-0.56%	1 (1.11%)	1 (0.74%)	$760.00	28.75%
Middle Evaluators	9 (2.11%)	9 (2.36%)	$586.34	-0.67%	2 (2.22%)	2 (3.33%)	$612.50	3.76%
Late Evaluators	34 (7.96%)	34 (7.98%)	$568.57	-3.68%	n/a	n/a	n/a	n/a
Opportunists	235 (55.04%)	235 (27.91%)	$584.80	-0.93%	60 (66.67%)	60 (19.29%)	$587.17	-0.53%
Sip & Dippers	84 (19.67%)	84 (26.75%)	$590.76	0.08%	10 (11.11%)	10 (13.51%)	$602.79	2.12%
Early Participators	3 (0.70%)	3 (1.06%)	$575.73	-2.47%	0 (0.00%)	0 (0.00%)	n/a	n/a
Middle 1 Participators	6 (1.41%)	6 (7.14%)	$620.52	5.12%	7 (7.78%)	7 (18.42%)	$592.28	0.34%
Middle 2 Participators	7 (1.64%)	7 (2.81%)	$587.73	-0.43%	n/a	n/a	n/a	n/a
Late Participators	45 (10.54%)	45 (25.28%)	$600.55	1.74%	10 (11.11%)	10 (11.11%)	$602.99	2.15%
Total Winners	427				90			

Table 3: Price Premium Distribution and Winning Likelihood across Bidder Profiles

To examine differences in price premium across bidder strategies, one should note that there are many factors besides auction duration that affect price premium such as seller's other strategies and their reputation (e.g. Ba and Pavlou, 2002; Lucking-Reiley et al., 2007). Thus, comparing price premium across bidder classes without taking these factors into account could provide a bias to the result. The average total price and price premium shown in Table 3 are unadjusted statistics. To thoroughly examine differences of price premium, we adopted ANCOVA test and employed other sellers' strategies (auctions starting prices and shipping fees) and their feedback scores as covariates. Some of these covariates have undergone a log transformation to reflect their non-linear relationships with auction's price premium. For additional discussion of this transformation process, please refer to the following studies (Ba and Pavlou 2002; Lucking-Reiley et al., 2007). With these covariates included in the analysis, Table 4 summarized adjusted statistics of auction total prices and price premium.

A two-step approach was adopted to examine how auction duration influence auction price premium, rendering two sets of hypotheses (H_{3a} and H_{3b}). The first set of hypotheses compare price premium of different bidding strategies within each sample ($H_{3a\text{-}1}$ and $H_{3a\text{-}2}$). The second set of hypotheses compare price premium of the same bidding strategies across the two samples (H_{3b}). A caution should be taken in making interpretation of the results since some bidder classes have very few winners such as 4 winners from the early evaluator group discovered in the 1-day auction sample. More importantly, the group of early evaluators in 7-day auctions has only 1 winner, preventing us from calculating an average of price premium to perform the ANCOVA test. This group of bidders was not therefore included in the ANCOVA test of price premium within the sample of 7-day auctions.

Bidder Classes	1-Day Auctions		7-Day Auctions		Aggregated Bidder Classes	1-Day Auctions		7-Day Auctions	
	Average Total Price	Average Price Premium	Average Total Price	Average Price Premium		Average Total Price	Average Price Premium	Average Total Price	Average Price Premium
Early Evaluators	$587.43	-0.50%	n/a	n/a	Evaluators	$573.20	-2.90%	$667.04	13.00%
Middle Evaluators	$581.51	-1.5%	$627.48	6.30%	Opportunists	$584.68	-1.00%	$587.65	-0.40%
Late Evaluators	$567.78	-3.80%	n/a	n/a	Sip & Dippers	$590.03	0.00%	$608.92	3.20%
Opportunists	$585.34	-0.80%	$587.53	-0.50%	Participators	$599.56	1.60%	$599.52	1.60%
Sip & Dippers	$585.68	-0.80%	$603.99	2.30%					
Early Participators	$580.35	-1.70%	n/a	n/a					
Middle 1 Participators	$630.14	6.70%	$584.19	-1.00%					
Middle 2 Participators	$594.48	0.70%	n/a	n/a					
Late Participators	$606.09	2.70%	$602.31	2.00%					

Table 4: Distribution of *Adjusted* Total Price and Price Premium

ANCOVA test unveiled different results for the price premium comparison within each sample. We found a significant difference of price premium generated by different bidder classes in 1-day auctions (H_{3a-1}: $p = 0.005$) but the result is insignificant for 7-day auctions (H_{3a-2}: $p = 0.468$), producing a partial support to H_{3a}. Late participators ware found to be the most desirable group of bidders that generate significantly higher premium (2.7%) than other groups in 1-day auctions. Although middle1 participators reportedly showed higher price premium (6.7%), the result for this group may perhaps be inclusive due to their limited number of winners.

To compare price premium across the two samples, we utilized the aggregated groups developed earlier and recalculated their price premium (See Table 4). With these aggregated groups of bidders, we are able to conduct ANCOVA test of price premium on each pair of bidder groups. The test showed interesting results. There is no significant difference in price premium generated by opportunists across the two samples (H_{3b-2}: $p = 0.624$). Similar result was found for the group of participators (H_{3b-4}: $p = 0.997$). We however found that S&D and evaluators from 7-day auctions significantly produced higher price premium than their counterparts from 1-day auctions ($p = 0.09$ for S&D (H_{3b-3}) and $p = 0.01$ for evaluators (H_{3b-1}). These findings provided a partial support to H_{3b}.

DISCUSSION, IMPLICATIONS, AND DIRECTIONS FOR FUTURE RESEARCH

The current study extends our knowledge in the online auction domain by providing the evidence of how seller's decision about auction duration affects bidder's choice of strategies and their effectiveness. Since we adopted the cluster analysis variables used by Bapna et al. (2004), we will use their results as a benchmark and compare some of our findings to those reported in their study. We learned that bidder classes that were found in multi-itemed auctions (Bapna et al. 2004) also existed in single-itemed auctions. The four common bidder classes reported in the benchmark study are evaluators, opportunists, S&D, and participators. The benchmark study also reported that timing of bids help further segment some bidder classes. For example, evaluators were segmented into early evaluators and middle evaluators in the benchmark study. Our data revealed that timing of bids further segregate not only the evaluator group but also the participators groups, producing new breeds of bidders that were not reported in the benchmark study.

With this segregating role of bid timing, we found one common pattern that help pinpoint bidder's winning likelihood. Our result showed that late bidders are more likely to win. For instance, late evaluators in the 1-day auction sample won 34

auctions as opposed to 4 and 9 auctions won by early and middle evaluators, respectively. Late participators from the 1-day auction sample also won more auctions than other participators. Similar winning pattern was also observed for bidders in the 7-day auction sample (See Table 3). Such findings confirmed the benefits of observing and learning other bidders and later using valuations from other bidders to revise the bids.

Such benefits of late bidding behaviors are also witnessed by the opportunist strategy. Like evaluators, opportunists generally placed only a single bid in the auctions. Their time of bidding is however in closer proximity to the end of auctions. For instance, the average bid time of opportunists in the 1-day sample is approximately 36 seconds (0.60 minutes) before the auction ended. We found that opportunists exhibited a very similar behavior to late evaluators except that they put their bids approximately 4 minutes behind late evaluators on overage in the 1-day sample. Such behaviors resulted in a much higher winning likelihood. Over half of the auctions (55.04%) in the 1-day auction sample were won by opportunists. They also won 66.67% of the auctions in the 7-day sample. This winning likelihood was consistent to that reported by the benchmark study (51% - 70%).

One of this study's prime objectives is to examine the impacts of seller's choice of auction duration on bidder's behaviors and their success. Our results showed that there is a significant difference in bidder distribution across the auctions with shorter and longer duration. For example, we found a significant larger proportion of opportunists in the 7-day auction sample than that in the 1-day auction sample. Using opportunist strategy generally incurs higher monitoring costs to the bidders since they have to stay in the auctions almost until the end. Despite the higher monitoring cost, bidders that used this strategy appear to be drawn more to auctions with longer duration (40.55% in 7-day sample Vs 25.79% in 1-day sample). The longer auction duration enables them to observe their competitions for a longer period of time. The benefits of being able to observe and learn from the bidders seem to outweigh the higher monitoring, which later lead to higher winning likelihood.

The opposite explanation can be applied to the larger proportion of evaluators found in the 1-day auction sample (40.31% in 1-day sample Vs 25.42% in 7-day sample). Evaluators were claimed to be those that use their true valuations of products in forming their bids. They were also known as those to leave money on the table with the goal of minimizing their monitoring costs (Bapna et al. 2004). Shorter auction duration is therefore more conducive for this strategy since it will keep their monitoring activities succinct and reveal the final result of their bid promptly. As a result, their winning likelihood has dramatically and significantly increased in the auction with shorter duration (11.01% in 1-day sample Vs 3.33% in 7-day sample).

While we found a significant difference in popularity and winning likelihood of evaluators and opportunists across the two samples, there is no significant difference of participator and S&D distributions (See Table 2). S&D winning likelihood is however significantly higher in the 1-day sample (19.67% in 1-day sample Vs 11.11% in 7-day sample). Similar to evaluators, S&D generally placed fewer bids to keep their monitoring cost low. The auctions with shorter duration hence allowed them to achieve such a goal while staying in the game until it closed. We found that S&D in the 1-day sample placed their last bid only 1.44 minutes on average before the auctions ended, increasing their winning likelihood almost by twofold when compared to S&D in the 7-day sample. We did not however find significant difference of participator proportion nor their winning likelihood across the two samples.

Theoretical Implications

The current study is the first, known to us, to examine how online auction sellers' choice of strategies – case in point: the auction duration – affect buyers' choice of strategies and auction success. These two types of strategies are often studied separately in online auction literature. By marrying the two concepts together, the current study opens a new research forum for researchers in this area. According to the results, we found the intertwining roles of seller's auction duration strategies and online bidders' strategies. The distribution of bidder classes and distribution of winners are significantly different across shorter and longer auction durations.

To fully examine the relationship between auction duration and price premium, the current study brought other seller's strategies and their reputation as reflected by their feedback score into the equation. Although we found a significant difference of price premium produced by different bidder classes in the 1-day auction sample, we found a different result in the 7-day auction duration. We believe that such finding is attributed to the information asymmetries and emotional factors generally found when a decision has to be made in short period of time. When being involved in an auction with shorter duration, a bidder may not have sufficient time to do research on prices paid in the past auctions. Online bidders in this

situation may not be able to make a rational decision and become caught up in the moment, resulting in significant difference of price premium across bidder classes in the 1-day auction sample.

We also added to the literature a new finding that highlights the segregating role of bid timing. While the benchmark study helped us understand online bidding behaviors from a different light, the fundamental difference among bidders classes reported in their study is the number of bids. Opportunist was the only bidder class defined by their number of bids and bid timing. Although evaluators were segmented into early and middle evaluators in their first sample (1999), they found only early evaluator in their second sample (2000). Bapna et al. (2004) argued that the disappearance of middle evaluators stemmed from bidder evolution process and their main objective to keep their monitoring cost low. Our findings however showed a wider spectrum of bidder classes in online auction market as witnessed by the multiple classes of evaluators and participators in both samples. With this finding, we are able to put more spotlight on timing of bids and thoroughly evaluate its winning effectiveness in the online auction environment.

Practical Implications

With a better understanding in the relationship between auction sellers' and buyer's strategies, we offer a number of practical guidelines for online auction participators. We believe that drawing certain types of bidders to the auctions can help enhance price premium. Although auction sellers' decision to adopt longer auction duration alone can help promote their price premium, there may perhaps be some situations where auction sellers may find using shorter auction duration more favorable such as when the goal of improving inventory turnaround time is at higher priority. In such situation, having more involvement from participators in the auction will generate higher price premium. All of participators in the 1-day auction sample have a positive price premium (See Table 4). Participators are generally those that are more engaged in the bidding process and perhaps more emotionally invested in the auction. Using a lower opening bid can draw more attention from this type of bidders. Online auctioneers can also change their rule of minimum bid increment to a lower amount to attract more participators.

As to online bidders, choosing the right auction to participate can increase the chance of winning. For instance, those that need to adopt evaluator strategy – perhaps due to their limited time resources – should participate in auctions with shorter duration. By placing their bids in auctions with longer duration, they leave their money on the table for a longer period of time and allow more time for other bidders to compete, which in turn dramatically reduce their chance of winning (See Table 2). Opportunists, on the other hands, should participate in auctions with longer duration since it allows them to observe and learn more about other bidders and later use such information to revise their bids.

Limitations and Directions for Future Research

Our study faced some limitations and challenges. Collecting live auction data gave us a limited control over the sample size. Choosing an electronic (iPads) as a product of interest, while giving us a larger sample size, presented us a new challenge due to its rapid change in prices. We therefore limited our data collection period to five weeks to avoid price reduction due to the product becoming obsolete. With limited control over data collection, we cannot predict in advance how many members and winners in different bidder classes.

We agree with Bapna and his colleagues that online bidders keep evolving (Bapna et al. 2004). Thus, we believe there is a constant need to reexamine online bidder behaviors in the future. In their subsequent study (Bapna et al. 2009), they found that a larger proportion of participators in an auction will help promote auction price premium – a finding that contradicts their prior results. The findings of our study are more in line with their new finding but also presented new emerging evidence. As online auction is becoming a mainstream avenue for buyers to transact their business online and new auction technologies are presented to the buyers, it is very possible to discover a new breed of online bidders which in turn changes the effectiveness of other bidder classes.

Last but not least, while our results underscored the role of bid timing and demonstrated that some bidder classes can be further segmented, we found this evidence only on evaluators and participators. We believe that its effect can be applied on other bidder groups such as S&D. Thus, we encourage other researchers in this area to replicate our approach on other auction duration such as 3-day, 5-day, and 10-day. Some online auctioneers, such as eBay, also allow their sellers to choose customized auction durations at an extra cost which can be another research opportunity in this area. Future studies can also

replicate our effort to examine how other sellers' strategies such as their opening bid influence bidder strategies and their effectiveness.

CONCLUSION

The current study examined the interdependencies between auction sellers' and bidders' strategies by focusing on the case of seller's choice of auction duration. We found that shorter and longer auction durations attract different types of bidders. Auctions with shorter duration were found more attractive to those that attempt to keep monitoring cost low such as evaluators while auctions with longer duration appear more attractive to those that benefit from observing other bidders' action such as opportunists. These different mixes of bidders later engender different winning likelihood and price premium to different bidder classes. We believe that participating in auctions with shorter duration promotes emotional involvement and information asymmetries among bidders as witnessed by significant difference of price premium across different bidder strategies. We also found that winning effectiveness of a bidding strategy varies across auction durations. We hope that the results from this study will enable both online auction sellers and bidders to find the right match and learned more about their competition in the online auction environment.

REFERENCES

References are available upon request to the first author.