



Going Once ... Going Twice ... The Bidding Behavior of Buyers in Internet Auctions

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Would you like to go on an Internet auction site and know how much to bid for a certain item -- and also know that you didn't overpay for that item? How about when you sell an item in an online auction: Would you like to know what price to set that ensures you don't leave money on the online table?

Wharton marketing and statistics professor [Eric T. Bradlow](#) can't provide specific answers. But he does offer guidance on the behavior of potential buyers in a new study entitled, "An Integrated Model for Bidding Behavior in Internet Auctions: Whether, Who, When, and How Much," recently published in the *Journal of Marketing Research*. Bradlow, who is also academic director of the Wharton Small Business Development Center, co-authored the study with Cornell marketing professor Young-Hoon Park. "To the best of our knowledge, this is the first attempt to model formally the behavioral aspects of bidding behavior for the entire sequence of bids in Internet auctions," the authors write.



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Bradlow and Park base their research on a unique set of data. One of the largest Internet auction sites in Korea provided them with information on the auctions of notebook computers from July 2001 to October 2001. The paper includes a description of the computational approach for the integrated model. "What any person who wanted to use the model would need," says Bradlow, "is a complete history of bids as the auction is going along. This can be gotten from the site itself, as in our case, or technologically sophisticated people can themselves write programs to collect this data in real time."

As for the rest of us, the research provides intriguing insights into how Internet auctions work and how we can be more successful buyers or sellers. For example, information that may help refine buying strategy includes:

- **Bidding timing:** Bidding activity is concentrated at the end of each auction, the research suggests. Approximately 75% of final bids are submitted after 97% of the auction duration has passed.
- **Buy It Now (BIN) feature:** The BIN feature is a price set by the seller that, if bid, ends the auction immediately and the item is sold at the BIN price. When a seller uses the BIN feature, it is successful approximately 40% of the time. And more than half of these auctions end at the first bid.
- **Latent Bidders:** Not all the bidders are participating from the beginning. "They may wait on the sidelines of the bidding process for an opportune moment to enter," the authors write. "There are various reasons for this waiting behavior; for example, such bidders may enter later in the auction so as not to reveal their preferences or set off a bidding frenzy."

Sellers may consider these findings helpful:

- **Keep it short:** The minimum bid and the auction duration have counterbalancing effects on the buyers' willingness to bid. "This suggests that sellers should shorten their auctions and raise the minimum price," the authors write. They add a recommendation that "empirical experimentation be used to determine the exact choices."
- **Play it straight:** A seller's reputation influences a buyer's willingness to bid. "Sellers should be concerned not only with the product but also, as in bricks-and-mortar selling, with the entire buying experience from beginning through delivery."
- **Target the newbies:** Auction participants with less search experience -- who are not actively comparing prices at other sites -- have a greater willingness to buy. "This suggests that there is an opportunity for auction sellers to target these participants rather than use an overall blanket attraction strategy."
- **Appeal to the losers:** Because the authors could analyze the bidders' activity, they discovered that a buyer whose bid falls short has a greater willingness to bid more in the next auction. This new finding seems reasonable, given human nature, Bradlow says, but it became obvious only through the rich data made available to the authors. "If sellers were able to identify and target the participants who are recent 'losers' (and, in particular, those losers who nearly won), they might be able to drive up bid prices," the authors suggest.
- **Set BIN higher:** Buy It Now proved to be a double-edged feature, Park and Bradlow discovered. The data suggests that the existence of the BIN feature lowers the buyers' willingness to bid. Rather than lure in leisurely surfers of the Internet auction sites (potential buyers who are "just looking"), BIN actually turns them off. Of course, some do stop window-shopping and actually join the bidding. And the higher the BIN price, the greater is their willingness to bid.

What could be an explanation for this buyer behavior? "I think the cause could be two things," says Bradlow. "One is that sellers set BIN prices too low and hence the bid increments from auctions with BIN items are smaller than the corresponding item where there is no upper bound (on the price). This could be due to the effect of signaling: The BIN price signals quality, and a value set low signals low value.

"A second possibility is that the existence of the BIN price brings in a different kind of bidding dynamic, and bid increments increase more slowly," says Bradlow, adding that the BIN take-away for sellers is this: "People could be leaving money on the table by setting BIN too low."

A Bidder's "Value Meter"

Bradlow and Park did not initially set out to identify these specific Internet auction tips. Instead, their research was aimed at developing a probability model for auction behavior. Previous studies have reported that participants recognize and respond to certain value signals such as the minimum bid, the seller's reputation, other participants' bids, or the number of bids submitted up to that point. Because of these signals, every bidder sets a certain value on the object of the auction.

"We don't observe this valuation," says Bradlow. "All we observe is what the bidders have done. From their revealed action, we posit that there is something going on in their brain -- their 'value meter.'"

Bradlow suggests that a bidder's value meter is continually recalibrating. "You can make the assumption that people's valuations about an object are how much they like it. But this is too simplistic a process. For example, if there are a lot of bidders -- leading people to think, 'Oh wow, 1,000 bidders! That thing must be good' -- the valuations are changing. People receive signals. They see a fast flurry of bids or a big bump in bid amount. Or the item has been sitting and it is stale. In the model, we wanted to capture that as time progresses, valuation can change. We wanted to illustrate that phenomenon."

As part of the paper's description of bidding dynamics -- that is, behavior over the entire sequence of bids -- the authors built a probability model for auction behavior on a valuation that they name "consumer willingness to bid (WTB)." The WTB governs four questions -- whether people bid, who bids, when they bid and how much they bid. The authors propose that bidders update their WTB for a particular item over the duration of the auction.

The authors were able to create such a sweeping probability model because they had access to the entire auction history, which meant they could track individual bidders over time and see an individual's multiple bids. Given this breadth and depth of material, the authors could address the four bidding aspects all at once. "The data was so rich," says Bradlow. "I thought, 'Why bastardize it and look at individual (behavior) questions when we could model the whole thing?'"

During the three months that the authors studied notebook computer auctions, a total of 2,618 notebooks were put up for auction. Of these, 296 auction items had no bids. On average, there were approximately 5.8 unique bidders and 8.4 bids per auction.

The authors acknowledge that their proposed model has several limitations. The data is from ascending first-price auctions (bids increase and the winning bidder pays his or her bid) in contrast to the second-price auctions (bids increase and the winning bidder pays the amount bid by the second highest bidder) that eBay uses. Theoretical work in auctions has shown that the format of the auction may have an impact on bid sequences, and hence the study's empirical findings should be used with caution for different auction formats. "With that in mind, the empirical findings we report should be considered suggestive rather than definitive," the authors note.

Also, their model is for notebook auctions and reflects the product category, which is one where people may have a significant amount of knowledge and experience. "We hope our model provides a framework for further real data studies and exploration in other product categories," such as collectibles, the authors say, adding that the actual findings may change depending on such things as consumer knowledge of the product category, their valuations for items in that category and the interplay between online and offline purchasing.

Even when one of the authors (Bradlow) is a fervent Yankees fan and might consider looking for a successful online bidding strategy to buy hard-to-get baseball tickets, the research has its limitations. "In terms of the Yankees and a bidding strategy," says Bradlow, "that is really beyond the direct scope of this paper. To develop a practical real-time bidding system would require some knowledge of the intent of, and strategy used by, the seller. Yet, certainly our approach could be used as a screening device for opportunities that are out there."

The authors hope that their article "serves as a call for more extensive real data study" of Internet auction bidding. "There is no reason why someone could not take our model and adapt it into a real-time forecasting system for internet auctions. This would be the greatest empirical test of its worth," says Bradlow. As online bidding continues to grow at a phenomenal pace, he adds, the development of a real-time forecasting system "may be happening soon in an online auction near you."

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