

## Rejoinder

# Causes and Implications of Some Bidders Not Conforming to the Sealed-Bid Abstraction

Robert Zeithammer

Anderson School of Management, University of California, Los Angeles, Los Angeles, California 90095,  
rzeitham@ucla.edu

Christopher Adams

Federal Trade Commission, Washington, DC 20580, cadams@ftc.gov

This paper presents the authors' rejoinder to Zeithammer and Adams [Zeithammer, R., C. Adams. 2010. The sealed-bid abstraction in online auctions. *Marketing Sci.* 29(6) 964–987]. This rejoinder clarifies and qualifies conclusions of the original paper and makes suggestions for fruitful areas of future research. In particular, the original paper shows that bidding style can make a big difference in managerial decisions, but a structural model would be necessary to make confident predictions under different reserve prices. The rejoinder also clarifies the interpretation of feedback as a measure of bidder experience, and the relationship between bidder experience and bidding style.

*Key words:* auctions; econometrics; empirical IO methods; measurement and inference

*History:* Received: July 19, 2010; accepted: July 20, 2010. Published online in *Articles in Advance* August 11, 2010, and updated October 20, 2010.

## Introduction

We thank Ali Hortaçsu, Eric Nielsen, Kannan Srinivasan, and Xin Wang for taking the time to study our work and discuss its assumptions and implications. In this rejoinder, we hope to further clarify both the strengths and the limitations of our paper. We respond first to Hortaçsu and Nielsen, and then to Srinivasan and Wang.

## Rejoinder to Hortaçsu and Nielsen (2010)

We agree that the reduced-form nature of our model weakens our counterfactual exercises. The purpose of our model is to demonstrate that accounting for heterogeneity in bidding style *can* make a big difference in managerial decisions. To explain why reactive bidders bid the way they do and are more confident about their behavior under different reserve prices, a structural model of the antecedents of reactive bidding would be necessary. We hope our general modeling idea of bidding-style heterogeneity will stimulate future research in this direction. The key question such a structural model would need to address is why anyone would bid early and often, instead of waiting to bid at the end of the auction.

Hortaçsu and Nielsen point out an apparent tension between our discussion of bidder behavior in the

“testing” section of the paper and in the “modeling” section of the paper. To resolve this tension, please note that we distinguish between “incremental” and “reactive” bidders, the latter of which do not make an appearance until the modeling part of the paper. Both types of bidders bid in an ascending fashion up to their valuation, but *incremental* bidders increase their proxy by exactly one increment, whereas *reactive* bidders increase it by more than an increment. The difference is critical for our conditional order statistic approach because an incremental winner provides no information about his valuation beyond the fact that it exceeds the second-highest bid, whereas a reactive winner does. By focusing on the “OverInc” subset of the data in estimation, we effectively ignore the non-informative incremental winners in the modeling part of the paper. The confusion regarding the two terms leads the authors to state that “an auction won by a reactive bidder should always have the top two bids separated by exactly one bid increment” (Hortaçsu and Nielsen 2010, p. 996). Although this statement is true for incremental bidders, it is not true for reactive bidders.

We thank Hortaçsu and Nielsen for emphasizing the key implication of having reactive bidders in an auction, namely, that when they win the auction, their bid is biased downward relative to their valuation.

The bias is actually more general and implicates models that use the second-highest bid as well: if a reactive bidder loses the auction and is the second-highest bidder, then his bid may also be biased downward. In particular, the second-highest bid is below the second-highest valuation when the second-highest bidder is reactive and does not have the opportunity to react to a higher bid before the auction ends.

Another situation that involves bids diverging from valuations is an auction with shill bidding, and we agree that the existence of shill bidding may create concerns for interpreting bids as valuations of bidders. An interesting open question remains regarding how to detect shilling and how our tests can be used in the presence of shilling. Our analysis suggests the inexperience of the bidders—rather than the characteristics of the auctions—drives the test failure; however, we did not explicitly analyze shill bidding.

The authors suggest a robustness check where the sample is limited to auctions with sealed bidders. Although we are grateful for the suggestion, the check cannot be implemented given our partially observed bidding-style model. The problem is that although we might be able to detect a reactive bidder, a “possibly sealed” bidder (i.e., a bidder who bids only once during an auction) may just be a reactive bidder that did not get the opportunity to bid multiple times in an auction. Therefore, we do not have a subset of auctions with bidders known to be sealed. See §5.3 of Zeithammer and Adams (2010) for further discussion of this issue.

Hortaçsu and Nielsen also provide an example where our new test (T5) fails, demonstrating a limit to the potential generalizability of our Proposition 1. In particular, the proposition requires that valuations be drawn iid from some distribution  $F$ , and the authors suggest the proposition will not hold if *ex ante* asymmetries exist. If T5 is going to be used more generally, there may be fruitful work in generalizing the proposition.

## Rejoinder to Srinivasan and Wang (2010)

Along with prior literature, we find a negative correlation between a bidder’s feedback and his tendency to submit multiple bids in an auction. We interpret feedback as a measure of bidder experience. Srinivasan and Wang clarify the interpretation of this correlation and suggest other measures of bidder experience following Wang and Hu (2009). Tracking a cohort of bidders for the first six months of being registered on eBay, Wang and Hu find a negative correlation between total experience (the total number of auctions in which the bidder submitted a bid) and multiple bidding. Furthermore, they find

that losing experiences for which the feedback measure does not account drive the correlation. Therefore, losing experiences might be a better measure of bidder experience, and inferences about the effect of experience on bidding style based on using feedback as a proxy for experience may be biased. We agree that a more detailed measure would be useful, and we propose that we have just such a measure in *Years on eBay*. *Years on eBay* is a useful measure of eBay experience because it accounts for not only the auctions lost, but also auctions the bidder only observed and auctions in which he or she was interested but did not arrive early enough to submit a bid. Srinivasan and Wang’s discussion of the shortcoming of feedback as a measure of experience helps us understand why *Years on eBay* is significantly negatively correlated with multibidding even after we control for feedback (see Table 8 of Zeithammer and Adams 2010).

Srinivasan and Wang (2010) also suggest that feedback may be endogenous to multibidding because multibidders tend to win less and feedback is essentially a count of the total number of auctions won. Therefore, interpreting feedback as an endogenous proxy for unobserved individual heterogeneity in bidding style may be more prudent: if the bidder starts out bidding in a sealed fashion, he will win more and so will have larger feedback conditional on time spent on eBay. If, on the other hand, he starts out reactive, then he will have to learn (over time and through losing experiences), and his lower feedback will indicate the reactive style. In other words, the negative correlation between a bidder’s feedback and his tendency to submit multiple bids in an auction may be mechanical and should not be interpreted as an “effect” of feedback on multibidding. We think this point is important, and we caution our readers against such a causal inference in the first stage of our model. However, this caution does not apply to our estimates of demand in the second stage because our first-stage estimates of the probability of bidding style conditional on feedback (interpreted as a mere endogenous proxy for unobserved heterogeneity) and *Years on eBay* (proxy for cumulative experience) are not necessarily biased.

Wang and Hu’s (2009) results suggest that within a given entry cohort (i.e., within a generation of bidders all entering at the same time), bidders’ behavior asymptotically approaches sealed bidding over time, and so the violation of the sealed-bid abstraction we document should be weaker within each cohort as time passes. We agree that a study interested in individual behavior can therefore still invoke the sealed-bid abstraction on a properly selected subset of experienced enough bidders. On the other hand, we propose that a study of market-level phenomena, such as demand, needs to account for constant arrival

of new inexperienced bidders into the market. One modeling approach consistent with both our results and Wang and Hu's (2009) would be a model of overlapping generations. In such a model, the steady-state demand is composed of both reactive and sealed bidders in every period, and the problems our rejection of the sealed-bid abstraction causes are not necessarily alleviated.

## Conclusion

In conclusion, we thank the commentators for both clarifying and qualifying our contribution. We hope

the comments stimulate further research of bidding behavior in online auctions.

## References

- Hortaçsu, A., E. R. Nielsen. 2010. Commentary: Do bids equal values on eBay? *Marketing Sci.* 29(6) 994–997.
- Srinivasan, K., X. Wang. 2010. Commentary: Bidders' experience and learning in online auctions: Issues and implications. *Marketing Sci.* 29(6) 988–993.
- Wang, X., Y. Hu. 2009. The effect of experience on Internet auction bidding dynamics. *Marketing Lett.* 20(3) 245–261.
- Zeithammer, R., C. Adams. 2010. The sealed-bid abstraction in online auctions. *Marketing Sci.* 29(6) 964–987.