Bidding Wars in Internet Auctions

Henner Gimpel*

*Information Management and Systems, University of Karlsruhe
Englerstr. 14, 76131 Karlsruhe, Germany
http://www.iw.uni-karlsruhe.de
gimpel@iw.uni-karlsruhe.de

Abstract

Empirical data on bidding behavior in Internet auctions and conventional predictions from expected utility theory diverge—observed multiple bidding in second-price auctions appears somewhat puzzling. Multiple bidding is, from the viewpoint of expected-utility theory, attributed to irrational nuisance by inexperienced bidders. Behavioral models can help explaining bidding dynamics by more closely studying the psychological context within an auction. This paper points out the endowment effect as a major source of empirically observed bidding wars .

1 Introduction

Internet auctions have gained enormous popularity during the last years and online auction houses constitute a fruitful data source for economists. Sites like eBay and Amazon have reduced the transaction costs connected to traditional auctions and therefore provide a new channel for retailing consumer goods. In accordance with this transition, auction theory moves from analyzing high stakes auctions like the FCC spectrum auctions [5] and Treasury auctions [1] to analyzing consumer auctions on the internet. The iterative nature of English auctions influences participants valuations.

In an English proxy auction—like the one implemented by eBay—a bidder privately submits a bid ceiling to her proxy agent who subsequently represents her in the iterative English auction. The proxy increases the auction price on behalf of his principal until either his bid ceiling is reached, or his principal is the high-bidder. At any point in time the current price in the auction is a minimum increment above the second highest submitted bid ceiling. Technically, this results in a second price auction; the bidder with the highest submitted bid ceiling wins and pays the second highest submitted bid ceiling plus an increment. The neoclassical notion of bidders purely self-interested in monetary outcomes might be a reasonable model of institutional auction participants, whereas this is not necessarily true for consumers.

2 Expected-utility Theory

For second-price sealed-bid (Vickrey) auctions, conventional expected-utility theory offers a simple normative advice: truthtelling, i.e. bidding ones true value for the item at sale, is a weakly dominant strategy citeVickrey61. In a standard independent private values model (short: IPV) one might be tempted to extended this advice to the English proxy auction. In fact, on its website eBay recommends: "When you place a bid, you enter the maximum amount you'd be willing to pay for the item. [...] This means you don't have to keep coming back to re-bid every time another bid is placed."[1] If a bidder knows her valuation for sure, assumes that it is does not convey any useful information to competing bidders (like in the IPV), and faces however small transaction costs for returning to the auction site and submitting a bid later on, this recommendation holds. However, Wilcox demonstrates that with non-independent values and a slight uncertainty about ones own valuation, a bidder can do better by submitting her bid in the last possible moment of the auction [9]. If all bidders follow this late bidding strategy, the English proxy auction strategically reduces to a second-price sealed-bid auction. Either way—whether one assumes valuations know for sure and transaction costs, or uncertain interdependent valuations—multiple bidding remains puzzling.

Several studies find significant empirical evidence for (1) *multiple bidding* and (2) *late bidding* on eBay [6, 7, 9]. Multiple bidding is submitting several bids in a single auction, i.e. rising the proxy's bid ceiling during the course of the auction.[2] Late bidding—or sniping—is defined as bidding in the last minutes or seconds of an auction[3].

Wilcox concludes "that most nonprofessional bidders do not bid in a manner consistent with game-theoretic predictions" but acknowledges the lack of possible costs of late bidding in his model [9]. This is exactly the point Ockenfels and Roth pick up [6]: They introduce the non-negligible probability of last-minute bids to be rejected by the auction house due to delay caused by Internet traffic. Subsequently they derive a rational expectations equilibrium in late bidding for private values as well as for uncertain interdependent values. In line with Wilcox's argumentation, Ockenfels and Roth assume that the observed patterns of multiple bidding are generated by "naïve incremental bidders".

The two papers described above are concerned with rationalizing late-bidding and regard multiple bidding as irrational nuisance caused by inexperienced bidders. While this certainly is one explanation for multiple bidding, it might not be the only one. The assumptions made by conventional auction theory are:

- there exists such a thing as a true valuation independent from the elicitation process,
- this valuation is constant during the course of the auction,
- this valuation is independent from the mechanism employed,

[1] http://pages.ebay.com/help/buy/proxy-bidding.html, June 1, 2005

[2] Shah and co-authors identify a bidding patter called *unmasking*—a series of multiple bids in a short span of time where no bids from other bidders are in-between [7]. One rationale for this pattern is the attempt to disclose another bidder's bid ceiling. Unmasking results in multiple bids by a bidder but is not included in what is called *multiple bidding* in this paper.

[3] The above definition assumes a fixed-deadline auction. If the auction implements a so called *soft end*, late bidding is defined with respect to a hypothetical deadline. See [6] for details.

- the bidders are aware of the expected utility-maximizing strategy in a second-price sealed-bid auction,
- they are able to transfer this to the English proxy auction, and
- they are solely interested in the good and not in bidding or winning itself.

All of these assumptions are questionable in real world consumer auctions.

3 Behavioral Economics

Behavioral economics offers several insights in the psychological context of consumer decision making which might explain multiple bidding. One important component are endowment effects: Consumers who posses a good demand a higher price for selling the good, than they would be willing to pay wouldn't they own the good. If one now assumes bidders to get attached to a good and to take *virtual possession* of the good when they become high-bidder in an auction, then this increases the valuation of the good. To secure their *psychological endowment*, these bidders would subsequently be willing to submit higher bid ceilings, than they did in the first place.

The term *endowment effect* denotes the increased value of a good to an individual when the good becomes part of the individual's endowment. This effect manifests the loss aversion inherent in prospect theory [4, 8] and contrasts the Coase theorem which asserts that the allocation of resources will be independent of property rights when costless trades are possible. The Coase theorem relies on the assumption that entitlements do not affect valuations; however, with endowment effects valuations are affected and sellers request a higher price for giving up a good, than buyers are willing to pay [3].

Heyman and co-authors relate the endowment effect to bidding dynamics in auctions and assume that bidders develop a sense of ownership during an auction which they term *quasi-endowment*, i.e. attachment to an un-owned item [2]. The authors point out that the longer a bidder is involved with an auction, the more the sense of ownership might increase. This is especially clear the longer the bidder is high-bidder in the auction. Heyman and co-authors then conduct two experiments on bidder behavior. Their data supports the hypothesis that the duration of a bidder's involvement in an auction leads to higher bids and conclude that the bidder's valuation for the item increases with its quasi-endowment.

4 Conclusion

Conventional auction theory partly fails to explain empirically observed bidding behavior in internet auctions. The present paper outlines the endowment effect as one potential explanation for the existence of bidding wars. This argumentation is in line with the experimental evidence recently presented by Heyman and co-authors [2]. Field data from auctions running on eBay.com will be presented at the Group Decision and Negotiation conference (GDN 2005) in Vienna.

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