

NON-EQUIVALENCE BETWEEN THE DUTCH AND THE FIRST PRICE AUCTIONS WITH RECIPROCALLY SPITEFUL BIDDERS

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Within the independent private value model, the Dutch descending-bid auction and the first price sealed-bid auction shares the same equilibrium bidding strategy. This is one of the building blocks of the classic revenue equivalence theorem, along with the isomorphism between the English ascending-bid auction and the second price sealed-bid auction. At the same time, however, it is also well known that the winning bids observed in laboratory Dutch auctions are significantly lower than those in first price auctions (see Kagel 1995).

There have been several theoretical attempts to explain the strategic non-equivalence between the Dutch and the first price auctions under the independent private value assumption, including Weber (1982), Chew and Nishimura (2001), and Nakajima (2003). These studies introduce bidders with non-expected utility preferences and show their optimal bidding strategies change as the Dutch clock comes down. While these theories succeed in explaining the non-equivalence, they predict that bidders' optimal bids in the Dutch auction are bounded from below by those in the first price auction if bidders' preferences are consistent with the famous Allais paradox, which is opposite to the experimental results.

This paper explores an alternative explanation for such strategic non-equivalence between Dutch and first price auctions: reciprocal preferences. A disadvantageous bidder with lower value is spiteful in the sense that her utility increases as the earnings of her rival decrease if she loses. If the lower value bidder overbids to shade the higher value bidder's winning payoff, the higher bidder can retaliate by deliberately lose and collect positive losing utility knowing her rival suffering negative payoff. However, once both bidders underbid such that both bidders potentially earn positive winning payoff, it is not fun for the lower value bidder to win with the bid close to her value without responding enough to her rival's underbidding.

In order to incorporate such two-way interaction between bidders, we construct a two-bidder, intention-based sequential decision model that shares its spirit with the work by Dufwenberg and Kirchsteiger (2004). We show that equilibrium bids in the Dutch auction are more likely to be lower than those in the first-price auction. This result holds for both complete and incomplete information environment. In addition, our equilibrium bids in the first price auction are higher than those predicted by the conventional risk neutral self-interest agents without referring to risk aversion.

We also present experimental evidence broadly consistent with the predictions of this model. In the complete information environment, some lower value bidders overbid in the both auctions. The higher value bidders tend to wait for the Dutch clock to descend further beyond

their corresponding bids in the first price auction so that more bidders with lower value win with negative payoff in the Dutch auction. Average prices in the first price auction are higher than those in the Dutch auction in both complete and incomplete information environment. The fact that we observe such different bidding pattern between two forms of auction even in the complete information environment certainly suggests that the factors other than risk preferences must be the working force in bidders' mind.

This paper is a sequel to Nishimura et al. (2007) which examines the role of reciprocally spiteful bidding behavior in the English ascending-bid auction and the second price sealed-bid auction. Our study theoretically as well as experimentally shows more frequent aggressive spiteful overbidding in the second price auction than in the English auction particularly in the complete information environment where bidders can judge their relative position. Spiteful biddings in experimental second price auctions have recently documented also by Cooper and Fang (2007) and Andreoni et al. (2007). These studies including this paper belong to the line of research just started to examine social preferences in the competitive environment.

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