Revealed Preference in Bidding: Empirical Evidence from Recent Spectrum Auctions

by

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Abstract

Activity rules are among the key innovations underlying modern dynamic multi-item auctions. Activity rules require bidders to bid on substantial sets of items early in the auction, in order to retain the eligibility to bid on similarly-sized sets of items later in the auction. Without activity rules, bidders would have strong incentive to "bid snipe," working cross-purposes to the objectives of a dynamic auction. Traditional activity rules have required monotonicity in the eligibility points assigned to the various items. However, in recent work, Ausubel and Baranov (2013, 2014) have argued that the traditional rules may be both too weak and too strong, and instead have advocated activity rules based upon the Generalized Axiom of Revealed Preference (GARP).

Two recent spectrum auctions provide opportunities to explore these issues empirically. The Canadian 700 MHz Auction of Jan.–Feb. 2014 affords a unique opportunity to explore GARP-based activity rules, since: (a) the activity rules implemented were weaker than GARP, so bidding consistently with GARP was always feasible; (b) the auction generated a rich set of data, with 108 rounds of bidding over 98 licenses and revenues of $5 billion; and (c) the full bidding data is accessible for study. The UK Digital Dividend Auction of 2013 also provides reasonable opportunities, as: (a) the auction also generated a rich set of data, with 52 rounds of bidding over multiple spectrum bands; and (b) the full bidding data is accessible. However, the UK auction used a points-based activity rule that could prevent bidding consistently with GARP. Importantly, note that most spectrum auctions prior to 2013 were much more difficult test-beds for studying these issues, as either there were provisional winners of licenses named after each round, requiring bidders potentially to make major deviations from bidding consistently with GARP, or the bidding data was not made available after the auction.

We analyze the empirical evidence from two perspectives. First, GARP may be thought to be too constraining an activity rule for use in practice. Under this first view, GARP violations exhibited in the bidding data may suggest that GARP-based activity rules are not viable. Second, and quite differently, bidders' true preferences may be thought to be generally consistent with GARP. Under this second view, GARP violations may suggest instances in which the empirical auction rules permitted bidders to exploit strategic opportunities—and testing for GARP violations may then be a technique for systematically detecting some strategic manipulations.

Ultimately, these two hypotheses are probably not empirically distinguishable. However, by testing the bidding data for consistency with GARP and by attempting to understand if bidders had apparent strategic motives for placing bids that violated GARP, we can shed light on whether activity rules in past auctions have been appropriate and we can gain insight into the optimal structuring of activity rules for future auctions.

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