

We establish a structural estimation method of the scoring auction model. We show a semi-parametric procedure to identify the joint distribution of bidders' multi-dimensional private signals from observed multi-dimensional bids in a first-score (FS) auction and demonstrate sufficient conditions for identification. A simulation experiment is also conducted to verify the consistency of our estimation procedure. The scoring auction model in our analysis allows not only the quasilinear scoring rule but also a broad class of non-quasilinear rules including price-over-quality ratio (PQR) scoring rules. An empirical analysis of multi-dimensional bidding in the Japanese public procurement auctions is provided. A series of counterfactual analyses quantify the impact of the change of auction formats and scoring rules on the utilities of both bidders and the auctioneer.