Optimal Auctions with Ambiguity

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A crucial assumption in the optimal auction literature is that each bidder's valuation is known to be drawn from a single unique distribution. In this paper we study the optimal auction problem allowing for ambiguity about the distribution of valuations and where the agents may display ambiguity aversion (modeled using the maxmin expected utility model of Gilboa and Schmeidler (1989). When the bidders are ambiguity averse with all types having the same set of priors (and the seller is ambiguity neutral) we show that (i) the optimal incentive compatible and individually rational mechanism must be such that for each type of bidder the minimum expected utility is attained by using the seller's prior; (ii) an auction that provides full insurance to all types of bidders is always in the set of optimal auctions; (iii) and in particular, when the bidders' set of priors is the epsilon-contamination of the seller's prior the *unique* optimal auction provides full insurance to bidders of all types; (iv) in general, neither the first nor the second price auction is optimal (even with suitably chosen reserve prices). When the seller is ambiguity averse (and the bidders are ambiguity neutral) the optimal auction involves the seller being perfectly insured.

Next we look at the case where different types may have different sets of priors. In this case, we show that if lower types are more ambiguity averse than higher types, full surplus extraction is not possible. Furthermore, the impossibility of full surplus extraction result is robust to small perturbations of bidders' sets of priors.