Robust Repeated Auctions under Heterogeneous Buyer Behavior

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We study revenue optimization in a repeated auction between a single seller and a single buyer. Traditionally, the design of repeated auctions requires strong modeling assumptions about the bidder behavior, such as it being myopic, infinite lookahead, or some specific form of learning behavior. Is it possible to design mechanisms which are simultaneously optimal against a multitude of possible buyer behaviors? We answer this question by designing a simple state-based mechanism that is simultaneously approximately optimal against a k -lookahead buyer for all k , a buyer who is a no-regret learner, and a buyer who is a policy-regret learner. Against each type of buyer our mechanism attains a constant fraction of the optimal revenue attainable against that type of buyer. We complement our positive results with almost tight impossibility results, showing that the revenue approximation tradeoffs achieved by our mechanism for different lookahead attitudes are near-optimal.

This is an extended abstract. A full version of this paper is available as [1]¹.

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REFERENCES

- [1] Shipra Agrawal, Constantinos Daskalakis, Vahab Mirrokni, and Balasubramanian Sivan. 2018. Robust Repeated Auctions under Heterogeneous Buyer Behavior. *CoRR* abs/1803.00494 (2018). <http://arxiv.org/abs/1803.00494>

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