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The winner's curse: Conditional reasoning and belief formation

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Abstract

In explaining the winner's curse, recent approaches have focused on one of two cognitive processes: conditional reasoning and belief formation. We provide the first joint experimental analysis of the role of these two obstacles. First, we observe that overbidding decreases significantly between a simple common-value auction and a transformed version of this auction that does not require conditional reasoning. Second, assistance in belief formation leads to comparable behavioral changes in both games. The two effects are of similar magnitude and amplify each other when jointly present. We conclude that the combination and the interaction of the two cognitive processes in auctions lead to relatively low strategic sophistication compared to other domains. The study's focus on games' objective cognitive challenges is potentially useful for improving predictions across games and complements the common focus on behavioral models and their explanatory power.

JEL classification: D44; D82; C91

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1. Introduction

The "winner's curse" (WC) in common-value auctions (CVA) refers to the systematic overbidding relative to the Bayesian Nash equilibrium (BNE) that leads to losses for winners in field settings and laboratory experiments.[1] This phenomenon is one of the most important and robust findings in empirical auction analysis and has generated ample theoretical work.

Two main departures from the BNE have been modeled. Both maintain the assumption that players best respond to their beliefs but relax the requirement of *consistency of beliefs*. First, in equilibrium models such as cursed equilibrium (CE, Eyster and Rabin, 2005), behavioral equilibrium (Esponda, 2008), and the application of analogy-based expectation equilibrium to auctions (Jehiel, 2005; Jehiel and Koessler, 2008), beliefs do not fully take into account what bids tell about underlying signals, capturing that agents do not optimally adjust for the information revealed by winning. Second, the level-k model assumes non-equilibrium beliefs that result from iterated best responses (Nagel, 1995; Stahl and Wilson, 1995). It has been applied to private information games such as auctions and zero-sum betting (Crawford and Iriberri, 2007; Brocas et al., 2014). When one assumes beliefs of uninformed play, this approach can implicitly capture that agents do not fully account for revealed information.

Doubts have been cast on the sufficiency of these *belief-based* models to explain auction behavior. With an innovative semi-computerized version of the maximal game, Ivanov et al. (2010, ILN) experimentally study whether these models can explain the WC and claim that they cannot. Along these lines, Charness and Levin (2009, CL) use computerized sellers in an acquiring-a-company game and document that subjects have a more general problem with *conditional reasoning* – drawing appropriate conclusions from hypothetical events – that seems not to be fully captured by the relaxation of beliefs.

In turn, however, Costa-Gomes and Shimoji (2015) criticize ILN's use of game theoretical concepts when the interaction with a known computer program is a single-person decision problem. They argue that belief-based models are indeed compatible with some observations from ILN's experiment. Moreover, Camerer et al. (2016) suggest on the basis of the Quantal Response Equilibrium (QRE, McKelvey and Palfrey, 1995) that imprecise best responses combined with non-equilibrium beliefs could explain observed behavior.

This discussion shows that no consensus has been reached on how to explain the WC. In this study, we do not test concrete models of reasoning, but take a step back and focus on two objective game complexities whose relative importance in causing the WC is – as shown above – disputed in the literature: the needs for *conditional reasoning* and for *belief formation*. Both activities are indispensable to reach a best response. In any strategic situation, subjects have to *form beliefs* about their opponents' behavior in order to know what to best respond to. In CVAs, best responding further requires *conditioning* on hypothetical situations induced by the game's structure. For example, one's bid is only relevant when winning, which implies that all others have bid less. Crucially, which of the two complexities poses a more substantial challenge for bidders in CVAs remains an open empirical question. By providing the first joint experimental analysis that disentangles the impact of these two cognitive processes in a

[1] See Capen et al. (1971) and Roll (1986) for evidence from the oil industry and corporate takeovers, respectively, and Bazerman and Samuelson (1983), Kagel and Levin (1986), Avery and Kagel (1997), Goeree and Offerman (2002), Lind and Plott (1991), Grosskopf et al. (2007), and the literature discussed in Kagel and Levin (2002) for experimental evidence.