Analysis plan

1 Main analyses

The main analyses that I will conduct are as follows:

1. First, I will compute the mean absolute prediction errors of the two models under consideration (level-k and Bayes-Nash equilibrium). In the case of equilibrium, this is relatively straightforward since the model is 'parameter free' (at least under the assumption of risk neutrality). In the case of level-k, I will pursue two separate approaches:

   (a) Fitting each participant with a level inferred from their choice in the 11-20 game and using this level to get a definite prediction about how they should bid.

   (b) Fitting each participant with the level chosen from the 1-3 range that minimises the model's mean absolute prediction error.

   The idea of this exercise is to get a sense of which model can better explain 'average' bidding behaviour.

2. Second, I will use maximum likelihood to fit a series of "mixture of types" models (similarly to [2] and [1]). The idea here is to see if either model can accurately describe the behaviour of some subjects, even if it fails to describe the behaviour of the average bidder. Again, I will do this in a variety of ways:

   (a) I will start by restricting the possible levels (in the level-k model) to the 1-3 range.

   (b) I will then allow for higher levels but restrict the set of possible levels to sets of consecutive integers. At the extreme, I will estimate a model which includes all possible levels (this is feasible since the level-k predictions eventually cycle).

   (c) I will check whether the results change if one includes level-0 players.

3. Remaining with a maximum likelihood approach, I will then compute the level that best fits each individual's bidding behaviour (as opposed estimating a distribution over levels). This will allow me to compute the correlation between individual levels as estimated from their bidding and individual levels as inferred from the 11-20 game.

4. Turning to subject reports, I will compute the fraction who mentioned iterated reasoning when asked to explain their bidding behaviour. The goal here is to examine the extent to which the level-k model accurately characterises subjects' conscious reasoning.

5. Finally, I will examine if changing the bid discretisation alters bids in the way predicted by the level-k model. To do this, I will regress subject bids on a dummy variable indicating treatment assignment plus controls for the valuation associated with the bid and the demographic characteristics associated with the relevant subject.

Note that each of these exercises will be performed separately across auction types and treatments (i.e., the data will not be pooled).

2 Robustness checks

Here is a non-exhaustive list of the robustness checks I plan on performing:

1. I will estimate a risk aversion parameter using subject responses to the "bomb risk elicitation task" (under the assumption of constant relative risk aversion). I will then investigate whether incorporating risk aversion into the models alters any of my substantive conclusions.

2. I will examine if any of the main conclusions change if one drops dominated bids from the analysis.

3. I will also see if anything changes if one assumes that level-k players submit the highest optimal bid when indifferent, not the lowest one (as in my main analysis).

4. I will examine the effect of dropping all but the first round of bidding from the analysis.

References

[1] Vincent P Crawford and Nagore Iriberri. "Level-k auctions: Can a nonequilibrium model of strategic thinking explain the winner's curse and overbidding in private-value auctions?" In: *Econometrica* 75.6 (2007), pp. 1721–1770.

[2] Dale O Stahl and Paul W Wilson. "Experimental evidence on players' models of other players". In: *Journal of Economic Behavior & Organization* 25.3 (1994), pp. 309–327.