Computational Economics: Problem set 3

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Problem 1. Using the code and dataset in Aguiar, Boccardi, Kashaev and Kim 2021, test for the null hypothesis that random utility that is stable across attention frames describes the dataset under a random CRRA assumption.

Then test the second null hypothesis that the dataset is described by the LA (logit attention) model that has a distribution of preferences that is stable across frames under a random CRRA assumption.

Random CRRA Assumption: Assume that preference rankings are as if DMs are expected utility maximizers with CRRA Bernoulli utility function

$$u(x,\sigma) = \begin{cases} \frac{x^{1-\sigma}}{1-\sigma}, & \sigma \neq 1, \\ \ln(x), & \sigma = 1. \end{cases}$$

This means that for any two lotteries l_1, l_2, and prizes z_s for each state of the world as in Aguiar, Boccardi, Kashaev and Kim 2021, there is a ranking over lotteries indexed by σ such that:

$$l_1 \succ_\sigma l_2 \iff \sum_{s\in\Omega} l_{1,s} u(z_s,\sigma) \geq \sum_{s\in\Omega} l_{2,s} u(z_s,\sigma).$$

Hint: The way to implement this amounts to constructing rankings under CRRA for all CRRA between [-1,1]. There is no single way to do this but you should be expecting 6 rankings for the case of 5 lotteries under LA. Notice that the set of all possible rankings with 5 alternatives is $5! = 120$ rankings, and the CRRA assumption will rule out 114 rankings.

Report test statistic, pvalue, and the histogram of the bootstrap distribution of the test statistic for both null hypothesis.

Estimate the distribution of risk aversion under the LA model using the CRRA assumption using only the high and medium cost treatments.

Problem 2. Choose either the gravity model, or the two-stages least square supply and demand model. In either of those problems use bootstrapping to provide boostrap standard errors for σ or β/b in the supply and demand model. Use the document bootstrap_problem_set_2.pdf in the folder of the problem set. Use parallelization in Julia, using the package distributed and the pmap() technique. Use at least B, boostrap numer of simulations equal to $B \geq 10000$.