

ECON 761 - Problem Set 6

Due by end of day on Monday 12/5. This is another practical problem set, asking you to use what you know on auction theory and structural estimation to back out primitives from bid data.

First Price Auctions

Download the data set `fpa.dat` for first-price auctions that is posted on the course web page. This is an ascii file with 4 columns, representing all bids in 500 auctions with $n = 4$ bidders.

1. Write a program to nonparametrically estimate the underlying distribution of valuations from these data, assuming private values and no reserve price. Use a kernel estimator like that discussed in class in Lecture 16. In particular, you will estimate the cdf G_{M_i, B_i} and the pdf g_{M_i, B_i} using the formulas in slide 9 of Lecture 16. For more background, consult the Athey-Haile handbook chapter or the RAND paper by Li, Perrigne and Vuong referenced below. Run your program on the downloaded data.
2. Turn in a printout of your code and output showing the estimated value of $F_U(u_1, u_2, u_3, u_4)$ at all vectors (u_1, u_2, u_3, u_4) for which each u_i is either the 25th percentile or 75th percentile of the marginal distribution $F_U(\cdot)$. Remember that bids are strictly increasing functions of the valuations, so that quantiles of the bid distribution map through the inverse equilibrium bid function to the same quantiles of the valuation distribution. This means reporting your estimate of $F_U(u_1, u_2, u_3, u_4)$ for 2^4 different vectors (u_1, u_2, u_3, u_4) .
3. Does it appear that bidders are symmetric? We are not asking you to perform a formal test, i.e., to do the inference correctly. Just examine some features which, if you accounted for the estimation error, would enable you to test formally.
4. Does it appear that values are independent? (same comment)
5. Assuming symmetry and independence, use your estimate of the joint distribution F_U to construct an estimator of the marginal distribution of valuations. Show a plot.
6. Now re-estimate imposing the assumption of symmetric independent private values from the beginning. Turn in your code and a graph showing a plot of your estimated CDF of the (marginal) distribution of a bidders private values. Does this look the same as your graph in part 5.?

References

- [1] Li, Tong, Isabelle Perrigne, and Quang Vuong. "Structural estimation of the affiliated private value auction model." RAND Journal of Economics (2002): 171-193.
- [2] Athey, Susan, and Philip A. Haile. "Nonparametric approaches to auctions." Handbook of econometrics 6 (2007): 3847-3965.