Empirical Industrial Organization

CY Cergy Paris Université
Master in economic analysis and PhD, Economics track.
Problem Set 2
Due: February 4, 2025

Problem 1

A seller auctions off an object to 3 buyers. Buyer valuations $\epsilon_\ell, \ell = 1, 2, 3$, are distributed i.i.d. with support $[0, 1]$ and distribution function $F(x) = x^2$. Each buyer ℓ knows the realization of ϵ_ℓ but only knows the distribution of other buyers' valuations.

1. Determine the distribution function of the maximum valuation among 2 buyers.

The item is sold through a first price sealed bid auction. We look for a symmetric Bayes-Nash equilibrium where all bidders use the same bidding function β, where a bidder with value ϵ bids $b = \beta(\epsilon)$. The function β is taken to be strictly increasing and differentiable.

2. Write bidder 1's problem and use the corresponding first order condition to determine the equilibrium bidding function β (Instruction: you should write all the equations using the distribution function you derived in question 1. Do not use the general formulation that is in the slides.)

3. Assume now that a sealed bid second price auction with reserve price r is used instead. Show that the optimal reserve price is $r = \frac{1}{\sqrt{3}}$.