14.27 — Economics and E-Commerce Fall '14

Lecture 10 - Search and Obfuscation on the Internet

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Before the exam, we talked about price search and saw one model, Diamond, that said all firms price at P^m in the presence of any search costs at all

- knife-edge aspect of pricing seems unrealistic
- there is a lot of price dispersion in real life
- casual empiricism suggests that degree of price dispersion might be a function of level of search costs

First, we must introduce a notion of a mixed strategy.

What we've encountered so far in games we've seen are what are called "pure strategies." A pure strategy is a well-defined, non-stochastic action or set of actions.

A "mixed strategy" is simple one of a number of pure strategies chosen stochastically with a fixed frequency.

- e.g., flip a coin
  - H $\rightarrow$ set $P = P^m$
  - T $\rightarrow$ set $P = c$
- e.g., game played between pitcher and batter in baseball
  - strategies:
    - pitcher: what pitch to throw
    - batter: whether to prepare for a particular pitch & which one
  - batter has huge advantage if he knows a fastball or curveball or slider is coming
  - even though there are some game situations where fastball sort of makes more sense than other pitches, pitcher will still want to employ a mixed strategy of what pitch to throw
  - batters will also want to employ a mixed strategy between swinging aggressively for a particular pitch or more tentatively to be able to adjust

Model

same as Diamond $\begin{cases} N \text{ firms produce homogeneous goods} \\ \text{constant, common } mc,\ c \\ \text{continuum of consumers, each with } D(P) \\ \text{assume } (P-c)D(P) \text{ concave} \\ \text{firms simultaneously choose prices } P_1, ..., P_N \end{cases}$

- fraction of consumers μ have search cost $s \leq 0$ "shoppers"
- fraction $1-\mu$ have search cost $s \sim [\underline{s}, \bar{s}]$ with $0 < \underline{s} < \bar{s} < cs(P^m)$
- consumers search optimally and purchase as before

Proposition (Stahl, 1989)

- the model has no pure strategy NE
- there exists a symmetric mixed strategy NE where firms choose prices from a continuous distribution F with support not containing c –price dispersion.
- as proposition of shoppers (μ) goes from 0 to 1, the NE changes continuously from Diamond NE to Bertrand NE
- as $\underline{s}$ and $\bar{s}$ decrease, the NE converges to Bertrand

Notes

- Diamond produces extreme result (P^m) with infinitesimal search costs
- search costs confer de factor monopoly status on every seller
- Diamond also predicts that everyone prices the same –no dispersion
- empirical evidence suggests that markets where search costs are substantial exhibit a lot of price dispersion
- including a fraction of people who like to shop in the model changes results substantially
  - price dispersion
  - doesn't have knife-edge characteristic like Diamond
- in Stahl model, prices increase with increased search costs, which suggests collective incentive of firms to raise search costs (perhaps not individual)

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