Chapter 7

Nash Equilibrium: Shopping, Standing And Voting On A Line

We first consider the alternative "Bertrand" model of imperfect competition between two firms in which the firms set prices rather than setting quantities. Then we consider a richer model in which firms still set prices but in which the goods they produce are not identical. We model the firms as stores that are on either end of a long road or line. Customers live along this line. Then we return to models of strategic politics in which it is voters that are spread along a line. This time, however, we do not allow candidates to choose positions: they can only choose whether or not to enter the election. We play this "candidate-voter game" in the class, and we start to analyze both as a lesson about the notion of equilibrium and a lesson about politics.

Bertrand Competition

Players: Two firms.

Costs: Constant marginal costs = c.

Strategy set: Prices ($0 \le p \le 1$).

Quantity produced $Q(p) = 1 - p$ where p is the lower of the two prices.

Demand for firm 1

$q1 = 1 - p1$ if $p1 < p2$

$q1 = 0$ if $p1 > p2$.

$q1 = (1-p1)/2$ if $p1 = p2$.

Payoffs: $q1*p1 - q1*c = q1*(p1 - c)$ (revenue - cost).

$BR1(p2) = p1 > p2$ if $p2 < c$.

$BR1(p2) = p1 = p2 - e$ if $c < p2 \le p$ monopoly.

$BR1(p2) = p1 = p$ monopoly if $p2 > p$ monopoly.

$BR1(p2) = p1 \ge c$ if $p2 = c$.

Nash Equilibrium = ($p1 = c$, $p2 = c$).

$p = c$. Profit = 0.

Outcome is like perfect competition even though only 2 firms.

Same setting like Cournot, but with a different strategy set, led to a very different outcome.

Linear City Model

Firms set prices.

Each consumer chooses the product whose total cost to her is smaller.

For example, if a consumer buys from firm 1, it pays $p1 + t*y*y$.

If a consumer buys from firm 2, it pays $p2 + t*(1-y)*(1-y)$

Candidate Voter Model

Even distribution of voters.

Voters vote for the closest candidate.

The number of candidates is not fixed (endogenous).

Candidates cannot choose their position.

Each voter is a potential candidate.
Players: Voters/Candidates.
Strategy: To run or to not run.
Voters vote for the closest running candidate.
Win if get plurality. Flip is tie.
Payoffs
Price of win = B. B >= 2*c
Cost of running = C.
And if you are at X and the winner of the election is at Y then you pay a cost of -|X - Y|.
If X enters and wins then his payoff is B - C.
If X enters but Y wins then his payoff is - C - |X - Y|.
If X stays out but Y wins then his payoff is - |X - Y|.