Industrial Organization, Week 4
Dynamic Oligopoly

Dio Mavroyiannis †

Milestone Institute

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Agenda

Dynamic

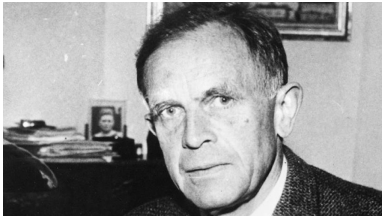
- Plan: We look at our second dynamic model today
- Economic modelling works by gradually making things more complicated

Sequential equilibrium

- In game theory there is a whole family of equilibrium concepts we can use when there is time
- Examples: Risk, Markovian, Perfect, subgame perfect, bayesian, sunspot, etc
- Refinements: The most famous is called cho kreps intuitive criterion
- Most are discrete concepts
- In infinite games there are more equilibria possible which enable cooperation

Agenda

Stackelberg



- Born in 1905 Russia, died at 40 in Spain
- What happens if one firm produces first?
- Incumbent and Entrant take decisions at different times

Commitment

Timing and Strategy

- t=0 Firm 1 produces first
- t=1 Firm 2 produces second
- t=2 Profits are realized
- Backward induction implies, start with second mover
- Then plug in second movers move into first movers
- Once we have both we can plug them into profits/price

Sequential equilibrium 1

The data	$P(q) = 600 - Q; c(q) = qc$
The profit function is	$\pi_2(q_1, q_2) = P(Q)q_2 - cq_2$
FOC	$\frac{\delta \pi_2}{\delta q_2} = 600 - q_1 - 2q_2 - c = 0$
Re-arrange	$q_2 = \frac{600 - c - q_1}{2}$

Sequential equilibrium 2

Now we setup the profit of firm 1	$\pi_1(q_1, q_2) = (600 - q_1 - q_2)q_1 - q_1 c$
Plug-in the reaction of firm 2	$\pi_1(q_1, q_2) = (600 - q_1 - \frac{600 - c - q_1}{2})q_1 - q_1 c$
Simplify	$= (300 + \frac{c}{2} - \frac{q_1}{2})q_1 - cq_1$
Take the derivative	$\frac{\delta \pi_1}{\delta q_1} = 300 + \frac{c}{2} - q_1 - c = 0$
Solve for the quantity	$q_1 = 300 - \frac{c}{2}$

Sequential equilibrium 3

We have our two q's $q_1 = 300 - \frac{c}{2}; q_2 = \frac{600 - c - q_1}{2}$

Plug-in the reaction of firm 2 $q_2 = 150 - \frac{c}{4}$

Price: $P(q) = 150 + \frac{3c}{4}$

How to plot isoprofit

- To plot the isoprofit on the reaction curve graph do the following:
- pick a number, say h
- equalize $\pi_1(q_1, q_2) = h$
- solve for q_2
- Do this a few times with different h
- Plot each q_2
- note: if the curves intersect you have a mistake