EE481: Industrial Economics

Dynamic Oligopoly Models

Dr. Wanwiphang Manachotphong

Department of Economics, Thammasat University

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Your Background

- Have already learned all the main static models
  - Monopoly
  - Duopoly
  - Oligopoly
    - Cournot
    - Bertrand
    - Stakelberg
  - Cartel
- For a quick review, I have also posted a Pindyck & Rubinfeld's ppt. on moodle.

Your Background

The basic (mostly static) models are useful benckmarks

- Non-cooperative games
  - Cournot $\rightarrow$ firms use "quantity" as strategic variable.
  - Bertrand $\rightarrow$ firms use "price" as strategic variable.
  - Stakelberg $\rightarrow$ firms can use "quantity" or "price" as strategic variable. But, there is a leader who moves first.
- Cooperative games
  - Joint-monopoly (or cartel)

Dynamic Oligopoly

The basic (mostly static) models are useful benckmarks, but not realistic.

- In the real world, firms usually meet more than 1 period
- They play dynamic games
  - repeated
  - sequential
- We introduce a dynamic oligopoly model (repeated oligopoly for this class).

Some Questions

1. Suppose all sellers have to obtain a government license to sell air purifiers in Thailand. The government also limit the number of licenses.
    1. How likely is it for the sellers to form a cartel?
2. Suppose you are in debt and your lender will come take away all your money (and set fire on your house) if you are unable to pay back the loan. Cheating now would give you enough money to pay back the loan. Would you cheat?
3. Suppose you are one of the air purifier sellers and you (only you) plan to quit at the end of this year. Would collusion until the end of this year be optimal for you?

The above problems imply that the value of your discount factor matters!

A Model of Repeated Oligopoly

- Repeated game is also called "supergame"
- Suppose firms compete infinitely
- The present value (PV or V) of the profit for firm i is

where

A Model of Repeated Oligopoly

- Firm $i's$ profit can take the following 3 values:
  - $\pi_i = \pi^*$or profit from ..
  - $\pi_i = \pi^r$or profit from ..
  - $\pi_i = \pi^c$ or profit when ...

$$\pi^r > \pi^* > \pi^c$$

Condition to sustain collusion

- For collusion to be possible, each firm has to expect the total profit from collusion to be greater than cheating!

- Suppose firms play a grim strategy
  - Collude until one firm cheats. Then, not collude (play cournot) forever.

Condition to sustain collusion

- So, PV from colluding
- and PV from cheating

Condition to sustain collusion

Therefore, for firm i not to cheat

- If δ is large enough (meaning that firms puts enough value on their future profits), collusion can be sustained.

Example: the exact value of δ

Suppose there are 5 firms in the market. Each firm's marginal cost is 10 and the market demand curve is $P = 130 - Q$. Find the value of δthat makes collusion sustained in this case.

- We need to find$\pi_i^r, \pi_i^*, \pi_i^c$ for each firm.

Example: the exact value of δ (cont.)

Example: the exact value of δ (cont.)

Reference and Further Reading I


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Paul Klemperer & Margaret Meyer.
"Price Competition vs. Quantity Competition: The Role of Uncertainty," .
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