Oligopoly

Fun and games

Oligopoly

- An *oligopolist* is one of a small number of producers in an industry.
- The industry is an *oligopoly*.
  - All oligopolists produce a standardized product.
    - (If producers in an industry produce differentiated products, the industry is *monopolistically competitive*.)
  - We're eliminating the assumption of small market share, and of free entry and exit.
- Barriers to entry: similar to monopoly.

Oligopoly

- How much should a firm produce?
- Up to this point we have said to maximize profits simply set MR=MC.
- The profit maximization decision is not quite as simple in the world of Oligopoly
- The oligopolist's decision is best described in the context of a puzzle or game.

Duopoly

- We will study the case of two duopolists in a duopoly.
- Example:
  - ADM and Ajinomoto are the two producers of lysine.
  - Assumption (for simplicity): both producers have zero marginal cost.
    - So the profit-maximizing output is the same as the revenue-maximizing output.

Incentives to cheat

Price of lysine	*Quantity of lysine*	*Total revenue*	
$12	0	$0	
11	10	110	
10	20	200	
9	30	270	
8	40	320	
7	50	350	
6	60	360	← Outcome with "Collusion"
5	70	350	
4	80	320	
3	90	270	
2	100	200	
1	110	110	
0	120	0	← Perfect Competition Outcome

Incentives to cheat

- Cooperative outcome:
  - The two duopolists *collude* and form a *cartel*.
    - They act like a monopolist.
      - (Cartel agreements are illegal.)
  - Together they produce 60 million pounds.
    - Assume they split it equally: each produces 30 million pounds.
- Noncooperative outcome:
  - Each firm has an incentive to cheat and produce more than 30 million pounds.

Incentives to cheat

Price of lysine	*Quantity of lysine*	*Total revenue*
$12	0	$0
11	10	110
10	20	200
9	30	270
8	40	320
7	50	350
3	90	270
2	100	200
1	110	110
0	120	0

In a cartel, each producer makes $6 · 30 million = $180 million revenue.

If one producer "cheats" and produces 10 million pounds more, it makes $5 · 40 million = $200 million revenue.

If the other producer "cheats" also and produces 10 million pounds more, it makes $4 · 40 million = $160 million revenue.

Incentives to cheat

- Why do oligopolists, unlike monopolists, have an incentive to cheat (increase output)?
- The price effect from an additional unit of output is smaller for an oligopolist than for a monopolist
  - Producing an additional unit has two effects:
    - Positive quantity effect
    - Negative price effect
- The Oligopolist only cares about the price effect on its own units of output
- The oligopolist in our example only produced half of the total output in the industry

Price versus quantity competition

- Oligopolists can either choose a quantity of output and sell at market price (lysine)
- Or, they can choose a price and sell as much as they can at that price
- The type of competition matters because whether or not a rival can undercut depends on how difficult it is to increase output

Price versus quantity competition

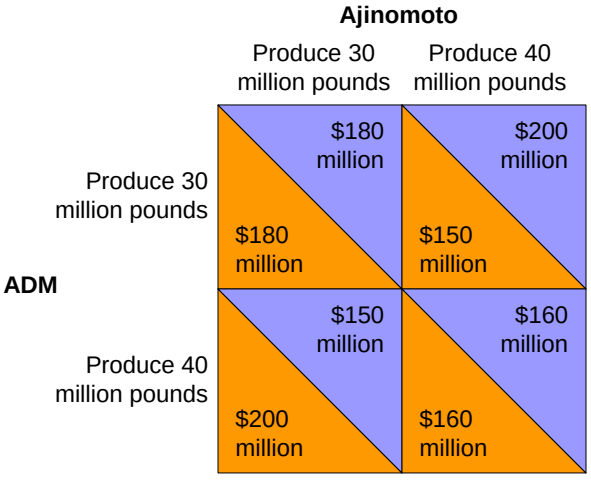
- *"Cournot"* – quantity competition
  - Firms' output capacity is constrained.
  - Firms can price above marginal cost
  - Example, Boeing and Airbus
- *"Bertrand"* – price competition
  - If firms have excess capacity they will engage in price competition.
  - Price will be driven down to marginal cost
  - Example, Air Canada and British Airways.

Game theory

- The study of how economic actors (producers, consumers) make decisions when the *"payoff"* depends not just on what they do, but also what someone else does, is called *game theory*.
  - The economic actors are called "players".
  - The payoffs are the firms' profits

Prisoners' dilemma

- The payoff matrix shows both players' *payoffs*



Equilibrium in games

- Given the action of one player, what would the other player do?

		Ajinomoto: Produce 30 million pounds	Ajinomoto: Produce 40 million pounds
ADM: Produce 30 million pounds		ADM: $180 million Ajinomoto: $180 million	ADM: $200 million Ajinomoto: $150 million
ADM: Produce 40 million pounds		ADM: $150 million Ajinomoto: $200 million	ADM: $160 million Ajinomoto: $160 million

Equilibrium in games

- In the prisoners' dilemma, regardless of what one player does, it is always best for the other player to "cheat".
  - That is, cheating is a *dominant strategy*.
  - The outcome in which both players play their dominant strategy is a *dominant strategy equilibrium*.
    - Dominant strategy equilibrium is a sub-class of *Nash equilibrium*.
  - This is why most cartels don't last very long

Tacit collusion

- Oligopolists may, however, be able to collude *"tacitly"*.
  - This is especially true when they interact repeatedly, not just once as in the prisoners' dilemma.
- Example, suppose that ADM and Anjinimoto play the prisoner's dilemma game several times (sell lysine for several years)

"Tit for tat"

- The firms will likely take into account the effect of their actions this year on future outcomes
- Sure ADM can increase production to 40 million pounds this year but Ajinimoto will likely also respond by increasing production next year
  - Sometimes referred to as *"tit for tat"*
- Cheating will result in costs in all future periods
  - The dominant strategy might be *"tacit collusion"*

The assessment

- When oligopolists manage to collude – overtly or tacitly – they create the same inefficiency as a monopolist.
  - Government intervention may improve efficiency (*competition policy*).
- But oligopolists may not be able to collude.
- We don't know a whole lot about this (yet).