

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 $MR=MC$.
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- 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.

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
5	70	350
4	80	320
3	90	270
2	100	200
1	110	110
0	120	0

Incentives to cheat

- Cooperative outcome:
 - The two duopolists *collude* and form a *cartel*.
 - They act like a monopolist.
 - (Cartel agreements are illegal.)
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- Noncooperative outcome:
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Incentives to cheat

<i>Price of lysine</i>	<i>Quantity of lysine</i>	<i>Total revenue</i>	In a cartel, each producer makes \$6 · 30 million = \$180 million 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	

Incentives to cheat

- Why do oligopolists, unlike monopolists, have an incentive to cheat (increase output)?
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 - Producing an additional unit has two effects:
 - Positive quantity effect
 - Negative price effect
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- 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
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- “*Bertrand*” – price competition
 - If firms have excess capacity they will engage in price competition
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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*.

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Prisoners' dilemma

- | | | Ajinomoto | |
|-----|---------------------------|-------------------------------|-------------------------------|
| | | Produce 30 million pounds | Produce 40 million pounds |
| ADM | Produce 30 million pounds | \$180 million / \$180 million | \$200 million / \$150 million |
| | Produce 40 million pounds | \$150 million / \$200 million | \$160 million / \$160 million |

Equilibrium in games

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

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

Equilibrium in games

- - 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 Ajinimoto play the prisoner’s dilemma game several times

“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
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The assessment

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