



Presentation to accompany

# **Principles of Microeconomics, Fourth Edition**

N. Gregory Mankiw

## **Lecture 11**

# Previously...

- Monopoly
  - Pricing/decision-making
  - Welfare effects
  - Government response
- Price discrimination

# Today...

- Oligopoly
  - duopoly
  - cartel, collusion
  - game theoretical approach

# Imperfect Competition

Imperfect competition refers to those market structures that fall between perfect competition and pure monopoly

Imperfect competition includes industries in which firms have competitors but do not face so much competition that they are price takers

# Imperfect Competition

## Types of Imperfectly Competitive Markets

### Oligopoly

Only a *few sellers*, each offering a similar or identical product to the others  
(tennis balls)

### Monopolistic Competition

*Many firms* selling products that are similar but not identical  
(novels, movies)

# Oligopoly

Because of the few sellers, the key feature of oligopoly is the tension between cooperation and self-interest

# Oligopoly

## Characteristics of an Oligopoly Market

- few sellers offering similar or identical products
- interdependent firms
- best off cooperating and acting like a monopolist by producing a small quantity of output and charging a price above marginal cost

Simplest type of oligopoly is a duopoly - an oligopoly with only two members

# Oligopoly

Quantity (in gallons)	Price	Total Revenue (and total profit)
0	\$120	\$ 0
10	110	1,100
20	100	2,000
30	90	2,700
40	80	3,200
50	70	3,500
60	60	3,600
70	50	3,500
80	40	3,200
90	30	2,700
100	20	2,000
110	10	1,100
120	0	0



# Oligopoly

## Price and Quantity Supplied

- The price of water in a perfectly competitive market would be driven to where the marginal cost is zero:  
 $P = MC = \$0$   
 $Q = 120$  gallons
- The price and quantity in a monopoly market would be where total profit is maximized:  
 $P = \$60$   
 $Q = 60$  gallons

# Oligopoly

## Price and Quantity Supplied

- The socially efficient quantity of water is 120 gallons, but a monopolist would produce only 60 gallons of water
- So what outcome then could be expected from duopolists?

# Oligopoly

The duopolists may agree on a monopoly outcome

## Collusion

An agreement among firms in a market about quantities to produce or prices to charge

## Cartel

A group of firms acting in unison

# Oligopoly

Although oligopolists would like to form cartels and earn monopoly profits, often that is not possible

Antitrust laws prohibit explicit agreements among oligopolists as a matter of public policy

# Oligopoly

When firms in an oligopoly individually choose production to maximize profit, they produce quantity of output greater than the level produced by monopoly and less than the level produced by competition

The oligopoly price is less than the monopoly price but greater than the competitive price (which equals marginal cost)

# Oligopoly

## Summary

Possible outcome if oligopoly firms pursue their own self-interests:

- Joint output is greater than the monopoly quantity but less than the competitive industry quantity
- Market prices are lower than monopoly price but greater than competitive price
- Total profits are less than the monopoly profit

# Oligopoly

How increasing the number of sellers affects the price and quantity:

- The output effect: Because price is above marginal cost, selling more at the going price raises profits
- The price effect: Raising production will increase the amount sold, which will lower the price and the profit per unit on all units sold

# Oligopoly

As the number of sellers in an oligopoly grows larger, an oligopolistic market looks more and more like a competitive market

The price approaches marginal cost, and the quantity produced approaches the socially efficient level



# Duopoly

**Game theory** is the study of how people behave in strategic situations

Strategic decisions are those in which each person, in deciding what actions to take, must consider how others might respond to that action

# Oligopoly

Because the number of firms in an oligopolistic market is small, each firm must act strategically

Each firm knows that its profit depends not only on how much it produces but also on how much the other firms produce

# Oligopoly

A **Nash equilibrium** is a situation in which economic actors interacting with one another each choose their best strategy given the strategies that all the others have chosen

# Duopoly – Strategic Interaction

The **prisoners' dilemma** provides insight into the difficulty in maintaining cooperation

Often people (firms) fail to cooperate with one another even when cooperation would make them better off

# Duopoly – Strategic Interaction

The prisoners' dilemma is a particular “game” between two captured prisoners that illustrates why cooperation is difficult to maintain even when it is mutually beneficial

# Duopoly – Strategic Interaction

2 players – prisoners, Bonnie & Clyde

2 strategies (actions)

- Confess
- Remain silent

Payoffs

- Both confess – each gets 8 years
- Both remain silent – each gets 1 year
- 1 remains silent, other confesses – 20 for the accused (who remained silent), 0 for the one who confessed

# Duopoly – Strategic Interaction

		Bonnie's Decision	
		Confess	Remain Silent
Clyde's Decision	Confess	Bonnie gets 8 years Clyde gets 8 years	Bonnie gets 20 years Clyde goes free
	Remain Silent	Bonnie goes free Clyde gets 20 years	Bonnie gets 1 year Clyde gets 1 year

# Duopoly – Strategic Interaction

The **dominant strategy** is the best strategy for a player to follow regardless of the strategies chosen by the other players

In our case:

Dominant strategy for both players  
(identical situation) – confess



# Duopoly – Strategic Interaction

## Equilibrium

- solution, in which no player has an incentive to deviate
- would not change the chosen strategy after they learned the outcome and were given the opportunity to reconsider

Equilibrium:

- strategy for each player

# Duopoly – Strategic Interaction

Dominant strategy for both – confess

- End up with 8 years
- If remained silent – would be better off

Cooperation is difficult to maintain, because cooperation is not in the best interest of the individual player

Self-interest makes it difficult for the oligopoly to maintain a cooperative outcome with low production, high prices, and monopoly profits

# Duopoly – Strategic Interaction

## Prisoner's dilemma

- illustrates also the situation with oligopoly
- and other (advertising, arms races, ...)

## Duopoly

- if collude and split production equally – highest possible profit
- if one breaks the agreement & produces more – higher share of the market – higher profit
- if both produce more (competition) – lower profits

# Duopoly – Strategic Interaction

		Jack's Decision	
		Sell 40 Gallons	Sell 30 Gallons
Jill's Decision	Sell 40 Gallons	Jack gets \$1,600 profit Jill gets \$1,600 profit	Jack gets \$1,500 profit Jill gets \$2,000 profit
	Sell 30 Gallons	Jack gets \$2,000 profit Jill gets \$1,500 profit	Jack gets \$1,800 profit Jill gets \$1,800 profit

# Duopoly – Strategic Interaction

Is cooperation possible?

Key – **repeated interaction**

If the players ‘play the game’ repeatedly, their behavior differs

- know that have to keep the agreements because will not get any profits in the future
- price of deviating (breaking the agreement) = all the profits from the cooperative strategy in the future

Players can build reputation

# Summary I

- Oligopolists maximize their total profits by forming a cartel and acting like a monopolist
- If oligopolists make decisions about production levels individually, the result is a greater quantity and a lower price than under the monopoly outcome

# Summary II

- The prisoners' dilemma shows that self-interest can prevent people from maintaining cooperation, even when cooperation is in their mutual self-interest
- The logic of the prisoners' dilemma applies in many situations, including oligopolies

# Summary III

- Policymakers use the antitrust laws to prevent oligopolies from engaging in behavior that reduces competition