In this chapter, look for the answers to these questions:

- What market structures lie between perfect competition and monopoly, and what are their characteristics?
- What outcomes are possible under oligopoly?
- Why is it difficult for oligopoly firms to cooperate?
- How are antitrust laws used to foster competition?

**BETWEEN MONOPOLY AND PERFECT 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.
- Types of Imperfectly Competitive Markets
  - **Oligopoly**
    - Only a few sellers, each offering a similar or identical product to the others.
  - **Monopolistic Competition**
    - Many firms selling products that are similar but not identical.

**MARKETS WITH ONLY A FEW SELLERS**

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

**A Duopoly Example**

- A duopoly is an oligopoly with only two members. It is the simplest type of oligopoly.

<table>
<thead>
<tr>
<th>Quantity (in gallons)</th>
<th>Price</th>
<th>Total Revenue (and total profit)</th>
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<tbody>
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A Duopoly Example

- **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
  - 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?

**The Market for Water**

- In a competitive market, quantity would equal 120 and \( P = MC = $0 \).
- A monopoly would produce 60 gallons and charge $60. Note that \( P > MC \).
- Total industry output with a duopoly will probably exceed 60, but be less than 120.

**EXAMPLE:** Cell Phone Duopoly in Smalltown

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- Smalltown has 140 residents
- The “good”: cell phone service with unlimited anytime minutes and free phone
- Smalltown’s demand schedule
- Two firms: Cingular, Verizon (duopoly: an oligopoly with two firms)
- Each firm’s costs: \( FC = $0, \ MC = $10 \)

**EXAMPLE:** Cell Phone Duopoly in Smalltown

<table>
<thead>
<tr>
<th>( P )</th>
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**EXAMPLE:** Cell Phone Duopoly in Smalltown

- One possible duopoly outcome: collusion
- **Collusion:** an agreement among firms in a market about quantities to produce or prices to charge
- Cingular and Verizon could agree to each produce half of the monopoly output:
  - For each firm: \( Q = 30, \ P = $40, \) profits = $900
- **Cartel:** a group of firms acting in unison, *e.g.*, Cingular and Verizon in the outcome with collusion

**EXAMPLE:** Cell Phone Duopoly in Smalltown

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**EXAMPLE:** Cell Phone Duopoly in Smalltown

- Competitive outcome: \( P = MC = $10 \)
  - \( Q = 120 \)
  - Profit = \$0\)

- Monopoly outcome:
  - \( P = $40 \)
  - \( Q = 60 \)
  - Profit = \$1,800\)

**EXAMPLE:** Cell Phone Duopoly in Smalltown

- Duopoly outcome with collusion:
  - Each firm agrees to produce \( Q = 30 \)
  - Cingular, earns profit = \$900\)

- If Cingular reneges on the agreement and produces \( Q = 40 \), what happens to the market price?
  - Cingular’s profits?

- Is it in Cingular’s interest to renege on the agreement?
EXAMPLE: Cell Phone Duopoly in Smalltown

Answers

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If both firms stick to agreement, each firm’s profit = $900

If Cingular reneges on agreement and produces $Q = 40$:
- Market quantity = 70, $P = $35
- Cingular’s profit = $40 \times ($35 – 10) = $1000
- Cingular’s profits are higher if it reneges.

Verizon will conclude the same, so both firms renge, each produces $Q = 40$:
- Market quantity = 80, $P = $30
- Each firm’s profit = $40 \times ($30 – 10) = $800

EXAMPLE: Cell Phone Duopoly in Smalltown

Collusion vs. Self-Interest

• Both firms would be better off if both stick to the cartel agreement.
• But each firm has incentive to renege on the agreement.
• Lesson:
  It is difficult for oligopoly firms to form cartels and honor their agreements.

The oligopoly equilibrium

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If each firm produces $Q = 40$, market quantity = 80
- Cingular’s profit = $800

Is it in Cingular’s interest to increase its output further, to $Q = 50$?
- Market quantity = 90, $P = $25
- Cingular’s profit = $50 \times ($25 – 10) = $750
- Cingular’s profits are higher at $Q = 40$ than at $Q = 50$.

The same is true for Verizon.

• Nash equilibrium: a situation in which economic participants interacting with one another each choose their best strategy given the strategies that all the others have chosen
  - Our duopoly example has a Nash equilibrium in which each firm produces $Q = 40$.
    - Given that Verizon produces $Q = 40$, Cingular’s best move is to produce $Q = 40$.
    - Given that Cingular produces $Q = 40$, Verizon’s best move is to produce $Q = 40$.

EXAMPLE: Cell Phone Duopoly in Smalltown

The Equilibrium for an Oligopoly

A Comparison of Market Outcomes

When firms in an oligopoly individually choose production to maximize profit,
- $Q$ is greater than monopoly $Q$
  but smaller than competitive market $Q$
- $P$ is greater than competitive market $P$
  but less than monopoly $P$
The Output & Price Effects

- Increasing output has two effects on a firm’s profits:
  - **output effect**: If $P > MC$, selling more output raises profits.
  - **price effect**: Raising production increases market quantity, which reduces market price and reduces profit on all units sold.
- If output effect > price effect, the firm increases production.
- If price effect > output effect, the firm reduces production.

Competition, Monopolies, and Cartels

- 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.
- 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.

Equilibrium for an 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.
- 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).

How the Size of an Oligopoly Affects the Market Outcome

- 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.
  - 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.

GAME THEORY AND THE ECONOMICS OF COOPERATION

- **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.
- Because the number of firms in an oligopolistic market is small, each firm must act strategically.
- Each firm knows that its profit depends not
The Prisoners’ Dilemma

- 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.
- 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.

Prisoners’ Dilemma Example

- The police have caught Bonnie and Clyde, two suspected bank robbers, but only have enough evidence to imprison each for 1 year.
- The police question each in separate rooms, offer each the following deal:
  - If you confess and implicate your partner, you go free.
  - If you do not confess but your partner implicates you, you get 20 years in prison.
  - If you both confess, each gets 8 years in prison.

Oligopolies as a Prisoners’ Dilemma

- The dominant strategy is the best strategy for a player to follow regardless of the strategies chosen by the other players.
- Cooperation is difficult to maintain, because cooperation is not in the best interest of the individual player.
Oligopolies as a Prisoners’ Dilemma

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

Figure 4 An Arms-Race Game

Decision of the United States (U.S.)

- Arm
  - U.S. at risk
  - USSR at risk
- Disarm
  - U.S. at risk and weak
  - USSR safe and powerful

Disarm

U.S. at risk and weak
USSR safe and powerful

Figure 5 A Common-Resource Game

Exxon’s Decision

- Drill Two Wells
  - Exxon gets $4 million profit
  - Chevron gets $4 million profit
- Drill One Well
  - Exxon gets $3 million profit
  - Chevron gets $6 million profit

Chevron’s Decision

- Drill Two Wells
  - Exxon gets $6 million profit
  - Chevron gets $3 million profit
- Drill One Well
  - Exxon gets $5 million profit
  - Chevron gets $5 million profit

Cingular & Verizon in the Prisoners’ Dilemma

Each firm’s dominant strategy: renege on agreement, produce \( Q = 40 \).

A The “fare wars” game

The players: American Airlines and United Airlines

The choice: cut fares by 50% or leave fares alone.

- If both airlines cut fares, each airline’s profit = $400 million
- If neither airline cuts fares, each airline’s profit = $600 million
- If only one airline cuts its fares, its profit = $800 million the other airline’s profits = $200 million

Answers

Nash equilibrium: both firms cut fares

American Airlines

Cut fares
Don’t cut fares

$400 million
$200 million

$800 million
$600 million

United Airlines

Cut fares
Don’t cut fares

$400 million
$800 million

$200 million
$600 million
Why People Sometimes Cooperate

- Firms that care about future profits will cooperate in repeated games rather than cheating in a single game to achieve a one-time gain.

PUBLIC POLICY TOWARD OLIGOPOLIES

- Cooperation among oligopolists is undesirable from the standpoint of society as a whole because it leads to production that is too low and prices that are too high.

Restraint of Trade and the Antitrust Laws

- Antitrust laws make it illegal to restrain trade or attempt to monopolize a market.
  - Sherman Antitrust Act of 1890
  - Clayton Antitrust Act of 1914

Controversies over Antitrust Policy

- Antitrust policies sometimes may not allow business practices that have potentially positive effects:
  - Resale price maintenance
  - Predatory pricing
  - Tying

Controversies over Antitrust Policy

- Resale Price Maintenance (or fair trade)
  - occurs when suppliers (like wholesalers) require retailers to charge a specific amount
  - Predatory Pricing
    - occurs when a large firm begins to cut the price of its product(s) with the intent of driving its competitor(s) out of the market
  - Tying
    - when a firm offers two (or more) of its products together at a single price, rather than separately

1. Resale Price Maintenance ("Fair Trade")

- Occurs when a manufacturer imposes lower limits on the prices retailers can charge.
- Is often opposed because it appears to reduce competition at the retail level.
- Yet, any market power the manufacturer has is at the wholesale level; manufacturers do not gain from restricting competition at the retail level.
- The practice has a legitimate objective: preventing discount retailers from free-riding on the services provided by full-service retailers.

2. Predatory Pricing

- Occurs when a firm cuts prices to prevent entry or drive a competitor out of the market, so that it can charge monopoly prices later.
- Illegal under antitrust laws, but hard for the courts to determine when a price cut is predatory and when it is competitive & beneficial to consumers.
- Many economists doubt that predatory pricing is a rational strategy:
  - It involves selling at a loss, which is extremely costly for the firm.
  - It can backfire.
3. Tying

- Occurs when a manufacturer bundles two products together and sells them for one price (e.g., Microsoft including a browser with its operating system).
- Critics argue that tying gives firms more market power by connecting weak products to strong ones.
- Others counter that tying cannot change market power: Buyers are not willing to pay more for two goods together than for the goods separately.
- Firms may use tying for price discrimination, which is not illegal, and which sometimes increases economic efficiency.