Chapter 27
Oligopoly and Strategic Behavior

Introduction

As your jet taxis its way around the airport, you begin to notice a pattern. One company’s wide-bodied airlines were manufactured by Boeing, and another by Airbus.

During the past several years, these two firms have been the only manufacturers of large commercial passenger jets.

In this chapter you will learn how quantities and prices get determined in a market with so few firms competing each other.

Learning Objectives

• Outline the fundamental characteristics of oligopoly
• Understand how to apply game theory to evaluate the pricing strategies of oligopolistic firms
• Identify features of an industry that help or hinder efforts to form a cartel that seeks to restrain output and earn economic profits
• Illustrate how network effects and market feedback can explain why some industries are oligopolies
• Explain why multiproduct firms selling complimentary sets of products may or may not want their products to be compatible with those of their competitors
Chapter Outline

- Oligopoly
- Strategic Behavior and Game Theory
- The Cooperative Game: A Collusive Cartel
- Network Effects
- Product Compatibility in Multiproduct Oligopolies Facing Network Effects
- Comparing Market Structures

Did You Know That...

- Google, Inc., operator of the well-known Internet search engine, recently paid almost $1 billion to serve as the exclusive provider of search technology and text-based advertisements on the social networking site MySpace?
- This enabled Google to replace Yahoo as the search engine utilized by visitors to this Web site.
- In this chapter, you will learn about how firms in industries containing just a few competitors can benefit—or lose out—when a consumer’s willingness to purchase their products is influenced by other consumers’ decisions about whether or not to buy them.

Oligopoly

- An important market structure that we have yet to discuss involves a situation in which a few large firms comprise an entire industry.
- They are not perfectly competitive, nor even monopolistically competitive, and because there are several of them a pure monopoly doesn’t exist.
Oligopoly (cont'd)

• Oligopoly
  – A market situation in which there are very few sellers.
  – Each seller knows that the other sellers will react to its changes in prices and quantities.

Oligopoly (cont'd)

• Characteristics of oligopoly
  – Small number of firms
  – Interdependence
    • Strategic dependence

Oligopoly (cont'd)

• Strategic Dependence
  – A situation in which one firm's actions with respect to price, quality, advertising, and related changes may be strategically countered by the reactions of one or more other firms in the industry.
  – Such dependence can exist only when there are a limited number of firms in an industry.
Oligopoly (cont'd)

- Why oligopoly occurs
  - Economies of scale
  - Barriers to entry
  - Mergers
    - Vertical mergers
    - Horizontal mergers

Oligopoly (cont'd)

- Vertical Merger
  - The joining of a firm with another to which it sells an output or from which it buys an input

- Horizontal Merger
  - The joining of firms that are producing or selling a similar product

Oligopoly (cont'd)

- Measuring industry concentration
  - Concentration Ratio
    - The percentage of all sales contributed by the leading four or leading eight firms in an industry
    - Sometimes called the industry concentration ratio
Table 27-1 Computing the Four-Firm Concentration Ratio

<table>
<thead>
<tr>
<th>Firm</th>
<th>Annual Sales ($ millions)</th>
<th>Total number of firms in industry = 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>150</td>
<td>400</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>5 through 25</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>450</td>
<td></td>
</tr>
</tbody>
</table>

Four-firm concentration ratio = (400/450) = 88.9%

Table 27-2 Four-Firm Domestic Concentration Ratios for Selected U.S. Industries

<table>
<thead>
<tr>
<th>Industry</th>
<th>Share of Total Sales Accounted for by the Top Four Firms (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobacco products</td>
<td>99</td>
</tr>
<tr>
<td>Breakfast cereals</td>
<td>83</td>
</tr>
<tr>
<td>Household vacuum cleaners</td>
<td>69</td>
</tr>
<tr>
<td>Primary aluminum</td>
<td>59</td>
</tr>
<tr>
<td>Soft drinks</td>
<td>47</td>
</tr>
<tr>
<td>Computers</td>
<td>45</td>
</tr>
<tr>
<td>Printing and publishing</td>
<td>34</td>
</tr>
<tr>
<td>Commercial banking</td>
<td>29.5</td>
</tr>
</tbody>
</table>

Source: U.S. Bureau of the Census.

E-Commerce Example: Market Concentration in the Personal Computer Industry

- The computer printer industry generated $201.1 billion in revenues in a recent year, and several firms had a high market share.
- Of the four: Hewlett-Packard earned $35.0 billion, Dell $27.9 billion, Lenovo $14.1 billion and Acer $13.7 billion.
- These four firms had a concentration ratio for the computer printer industry of 45.1%
Oligopoly (cont’d)

- Oligopoly, Efficiency and Resource Allocation
  - To the extent oligopolists have market power—the ability to individually affect the market price for the industry’s output—they lead to resource misallocations, just as monopolies do.
  - But if oligopolies occur because of economies of scale, consumers might actually end up paying lower prices.
  - All in all, there is no definite evidence of serious resource misallocation in the United States because of oligopolies.

Oligopoly (cont’d)

- The more U.S. firms face competition from the rest of the world, the less any current oligopoly will be able to exercise market power.

Strategic Behavior and Game Theory

- Explaining the pricing and output behavior of oligopoly markets
  - Reaction Function
    - The manner in which one oligopolist reacts to a change in price, output, or quality made by another oligopolist in the industry
Strategic Behavior and Game Theory (cont'd)

• Game Theory
  - A way of describing the various possible outcomes in any situation involving two or more interacting individuals when those individuals are aware of the interactive nature of their situation and plan accordingly
  - The plans made by these individuals are known as game strategies.

Strategic Behavior and Game Theory (cont'd)

• Cooperative Game
  - A game in which the players explicitly cooperate to make themselves better off
    - Firms collude for higher than competitive rates of return

• Noncooperative Game
  - A game in which the players neither negotiate nor cooperate in any way
    - Relatively few firms with some ability to change price

Strategic Behavior and Game Theory (cont'd)

• Zero-Sum Game
  - A game in which any gains within the group are exactly offset by equal losses by the end of the game
Strategic Behavior and Game Theory (cont'd)

- **Negative-Sum Game**
  - A game in which players as a group lose at the end of the game

- **Positive-Sum Game**
  - A game in which players as a group are better off at the end of the game

Strategic Behavior and Game Theory (cont'd)

- **Strategies in noncooperative games**
  - **Strategy**
    - Any rule that is used to make a choice such as "always pick heads"
  - **Dominant Strategies**
    - Strategies that always yield the highest benefit

Example: The Prisoners' Dilemma

- A real-world example of game theory occurs when two people involved in a bank robbery are caught.
- What should they do when questioned by police?
- The result has been called the prisoners’ dilemma.
Example: The Prisoners’ Dilemma (cont'd)

• The two are interrogated separately and their interrogator indicates the following:
  1. If both confess, they each get five years in jail for the crime.
  2. If neither confesses, they each get two years based on a lesser charge.
  3. If only one confesses, that person will go free, but the other receives ten years.

Example: The Prisoners’ Dilemma (cont'd)

• Question
  - What would you do in this situation, keeping in mind no cooperation is involved between the two prisoners?

Example: The Prisoners’ Dilemma (cont'd)

• The prisoners’ alternatives are shown in a payoff matrix. There are four possibilities:
  1. Both confess.
  2. Neither confesses.
  3. Prisoner 1 confesses; Prisoner 2 doesn’t.
  4. Prisoner 2 confesses; Prisoner 1 doesn’t.
Figure 27-1  The Prisoners’ Dilemma Payoff Matrix

Example: The Prisoner’s Dilemma (cont’d)

• Regardless of what the other prisoner does, each person is better off if she or he confesses.
• So confessing is the dominant strategy, and each ends up behind bars for five years.

Strategic Behavior and Game Theory (cont’d)

• Applying game theory to pricing strategies
  ~ Would you choose a high price or a low price?
  • Remember
    ~ No collusion
Strategic Behavior and Game Theory (cont'd)

- **Opportunistic Behavior**
  - Actions that, because long-run benefits of cooperation are perceived to be smaller, focus on short-run gains
  - An example might be writing a check that you know will bounce.
  - Implies a noncooperative game which is not realistic—we make repeat transactions

Strategic Behavior and Game Theory (cont'd)

- **Tit-for-Tat Strategic Behavior**
  - In game theory, cooperation that continues so long as the other players continue to cooperate
The Cooperative Game: A Collusive Cartel

- **Cartel**
  - An association of producers in an industry that agree to set common prices and output quotas to prevent competition.

The Cooperative Game: A Collusive Cartel (cont’d)

- **The Rationale for a Cartel and the Seeds of Its Undoing**
  - If all the firms in an industry can find a way to cooperatively determine how much to produce to maximize their combined profits, then they can form a cartel and jointly act as a single producer. This means that they must collude. They must act together to attain the same outcome that a monopoly firm would aim to achieve.

The Cooperative Game: A Collusive Cartel (cont’d)

- **Cutting back on production**
  - A fledgling cartel faces two fundamental problems.
    - A monopoly producer maximizes economic profits by restraining its production to a rate below the competitive output rate.
    - As soon as all producers in the cartel begin restraining production and charging a higher price, each individual member could theoretically increase its revenues and profits by charging a slightly lower price, raising production, and selling more units.
The Cooperative Game: A Collusive Cartel (cont’d)

- Enforcing a cartel agreement
  - Four conditions make it more likely that firms will be able to coordinate their efforts to restrain output and detect cheating, thereby reducing the temptation for participating firms to cheat:
    - A small number of firms in the industry.
    - Relatively undifferentiated products.
    - Easily observable prices.
    - Little variation in prices.

The Cooperative Game: A Collusive Cartel (cont’d)

- Why Cartel Agreements Usually Break Down
  - Studies have shown that most cartel agreements do not last for more than 10 years. In many cases, cartel agreements break down more quickly than that.
  - One reason that cartels tend to break down is that the economic profits that existing firms obtain from holding prices above competitive levels provide an incentive for new firms to enter the market.
  - Variations in overall economic activity also tend to make cartels unsustainable.

Network Effects

- Network Effect
  - A situation in which a consumer’s willingness to purchase a good or service is influenced by how many others also buy or have bought the item
Network Effects (cont'd)

- **Positive Market Feedback**
  - Potential for a network effect to arise when an industry’s product catches on

- **Negative Market Feedback**
  - The tendency for industry sales to spiral downward rapidly when the product falls out of favor

Network Effects (cont’d)

- In some industries, a few firms can potentially reap most of the benefits of positive market feedback.
- There is a network effect present in the online auction industry, in which eBay, Amazon and Yahoo account for more than 80% of sales.
- When a small number of firms secure the bulk of payoffs resulting from positive market feedback, oligopoly is likely to emerge as the prevailing market structure.

Product Compatibility in Multiproduct Oligopolies Facing Network Effects

- In addition to helping make industries more concentrated, network effects influence decisions that firms make regarding product compatibility.
- Should a firm that produces two or more products that consumers regard as complements sell each one in a form that allows consumers its products only as a set? Or should the firm sell each product individually, perhaps in conjunction with a complimentary product offered by a competing firm?
• Sometimes firms stand to gain from making complimentary products it sells incompatible with those of competitors, such as Apple did with their iPod during the 2000s.
• Other times, a firm can lose from making incompatible products, such as Sony did back in the day of videocassettes.

• Multiproduct firm
  - A firm that produces and sells two or more different items.

• Of course, oligopolistic multiproduct firms cannot make choices about product compatibility in isolation from the decisions of their competitors. They must also take into account the reactions of other firms.
• To see how industry outcomes with regard to product compatibility can differ, see Figure 27-3.
Now consider a different industry situation, depicted by the payoff matrices in Figure 27-4, in which Firm 1 and Firm 2 recognize in advance that network effects will result in one of two formats winning out over the other with consumers.
Comparing Market Structures

- We have looked at perfect competition, pure monopoly, monopolistic competition and oligopoly.
- We are in a position to compare the attributes of these four different market structures.

### Table 27-3 Comparing Market Structures

<table>
<thead>
<tr>
<th>Market Structure</th>
<th>Number of Sellers</th>
<th>Unrestricted Entry and Exit</th>
<th>Ability to Set Price</th>
<th>Long-Run Economic Profits Possible</th>
<th>Product Differentiation</th>
<th>Nonprice Competition</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perfect Competition</td>
<td>Numerous</td>
<td>Yes</td>
<td>None</td>
<td>No</td>
<td>Considerable</td>
<td>Yes</td>
<td>Applications, railroad rates, real estate, retail trade</td>
</tr>
<tr>
<td>Monopolistic competition</td>
<td>Many</td>
<td>Yes</td>
<td>Some</td>
<td>No</td>
<td>Considerable</td>
<td>Yes</td>
<td>Airlines, cable TV, long-distance telephone service</td>
</tr>
<tr>
<td>Oligopoly</td>
<td>Few</td>
<td>Postal</td>
<td>Some</td>
<td>Yes</td>
<td>Frequent</td>
<td>Yes</td>
<td>armoured truck, college education, some electric companies, some local telephone companies</td>
</tr>
<tr>
<td>Pure monopoly</td>
<td>One</td>
<td>No for entry</td>
<td>Considerable</td>
<td>Yes</td>
<td>Limited to virtual</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>
Issues and Applications: Oligopoly in the Global Commercial Aircraft Industry (cont’d)

- Figure 27-5 displays the market shares of Airbus and Boeing since 1996. A rise in the market share of one firm must come at the expense of the other firms.
- Strategic dependence is as pronounced as it can possibly be in a duopoly setting.
- In the most recent year for which data are plotted in Figure 27-5, what was the approximate one-firm concentration ratio in the large-commercial-aircraft industry, and what was this industry’s two-firm concentration ratio?

Figure 27-5 Market Shares in Global Sales of Large Commercial Airliners

Source: U.S. Department of Transportation.

Summary Discussion of Learning Objectives

- The fundamental characteristics of oligopoly
  - Economies of scale
  - Barriers to entry
  - Strategic dependence
- Applying game theory to evaluate the pricing strategies of oligopolistic firms
  - Game theory looks at competition for payoffs
  - Depends on the strategies that others employ
Summary Discussion of Learning Objectives (cont'd)

• Industry Features That Contribute to or Detract Efforts to Form a Cartel
  – A small number of firms in the industry
  – Relatively undifferentiated products
  – Easily observable prices
  – Little variation in prices

Summary Discussion of Learning Objectives (cont'd)

• Why network effects and market feedback encourage oligopoly
  – Network effects arise when a consumer’s demand for a good or service is affected by how many other consumers also use the item.
  – Oligopoly can arise because a handful of firms may be able to capture all of the positive market feedback.

Summary Discussion of Learning Objectives (cont'd)

• Multiproduct Firms and Product Compatibility
  – Product compatibility refers to the capability of an item sold by one firm to function with another firm’s complementary product.
  – A multiproduct firm selling two or more complementary products may opt for incompatibility as it creates differentiation. A format battle may ensue, however.