Chapter 27
Oligopoly and Strategic Behavior

Learning Objectives

After you have studied this chapter you should be able to

1. list three reasons for the existence of oligopolies;
2. calculate concentration ratios and recognize their limitations;
3. distinguish between a cooperative and a noncooperative game;
4. answer questions concerning the essence of the kinked demand curve and enumerate criticisms of the kinked demand curve model;
5. distinguish among zero-sum, positive-sum, and negative-sum games;
6. recognize three ways that existing oligopolists deter entry into the industry;
7. define network effects and explain how they can create positive or negative market feedback that can affect industry concentration;
8. compare the main features of perfect competition, monopoly, monopolistic competition, and oligopoly.

Outline

1. Oligopoly is a market situation in which there are a very few sellers, each of which expects a reaction from its rivals to changes in its price and quantity; there are two major characteristics of oligopolies: a small number of firms and interdependence.

2. There are at least three reasons for the emergence of oligopolistic industries: economies of scale, barriers to entry, and merger (horizontal or vertical).
   (a) Four- or eight-firm concentration ratios are often calculated to determine the extent to which an industry is “monopolized.”
   (b) Over time some industries experience drastic changes (up or down) in their concentration ratios; others show little change.
3. Before an oligopoly situation can be analyzed with respect to price and output, specific assumptions about rival reactions must be made; a different model arises with each assumption regarding the oligopolist’s reaction function.

4. Because there is interdependence among oligopolistic competitors economists have developed an approach, called game theory, to describe how such firms interact rationally.
   (a) If firms collude and form a cartel, the game is referred to as a cooperative game.
   (b) If cartels are too expensive to form or enforce, then a noncooperative game is played among oligopolists.
   (c) Games are classified as being zero-sum, positive-sum, or negative-sum.

5. Oligopolistic decision makers derive a strategy, or rule used to make a choice; a dominant strategy is one that always yields the highest benefit, regardless of what the other oligopolists do.

6. The most famous example of game theory is called the prisoners’ dilemma in which it can be shown that (under specified conditions) in situations in which there is more than one party to a crime, the dominant strategy for each prisoner is to confess.

7. A payoff matrix indicates the consequences of the strategies chosen by the players in the game.

8. Another oligopoly model results from assuming that rivals will match a price reduction, but ignore a price increase.
   (a) In such a situation, for the oligopolist the price elasticity of demand above the current price will be very high, and the price elasticity of demand below the current price will be very low; the result is a kinked demand curve and a discontinuous marginal revenue curve.
   (b) One implication of the kinked demand curve model is price rigidity; any change in marginal costs in the discontinuous gap of the marginal revenue curve will leave price unaltered.
   (c) One criticism of this analysis is that it offers no explanation of how the current price was established; empirical evidence indicates that oligopolies tend to change price more frequently than do monopolies.

9. Sometimes even if no formal cartel arises among oligopolists, tacit collusion in the form of price leadership can occur; the largest firm announces its price and smaller competitors then follow this lead.

10. On occasion smaller rivals may set price too far below the price leader and a price war results.

11. Strategic decision making could lead to pricing or investing policies that deter entry by potential competitors; entry-deterrence strategies include threats of a price war, investment in excess capacity by existing firms, inducing governments to restrict entry, and raising switching costs to customers.

12. The limit-pricing model suggests that existing oligopolists collude to set the highest price they can without encouraging entry into the industry.
13. Network effects occur when the willingness of consumers to buy a product depends on how many other consumers purchase it.

(a) When network effects are an important feature of a product, an industry can experience positive market feedback, or a tendency for its product to come into favor with additional consumers because other consumers have chosen to purchase it; if a few firms can reap most of the benefits of positive market feedback, then the result can be greater concentration in the industry.

(b) Network effects can also result in negative market feedback, which occurs if some consumers cut back on purchases of a product, causing it to fall out of favor with other consumers.

## Key Terms

<table>
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<tr>
<th>Oligopoly</th>
<th>Price war</th>
<th>Game theory</th>
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<tr>
<td>Concentration ratio</td>
<td>Payoff matrix</td>
<td>Noncooperative game</td>
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<td>Horizontal merger</td>
<td>Vertical merger</td>
<td>Cooperative game</td>
</tr>
<tr>
<td>Reaction function</td>
<td>Network effect</td>
<td>Strategic dependence</td>
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## Key Concepts

| Zero-sum game | Entry deterrence strategy | Dominant strategies |
| Positive-sum game | Price leadership | Prisoners’ dilemma |
| Negative-sum game | Limit pricing model | Opportunistic behavior |
| Tit-for-tat strategic behavior | Negative market feedback | Positive market feedback |

## Completion Questions

Fill in the blank or circle the correct term.

1. Two key characteristics of oligopoly are ___________ and ___________.

2. Oligopolies may emerge because of ________________, ________________, and ________________.

3. Concentration ratios (fall, rise) as the definition of “industry” is narrowed, and they ___________ as the definition is broadened.

4. Economists have developed an approach to analyze the interdependence among oligopolists called ________________ theory.

5. If oligopolists collude and form a cartel this is a ____________ game; if cartels are too expensive to form or enforce then oligopolists will play a ________________ game.

6. Games are referred to as ________________-sum if one player’s benefit is exactly equal to the expense of the other, ________________-sum if the sum of the players’ benefit is positive, and ________________-sum if the sum of the players’ benefit is negative.

7. The most famous example of game theory is ________________ in which the dominant strategy of prisoners (usually) is to (confess, not confess).
8. Assume that firm B is an oligopolist. If its rivals match its price reductions but ignore its price increases, firm B will have a ______________ demand curve; its marginal revenue curve will be ______________; firm B probably (will, will not) change its price very often. Because its demand curve is negatively sloped, in equilibrium firm B’s (P = MC, P > MC, P < MC) and from society’s point of view it will produce (too little, too much, just enough) and its price will be (too low, too high, just right).

9. Even if no formal cartel arises in an oligopolistic industry, tacit collusion in the form of ______________ leadership may result; occasionally such a system breaks down and a price ______________ results.

10. Existing oligopolists can use the following strategies to deter entry: ____________________, ____________________, and ____________________; the ____________________ model suggests that existing firms set the highest price they can without encouraging entry.

11. When a consumer’s willingness to purchase a good or service is influenced by how many other consumers also purchase the item, there is a ______________.

12. (Positive; Negative) market feedback arises when there is a tendency for a good or service to come into favor with additional consumers because other consumers have chosen to buy the item; (positive; negative) market feedback arises when there is tendency for a good or service to fall out of favor with more consumers because other consumers have stopped purchasing the item.

**True-False Questions**

Circle the T if the statement is true, the F if it is false. Explain to yourself why a statement is false.

T  F  1. The main characteristic of the oligopoly market structure is that an oligopolist must consider the reaction of its rivals.

T  F  2. Perhaps the strongest reason for the existence of oligopolies is economies of scale relative to market demand.

T  F  3. Concentration ratios provide an accurate measure of the degree of monopoly power in an industry.

T  F  4. If an oligopolist’s rivals match all of its price changes, its demand curve will be kinked.

T  F  5. Cartels are usually expensive to set up and enforce.

T  F  6. A dominant strategy is one that is always preferred by a player, regardless of what other players do.

T  F  7. Price wars result because all players are in a positive-sum game.

T  F  8. The limit-pricing model suggests that oligopolists set price at the highest price they can.

T  F  9. Collusion may be found in both formal and tacit arrangements.

T  F  10. Opportunistic behavior helps keep collusive agreements together.

T  F  11. If a firm’s strategy is to continue to cooperate with other firms in a collusive manner as long as other firms also do so, then it engages in tit-for-tat strategic behavior.

T  F  12. The strongest element of the theory of the kinked demand curve is its ability to explain the current price and output decision of an oligopolist.
T F 13. A firm pursues an entry deterrence strategy if it engages in behavior designed to raise a potential competitor’s cost of entering the industry.

T F 14. A network effect arises any time that one consumer’s demand for an item is influenced by how many other consumers purchase the item.

T F 15. Positive market feedback can help explain why one firm can develop a position of dominance within an industry, but it cannot help explain why an entire industry might rapidly expand when the industry product is subject to network effects.

■ Multiple Choice Questions

Circle the letter that corresponds to the best answer.

1. In which of the following will the players’ sum of benefits be positive?
   (a) negative-sum game
   (b) zero-sum game
   (c) positive-sum game
   (d) prisoners’ dilemma

2. If oligopoly B’s rivals ignore its price increases but match its price decreases, then B’s demand curve will be
   (a) discontinuous.
   (b) kinked at the going price.
   (c) below its marginal revenue curve.
   (d) proportionate to the industry demand curve.

3. In long-run equilibrium for a profit-maximizing oligopolist,
   (a) MR = MC.
   (b) P > MR.
   (c) economic profits can be greater than zero.
   (d) All of the above

4. Which firms must have zero economic profits in the long run?
   (a) monopolist, perfect competitor
   (b) oligopolist, monopolistic competitor
   (c) perfect competitor, monopolistic competitor
   (d) perfect competitor, oligopolist

5. Of the following, the best explanation for the existence of oligopolies is
   (a) no economies of scale exist.
   (b) large economies of scale relative to market demand.
   (c) advertising.
   (d) one firm has exclusive ownership of an important raw material.
6. In an oligopolistic industry, entry will result if
   (a) normal profits exist.
   (b) the industry LAC curve is below the market demand curve.
   (c) the industry LAC curve is above the market demand curve.
   (d) advertising is permitted.

7. The kinked demand curve theory
   (a) is supported by empirical evidence.
   (b) requires that an oligopolist’s rivals exactly match its price changes.
   (c) predicts price rigidity.
   (d) requires collusion.

8. Which of the following is a strategy to deter entry by potential competitors?
   (a) raising switching costs to customers
   (b) investment in excess capacity by existing firms
   (c) limit-pricing strategy
   (d) All of the above

9. The four-firm concentration ratio is
   (a) the sum of the dollar sales of the four top-selling firms in an industry.
   (b) the sum of the physical outputs of the top four producing firms in an industry.
   (c) the percentage of total industry output produced by the leading four firms in an industry.
   (d) the percentage of total industry dollar sales received by the leading four firms in an industry.

10. In the context of game theory, collusion is always a
    (a) noncooperative game.
    (b) negative-sum game.
    (c) cooperative game.
    (d) zero-sum game.

11. The strategy that always yields the highest benefit to a player in a game regardless of what other
    players may do is that player’s
    (a) dominant strategy.
    (b) tit-for-tat strategy.
    (c) positive-sum strategy.
    (d) opportunistic strategy.

12. Price leadership
    (a) is a form of implicit, or tacit, collusion among oligopolists.
    (b) always results whenever there is a price war among oligopolists.
    (c) always results whenever oligopolists engage in a noncooperative game.
    (d) is a synonym for limit pricing intended to make market entry by other firms unprofitable.
13. Firms in an oligopolistic industry are more likely to be able to maintain a collusive agreement if
(a) their owners engage in opportunistic behavior.
(b) their collusive agreement is a zero-sum game.
(c) their collusive agreement is a positive-sum game.
(d) their collusive agreement is a negative-sum game.

14. A network effect exists for a product when
(a) the willingness of consumers to buy that product is influenced by how many other consumers purchase it.
(b) the willingness of consumers to buy that product is influenced by how many firms offer the item for sale.
(c) the willingness of firms to sell that product is influenced by how many consumers purchase the product.
(d) the willingness of firms to sell that product is influenced by how many other firms sell the product.

15. A situation in which a significant number of consumers have chosen to purchase more units of a good or service in response to purchases by other consumers, thereby causing an industry to experience surging sales, is an example of
(a) negative market feedback.
(b) positive market feedback.
(c) an outcome of limit pricing.
(d) an outcome of price leadership.

16. Which firm has the least control over its price?
(a) monopolistic competitor
(b) perfect competitor
(c) monopolist
(d) oligopolist

17. In the United States, a good example of an oligopolistic industry is
(a) a single local power company.
(b) the college textbook industry.
(c) the roofing nail industry.
(d) the retail trade industry.

■ Matching

Choose the item in column (2) that best matches an item in column (1).

<table>
<thead>
<tr>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) positive-sum game</td>
<td>(g) a rule for making a choice</td>
</tr>
<tr>
<td>(b) oligopoly</td>
<td>(h) strategic dependence among a few firms</td>
</tr>
<tr>
<td>(c) kinked demand curve</td>
<td>(i) following the crowd to buy a hot product</td>
</tr>
<tr>
<td>(d) cooperative game</td>
<td>(j) all players benefit</td>
</tr>
<tr>
<td>(e) strategy</td>
<td>(k) discontinuous marginal revenue curve</td>
</tr>
<tr>
<td>(f) positive market feedback</td>
<td>(l) collusive behavior</td>
</tr>
</tbody>
</table>
1. Use the graph of the oligopolist below to answer each of the questions that follow.

(a) At what level of output will this firm operate? __________
(b) What is the marginal cost at this level of output? __________
(c) What price will the firm charge for its product? __________
(d) The area of what rectangle equals total revenue? __________
(e) What is the firm’s average cost? __________
(f) The area of what rectangle is equal to the firm’s total cost? __________
(g) The area of what rectangle is equal to the firm’s profit? __________
(h) Suppose the firm is operating at an output level of Y units. How low would marginal costs at Y units of output have to drop before the firm would lower its price? __________
### Problems

1. Consider the table below, then answer the questions that follow. All information is for domestic firms.

<table>
<thead>
<tr>
<th>Domestic Firms in Industry A</th>
<th>Annual Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$2,000,000</td>
</tr>
<tr>
<td>2</td>
<td>1,500,000</td>
</tr>
<tr>
<td>3</td>
<td>1,400,000</td>
</tr>
<tr>
<td>4</td>
<td>1,100,000</td>
</tr>
<tr>
<td>5</td>
<td>1,000,000</td>
</tr>
<tr>
<td>6</td>
<td>700,000</td>
</tr>
<tr>
<td>7</td>
<td>200,000</td>
</tr>
<tr>
<td>8</td>
<td>100,000</td>
</tr>
<tr>
<td>9–20 (remaining firms)</td>
<td>1,000,000</td>
</tr>
</tbody>
</table>

(a) What is the 4-firm concentration ratio?
(b) What is the 8-firm concentration ratio?
(c) What would happen to the concentration ratios if industry B’s product is a substitute for Industry A’s product?
(d) What would happen to the concentration ratios if the sales of imported goods in Industries A and B that are sold in domestic markets were included?

### Answers

#### Completion Questions

1. small number of firms; interdependence
2. economies of scale; barriers to entry; product differentiation and advertising; merger
3. rise; fall
4. game
5. cooperative; noncooperative
6. zero; positive; negative
7. the prisoners’ dilemma; confess
8. kinked; below its demand curve and discontinuous; will not; P > MC; too little; too high
9. price; war
10. threats of price wars; investment in excess capacity; get government to restrict entry; limit-pricing
11. network effect
12. Positive; negative

#### True-False Questions

1. T
2. T
3. F They are very inaccurate, if only because inter-industry competition exists; foreign competition exists too.
4. F Its demand curve will be proportionate to the industry demand curve.
5. T
6. T
7. F They result when price leadership strategies break down.
8. F They set price at the highest level that will still discourage entry.
9. T
10. F By definition, opportunistic behavior involves actions that ignore possible long-run benefits of cooperation.

11. T

12. F The theory of the kinked demand curve takes the current price and output of an oligopolist as given; it provides no explanation of how the firm has selected this price and output level.

13. T

14. T

15. F Positive market feedback can occur either for an individual firm or for an entire industry.

Multiple Choice Questions

1. (c) 10. (c)
2. (b) 11. (a)
3. (d) 12. (a)
4. (c) 13. (c)
5. (b) 14. (a)
6. (b) 15. (b)
7. (c) 16. (b)
8. (d) 17. (b)
9. (d)

Matching

(a) and (j) (d) and (l)
(b) and (h) (e) and (g)
(c) and (k) (f) and (i)

Working with Graphs

1. (a) 0Y
   (b) 0C
   (c) 0F
   (d) 0FGY
   (e) 0D
   (f) 0DJY
   (g) DFGJ
   (h) below 0A

Problems

1. (a) 6/9 (or 0.67)
   (b) 8/9 (or 0.89)
   (c) They would fall.
   (d) They would fall.
Glossary

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.

Cooperative game  A game in which the players explicitly cooperate to make themselves better off. As applied to firms, it involves companies colluding in order to make higher than competitive rates of return.

Dominant strategies  Strategies that always yield the highest benefit. Regardless of what other players do, a dominant strategy will yield the most benefit for the player using it.

Entry deterrence strategy  Any strategy undertaken by firms in an industry, either individually or together, with the intent or effect of raising the cost of entry into the industry by a new firm.

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.

Horizontal merger  The joining of firms that are producing or selling a similar product.

Limit-pricing model  A model that hypothesizes that a group of colluding sellers will set the highest common price that they believe they can charge without new firms seeking to enter that industry in search of relatively high profits.

Negative market feedback  A tendency for a good or service to fall out of favor with more consumers because other consumers have stopped purchasing the item.

Negative-sum game  A game in which players as a group lose at the end of the game.

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.

Noncooperative game  A game in which the players neither negotiate nor cooperate in any way. As applied to firms in an industry, this is the common situation in which there are relatively few firms and each has some ability to change price.

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.

Opportunistic behavior  Actions that ignore the possible long-run benefits of cooperation and focus solely on short-run gains.

Payoff matrix  A matrix of outcomes, or consequences, of the strategies chosen by players in a game.

Positive market feedback  A tendency for a good or service to come into favor with additional consumers because other consumers have chosen to buy the item.

Positive-sum game  A game in which players as a group are better off at the end of the game.

Price leadership  A practice in many oligopolistic industries in which the largest firm publishes its price list ahead of its competitors, who then match those announced prices. Also called parallel pricing.

Price war  A pricing campaign designed to capture additional market share by repeatedly cutting prices.

Prisoners’ dilemma  A famous strategic game in which two prisoners have a choice between confessing and not confessing to a crime. If neither confesses, they serve a minimum sentence. If both confess, they serve a longer sentence. If one confesses and the other doesn’t, the one who confesses goes free. The dominant strategy is always to confess.

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 dependence  A situation in which one firm’s actions with respect to price, quality, advertising, and related changes may be strategically countered by one or more other firms in the industry. Such dependence can only exist when there are a limited number of major firms in an industry.

Strategy  Any rule that is used to make a choice, such as “always pick heads.”

Tit-for-tat strategic behavior  In game theory, cooperation that continues so long as the other players continue to cooperate.

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

Zero-sum game  A game in which any gains within the group are exactly offset by equal losses by the end of the game.