

◆ Competition and Efficiency

A competitive market can achieve an efficient use of resources. You first studied efficiency in Chapter 2. Then in Chapter 5, using only the concepts of demand, supply, consumer surplus, and producer surplus, you saw how a competitive market achieves efficiency. Now that you have learned what lies behind the demand and supply curves of a competitive market, you can gain a deeper understanding of the efficiency of a competitive market.

Efficient Use of Resources

Recall that resource use is efficient when we produce the goods and services that people value most highly (see Chapter 2, pp. 33–35, and Chapter 5, p. 108). If someone can become better off without anyone else becoming worse off, resources are *not* being used efficiently. For example, suppose we produce a computer that no one wants and no one will ever use and, at the same time, some people are clamoring for more video games. If we produce fewer computers and reallocate the unused resources to produce more video games, some people will become better off and no one will be worse off. So the initial resource allocation was inefficient.

In the more technical language that you have learned, resource use is efficient when marginal social benefit equals marginal social cost. In the computer and video games example, the marginal social benefit of a video game exceeds its marginal social cost; the marginal social cost of a computer exceeds its marginal social benefit. So by producing fewer computers and more video games, we move resources toward a higher-valued use.

Choices, Equilibrium, and Efficiency

We can use what you have learned about the decisions made by consumers and competitive firms and market equilibrium to describe an efficient use of resources.

Choices Consumers allocate their budgets to get the most value possible out of them. We derive a consumer's demand curve by finding how the best budget allocation changes as the price of a good changes. So consumers get the most value out of their resources at all points along their demand curves. If the people who consume a good or service are the

only ones who benefit from it, then the market demand curve measures the benefit to the entire society and is the marginal social benefit curve.

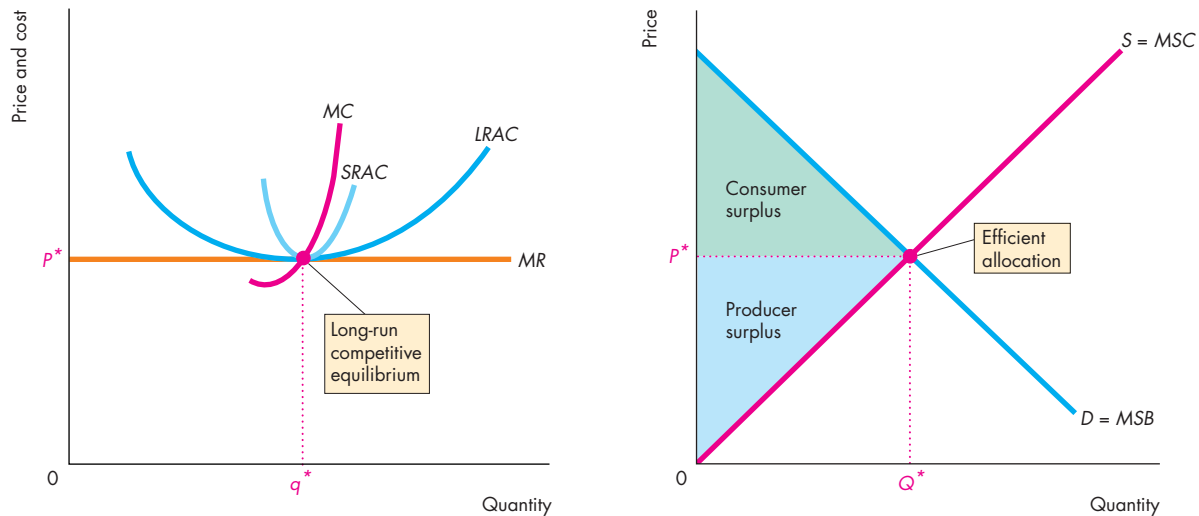
Competitive firms produce the quantity that maximizes profit. We derive the firm's supply curve by finding the profit-maximizing quantity at each price. So firms get the most value out of their resources at all points along their supply curves. If the firms that produce a good or service bear all the costs of producing it, then the market supply curve measures the marginal cost to the entire society and the market supply curve is the marginal social cost curve.

Equilibrium and Efficiency Resources are used efficiently when marginal social benefit equals marginal social cost. Competitive equilibrium achieves this efficient outcome because, with no externalities, price equals marginal social benefit for consumers, and price equals marginal social cost for producers.

The gains from trade are the sum of consumer surplus and producer surplus. The gains from trade for consumers are measured by *consumer surplus*, which is the area below the demand curve and above the price paid. (See Chapter 5, p. 109.) The gains from trade for producers are measured by *producer surplus*, which is the area above the supply curve and below the price received. (See Chapter 5, p. 111.) The total gains from trade equals total surplus—the sum of consumer surplus and producer surplus. When the market for a good or service is in equilibrium, the gains from trade are maximized.

Illustrating an Efficient Allocation Figure 12.12 illustrates the efficiency of perfect competition in long-run equilibrium. Part (a) shows the individual firm, and part (b) shows the market. The equilibrium market price is P^* . At that price, each firm makes zero economic profit and each firm has the plant that enables it to produce at the lowest possible average total cost. Consumers are as well off as possible because the good cannot be produced at a lower cost and the price equals that least possible cost.

In part (b), consumers get the most out of their resources at all points on the market demand curve, $D = MSB$. Consumer surplus is the green area. Producers get the most out of their resources at all points on the market supply curve, $S = MSC$. Producer surplus is the blue area. Resources are used efficiently at the quantity Q^* and price P^* . At this point, marginal social benefit equals marginal social

FIGURE 12.12 Efficiency of Perfect Competition

(a) A single firm

Demand, D , and supply, S , determine the equilibrium price, P^* . A firm in perfect competition in part (a) produces q^* at the lowest possible long-run average total cost. In part (b), consumers have made the best available choices and are

(b) A market

on the market demand curve, and firms are producing at least cost and are on the market supply curve. With no externalities, marginal social benefit equals marginal social cost, so resources are used efficiently at the quantity Q^* .



cost, and total surplus (the sum of producer surplus and consumer surplus) is maximized.

When firms in perfect competition are away from long-run equilibrium, either entry or exit is taking place and the market is moving toward the situation depicted in Fig. 12.12. But the market is still efficient. As long as marginal social benefit (on the market demand curve) equals marginal social cost (on the market supply curve), the market is efficient. But it is only in long-run equilibrium that consumers pay the lowest possible price.

◆ You've now completed your study of perfect competition. *Reading Between the Lines* on pp. 292–293 gives you an opportunity to use what you have learned to understand events in the global market for corn during the past few years.

Although many markets approximate the model of perfect competition, many do not. In Chapter 13, we study markets at the opposite extreme of market power: monopoly. Then we'll study markets that lie between perfect competition and monopoly. In

REVIEW QUIZ

- 1 State the conditions that must be met for resources to be allocated efficiently.
- 2 Describe the choices that consumers make and explain why consumers are efficient on the market demand curve.
- 3 Describe the choices that producers make and explain why producers are efficient on the market supply curve.
- 4 Explain why resources are used efficiently in a competitive market.

You can work these questions in Study Plan 12.6 and get instant feedback.



Chapter 14 we study monopolistic competition and in Chapter 15 we study oligopoly. When you have completed this study, you'll have a tool kit that will enable you to understand the variety of real-world markets.

Perfect Competition in Corn

Bumper Harvests Bring Stability

<http://www.ft.com>

June 1, 2010

There is no better fertilizer than high prices, the old farming adage goes. Trends in agriculture appear to be proving this resoundingly true.

The spike in prices that caused the first global food crisis in 30 years in 2007–08 has led to large increases in production of foods such as corn and wheat. Farmers have responded to higher prices. ...

The U.S. Department of Agriculture said ... “Higher prices, and thus expanded acreage, in combination with favorable weather, have helped production expand sharply.”

Global corn production will hit 835m metric tons in the 2010–11 season, its highest ever level, the USDA forecasts. ... That is likely to lead to a period of relatively stable prices. ...

While prices for the main food and feed grain crops—corn, wheat, and soybeans—are likely to remain steady and low in the next year or so, that does not mean a repeat of the food crisis is impossible. ...

One argument against that view holds that technological gains in response to the crisis have boosted productivity, making farmers more able to deal with increasing consumption.

Some crops, such as corn, saw record yields in the 2009–10 season and the USDA is predicting high yields for next year as well.

But analysts ascribe the gains in productivity more to fortunate weather conditions than a revolution in farming technology. ...

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ESSENCE OF THE STORY

- In 2010–11, global corn production will reach its highest ever level at 835 million metric tons.
- High prices in 2007–08 led to large increases in the acreage of corn and wheat.
- Favorable weather also helped to increase production of these crops.
- Prices for corn, wheat, and soybeans will likely remain low next year, but a future price rise might occur.
- A revolution in farming technology would increase production without raising costs and prices.
- The current gain in productivity is most likely the result of fortunate weather and likely to be temporary.

ECONOMIC ANALYSIS

- The global market for corn is competitive and the model of perfect competition shows how that market works.
- During 2006 through 2008, increases in demand brought a rising price and an increase in the quantity of corn supplied.
- In 2009 and 2010, good weather conditions brought an increase in the supply of corn and the quantity of corn increased further but its price fell.
- Figure 1 illustrates these events in the market for corn and Fig. 2 their effects on an individual farm.
- From 2006 through 2008, the supply curve of corn was S_0 in Fig. 1. The demand for corn increased and by 2008, the demand curve was D . The price of corn in 2008 was \$310 per metric ton and 800 million metric tons were produced.
- In 2008, the farm faced a marginal revenue curve MR_0 and had average total cost curve ATC_0 and marginal cost curve MC_0 in Fig. 2.
- The farm maximized profit by producing 8,000 metric tons and (we will assume) made zero economic profit.
- In 2009 and 2010, good weather conditions increased the supply of corn. By 2010–11, the supply curve had shifted rightward to S_1 . The price fell to \$230 per metric ton and production increased to 835 million metric tons.
- Back on the farm in Fig. 2, the lower price decreased marginal revenue and the MR curve shifted downward to MR_1 .
- But the fortunate weather increased farm productivity and lowered the cost of producing corn. The average total cost curve shifted downward to ATC_1 and the marginal cost curve shifted downward to MC_1 .
- The combination of the lower price and lower costs might leave the farm with an economic profit. In Fig. 2 we're assuming that the farm again made zero economic profit.
- If farms did make a positive (or negative) economic profit, entry (or exit) would eventually return them to a zero economic profit position like that shown in Fig. 2.

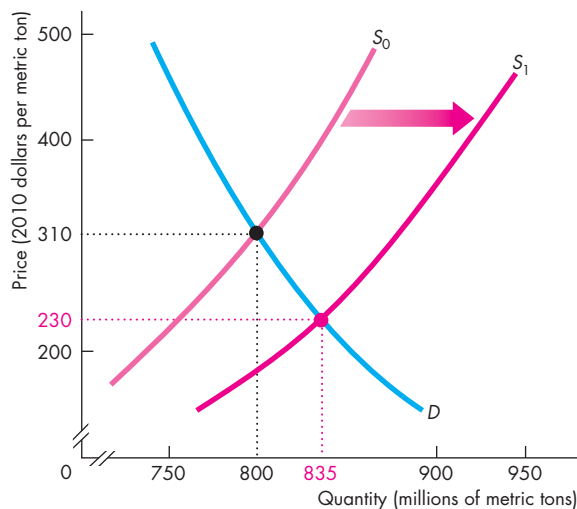


Figure 1 The market for corn

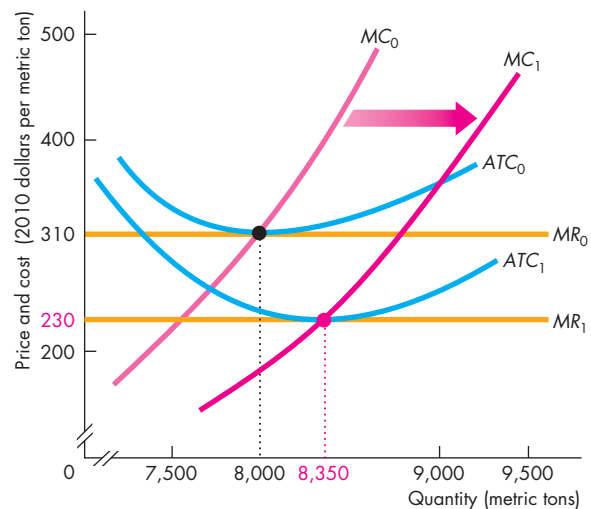


Figure 2 A corn farmer



SUMMARY

Key Points

What Is Perfect Competition? (pp. 274–275)

- In perfect competition, many firms sell identical products to many buyers; there are no restrictions on entry; sellers and buyers are well informed about prices.
- A perfectly competitive firm is a price taker.
- A perfectly competitive firm's marginal revenue always equals the market price.

Working Problems 1 to 3 will give you a better understanding of perfect competition.

The Firm's Output Decision (pp. 276–279)

- The firm produces the output at which marginal revenue (price) equals marginal cost.
- In short-run equilibrium, a firm can make an economic profit, incur an economic loss, or break even.
- If price is less than minimum average variable cost, the firm temporarily shuts down.
- At prices below minimum average variable cost, a firm's supply curve runs along the y -axis; at prices above minimum average variable cost, a firm's supply curve is its marginal cost curve.

Working Problems 4 to 7 will give you a better understanding of a firm's output decision.

Output, Price, and Profit in the Short Run

(pp. 280–283)

- The market supply curve shows the sum of the quantities supplied by each firm at each price.
- Market demand and market supply determine price.
- A firm might make a positive economic profit, a zero economic profit, or incur an economic loss.

Working Problems 8 and 9 will give you a better understanding of output, price, and profit in the short run.

Output, Price, and Profit in the Long Run

(pp. 283–285)

- Economic profit induces entry and economic loss induces exit.
- Entry increases supply and lowers price and profit. Exit decreases supply and raises price and profit.
- In long-run equilibrium, economic profit is zero. There is no entry or exit.

Working Problems 10 and 11 will give you a better understanding of output, price, and profit in the long run.

Changing Tastes and Advancing Technology

(pp. 286–289)

- A permanent decrease in demand leads to a smaller market output and a smaller number of firms. A permanent increase in demand leads to a larger market output and a larger number of firms.
- The long-run effect of a change in demand on price depends on whether there are external economies (the price falls) or external diseconomies (the price rises) or neither (the price remains constant).
- New technologies increase supply and in the long run lower the price and increase the quantity.

Working Problems 12 to 16 will give you a better understanding of changing tastes and advancing technologies.

Competition and Efficiency (pp. 290–291)

- Resources are used efficiently when we produce goods and services in the quantities that people value most highly.
- Perfect competition achieves an efficient allocation. In long-run equilibrium, consumers pay the lowest possible price and marginal social benefit equals marginal social cost.

Working Problems 17 and 18 will give you a better understanding of competition and efficiency.

Key Terms

External diseconomies, 287

External economies, 287

Long-run market supply curve, 287

Marginal revenue, 274

Perfect competition, 274

Price taker, 274

Short-run market supply curve, 280

Shutdown point, 278

Total revenue, 274



STUDY PLAN PROBLEMS AND APPLICATIONS



You can work Problems 1 to 18 in MyEconLab Chapter 12 Study Plan and get instant feedback.

What Is Perfect Competition? (Study Plan 12.1)

Use the following information to work Problems 1 to 3.

Lin's makes fortune cookies that are identical to those made by dozens of other firms, and there is free entry in the fortune cookie market. Buyers and sellers are well informed about prices.

1. In what type of market does Lin's operate? What determines the price of fortune cookies and what determines Lin's marginal revenue from fortune cookies?
2. a. If fortune cookies sell for \$10 a box and Lin's offers its cookies for sale at \$10.50 a box, how many boxes does it sell?
b. If fortune cookies sell for \$10 a box and Lin's offers its cookies for sale at \$9.50 a box, how many boxes does it sell?
3. What is the elasticity of demand for Lin's fortune cookies and how does it differ from the elasticity of the market demand for fortune cookies?

The Firm's Output Decision (Study Plan 12.2)

Use the following table to work Problems 4 to 6. Pat's Pizza Kitchen is a price taker. Its costs are

Output (pizzas per hour)	Total cost (dollars per hour)
0	10
1	21
2	30
3	41
4	54
5	69

4. Calculate Pat's profit-maximizing output and economic profit if the market price is
 - (i) \$14 a pizza.
 - (ii) \$12 a pizza.
 - (iii) \$10 a pizza.
5. What is Pat's shutdown point and what is Pat's economic profit if it shuts down temporarily?
6. Derive Pat's supply curve.
7. The market for paper is perfectly competitive and there are 1,000 firms that produce paper. The table sets out the market demand schedule for paper.

Price (dollars per box)	Quantity demanded (thousands of boxes per week)
3.65	500
5.20	450
6.80	400
8.40	350
10.00	300
11.60	250
13.20	200

Each producer of paper has the following costs when it uses its least-cost plant:

Output (boxes per week)	Marginal cost (dollars per additional box)	Average variable cost (dollars per box)	Average total cost (dollars per box)
200	6.40	7.80	12.80
250	7.00	7.00	11.00
300	7.65	7.10	10.43
350	8.40	7.20	10.06
400	10.00	7.50	10.00
450	12.40	8.00	10.22
500	20.70	9.00	11.00

- a. What is the market price of paper?
- b. What is the market's output?
- c. What is the output produced by each firm?
- d. What is the economic profit made or economic loss incurred by each firm?

Output, Price, and Profit in the Short Run

(Study Plan 12.3)

8. In Problem 7, as more and more computer users read documents online rather than print them, the market demand for paper decreases and in the short run the demand schedule becomes

Price (dollars per box)	Quantity demanded (thousands of boxes per week)
2.95	500
4.13	450
5.30	400
6.48	350
7.65	300
8.83	250
10.00	200
11.18	150

If each firm producing paper has the costs set out in Problem 7, what is the market price and the economic profit or loss of each firm in the short run?

9. Fuel Prices Could Squeeze Cheap Flights

Airlines are having difficulty keeping prices low, especially as fuel prices keep rising. Airlines have raised fares to make up for the fuel costs.

American Airlines increased its fuel surcharge by \$20 a roundtrip, which Delta, United Airlines, and Continental matched.

Source: CNN, June 12, 2008

- Explain how an increase in fuel prices might cause an airline to change its output (number of flights) in the short run.
- Draw a graph to show the increase in fuel prices on an airline's output in the short run.
- Explain why an airline might incur an economic loss in the short run as fuel prices rise.

Output, Price, and Profit in the Long Run

(Study Plan 12.4)

- The pizza market is perfectly competitive, and all pizza producers have the same costs as Pat's Pizza Kitchen in Problem 4.
 - At what price will some firms exit the pizza market in the long run?
 - At what price will firms enter the pizza market in the long run?
- In Problem 7, in the long run,
 - Do firms have an incentive to enter or exit the paper market?
 - If firms do enter or exit the market, explain how the economic profit or loss of the remaining paper producers will change.
 - What is the long-run equilibrium market price and the quantity of paper produced? What is the number of firms in the market?

Changing Tastes and Advancing Technology

(Study Plan 12.5)

- If in the long run, the market demand for paper remains the same as in Problem 8,
 - What is the long-run equilibrium price of paper, the market output, and the economic profit or loss of each firm?
 - Does this market experience external economies, external diseconomies, or constant cost? Illustrate by drawing the long-run supply curve.

Use the following news clip to work Problems 13 and 14.

Coors Brewing Expanding Plant

Coors Brewing Co. of Golden will expand its Virginia packaging plant at a cost of \$24 million. The addition will accommodate a new production line, which will bottle beer faster. Coors Brewing employs 470 people at its Virginia plant. The expanded packaging line will add another eight jobs.

Source: *Denver Business Journal*, January 6, 2006

- How will Coors' expansion change its marginal cost curve and short-run supply curve?
 - What does this expansion decision imply about the point on Coors' *LRAC* curve at which the firm was before the expansion?
- If other breweries follow the lead of Coors, what will happen to the market price of beer?
 - How will the adjustment that you have described in part (a) influence the economic profit of Coors and other beer producers?
- Explain and illustrate graphically how the growing world population is influencing the world market for wheat and a representative individual wheat farmer.
- Explain and illustrate graphically how the diaper service market has been affected by the decrease in the North American birth rate and the development of disposable diapers.

Competition and Efficiency (Study Plan 12.6)

- In a perfectly competitive market in long-run equilibrium, can consumer surplus be increased? Can producer surplus be increased? Can a consumer become better off by making a substitution away from this market?
- Never Pay Retail Again**
Not only has scouring the Web for the best possible price become standard protocol before buying a big-ticket item, but more consumers are employing creative strategies for scoring hot deals. Comparison shopping, haggling and swapping discount codes are all becoming mainstream marks of savvy shoppers. Online shoppers can check a comparison service like Price Grabber before making a purchase.

Source: CNN, May 30, 2008

- Explain the effect of the Internet on the degree of competition in the market.
- Explain how the Internet influences market efficiency.



ADDITIONAL PROBLEMS AND APPLICATIONS



You can work these problems in MyEconLab if assigned by your instructor.

What Is Perfect Competition?

Use the following news clip to work Problems 19 to 21.

Money in the Tank

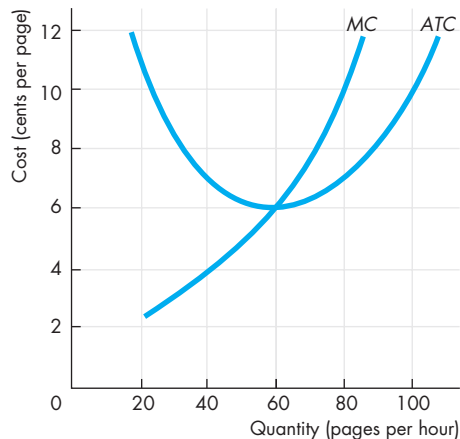
Two gas stations stand on opposite sides of the road: Rutter's Farm Store and Sheetz gas station. Rutter's doesn't even have to look across the highway to know when Sheetz changes its price for a gallon of gas. When Sheetz raises the price, Rutter's pumps are busy. When Sheetz lowers prices, there's not a car in sight. Both gas stations survive but each has no control over the price.

Source: *The Mining Journal*, May 24, 2008

19. In what type of market do these gas stations operate? What determines the price of gasoline and the marginal revenue from gasoline?
20. Describe the elasticity of demand that each of these gas stations faces.
21. Why does each of these gas stations have so little control over the price of the gasoline it sells?

The Firm's Output Decision

22. The figure shows the costs of Quick Copy, one of many copy shops near campus.



If the market price of copying is 10¢ a page, calculate Quick Copy's

- a. Profit-maximizing output.
 - b. Economic profit.
23. The market for smoothies is perfectly competitive. The following table sets out the market demand schedule.

Price (dollars per smoothie)	Quantity demanded (smoothies per hour)
1.90	1,000
2.00	950
2.20	800
2.91	700
4.25	550
5.25	400
5.50	300

Each of the 100 producers of smoothies has the following costs when it uses its least-cost plant:

Output (smoothies per hour)	Marginal cost (dollars per additional smoothie)	Average variable cost (dollars per smoothie)	Average total cost
3	2.50	4.00	7.33
4	2.20	3.53	6.03
5	1.90	3.24	5.24
6	2.00	3.00	4.67
7	2.91	2.91	4.34
8	4.25	3.00	4.25
9	8.00	3.33	4.44

- a. What is the market price of a smoothie?
- b. What is the market quantity of smoothies?
- c. How many smoothies does each firm sell?
- d. What is the economic profit made or economic loss incurred by each firm?

24. Cadillac Plant Shuts Down Temporarily, Future Uncertain

Delta Truss in Cadillac [Michigan] is shutting down and temporarily discontinuing truss production. Workers fear this temporary shutdown will become permanent, but the firm announced that it anticipates that production will resume when the spring business begins.

Source: *9&10 News*, February 18, 2008

- a. Explain how the shutdown decision will affect Delta Truss' *TFC*, *TVC*, and *TC*.
- b. Under what conditions would this shutdown decision maximize Delta Truss' economic profit (or minimize its loss)?
- c. Under what conditions will Delta Truss start producing again?

Output, Price, and Profit in the Short Run**25. Big Drops in Prices for Crops Make It Tough Down on the Farm**

Grain prices have fallen roughly 50 percent from earlier this year. With better-than-expected crop yields, world grain production this year will rise 5 percent from 2007 to a record high.

Source: *USA Today*, October 23, 2008

Why did grain prices fall in 2008? Draw a graph to show that short-run effect on an individual farmer's economic profit.

Output, Price, and Profit in the Long Run

26. In Problem 23, do firms enter or exit the market in the long run? What is the market price and the equilibrium quantity in the long run?
27. In Problem 24, under what conditions will Delta Truss exit the market?
28. **Exxon Mobil Selling All Its Retail Gas Stations**
Exxon Mobil is not alone among Big Oil exiting the retail gas business, a market where profits have gotten tougher as crude oil prices have risen. Gas station owners say they're struggling to turn a profit because while wholesale gasoline prices have risen sharply, they've been unable to raise pump prices fast enough to keep pace.

Source: *Houston Chronicle*, June 12, 2008

- Is Exxon Mobil making a shutdown or exit decision in the retail gasoline market?
- Under what conditions will this decision maximize Exxon Mobil's economic profit?
- How might Exxon Mobil's decision affect the economic profit of other gasoline retailers?

Changing Tastes and Advancing Technology**29. Another DVD Format, but It's Cheaper**

New Medium Enterprises claims the quality of its new system, HD VMD, is equal to Blu-ray's but it costs only \$199—cheaper than the \$300 cost of a Blu-ray player. Chairman of the Blu-ray Disc Association says New Medium will fail because it believes that Blu-ray technology will always be more expensive. But mass production will cut the cost of a Blu-ray player to \$90.

Source: *The New York Times*, March 10, 2008

- Explain how technological change in Blu-ray production might support the prediction of lower prices in the long run. Illustrate your explanation with a graph.
- Even if Blu-ray prices do drop to \$90 in the long run, why might the HD VMD still end up being less expensive at that time?

Competition and Efficiency

30. In a perfectly competitive market, each firm maximizes its profit by choosing only the quantity to produce. Regardless of whether the firm makes an economic profit or incurs an economic loss, the short-run equilibrium is efficient. Is the statement true? Explain why or why not.

Economics in the News

31. After you have studied *Reading Between the Lines* on pp. 292–293 answer the following questions.
- What are the features of the global market for corn that make it competitive?
 - If the increase in production during 2009 and 2010 was due entirely to good weather, what will happen to the price and quantity produced when normal weather returns?
 - What will happen to an individual farmer's marginal revenue, marginal cost, average total cost, and economic profit if the events in part (b) occur?
 - If the increase in production during 2009 and 2010 was due mainly to a revolution in farm technology, what will happen to the price and quantity produced when normal weather returns?

32. Cell Phone Sales Hit 1 Billion Mark

More than 1.15 billion mobile phones were sold worldwide in 2007, a 16 percent increase in a year. Emerging markets, especially China and India, provided much of the growth as many people bought their first phone. Carolina Milanese, research director for mobile devices at Gartner, reported that in mature markets, such as Japan and Western Europe, consumers' appetite for feature-laden phones was met with new models packed with TV tuners, global positioning satellite functions, touch screens, and cameras.

Source: CNET News, February 27, 2008

- Explain the effects of the increase in global demand for cell phones on the market for cell phones and on an individual cell-phone producer in the short run.
- Draw a graph to illustrate your explanation in part (a).
- Explain the long-run effects of the increase in global demand for cell phones on the market for cell phones.
- What factors will determine whether the price of cell phones will rise, fall, or stay the same in the new long-run equilibrium?