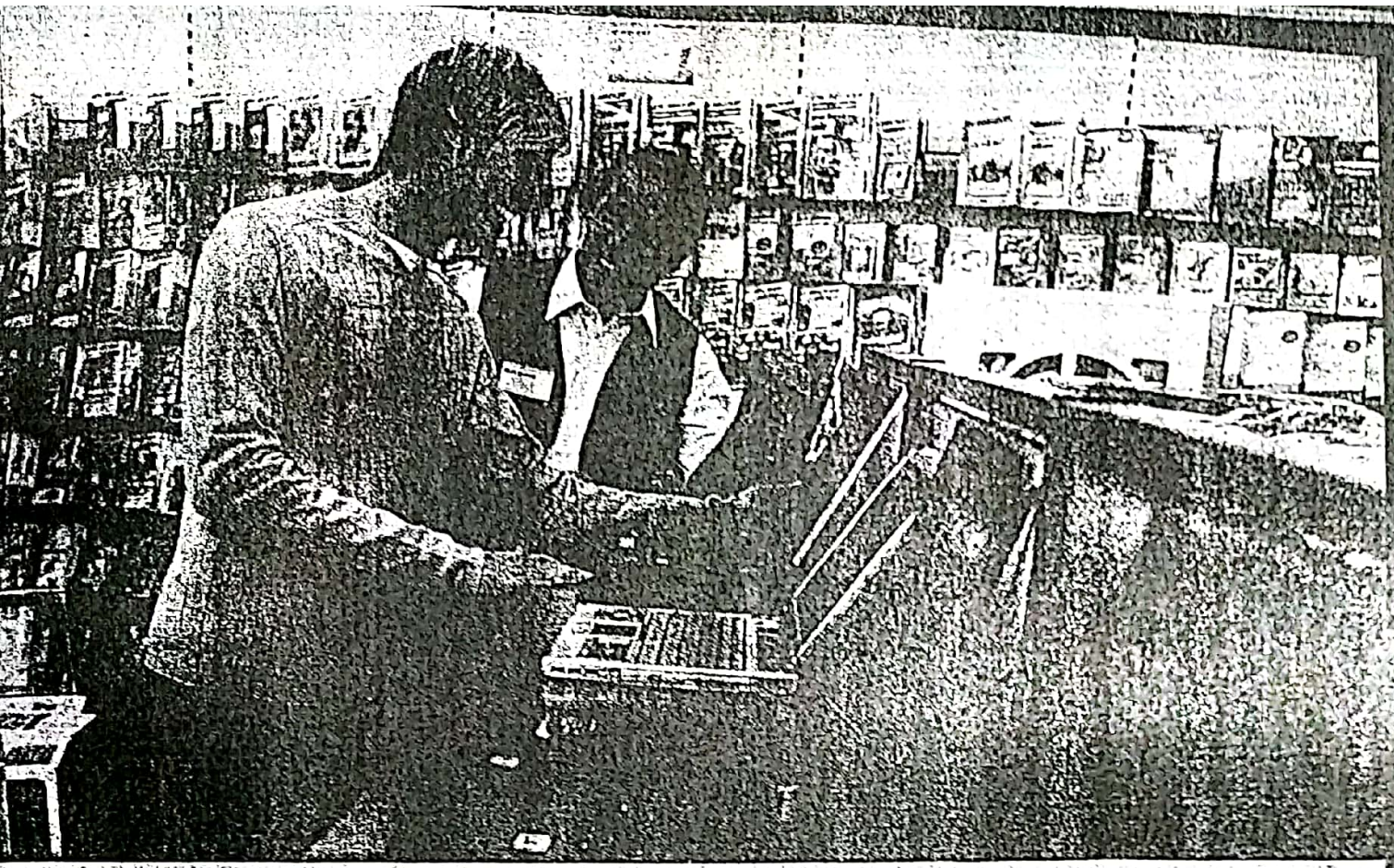

CHAPTER

Perfect Competition [6-7]

How does a giant company like Bell Canada differ from a small-town restaurant or a single broccoli-farmer? From an economist's perspective, the main distinction is the type of market in which each producer does business. In this chapter, we will introduce the four market structures—perfect competition, monopolistic competition, oligopoly, and monopoly. We will then focus on the first of these structures, perfect competition. We will see that though perfect competition is not the most common market structure, it is an ideal against which all other markets are compared.

> Under perfect competition, the business dodoes, dinosaurs, and great ground sloths are in for a bad time—as they should be.
>
> – R.H. BORK AND W.S. BOWMAN JR., AMERICAN LEGAL SCHOLARS

LEARNING OBJECTIVES After this chapter, you will be able to

LO 1 Identify the four market structures and the main differences among them.

LO 2 Describe the profit-maximizing output rule and explain how perfect competitors use it in the short run

LO 3 Identify how perfectly competitive markets adjust in the long run and the benefits they provide to consumers

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5.1 | Market Structures

LO1 While product markets come in all shapes and sizes, each has one of four structures: perfect competition, monopolistic competition, oligopoly, or monopoly. The number of businesses involved in the market, whether or not a standard product is being sold, and the ease with which businesses can enter and exit the industry, all determine the market structure.

Perfect Competition

perfect competition: a market structure characterized by many buyers and sellers of a standard product and easy entry to and exit from the industry

The ideal form of competition, which we will focus on in this chapter, allows for the unobstructed operation of demand and supply forces. **Perfect competition** has three main characteristics: many buyers and sellers, a standard product, and easy entry to and exit from the industry. In a perfectly competitive market, businesses consider the price of the product they sell to be determined by the forces of demand and supply. While common in primary industries, such as agriculture, and in markets for financial assets, such as stocks, bonds, and foreign currencies, perfectly competitive markets are not common in most other sectors of the economy. Further practice involving the characteristics of perfect competition, as well as other concepts connected with the operation of perfectly competitive markets, can be found in the simulation accompanying this chapter at the book's Online Learning Centre (www.mcgrawhill.ca/olc/lovewell).

MANY BUYERS AND SELLERS

The most important feature of perfectly competitive industries is that there are large numbers of buyers and sellers. For example, in the Canadian broccoli market, there are many consumers and many farmers. As a result, no single participant is large enough to affect the prevailing price in the industry.

STANDARD PRODUCT

In a perfectly competitive market, each business supplies a product that is indistinguishable from that of other businesses. One farmer's crop of broccoli, for example, is not noticeably different from that same variety of broccoli produced by other farmers.

EASY ENTRY AND EXIT

Finally, for a market to be perfectly competitive, businesses must be free to enter or exit the industry. Compared with most other industries, for example, it is relatively easy for farmers to transfer resources from the production of other crops to the growing of broccoli, since agricultural land has a wide variety of uses. Similarly, farmers can leave the broccoli market with little difficulty by devoting resources to alternative agricultural uses.

Monopolistic Competition

monopolistic competition: a market structure characterized by many buyers and sellers of slightly different products, and easy entry to and exit from the industry

Monopolistic competition is the structure most prevalent in the service sector and applies, for example, to the restaurant industry. This market structure is characterized by a large number of businesses (though not as many as in a perfectly competitive industry), perceptible differences among the products of competitors, and easy entry and exit of businesses. Product differences can be related to location, quality, or the image consumers have of each business's product.

Oligopoly

oligopoly: a market structure characterized by only a few businesses offering standard or similar products and restricted entry to the industry

An **oligopoly** is a market in which there are only a few businesses, and entry to the industry is restricted. Oligopolies are extremely common in the Canadian economy (as in most other economies), as illustrated by the steel, automobile, and insurance industries. The

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products sold in oligopolies may or may not vary, depending on the particular market. For example, in the steel industry, a standard product is produced, whereas the automobile and insurance industries offer some variety among their products.

Monopoly

A **monopoly** is an industry in which a single business supplies a product with no close substitutes. This market structure is the exact opposite of perfect competition. Monopolies are quite common in the Canadian economy. Electrical power companies, for example, often have a monopoly in particular regions of the country. High-profile monopolies include Canada Post and Via Rail. Small companies, such as a caterer with exclusive rights to sell food at a certain sports stadium, can be monopolies as well.

monopoly: a market structure characterized by only one business supplying a product with no close substitutes and restricted entry to the industry

Entry Barriers

Markets that are oligopolies and monopolies require entry barriers to continue as such. **Entry barriers** are economic or institutional obstacles that stop potential competitors from setting up in an industry where economic profits are being made. There are six main entry barriers: increasing returns to scale, market experience, restricted ownership of resources, legal obstacles, market abuses, and advertising.

entry barriers: economic or institutional obstacles to businesses entering an industry

INCREASING RETURNS TO SCALE

In industries where established companies benefit from increasing returns to scale, and therefore decreasing average costs when output increases in the long run, small companies just entering the market will be unable to charge as low a price. This is because small companies find it difficult to raise sufficient funds to take full advantage of increasing returns to scale. Such obstacles arise because financial investments are often irreversible, increasing the risks associated with entering an industry.

In the extreme case, known as a **natural monopoly**, increasing returns to scale mean that it makes sense to have only one supplier of a product, given the size of the market. This applies to public utilities, which provide such products as water and such services as public transit. Having more than one company would require a large-scale duplication of inputs, thus leading to high per-unit costs and product prices.

natural monopoly: a market in which only one business is economically viable because of increasing returns to scale

While the concept is applicable to some markets, the term "natural monopoly" can be misleading, since there is nothing "natural" about this concept. For example, the telephone industry was once considered a natural monopoly, until recent technological innovations—such as cell phones and Internet phone services—made it possible to have competition. Similarly, cable television companies that were once regional monopolies are gradually losing this status because of new forms of satellite delivery. In the market for electrical power, the emergence of alternate means of generating electricity, such as solar and wind power, means that this industry's natural monopoly features are now limited to power transmission, not power generation.

MARKET EXPERIENCE

Even in cases where increasing returns to scale are not predominant, well-established businesses may have a cost advantage over potential rivals, simply because of their experience. A business can learn from experience how to supply a product more efficiently, thus decreasing its per-unit costs at all possible output levels.

RESTRICTED OWNERSHIP OF RESOURCES

When one or a few businesses control supplies of a resource to make a product, they effectively bar other businesses from entering the industry. One example of such control

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has been the South African company De Beers, which until recently owned or controlled over 75 percent of the world's supply of diamonds.

LEGAL OBSTACLES

Legislation regarding, for example, patents or licences can act as a barrier to entry. A patent gives the exclusive right to produce, use, or sell an invention for a given period (now 20 years in Canada). This exclusive right allows individuals and companies to reap some rewards of their innovations. Companies can become monopolies with patented products, as the patent-holder for the artificial sweetener aspartame, known as Nutrasweet, did for many years. Government licensing, too, can create closed or regulated markets. For instance, only Canada Post has the legal right to provide regular mail service, making it a monopoly in this industry. Similarly, only a certain number of Canadian television or radio stations have broadcast rights within different regions of the country, thus making these broadcasting industries oligopolies.

MARKET ABUSES

Established businesses in an industry may use unfair practices to maintain their dominant positions. A business might, for example, temporarily drop the price of its product below average cost to drive a new competitor out of business. This illegal strategy (a criminal offence in Canada) is known as **predatory pricing**. At one time, predatory pricing was used in the international airline industry; some large companies would cut fares only to increase them once upstart competitors had gone into bankruptcy.

predatory pricing: an unfair business practice of temporarily lowering prices to drive out competitors in an industry

ADVERTISING

The use of advertising as an entry barrier is most common in oligopolies, such as the beer and soft-drink industries. Because consumer preference for these products is so dependent on promotion, established companies with large advertising budgets can often stop small competitors from gaining a significant toehold in these markets. For example, the two beer companies with the largest presence in Canada, Molson Coors and InBev (seller of Labatt), use advertising to help them maintain sales of their various brands, which represent about 80 percent of total quantity demanded in the Canadian beer market.

Market Power

Businesses in perfectly competitive markets—or perfect competitors, as they may be called—are price-takers because they are forced to take the price for their product that is set by the market forces of demand and supply. In contrast, businesses in the remaining three types of markets have some influence over a product's price, so they are price-makers. In other words, these businesses have some measure of **market power**, or the ability to affect the price they charge. A business's market power depends on how easy it is for buyers to find substitutes for the business's output.

market power: a business's ability to affect the price of the product it sells

As a rule, a business in a monopoly (a monopolist) has the most market power. It deals with no competitors and has the largest possible size in relation to the industry. Because the monopolist sells a product with no close substitutes, the product's demand curve tends to be less elastic than for other products. A company in an oligopoly (an oligopolist) commonly has substantial market power because of the small number of competitors and the company's large size relative to the industry. A business in a monopolistically competitive market (a monopolistic competitor) has less market power because it faces many competitors and is small in relation to its market. Moreover, because it sells a product with close substitutes, its demand curve is relatively elastic. Finally, a perfect competitor has no market power because of its role as a price-taker. Figure 5.1 summarizes the attributes of different market structures.

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FIGURE 5.1 Attributes of Market Structures

	Perfect Competition	Monopolistic Competition	Oligopoly	Monopoly
Number of Businesses	very many	many	few	one
Type of Product	standard	differentiated	standard or differentiated	not applicable
Entry and Exit of New Businesses	very easy	fairly easy	difficult	very difficult
Market Power	none	some	some	great
Example	farming	restaurants	automobile manufacturing	public utilities

While perfect competitors have no market power due to the large number of businesses selling a standard product, a monopolist has a great deal of market power because it is the only seller of a product with few substitutes. Monopolistic competitors have some market power, due to the differentiated products they sell, and oligopolists have even more, depending on the number of businesses in a particular industry.

Do "new economy" industries exhibit entry barriers?

Some important markets in the new economy are oligopolies or even monopolies, suggesting the existence of entry barriers. In new economy industries, new types of entry barriers often appear alongside more traditional barriers, such as increasing returns to scale. For example, the network effect refers to the fact that some information products (for example, software such as a word-processing program, web resources such as a social networking site, or telecommunications services such as a text-messaging protocol) become more valuable when they are used by many people. Similarly, the lock-in effect refers to consumers' reluctance to buy a new information product (such as a particular brand of software) once they have already invested the time in learning or applying a similar product. In the case of Apple's iTunes, for example, consumers who use this software for buying music and movies soon acquire digital libraries configured using the provider's software. Users are therefore reluctant to switch to a competitor provider, especially if they are uncomfortable with the technical demands of converting digital files from one format to another. The lock-in effect can also be related to innovations in hardware design. For example, the oligopolistic nature of the e-book market—in which Amazon is a dominant players—is partly tied to the particular types of e-book readers that consumers choose to buy, since in many cases e-book readers are formatted to accept content from only one distributor. Once consumers have bought one of these readers, those uncomfortable with the technical demands of converting digital file formats are effectively limited in which content they can purchase, helping create a powerful barrier to entry. In the closely connected market for electronic tablets, such as the iPad, consumers can typically buy digital products from a range of providers, but find it most convenient to make purchases from the tablet's manufacturer.

http://www.digitalbookreaderz.com/pdf-ebook-reader-basics/

QUESTION What are some examples of new economy industries, besides e-books, in which network and lock-in effects have helped create oligopolies or monopolies?

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1. Product markets have one of four structures: perfect competition, monopolistic competition, oligopoly, or monopoly.
2. Market structure is determined by the number of buyers and sellers in the market, whether or not a standard product is being sold, and the ease with which businesses can enter or exit the market.
3. In monopolies and oligopolies, potential competitors face the entry barriers of increasing returns to scale, market experience, restricted ownership of resources, legal obstacles, market abuses, and advertising.
4. A business's market power, or ability to be a price-maker, tends to be greater for monopolists than for oligopolists, and greater for oligopolists than for monopolistic competitors. Perfect competitors possess no market power.

5.1 | PRACTICE QUESTIONS

1. Identify the market structure in which each of the following sellers operates. Briefly explain your answers.
   a. a café in a busy commercial district of a city
   b. a public transit company in a large metropolitan area
   c. a corporation that makes a popular brand of women's perfume
   d. an individual share-owner who sells 100 shares of RBC on the Toronto Stock Exchange
   e. a chartered bank that takes deposits and makes loans to businesses and households
   f. a creator of software apps for a popular brand of smart phone
2. Razor manufacturers often sell razor handles at relatively low prices while charging higher prices for razor blades. Explain the rationale behind this strategy.

5.2 | Perfect Competition in the Short Run

LO2 How do businesses make operating decisions? They do so by comparing a range of potential revenues and costs. All businesses—whether they are perfect competitors, monopolistic competitors, oligopolists, or monopolists, and whatever their product—use the same general methods in pursuing maximum profit. However, each business must apply the methods differently, according to the market structure in which it operates. To examine profit-maximizing decisions and actions, we will look first at a perfect competitor in the short run.

Business's Demand Curve

business's demand curve: the demand curve faced by an individual business, as opposed to an entire market

Because a perfect competitor is a price-taker, it must accept the price dictated by the market forces of demand and supply. Thus, the individual **business's demand curve** is different from the market demand curve. Recall that the market demand curve (D_m) has a negative slope, given that price and quantity demanded are inversely related. Because a

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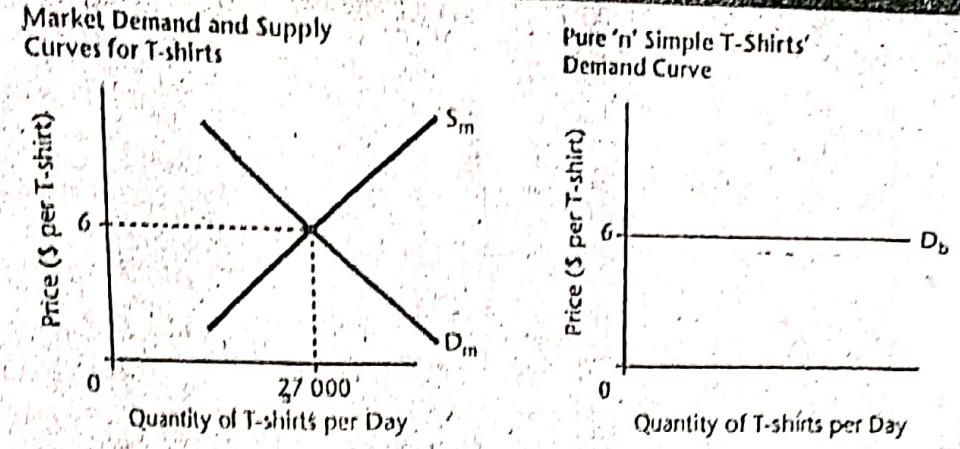
FIGURE 5.2 Demand Faced by a Perfect Competitor



Equilibrium occurs where the market demand and supply curves, (D_m and S_m) meet as shown on the graph on the left. The equilibrium price ($6) sets the position of the business's demand curve (on the graph on the right).

perfect competitor is one of many businesses in a market, the quantity it chooses to supply has no effect on equilibrium price and quantity in the market. See the graph for the T-shirt market in Figure 5.2. (We choose a basic item such as plain T-shirts because these are exchanged in a market that approximates perfect competition.) On the left, the intersection of the market demand and supply curves (D_m and S_m) provides the equilibrium price of $6 per T-shirt. No matter how many shirts Pure 'n' Simple T-Shirts supplies, it will sell all it produces at a price of $6 per shirt. Thus, the individual business's demand curve (D_b) is horizontal, or perfectly elastic, at a price of $6 as shown on the right in Figure 5.2.

Revenue Conditions

On the basis of the horizontal demand curve the business faces, the perfect competitor's total revenue (TR), or the overall earnings from selling a product, is calculated by multiplying the product's price by each potential quantity of output (q). For example, if Pure 'n' Simple T-Shirts sells 250 shirts at a price of $6, then its total revenue is $1500 (= $6 × 250). In addition to total revenue, the perfect competitor can examine two other revenue concepts to help make operating decisions: average revenue and marginal revenue.

AVERAGE REVENUE

Average revenue (AR) is the business's total revenue per unit of output (q). When Pure 'n' Simple T-Shirts sells 250 shirts and its total revenue is $1500, its average revenue equals $6 per unit of the product:

average revenue: a business's total revenue per unit of output

$$\text{Average revenue (AR)} = \frac{\text{total revenue (TR)}}{\text{quantity of output (q)}}$$

$$\$6 \text{ per shirt} = \frac{\$1500}{250 \text{ shirts}}$$

Note that average revenue for Pure 'n' Simple T-Shirts equals each shirt's $6 price. For all businesses, regardless of the market structure in which they operate, price will equal average revenue. This is because price can be defined in the same way as average revenue—as the business's total revenue per unit of output. The only exception to this rule occurs when a business practises price discrimination (or charges different prices to different customers for exactly the same product).

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MARGINAL REVENUE

marginal revenue: the extra total revenue earned from an additional unit of output

Marginal revenue is the extra total revenue (ΔTR) earned when the business sells another unit of output (Δq). For example, if Pure 'n' Simple T-Shirts has an increase in total revenue from $1500 to $1620 when it increases its output from 250 to 270 shirts, then the marginal revenue of each of these last 20 shirts is $6:

$$\text{Marginal revenue (MR)} = \frac{\Delta TR}{\Delta q}$$

$$\$6 \text{ per shirt} = \frac{\$120}{20 \text{ shirts}}$$

Relationship between Revenue Conditions and Demand

As the case of Pure 'n' Simple T-Shirts illustrates, average and marginal revenues are always equal for a perfectly competitive business. This follows from the fact that average revenue (or price) is constant at each possible quantity of output. Recall that when an average value, such as average revenue, is constant, it equals its related marginal value—which, in this case, is marginal revenue.

Figure 5.3 illustrates the relationships among price, average revenue, and marginal revenue for our example of Pure 'n' Simple T-Shirts. In the table, the values for price (column 1), marginal revenue (column 4), and average revenue (column 5) are identical. The demand curve this perfect competitor faces also represents the business's average revenue and marginal revenue curves. Because the business is a price-taker, this combined curve shows a constant value at all quantities of output. Thus, for a perfectly competitive business:

$$\text{Price (P)} = \text{Average revenue (AR)} = \text{Marginal revenue (MR)}$$

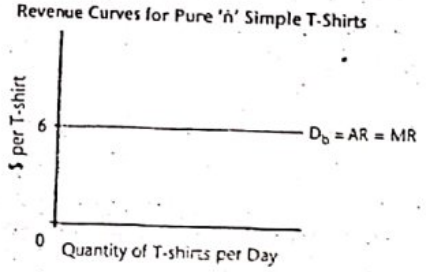
FIGURE 5.3 Revenues for a Perfect Competitor

ΔTR / Δq

Revenue Schedules for Pure 'n' Simple T-Shirts

(1) Price (P) ($ per T-shirt)	(2) Quantity (q) (T-shirts per day)	(3) Total Revenue (TR) (P × q)	(4) Marginal Revenue (MR) (ΔTR/Δq)	(5) Average Revenue (AR) (TR/q)
$ —	$ 0	$ 0		
6	80	480	480/80 = $6	480/80 = $6
6	200	1200	720/120 = 6	1200/200 = 6
6	250	1500	300/50 = 6	1500/250 = 6
6	270	1620	120/20 = 6	1620/270 = 6
6	280	1680	60/10 = 6	1680/280 = 6

Revenue Curves for Pure 'n' Simple T-Shirts



The business's demand schedule is shown in columns 1 and 2 of the table, which also shows that the constant values of price (P), average revenue (AR), and marginal revenue (MR) are identical. On the graph, the business's horizontal demand curve also represents its AR and MR curves.

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Does the profit-maximizing output rule also apply when a business is making a loss at all possible quantities of output?

Yes. In this case, the profit-maximizing output rule is used to determine the quantity at which the business makes the minimum possible loss. Since a loss is simply a negative profit, this means finding the output level with a negative profit that is closest to zero.

QUESTION If a loss-making business is choosing between two output levels that provide negative profits of −$100 and −$300, which output level minimizes its loss?

Profit Maximization

Regardless of the market it operates in, any business can maximize its profit by following a single **profit-maximizing output rule**: produce the quantity of output (q) at which marginal revenue and marginal cost intersect.

profit-maximizing output rule: produce at the level of output where marginal revenue and marginal cost intersect

Profit-maximizing rule: Marginal revenue (MR) = Marginal cost (MC)

Of course, this may result in an awkward quantity, such as 5.73 units, in which case the producer would choose the closest whole number, such as 6 units.

What happens if the condition MR = MC is not met? If each new unit of output is still providing more extra revenue to the business than it adds in cost, output should be increased to maximize profit. So, for example, if a business has a marginal revenue of $3 at its current output level, but the marginal cost of producing this unit is $2, the business is wise to increase its output. Recall that profit is the difference between total revenue and total cost. In this case, an additional unit of output is adding more revenue ($3) than it is costing ($2), so the profit added by this unit is $1. Profit-adding units such as these should be produced, no matter how small the contribution to profit. Once output is raised to the level at which marginal revenue and marginal cost are equal, any further increase in output would cause the business's profit to fall. So, for example, if a business produces beyond the output level at which marginal revenue and marginal cost are both $3, the business will soon find the marginal revenue of $3 surpassed by a marginal cost of $4. Hence, each additional unit is subtracting from profit, and output should be returned to the point at which marginal revenue and marginal cost are equal.

So, perfect competitors, like all other businesses, must determine their profit-maximizing output by looking at the business's cost and revenue figures. Pure 'n' Simple T-Shirts, for example, would examine the data in Figure 5.4 and ask: "At what output level does marginal revenue intersect with marginal cost?" If the marginal revenue and marginal cost figures are graphed, as shown, we can see that the profit-maximizing point occurs at point a. As the closest associated whole number is 270, Pure 'n' Simple T-Shirts should choose a quantity of 270 T-shirts. Note that, at this point, marginal cost is rising (i.e., upsloping). This condition is essential to make the intersection of the MR and MC curves a profit-maximizing point. If marginal cost were instead falling (i.e., downsloping), then the point would not be a desired one. Units of output to the left of such a point, when seen on a graph, would provide a loss. Meanwhile the business would be sacrificing profitable units that could be gained by expanding output.

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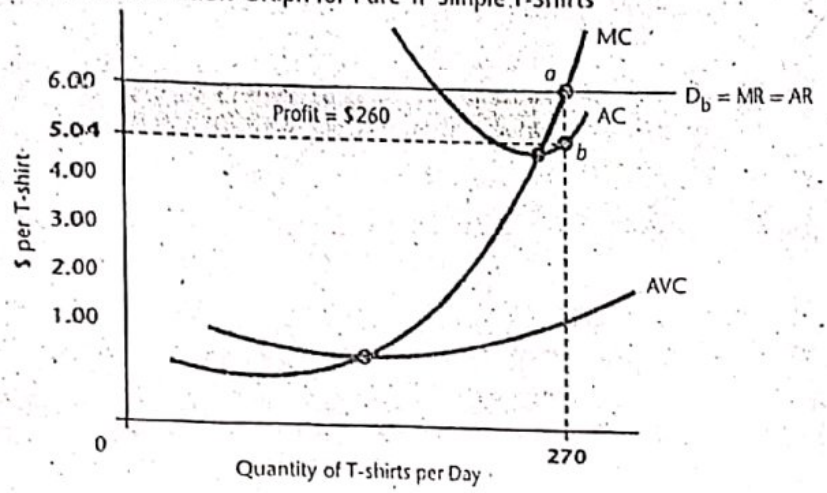
FIGURE 5.4

Profit Maximization Table for Pure 'n' Simple T-Shirts

(1) Total Product (q)	(2) Price (P) (=AR)	(3) Marginal Revenue (MR)	(4) Marginal Cost (MC) (ΔTC/Δq)	(5) Average Variable Cost (AVC) (VC/q)	(6) Average Cost (AC) (TC/q)	(7) Total Revenue (TR)	(8) Total Cost (TC)	(9) Total Profit (TR – TC)
0						0	$ 825	–$825
80	$6	$6	$1.75	$1.75	$12.06	$ 480	965	–485
200	6	6	1.33	1.50	5.63	1200	1125	75
250	6	6	2.50	1.70	5.00	1500	1250	250
270	6	6	5.50	**1.98**	**5.04**	**1620**	**1360**	**260**
280	6	6	10.50	2.29	5.24	1680	1465	215

Profit Maximization Graph for Pure 'n' Simple T-Shirts



The quantity of output at which the business maximizes its short-run profit—or minimizes its short-run loss—is found using either a graph or a table. On the graph, the profit-maximizing output is found where the MR and MC curves intersect at point *a*. Total profit is the area of the shaded rectangle, the width of which is the profit-maximizing output (q) and the height of which is the average revenue (AR) minus average cost (AC) at points *a* and *b*. In the table, this profit-maximizing output occurs where marginal cost (MC) in column 4 passes through the same values as the constant marginal revenue (MR) in column 3. The answer can be verified by calculating total profit at every output level, as in column 9, and then finding the output level at which the highest positive (or lowest negative) profit is possible.

This point can be checked against the table in Figure 5.4. The figures for marginal revenue (column 3) and marginal cost (column 4) pass through the same values nearest the output of 270 T-shirts (column 1). As can be seen in both the table and graph of Figure 5.4, the marginal cost of $5.50 falls short of the $6 marginal revenue between the output levels of 250 and 270 T-shirts. In contrast, between 270 and 280 T-shirts, marginal cost (now $10.50) is greater than the constant $6 marginal revenue. (Remember that marginal revenue and marginal cost are defined as changes that occur when moving from one output to another.) This means that marginal revenue and marginal cost cross closest to 270 T-shirts. To verify this result, a business's owners might calculate the total profit they would make at every possible quantity of output. The highest positive (or lowest negative) profit figure in this column corresponds to the profit-maximizing quantity. In the case of Pure 'n' Simple T-Shirts, the owner would subtract total cost (column 8) from total revenue (column 7), to get total profit (column 9). So, scanning column 9, it is clear that the best choice is again at 270 shirts, where total profit reaches its highest value of $260 (= $1620 − 1360).

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While the profit-maximizing point can be verified with the table, using a graph to find this point has a bonus: the graph immediately shows whether or not the business is earning an economic profit. When price (P) exceeds average cost (AC) at the profit-maximizing output, the business enjoys a short-run economic profit. If price is less than average cost, the business suffers a loss, or negative profit. If the business is at a profit-maximizing output where price and average cost are equal, the business is making no economic profit and is said to be at its **breakeven point**. Note, however, that at this point the business is still making a normal profit so that the owners are paid a sufficient amount to keep their funds and entrepreneurial skills tied up in the business.

breakeven point: the profit-maximizing output where price (or average revenue) equals average cost

Business's breakeven point:

Price (P) = Average Cost (AC) at the profit-maximizing output

Because the breakeven point is associated with a profit-maximizing output, this term has a special meaning in economics. Only at a single possible price will a business choose to break even. For a perfect competitor, this price equals minimum average cost. At higher prices, positive profits can be made, while at lower prices, the business can only make a loss.

Using a graph to show the profit-maximizing point has another bonus: with a graph, you can see immediately the relationship of a business's profit to its revenue and costs. The "revenue rectangle" has a height that is equal to price and a width that is equal to the quantity of output. The "cost rectangle" has a height that is equal to average cost and a width that is again equal to the quantity of output. The "profit rectangle" is the area of the revenue rectangle less the area of the cost rectangle. So, for example, in Figure 5.4, the marginal cost curve and marginal revenue curve for Pure 'n' Simple T-Shirts intersect at the profit-maximizing point. As we also know from the table, this point is closest to an output level of 270 shirts and a price of $6 per shirt. Thus, the company's revenue rectangle has an area of $1620 (= $6 price × 270 quantity). The cost rectangle has an area of $1360 (= $5.04 average cost × 270 quantity). The profit rectangle, then, is the shaded area of $260 profit (= $1620 − $1360).

WHEN SHOULD A BUSINESS CLOSE?

Would Pure 'n' Simple T-Shirts remain in business if it were making a loss? In the short run, the business would likely continue to operate as long as it earned sufficient revenue to pay its variable costs. The remaining fixed costs would have to be paid in the short run, whether or not the company stayed in business. As long as a business's total revenue more than covers its variable costs, it is better off remaining in business rather than shutting down and still having to pay its fixed costs. If total revenue were to fall below variable costs, however, the business would not be able to fund even its day-to-day operations, and it would have no choice but to close down.

Recall that total revenue for a business is found by multiplying price by the quantity of output (TR = P × q). Recall also that the sum of variable costs (VC) and fixed costs (FC) equals total cost (TC), so that variable costs can be found by subtracting fixed costs from total cost at any given output level (VC = TC − FC), and average variable cost is variable costs divided by quantity (AVC = VC ÷ q). To consider the question of whether or not a business should continue to operate, take a look at average variable cost in another way: variable costs equal average variable cost multiplied by quantity (VC = AVC × q). Now, we can establish a relationship between price and average variable cost by looking at the formula for total revenue (TR = P × q) and the formula for variable costs (VC = AVC × q). Recall that as long as variable costs do not exceed total revenue, the company should stay in business; if the variable costs begin to exceed total revenue,

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the company should shut down. Cancelling the quantity of output (q)—because it is a common element in both these expressions—means that total revenue exceeds variable costs as long as price is greater than average variable cost. Variable costs exceed total revenue when average variable cost exceeds price. At the profit-maximizing output where total revenue and variable costs (or average variable cost and price) are equal, the business reaches its **shutdown point**, which occurs at the point of minimum average variable cost:

shutdown point: the level of output where price (or average revenue) equals minimum average variable cost

$$\text{Business's shutdown point: Total Revenue (TR)} = \text{Variable Cost (VC)}$$
$$(P \times q) = (AVC \times q)$$
$$P = \text{minimum AVC}$$

Why does the shutdown point occur where price equals the minimum point on the average variable cost curve? Because at this point, the profit-maximizing output rule, MR = MC, is met at the same time as total revenue equals variable costs.

Consider our example of Pure 'n' Simple T-Shirts in Figure 5.5. When receiving a price of $6 per T-shirt (at point *a*), the company is maintaining a positive economic profit. If, for some reason, the price drops to $5, the business reaches its break-even point (point *b*). At the lowest point on the average variable cost curve, at $1.50 (point *c*), average variable cost equals price, thus variable costs equal total revenue.

Pure 'n' Simple T-Shirts' shutdown point:

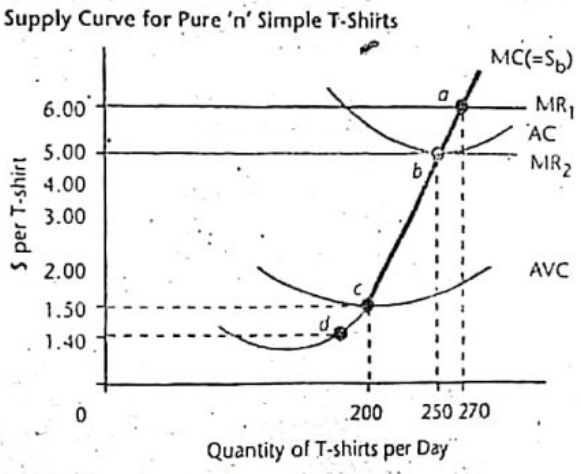
$$\text{TR (\$300)} = \text{Variable Cost (VC)}$$
$$P \times q\ (\$1.50 \times 200) = AVC \times q\ (\$1.50 \times 200)$$
$$P\ (\$1.50) = \text{minimum AVC (\$1.50)}$$

Point *c* in Figure 5.5 is Pure 'n' Simple T-Shirts' shutdown point. If the price falls further, to a price such as $1.40 (point *d*), the company closes down its operations, since total revenue, which at 200 units of output would now be $280 (= $1.40 × 200), no longer covers variable costs ($300).

FIGURE 5.5 Supply Curve for a Perfect Competitor

Supply Schedule for Pure 'n' Simple T-Shirts

Price (P) ($ per T-shirt)	Quantity Supplied (q) (T-shirts per day)
$6.00	270
5.00	250
1.50	200
1.40	0



At point *a* on the graph, price exceeds average cost (AC), and positive economic profits are made. Point *b* is the breakeven point, where price equals AC. At lower prices, the business makes a loss. Point c is the business's shutdown point, where price equals average variable costs (AVC). Below the shutdown point—for example, at point *d*—average variable costs would exceed price. The marginal cost curve (MC) above point c is the business's supply curve (S_b), the highlighted part of the curve.

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BUSINESS'S SUPPLY CURVE

Figure 5.5 also sheds light on how a change in price influences the operations of a perfectly competitive business. For example, if price falls from $6 to $5, the profit-maximizing output for Pure 'n' Simple T-Shirts changes from 270 to 250 shirts. At the same time, the business's economic profit falls to zero, since point *h* is the breakeven point. Notice that the effect of this price change on the business's quantity supplied is shown as a movement along the marginal cost curve (MC). Because the various profit-maximizing points for the business are all on the marginal cost curve, at least a portion of it represents the **business's supply curve** (S_b). The business's supply curve shows the quantity of output supplied by the business at every possible price. If price moves below the shutdown point (point *c*), Pure 'n' Simple T-Shirts will no longer be in business, and its output will fall to zero. Hence, only that part of the marginal cost curve above this point is the business's supply curve (the highlighted part of the MC curve).

business's supply curve: a curve that shows the quantity of output supplied by a business at every possible price

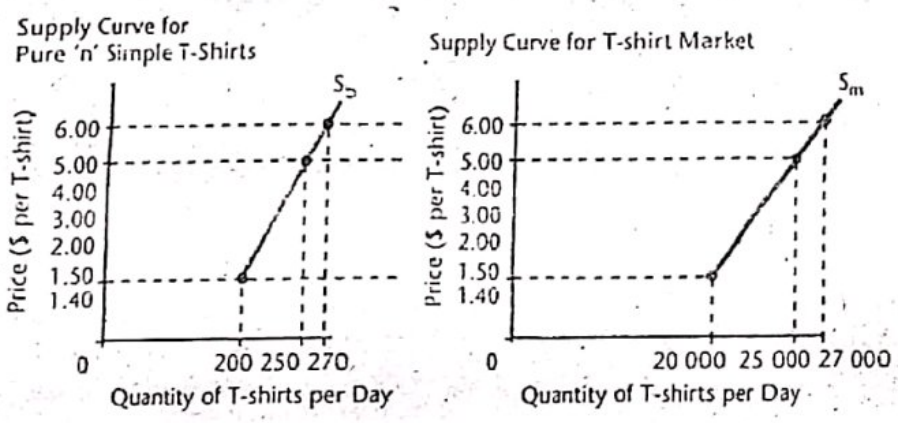
MARKET SUPPLY CURVE

The market supply curve (S_m) for a perfectly competitive industry is created using the supply curves for all businesses in the market. So, for the T-shirt market in which Pure 'n' Simple T-Shirts operates, we have the supply curve S_m as illustrated in Figure 5.6. If there are 100 businesses all identical to Pure 'n' Simple T-Shirts in the industry, then find the market supply curve for T-shirts by adding the profit-maximizing outputs produced by all 100 businesses at each possible price. Thus, at a price of $6, the quantity supplied in the market (Q) would be 27 000 shirts (= 270 shirts × 100 businesses), given that each business's output is 270 shirts.

FIGURE 5.6 Supply Curves for a Perfectly Competitive Business and Market

Business and Market Supply Schedules for T-shirts

Price (P) ($ per T-shirt)	Quantity Supplied (q) (S_b) (T-shirts per day)	Quantity Supplied (Q) (S_m) (T-shirts per day)
$6.00	270	27 000
5.00	250	25 000
1.50	200	20 000



If the T-shirt industry is made up of 100 identical businesses, then find the market supply curve (S_m) by multiplying each output level on Pure 'n' Simple T-Shirts' supply curve (S_b) by 100.

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1. All businesses—whatever market structures they operate in—maximize profits by finding the output level at which marginal revenue intersects marginal cost.
2. At the profit-maximizing output, a business's economic profit is positive if price is greater than average cost. When price and average cost are equal at the profit-maximizing output, the business is at its breakeven point, with economic profit at zero. If price is lower than average cost, then the business is operating at a loss, with negative economic profit.
3. For a perfect competitor, the breakeven point occurs when price equals minimum average cost. At lower prices, a perfect competitor will continue in business until the shutdown point, where price equals minimum average variable cost. A perfectly competitive business's supply curve is only the portion of its marginal cost curve that is above the shutdown point.
4. To find the supply for the entire perfectly competitive market, add the profit-maximizing outputs of all businesses in the market at each possible price.

5.2 PRACTICE QUESTIONS

1. A fisher sells salmon in a perfectly competitive market and faces a price of $5 per kg at possible weekly outputs of between 3000 and 5000 kg.
   a. Identify the fisher's marginal revenue in this output range.
   b. Explain how the relationship between price and marginal revenue is affected by the fact that this fisher operates in a perfectly competitive market.
   c. Using the EconGraphKit, available at the Online Learning Centre, draw the fisher's marginal revenue curve. Does it have the shape you expect? Explain.
2. The salmon fisher who faces a price of $5 per kg produces a weekly output of 4000 kg. The fisher's marginal cost is $4.95 between the possible outputs of 3900 and 4000 kg and $5.05 between the possible outputs of 4000 and 4100 kg.
   a. Is the fisher producing at the profit-maximizing point?
   b. If the average cost at an output of 4000 kg is $6, what is the fisher's total profit or loss?
   c. If the average variable cost at 4000 kg is $4, should the fisher stay in business in the short run?
   d. Using the EconGraphKit, available at the Online Learning Centre, draw the relevant ranges of the salmon fisher's marginal revenue, marginal cost, average cost, and average variable cost curves.
3. The salmon fisher discussed in question 2 has a breakeven point at a price of $6.00 and a weekly output of 5000 kg.
   a. Is this point on the fisher's supply curve?
   b. If price is below $6.00, is it possible for the fisher to make a positive profit?
   c. If price is above $6.00, is it possible for the fisher to choose a profit-maximizing point where he makes a loss?
   d. Is the fisher's shutdown point at a price above or below $6.00?
   e. Using the EconGraphKit, available at the Online Learning Centre, add the relevant information to the graph you drew in question 1.

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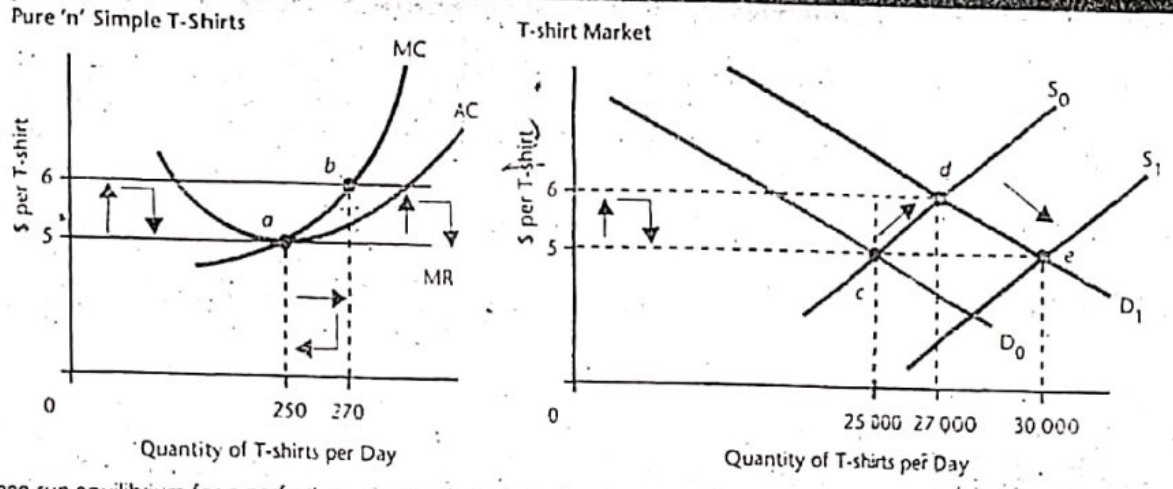
5.3 | Perfect Competition in the Long Run

In the long run, ease of entry into and exit from a perfectly competitive market becomes a crucial factor. Short-run profits and losses cause perfectly competitive markets to move toward a point of long-run equilibrium. Entrepreneurs enter industries where an economic profit can be expected and leave those industries where there are losses. Movement to and from the industry continues until all the businesses in the market reach long-run equilibrium, at which point they are just breaking even, with price equalling average cost and a normal profit being made.

The operation of these long-run competitive forces is illustrated in Figure 5.7 for the T-shirt market. Assume that this is a constant-cost industry of the sort described in Chapter 3, in which input prices are fixed regardless of the quantity of T-shirts produced. As a representative business in this industry, Pure 'n' Simple T-Shirts is originally in long-run equilibrium at a price of $5 (point *a* on the left), which is determined by the intersection of the market demand and supply curves (D_0 and S_0) at point *c* on the graph on the right. At this price, Pure 'n' Simple T-Shirts produces 250 shirts per day. Since price equals average cost, it is breaking even, or making zero economic profit. If the market demand for T-shirts increases from D_0 to D_1, the conditions of long-run equilibrium are temporarily broken. The new price in the market is $6, found at the intersection of D_1 and S_0 (point *d*). At this new price, Pure 'n' Simple T-Shirts makes a short-run economic profit, as shown on the graph on the left, since price (point *b*) exceeds average cost. This economic profit acts as a lure to new companies, who enter the industry and cause a shift in the market supply curve to the right, from S_0 to S_1. As a result, price returns to $5. With long-run equilibrium restored (point *e*), businesses in the market are again breaking even with a price equal to average cost, as exemplified by Pure 'n' Simple T-Shirts.

FIGURE 5.7 Long-Run Equilibrium for a Perfectly Competitive Business



Long-run equilibrium for a perfectly competitive business, such as Pure 'n' Simple T-Shirts, is shown on the left at point *a*, where price equals both marginal cost and minimum average cost. Associated with this point is the equilibrium point *c* for the entire market on the graph on the right. An increase in market demand for T-shirts from D_0 to D_1 shifts equilibrium to point *d*. At the new profit-maximizing point for the business (point *b* on the left graph), a positive profit is being made. The lure of economic profit causes new businesses to enter the market. Assuming that this is a constant-cost industry, the market supply curve shifts to the right, from S_0 to S_1, until price is driven back down to its original level at point *e*. On the left graph, Pure 'n' Simple T-Shirts returns to its long-run equilibrium point *a* because of these competitive forces.

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5.4 | Benefits of Perfect Competition

The long-run equilibrium shown in Figure 5.7 illustrates the advantages of perfectly competitive markets for buyers. It also helps explain how, through the "invisible hand" of competition, consumers ultimately benefit when competitive producers act in their own self-interest. This is because a perfectly competitive market in long-run equilibrium meets two requirements known as minimum-cost pricing and marginal-cost pricing.

Minimum-Cost Pricing

minimum-cost pricing: the practice of setting price where it equals minimum average cost

By operating at the breakeven point, where price equals minimum average cost, perfectly competitive businesses in long-run equilibrium satisfy the condition of **minimum-cost pricing**. If the price businesses are charging is above the minimum possible average cost, they can change the scale of production and reduce average costs further to maximize profit. By charging the minimum-cost price of $5 when it is in long-run equilibrium, Pure 'n' Simple T-Shirts, for example, chooses the least costly combination of inputs. Moreover, it is making zero economic profit, so that all these cost savings are passed on to T-shirt buyers. As long as this condition is met, the purchasing power of consumers' incomes when acquiring T-shirts is maximized.

Marginal-Cost Pricing

marginal-cost pricing: the practice of setting the price that consumers are willing to pay as equal to marginal cost

In long-run equilibrium, perfectly competitive businesses also practise **marginal-cost pricing**, meaning they produce at an output level where the price that consumers are willing to pay equals marginal cost. The fact that they do so follows from the equality of marginal revenue and price for perfectly competitive firms. The profit-maximizing output rule means that perfect competitors choose the quantity of output at which marginal revenue and marginal cost intersect. Since marginal revenue and price are identical for individual perfectly competitive businesses, the profit-maximizing output rule can also be expressed as the condition that price equals marginal cost.

If each business's marginal cost incorporates all possible costs to society, then a perfectly competitive market in long-run equilibrium operates at a price that fully reflects the product's opportunity cost. Furthermore, if all markets in an economy are close to being perfectly competitive, society's scarce resources are distributed among industries in a way that maximizes the overall satisfaction of consumers. This is because the prices of various products accurately reflect the extra costs of producing them.

Considering again the example of T-shirts, if they are priced at $6, while the marginal cost of an additional T-shirt is $3, then more of society's resources should be devoted to T-shirt production. Otherwise, consumers who derive satisfaction (measured in dollar terms) worth less than $6 from an extra unit of this product are not purchasing it, even though many of them would be willing to pay more than the product's marginal cost. Production in this market should, therefore, be increased until marginal cost equals $6. In contrast, if T-shirts are priced at $6 but the marginal cost of an additional T-shirt is $9, then less of society's resources should be employed in T-shirt production, since some units are being produced for which the extra cost is greater than the satisfaction (measured in dollar terms) that consumers gain from these units. Only if marginal cost and equilibrium are the same will resources be distributed to this industry in a way that maximizes the satisfaction of consumers.

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- In the long run, perfectly competitive markets reach an equilibrium at which businesses are at their breakeven point.
- In long-run equilibrium, perfectly competitive businesses operate at the minimum-cost and marginal-cost prices, thereby benefiting consumers.

5.4 PRACTICE QUESTIONS

1. A perfectly competitive market is in short-run equilibrium with price at $50 and the average cost of businesses in the market at $40.
   a. Outline the trends that will push this market toward long-run equilibrium.
   b. Once this market reaches its long-run equilibrium, will the minimum-cost pricing rule be met? Explain.
   c. Once this market reaches its long-run equilibrium, will the marginal-cost pricing rule be met? Explain.

LAST WORD

In this chapter, we examined the main differences between market structures in terms of how many businesses there are in each market, whether or not their products are standard, and how easy it is to enter and exit the industry. We also examined how businesses can maximize economic profit by following the profit-maximizing output rule. We took the case of a perfectly competitive business to analyze how it maximizes profit in the short run and long run. Because perfect competitors are price-takers, they have to make only one decision when maximizing profit—how much quantity of output to produce. In the next chapter, when we switch our attention to businesses in the other market structures, we will see that they must choose from among various possible quantities and prices when maximizing their economic profit.

KEY TERMS

average revenue 121
breakeven point 125
business's demand curve 120
business's supply curve 127
entry barriers 117
marginal-cost pricing 130
marginal revenue 122
market power 118
minimum-cost pricing 130
monopolistic competition 116
monopoly 117
natural monopoly 117
oligopoly 116
perfect competition 116
predatory pricing 118
profit-maximizing output rule 123
shutdown point 126

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1. Categorize each seller below on the basis of the type of market in which it operates. Explain each of your answers.
   a. a cattle farmer
   b. a computer maker
   c. a picture-framing shop in a large metropolitan area
   d. a seller of Canadian dollars in foreign currency markets
   e. a life insurance company
   f. a liquor store in a remote village
   g. a visual artist
   h. a country that produces a valuable radioactive mineral found in no other part of the world
   i. an online seller of used books
   j. a seller of antique porcelain china on an online auction site
   k. a provider of wireless phone and Internet services

2. The table below applies to a vegetable gardener who sells carrots at a local farmer's market.

Profit-Maximization Table for a Vegetable Gardener

(1) Price ($ per kilogram)	(2) Quantity (kilograms per month)	(3) Total Revenue ($)	(4) Total Cost ($)	(5) Marginal Revenue ($ per kilogram)	(6) Marginal Cost ($ per kilogram)	(7) Average Cost ($ per kilogram)	(8) Profit ($)
	0	$ 0	$ 18				$_____
$_____	100	48	41	$_____	$_____	$_____	_____
_____	200	96	57	_____	_____	_____	_____
_____	300	144	77	_____	_____	_____	_____
_____	400	192	106	_____	_____	_____	_____
_____	500	240	145	_____	_____	_____	_____
_____	600	288	199	_____	_____	_____	_____
_____	700	336	294	_____	_____	_____	_____
_____	800	384	501	_____	_____	_____	_____

   a. Copy and complete the table. What type of market does the gardener operate in? Explain.
   b. Identify the gardener's profit-maximizing or loss-minimizing quantity of output (rounded to the nearest 100 kilograms) and explain your answer using the profit-maximizing output rule.
   c. On a sheet of graph paper, plot the gardener's marginal revenue, marginal cost, and average cost curves. On your graph, show the profit-maximizing point identified in part b, as well as the area of profit or loss.
   d. At what price and quantity of output (rounded to the nearest 100 kilograms) would the gardener reach the breakeven point? Show this point on your graph.

3. a. On a sheet of graph paper, plot the total revenue and total cost curves for the vegetable gardener in the previous question.
   b. On a separate graph, directly below the one you drew in part a, plot the gardener's total profit at the various possible output levels.

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c. On your graphs, highlight the profit-maximizing or loss-minimizing quantity of output and discuss how it can be identified.

4. A fisher who sells mackerel in a perfectly competitive market faces revenues and costs shown in the table below.

Profit-Maximization Table for a Fisher

(1) Price ($ per kilogram)	(2) Quantity (kilograms per day)	(3) Total Revenue ($)	(4) Fixed Costs ($)	(5) Variable Costs ($)	(6) Total Cost ($)	(7) Average Fixed Cost ($ per kilogram)	(8) Average Variable Cost ($ per kilogram)	(9) Average Cost ($ per kilogram)	(10) Marginal Cost ($ per kilogram)
	0	$_____	$ 400	$ 0	$_____				$_____
$_____	90	_____	400	55	_____	$_____	$_____	$_____	_____
_____	220	_____	400	110	_____	_____	_____	_____	_____
_____	307	_____	400	165	_____	_____	_____	_____	_____
_____	360	_____	400	220	_____	_____	_____	_____	_____
_____	385	_____	400	275	_____	_____	_____	_____	_____
_____	400	_____	400	330	_____	_____	_____	_____	_____

a. Copy and complete the table, assuming that the fisher sells the catch at a price of 80 cents per kilogram.
b. On a sheet of graph paper, carefully plot the fisher's marginal cost, average fixed cost, average variable cost, and average cost curves.
c. Which of the output levels in the table represents this fisher's profit-maximizing or loss-minimizing quantity of output? At this quantity, what is the fisher's profit or loss? Draw the fisher's marginal revenue curve on your graph and use this curve to identify the profit-maximizing point as well as the area of profit or loss.
d. On your graph, identify the business's breakeven point, shutdown point, and supply curve. What is the significance of each of these concepts to the fisher?
e. If, in the long run, price remains at 80 cents and the total costs shown in the table still apply, what action will this fisher take? Explain.

5. How do the conditions of minimum-cost and marginal-cost pricing correspond to Adam Smith's notion of the "invisible hand"?

6. Redraw Figure 5.7 assuming an increasing-cost rather than a constant-cost industry.

7. (Policy Discussion Question)
Does the use of price ceilings and price floors in perfectly competitive markets, as outlined in Chapter 3, help or hinder the achievement of minimum-cost and marginal-cost pricing? Explain.

INTERNET APPLICATION QUESTIONS

1. a. Using the arguments in "Avoiding the Maple Syrup Solution" (at **http://www.fraserinstitute.org/publicationdisplay.aspx?id=12833&terms=Avoiding+the+Maple+Syrup+Solution**), outline four important barriers to entry that make it difficult for new firms to enter Canada's airline industry.
b. Why is the federal government reluctant to eliminate these entry barriers?

http://www.fraserinstitute.org/publicationdisplay.aspx?id=12833&terms=Avoiding+the+Maple+Syrup+Solution

www.mcgrawhill.ca/olc/lovewell

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http://www.fraserinstitute.org/publicationdisplay.aspx?id=12785&terms=A+Policy+Analysis+of+Net+Neutrality

2. In virtually all of Canada, access to land-based Internet is provided in a duopoly setting, with consumers purchasing service either from the local cable company or local telephone company.
   a. Using the arguments outlined in "A Policy Analysis of Net Neutrality" (at http://www.fraserinstitute.org/publicationdisplay.aspx?id=12785&terms=A+Policy+Analysis), explain how wireless technology is providing a significant source of potential competition in this market.
   b. Explain how, according to the article's author Steve Globerman, this potential competition can serve to stop established Internet Service Providers from overcharging consumers for their services.

Appendix | How Resource Markets Operate

Recall that in resource markets, households sell economic resources to businesses and households receive incomes in return. So, for their contribution of natural resources (including land), capital resources, and human resources (in particular labour and entrepreneurship), households receive incomes in the form of rent, interest, wages, and profit.

When analyzing resource markets, economists are especially interested in the way that resource prices are set, since these prices play a crucial role in determining people's incomes. For example, the relevant price in a labour market is the wage, which is the amount earned by a worker for providing labour for a certain period. **While a wage is usually thought of as a worker's income paid on an hourly basis, the term is used more broadly in economics to include workers' incomes (often known as salaries) paid by the day, month, or year.** It is important to remember that resource markets are affected by a wide array of factors. While social customs, governments, and labour unions play a part in determining resource prices, the interaction of demand and supply remains the central feature in these markets. Indeed, demand and supply conditions often influence resource markets *despite* outside intervention.

The Demand for Resources

Unlike the demand for consumer items, the demand for resources is determined indirectly. Since resources are used to produce final goods and services, it is the demand for these products that ultimately determines the demand for resources. For example, the number of printing presses demanded by a newspaper publishing company depends on the demand for the company's product. If the newspaper attracts more readers, the company will respond by increasing production and, therefore, buying more printing presses. Similarly, the number of workers hired by a car manufacturer depends on demand in the car market. A drop in the demand for cars will lower the demand for workers, resulting in hiring freezes and, perhaps, even layoffs.

marginal productivity theory: the theory that businesses use resources on the basis of how much extra profit these resources provide

To calculate resource demand, economists use **marginal productivity theory,** which states that businesses use resources on the basis of how much extra profit these resources provide. Therefore, when deciding whether or not it is profitable to buy one more unit of a resource, businesses consider three factors: the resource's marginal cost, its marginal product, and the marginal revenue provided by each new unit of output produced.

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First consider the example of a strawberry farm. Assume that the strawberry market is perfectly competitive (for the non-competitive case, see the appendix to this chapter available at the book's Online Learning Centre), that the farmer hires labour in a perfectly competitive resource market, and that the factors other than output and labour remain constant. So, the farmer hires workers in a market with many buyers and sellers, each of them having no effect on the prevailing price of the resource—namely, the hourly wage for farm workers. Therefore, the strawberry farm is a price-taker in both its product and resource markets.

According to the marginal productivity theory, a business decides how much of a resource to use on the basis of the resource's marginal product and marginal revenue, in addition to the resource's marginal cost to the business.

MARGINAL PRODUCT

The strawberry farmer must first estimate how much output will be added by hiring each new worker, while all other factors remain constant. In other words, the farmer must determine each worker's marginal product. Columns 1, 2, and 3 of the table in Figure A show the results. For the sake of simplicity, assume that the marginal product of labour starts to decline with the very first worker. At harvest time, the farmer hires more labour, and the total quantity of strawberries picked per hour increases, as shown in column 2; however, the marginal product of labour, shown in column 3, declines. For example, when the second worker is hired, the total product of strawberries rises from 10 to 18 kg, giving a marginal product for the second worker of 8 kg (= 18 − 10). With the third worker, the total product rises from 18 to 24 kg, giving a marginal product for the third worker of only 6 kg (= 24 − 18).

MARGINAL REVENUE

Once the marginal product of each worker is determined, the farmer must calculate the marginal revenue gained by selling the additional strawberries. Because the farmer is a price-taker in the perfectly competitive strawberry market, the price of strawberries is constant, and the price and marginal revenue for strawberries are equal. Hence, the farmer needs to know only the price of strawberries to find marginal revenue. Figure A shows the price of strawberries in column 4 as $2 per kilogram.

MARGINAL REVENUE PRODUCT

The effects of marginal product and marginal revenue on the business's demand for labour are summarized by the concept of **marginal revenue product** (MRP), which is the change in total revenue associated with employing each new unit of a resource—in this case, each new worker. Because it represents the *extra* revenue provided by the *extra* units of output produced by each new worker, marginal revenue product incorporates both marginal revenue and marginal product. The table in Figure A shows total revenue in column 5 (found by multiplying each total product value by price), and the marginal revenue product (the change in total revenue) in column 6. Expressing the marginal revenue product on the graph gives us the marginal revenue product curve. So, in the strawberry farm example, total revenue is $20 (= 10 × $2) when employing one worker and $36 (= 18 × $2) when employing two workers. Therefore, the marginal revenue product of the second worker is the difference between the two amounts, or $16 (= $36 − $20), shown on the graph at point *b*.

marginal revenue product: the change in total revenue associated with employing each new unit of a resource

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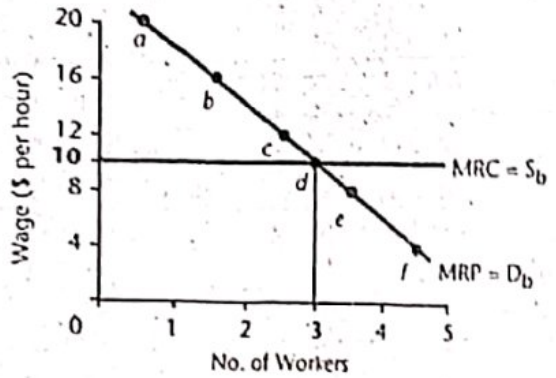
FIGURE A Labour Demand and Supply for a Product and Resource Price-Taker

Labour Demand and Supply Schedules for a Strawberry Farm

(1) Labour (L) (no. of workers)	(2) Total Product (q) (kilograms)	(3) Marginal Product (MP) ($\Delta q/\Delta L$) (kilograms)	(4) Output Price (P) ($ per kilogram)	(5) Total Revenue (TR) (P x q)	(6) Marginal Revenue Product (MRP = $\Delta TR/\Delta L$)	(7) Marginal Resource Cost (MRC = W) ($ per hour)
0	0		$2	$ 0		
1	10	10	2	20	$20 (a)	$10
2	18	8	2	36	16 (b)	10
3	24	6	2	48	12 (c)	10
4	28	4	2	56	8 (e)	10 (d)
5	30	2	2	60	4 (f)	10

Labour Demand and Supply Curves for a Strawberry Farm



To find the price-taking business's demand for labour D_b, calculate the marginal revenue product (MRP), or the change in the business's total revenue from hiring each new worker. The business's supply curve S_b is the marginal resource cost (MRC) of each new worker. Since the business can hire workers at a constant wage, S_b is a horizontal line, and the business's profit-maximizing employment level of labour is at point *d*.

BUSINESS'S LABOUR DEMAND AND SUPPLY

marginal resource cost: the extra cost of each additional unit of a resource

Given this information, it is a straightforward task for the strawberry farmer to find the profit-maximizing employment of labour. The extra cost of each additional unit of a resource for the business is referred to as **marginal resource cost** (MRC). In the case of the strawberry farmer, who is a price-taker in the labour market, and therefore a "wage-taker," marginal resource cost is simply the prevailing wage paid to farm workers. In our example, the wage is $10 per hour. According to the marginal productivity theory, the employer will use additional resources as long as marginal resource cost does not exceed marginal revenue product. Therefore, our strawberry farmer will hire three workers because each of the first three workers adds revenue ($20, $16, and $12 respectively) greater than the $10 cost per worker. Beyond this point, it is not profitable to hire more workers, since the extra revenue that each worker will provide the business will be less than the extra cost of that worker.

business's labour demand curve: a graph showing the possible combinations of workers demanded by a business at each possible wage

business's labour supply curve: a graph showing the possible combinations of workers supplied to a business at each possible wage

Expressed on the graph in Figure A, the marginal revenue product curve represents the **business's labour demand curve** (D_b). The business's labour demand curve shows how many workers are demanded by a business at each possible wage. The demand curve has a negative (downward) slope because businesses find it profitable to employ more workers at lower wages. The marginal resource cost curve represents the **business's labour supply curve** (S_b). This curve shows how many workers are supplied to a busi-

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ness at each possible wage. Because the business is a price-taker in the resource market, this curve is horizontal. No matter what action the strawberry farmer takes, the wage is fixed at the equilibrium wage determined by the entire market.

PROFIT-MAXIMIZING EMPLOYMENT RULE

The profit-maximizing point for the business occurs at the intersection of its demand and supply curves for labour (D_b and S_b). In other words, the business will hire workers up to the point where marginal revenue product and marginal resource cost are the same. This result provides a general **profit-maximizing employment rule** for resources. No matter what market a business operates in, it should use a resource up to the point where the resource's marginal revenue product equals its marginal resource cost.

profit-maximizing employment rule: a business *should* use a resource up to the point where the resource's marginal revenue product equals its marginal resource cost

Profit-maximizing employment rule:

$$\text{Marginal revenue product (MRP)} = \text{Marginal resource Cost (MRC)}$$

Note that the profit-maximizing employment rule parallels the profit-maximizing output rule outlined in the chapter, which is used by businesses to decide levels of output. Recall that the profit-maximizing output rule states that to maximize profits, a business should produce the quantity of output at which marginal revenue and marginal cost intersect, since up to this point, every unit of output has a marginal revenue that exceeds its marginal cost. Similarly, a business can maximize its profits by using a resource up to the point at which marginal revenue product equals marginal resource cost. By doing so, the business employs all units that give more extra revenue than they add to the business's costs.

MARKET DEMAND AND SUPPLY

Now, if we assume that all 1000 employers of farm workers in the region have marginal revenue product curves identical to the one shown in Figure A, we can derive the **labour market demand curve** (D_m). The labour market demand curve shows how many workers are demanded in a competitive labour market at each possible wage. By adding the labour demand curves of all businesses in this market, we have the labour market demand schedule and curve shown in Figure B. For example, at an hourly wage of $14, each of the 1000 farmers demands two workers, which gives a total labour demand of 2000. If the wage were to drop to $10, each farmer would demand three workers, raising total labour demanded in the market to 3000.

labour market demand curve: a graph showing the possible combinations of workers demanded in a certain labour market at each possible wage

Corresponding to this market demand for farm workers is a **labour market supply curve** (S_m), which shows the total supply of workers offering their services in a certain labour market at each wage. This curve has a positive (upward) slope because, in general, higher wages in a given market encourage more workers to offer their labour in that market. Suppose that for our strawberry market, wages increase from $10 per hour to $14 per hour. Figure B shows that this wage increase would increase the quantity of farm workers supplied from 3000 to 4000. Figure B also demonstrates another feature of resource markets that is similar to that in product markets: equilibrium occurs at the intersection of the labour market supply and demand curves.

labour market supply curve: a graph showing the possible combinations of workers supplying their labour in a certain labour market at each possible wage

MARKETS FOR OTHER RESOURCES

While marginal productivity theory can be employed in analyzing labour markets, this theory is not always applicable to other resources. In theory, a business should make choices about all economic resources on the basis of each resource's marginal revenue product and marginal resource cost. In practice, however, marginal revenue product tends to be calculated for labour and for natural resources, but not for the other economic resources.

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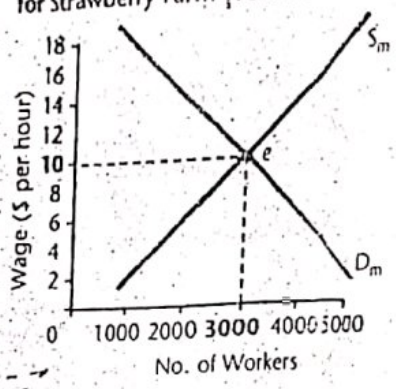
FIGURE B Demand and Supply in a Competitive Labour Market

Labour Demand and Supply Schedules for Strawberry Farm Workers

Wage (W) ($ per hour)	Labour Demanded (D_M) (no. of workers) (farm)	(no. of workers) (market)	Labour Supplied (S_M) (no. of workers) (market)
$18	1	1000	5000
14	2	2000	4000
10	3	3000	3000
6	4	4000	2000
2	5	5000	1000

Labour Demand and Supply Curves for Strawberry Farm Workers



The market demand curve for strawberry farm workers (D_m) is found by adding together the workers demanded by each farm at various wages. In a competitive labour market, this demand curve and the market supply curve (S_m) intersect at equilibrium point *e*.

This is because both labour and natural resources can be measured in standardized units—for example, an hour of a certain type of labour or a hectare of a certain grade of land. In contrast, it is usually harder to calculate marginal revenue product for capital goods. While it is possible to calculate the marginal revenue product of a particular material or type of machine used by a business, this cannot be done for an entire investment project—when a business contemplates building a factory, for example. One investment project differs so much from another that it is impossible to measure them in standardized units. Because they are physically indivisible, they must be counted in monetary terms—the number of dollars a business needs to undertake a certain investment project.

REVIEW

1. Resource markets, like product markets, are governed by the forces of demand and supply. However, the demand for resources is determined indirectly.
2. On the basis of the profit-maximizing employment rule, businesses decide how much of a resource to use by equating the resource's MRP (the change in total revenue associated with each new unit of resource) and MRC (the extra cost to the business of employing each additional unit of resource).
3. In a perfectly competitive resource market, the business is a price-taker; therefore, the business's resource supply (or MRC) curve is a horizontal line. In this market, the profit-maximizing employment level occurs where the business's resource demand (or MRP) curve and its resource supply curve intersect.
4. In a perfectly competitive resource market, the market's resource demand is the sum of the individual businesses' resource demand. The market's resource supply is the sum of all the individual resource owners' resource supply. Equilibrium is the point at which the market demand and market supply curves for the resource intersect.
5. Marginal productivity theory is commonly employed in analyzing markets and natural resources, but not for capital goods and entrepreneurship because of difficulties in measurement.

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PRACTICE QUESTIONS

1. A farmer sells pumpkins in a perfectly competitive product market at a price of $1 per kg, and hires workers in a perfectly competitive labour market at an hourly wage of $15. The farmer's hourly total product is 30 kg when employing one worker, 54 kg with two workers, 72 kg with three workers, 84 kg with four workers, and 90 kg with five workers.
   a. Construct a table similar to the one in Figure A to calculate the marginal revenue product of each worker this farmer could hire.
   b. Compare these values for marginal revenue product with the farmer's marginal resource cost, and identify how many workers the farmer will choose to hire. Explain your answer using the profit-maximizing employment rule.
   c. Using the EconGraphKit, available at the Online Learning Centre, draw the farmer's marginal revenue product and marginal resource cost curves, and show the farmer's profit-maximizing employment level.
   d. If there are 10 000 identical employers of farm workers in this region, how many farm workers will be demanded at a wage of $15?
   e. Using the EconGraphKit, available at the Online Learning Centre, draw the labour demand curve for this market, as well as a possible labour supply curve that gives an equilibrium wage of $15.

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QUESTIONS

1. The table below gives short-run production conditions for a company that makes radios.

Production Conditions for Ham-It-Up Radios

Labour (number of workers)	Total Product (radios per week)	Marginal Product (radios per worker)	Average Product (radios per worker)
0	0		
1	120	_____	_____
2	200	_____	_____
3	270	_____	_____
4	320	_____	_____
5	340	_____	_____
6	350	_____	_____
7	340	_____	_____

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a. Copy and complete the table and identify the ranges where marginal product is positive and where it is negative.
b. Explain the relationships between marginal product and total product, and between marginal product and average product.
c. On one graph, draw the total product curve. On another graph, draw the marginal product and average product curves. Why do the curves in these graphs differ from the corresponding curves portrayed in Figure 4.3 (in Chapter 4) of the text?

2. The table below shows cost and revenue data for a salmon fisher who sells his catch for $3 per kg in a perfectly competitive product market, and hires boat-hands in a perfectly competitive labour market at an hourly wage of $15.

Labour Demand and Supply Schedules for a Salmon Fisher

(1) Labour (no. of workers)	(2) Total Product (kilograms per hour)	(3) Marginal Product (kilograms per hour)	(4) Product Price ($ per kilogram)	(5) Total Revenue ($ per hour)	(6) Marginal Revenue Product ($ per hour)
0	0		$3		
1	16	$____	3	$____	$____
2	28	____	3	____	____
3	37	____	3	____	____
4	44	____	3	____	____
5	47	____	3	____	____
			3	____	____

a. Copy and complete the table. On a sheet of graph paper, plot the fisher's labour demand and labour supply curves.
b. What explains the shapes of the curves you drew in part a?
c. How many full-time boat-hands will the fisher employ? Explain using the profit-maximizing employment rule and your graph.
d. If the wage rate rises to $24 per hour, how many full-time boat-hands will the fisher now employ? Again, explain using the profit-maximizing employment rule and your graph.

3. Do you think marginal productivity theory is applicable to entrepreneurship? Why or why not?

4. Redraw the graph in Figure B to show the effects in this labour market if the government imposes a minimum wage of $14. Does this minimum wage represent price ceiling or price floor? Explain.

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CAN CAPITALISM SURVIVE?

Joseph Schumpeter and the Prospects for Capitalism

JOSEPH SCHUMPETER

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Joseph Schumpeter (1883–1950) is one of the most famous economists of the 20th century. The originality of his ideas and the breadth of his learning have been matched by few others. Born in a middle-class business family, he enjoyed an aristocratic upbringing after his father died and his mother married a high-ranking military commander in the Austrian army. Schumpeter studied law and economics at the prestigious University of Vienna. After working as a lawyer, he took up a career as a professor of economics. For a brief period after World War I, he served as the Minister of Finance in the Austrian government. In the 1930s, the political turmoil surrounding the rise of the Nazis in Germany caused him to move to the United States, where he taught for many years at Harvard University.

SCHUMPETER AND HIS INFLUENCE

Schumpeter's work is fascinating because of his ability to combine seemingly contradictory ideas. While a strong supporter of capitalism and private markets, he devised a theory of capitalist development that has interesting parallels with the work of Karl Marx. Like Marx, Schumpeter used not only the tools of economics, but also the other social sciences. He was, therefore, able to highlight the role played by politics and culture in affecting economic conditions.

The crucial player in Schumpeter's theory of capitalism is the entrepreneur. For Schumpeter, entrepreneurs are much more than risk-takers—they are innovators who, through imagination and creativity, supply new products or adopt new types of technology. While not necessarily inventors, they are able to bring fresh ideas to the marketplace. As Schumpeter noted:

> To carry any improvement into effect is a task entirely different from the inventing of it, and a task, moreover, requiring entirely different kinds of aptitudes. Although entrepreneurs, of course, may be inventors just as they may be capitalists, they are inventors not by nature of their function but by coincidence and vice versa.[1]

Schumpeter saw entrepreneurs as the driving forces of economic progress. He believed that a capitalist system would ensure the fastest possible pace of technological change because capitalism allows entrepreneurs to keep the profits resulting from their innovations.

According to Schumpeter, the importance of perfectly competitive markets is overrated in economic theory. In real capitalist economies, he said, competition usually takes place between a few rivals in oligopolistic markets. In pursuit of profit and market power, the rivals introduce new products and production methods, which, in turn, lead to economic growth and revitalize the capitalist system. Schumpeter called this process "creative destruction," since it destroys parts of the economy at the same time as it creates new industries and products.

PREDICTIONS FOR THE FUTURE

Given Schumpeter's opposition to socialism and his strong support for capitalism, we might expect that he would predict the downfall of socialism and the final victory of capitalism throughout the world. On the contrary, he believed that in the long run, capitalism was doomed, not because of its internal economic contradictions, but because of

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cultural and political trends flowing from its success. Hence, in answer to the question, "Can capitalism survive?" he gave the straightforward answer, "No. I do not think it can."

According to Schumpeter, because of the advantages they possess, giant companies will gradually take over most industries. In the process, the innovative spirit that once guided them will be crushed, as the imaginative entrepreneur is replaced by the cautious professional manager at the helm of business. Without the entrepreneur, there will no longer be a force in society to support the institution of private property.

At the same time, the growing class of intellectuals—professors, writers, and journalists—who live well off the prosperity provided by the capitalist system, will use their persuasive powers to turn others against capitalism. Therefore, a majority of people will also become opposed to property rights. Why are so many intellectuals hostile to capitalism? Because, stated Schumpeter, most of them are outsiders who are much more competent at criticizing the system than they are at working within it.

Schumpeter predicted that the elimination of the entrepreneur and the new popular hostility toward capitalism would lead to more government involvement in the economy. Attempts would be made by government bureaucrats to smooth out economic fluctuations, as well as reduce inequalities in the distribution of incomes. Gradually, the role of private property would shrink, and capitalist societies would turn towards socialism—of either the democratic or the authoritarian variety.

RELEVANCE FOR TODAY

It is important to note that Schumpeter developed his theories before and during World War II, before the massive expansion in government activity that took place in developed capitalist countries, such as Canada. As criticism of capitalist institutions became common in Canada and other countries in the 1960s and 1970s, many commentators suggested that Schumpeter's forecasts contained a good deal of truth. Are his predictions still as applicable in the 2010s as they were in previous decades? Some would argue that there has been a resurgence in entrepreneurship and popular support for capitalism that now makes Schumpeter's theories less relevant than they once were.

> During the late 1960s...Schumpeter's predictions seemed to be coming true. Third World nations, newly liberated from Europe, turned to socialism. By the early 1970s, Ph.D.s were driving taxicabs and blasting the establishment. But what did the 1980s bring us? Yuppies, short hair, striped shirts, and a parade of underdeveloped nations trading *Das Kapital* in for *Dress for Success*. ...Nobody urges centralized planning anymore.... Even if a return to market mechanisms does not magically turn poverty into wealth, at least governments have jettisoned rigid, ideological abhorrence of market economic systems.[3]

In the aftermath of 2008 credit meltdown, criticism of capitalist institutions, especially in the financial sector, came under renewed scrutiny and criticism, though it is not clear whether this shift in attitudes will be long-lasting. But, right or wrong, Schumpeter's work provides a classic example of how economic theorizing can be made to include not only economic factors, but also political and social trends. Meanwhile, his emphasis on entrepreneurship and innovation as drivers of growth has become an integral element of mainstream economic theory, as has his view of the potential competition to be found in oligopolistic markets.

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Notes

[1] Joseph A. Schumpeter, *The Theory of Economic Development* (New York: Oxford University Press, 1961), pp. 88–89.

[2] Joseph A. Schumpeter, *Capitalism, Socialism and Democracy* (New York: Harper & Row, 1976), p. 61, as quoted in *New Ideas From Dead Economists* by Todd G. Buchholz. Copyright © 1989 by Todd G. Buchholz. Used by permission of Dutton Signet, a division of Penguin Books USA Inc.

[3] From *New Ideas From Dead Economists* by Todd G. Buchholz. Copyright © 1989 by Todd G. Buchholz. Used by permission of Dutton Signet, a division of Penguin Books USA Inc.

1. Outline one possible reason why Schumpeter's predictions about capitalism have not been borne out since the 1980s.

2. If alive today, Schumpeter would doubtless argue that the process of creative destruction continues in capitalism. What might be a contemporary example from the Canadian economy?

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Monopoly and Imperfect Competition

Monopolies are a notable part of the Canadian economy, as illustrated by businesses as large as a public transit system in any of Canada's major cities, or as modest as a small-town newspaper. Pricing decisions in all such cases are analyzed with the same set of tools. Monopolistic competition and oligopoly—often grouped together and called imperfect competition—are even more common. We will see how the market forces facing each of these types of firms differ from those facing perfect competitors, and that Adam Smith's invisible hand of competition does not necessarily apply in all real-world markets.

> The biggest things are always the easiest to do because there is no competition.
>
> – SIR WILLIAM VAN HORNE, CANADIAN CAPITALIST

LEARNING OBJECTIVES After this chapter, you will be able to

LO 1 Outline the demand conditions faced by monopolists, monopolistic competitors, and oligopolists

LO 2 Distinguish between how monopolists, monopolistic competitors, and oligopolists maximize profits

LO 3 Describe non-price competition and the arguments over industrial concentration

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