CFA Institute

ECONOMICS

CFA® Program Curriculum
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CONTENTS

How to Use the CFA Program Curriculum

The CFA® Program exams measure your mastery of the core knowledge, skills, and abilities required to succeed as an investment professional. These core competencies are the basis for the Candidate Body of Knowledge (CBOK™). The CBOK consists of four components:

- A broad outline that lists the major CFA Program topic areas (www.cfainstitute.org/programs/cfa/curriculum/cbok/cbok)
- Topic area weights that indicate the relative exam weightings of the top-level topic areas (www.cfainstitute.org/en/programs/cfa/curriculum)
- Learning outcome statements (LOS) that tell you the specific knowledge, skills, and abilities you should gain from each curriculum topic area. You will find these statements at the start of each learning module and lesson. We encourage you to review the information about the LOS on our website (www.cfainstitute.org/programs/cfa/curriculum/study-sessions), including the descriptions of LOS "command words" on the candidate resources page at www.cfainstitute.org/-/media/documents/support/programs/cfa-and-cipm-los-command-words.ashx.
- The CFA Program curriculum that candidates receive access to upon exam registration.

Therefore, the key to your success on the CFA exams is studying and understanding the CBOK. You can learn more about the CBOK on our website: www.cfainstitute.org/programs/cfa/curriculum/cbok.

The curriculum, including the practice questions, is the basis for all exam questions. The curriculum is selected/developed specifically to provide candidates with the knowledge, skills, and abilities reflected in the CBOK.

CFA INSTITUTE LEARNING ECOSYSTEM (LES)

Your exam registration fee includes access to the CFA Institute Learning Ecosystem (LES). This digital learning platform provides access to all the curriculum content and practice questions. The LES is organized as a series of learning modules consisting of short online lessons and associated practice questions. This tool is your source for all study materials, including practice questions and mock exams. The LES is the primary method by which CFA Institute delivers your curriculum experience. Here, you will find additional practice questions to test your knowledge, including some interactive questions.

DESIGNING YOUR PERSONAL STUDY PROGRAM

An orderly, systematic approach to exam preparation is critical. You should dedicate a consistent block of time every week to reading and studying. Review the LOS both before and after you study curriculum content to ensure you can demonstrate

the knowledge, skills, and abilities described by the LOS and the assigned learning module. Use the LOS as a self-check to track your progress and highlight areas of weakness for later review.

Successful candidates report an average of more than 300 hours preparing for each exam. Your preparation time will vary based on your prior education and experience, and you will likely spend more time on some topics than on others.

ERRATA

The curriculum development process is rigorous and involves multiple rounds of reviews by content experts. Despite our efforts to produce a curriculum that is free of errors, we must make corrections in some instances. Curriculum errata are periodically updated and posted by exam level and test date on the Curriculum Errata webpage (www.cfainstitute.org/en/programs/submit-errata). If you believe you have found an error in the curriculum, you can submit your concerns through our curriculum errata reporting process found at the bottom of the Curriculum Errata webpage.

OTHER FEEDBACK

Please send any comments or suggestions to info@cfainstitute.org, and we will review your feedback thoughtfully.

Economics

LEARNING MODULE

1

The Firm and Market Structures

by Gary L. Arbogast, PhD, CFA, Richard V. Eastin, PhD, Richard Fritz, PhD, and Michele Gambera, PhD, CFA.

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LEARNING OUTCOMES

Mastery	*The candidate should be able to:*
☐	determine and interpret breakeven and shutdown points of production, as well as how economies and diseconomies of scale affect costs under perfect and imperfect competition
☐	describe characteristics of perfect competition, monopolistic competition, oligopoly, and pure monopoly
☐	explain supply and demand relationships under monopolistic competition, including the optimal price and output for firms as well as pricing strategy
☐	explain supply and demand relationships under oligopoly, including the optimal price and output for firms as well as pricing strategy
☐	identify the type of market structure within which a firm operates and describe the use and limitations of concentration measures

INTRODUCTION

This learning module addresses several important concepts that extend the basic market model of demand and supply to the assessment of a firm's breakeven and shutdown points of production. Demand concepts covered include own-price elasticity of demand, cross-price elasticity of demand, and income elasticity of demand. Supply concepts covered include total, average, and marginal product of labor; total, variable, and marginal cost of labor; and total and marginal revenue. These concepts are used to calculate the breakeven and shutdown points of production.

This learning module surveys how economists classify market structures. We analyze distinctions between the different structures that are important for understanding demand and supply relations, optimal price and output, and the factors affecting long-run profitability. We also provide guidelines for identifying market structure in practice.

LEARNING MODULE OVERVIEW

- Firms under conditions of perfect competition have no pricing power and, therefore, face a perfectly horizontal demand curve at the market price. For firms under conditions of perfect competition, price is identical to marginal revenue (MR).
- Firms under conditions of imperfect competition face a negatively sloped demand curve and have pricing power. For firms under conditions of imperfect competition, MR is less than price.
- Economic profit equals total revenue (TR) minus total economic cost, whereas accounting profit equals TR minus total accounting cost.
- Economic cost considers the total opportunity cost of all factors of production.
- Opportunity cost is the next best alternative use of a resource forgone in making a decision.
- Maximum economic profit requires that (1) MR equals marginal cost (MC) and (2) MC not be falling with output.
- The breakeven point occurs when TR equals total cost (TC), otherwise stated as the output quantity at which average total cost (ATC) equals price.
- Shutdown occurs when a firm is better off not operating than continuing to operate.
- If all fixed costs are sunk costs, then shutdown occurs when the market price falls below the minimum average variable cost. After shutdown, the firm incurs only fixed costs and loses less money than it would operating at a price that does not cover variable costs.
- In the short run, it may be rational for a firm to continue to operate while earning negative economic profit if some unavoidable fixed costs are covered.
- Economies of scale is defined as decreasing long-run cost per unit as output increases. Diseconomies of scale is defined as increasing long-run cost per unit as output increases.
- Long-run ATC is the cost of production per unit of output under conditions in which all inputs are variable.
- Specialization efficiencies and bargaining power in input price can lead to economies of scale.
- Bureaucratic and communication breakdowns and bottlenecks that raise input prices can lead to diseconomies of scale.
- The minimum point on the long-run ATC curve defines the minimum efficient scale for the firm.
- Economic market structures can be grouped into four categories: perfect competition, monopolistic competition, oligopoly, and monopoly.

- The categories of economic market structures differ because of the following characteristics: The number of producers is many in perfect and monopolistic competition, few in oligopoly, and one in monopoly. The degree of product differentiation, the pricing power of the producer, the barriers to entry of new producers, and the level of non-price competition (e.g., advertising) are all low in perfect competition, moderate in monopolistic competition, high in oligopoly, and generally highest in monopoly.
- A financial analyst must understand the characteristics of market structures to better forecast a firm's future profit stream.
- The optimal MR equals MC. Only in perfect competition, however, does the MR equal price. In the remaining structures, price generally exceeds MR because a firm can sell more units only by reducing the per unit price.
- The quantity sold is highest in perfect competition. The price in perfect competition is usually lowest, but this depends on factors such as demand elasticity and increasing returns to scale (which may reduce the producer's MC). Monopolists, oligopolists, and producers in monopolistic competition attempt to differentiate their products so that they can charge higher prices.
- Typically, monopolists sell a smaller quantity at a higher price. Investors may benefit from being shareholders of monopolistic firms that have large margins and substantial positive cash flows.
- In perfect competition, firms do not earn economic profit. The market will compensate for the rental of capital and of management services, but the lack of pricing power implies that there will be no extra margins.
- In the short run, firms in any market structure can have economic profits, the more competitive a market is and the lower the barriers to entry, the faster the extra profits will fade. In the long run, new entrants shrink margins and push the least efficient firms out of the market.
- Oligopoly is characterized by the importance of strategic behavior. Firms can change the price, quantity, quality, and advertisement of the product to gain an advantage over their competitors. Several types of equilibrium (e.g., Nash, Cournot, kinked demand curve) may occur that affect the likelihood of each of the incumbents (and potential entrants in the long run) having economic profits. Price wars may be started to force weaker competitors to abandon the market.
- Measuring market power is complicated. Ideally, econometric estimates of the elasticity of demand and supply should be computed. However, because of the lack of reliable data and the fact that elasticity changes over time (so that past data may not apply to the current situation), regulators and economists often use simpler measures. The concentration ratio is simple, but the Herfindahl-Hirschman index (HHI), with a little more computation required, often produces a better figure for decision making.

2 PROFIT MAXIMIZATION: PRODUCTION BREAKEVEN, SHUTDOWN AND ECONOMIES OF SCALE

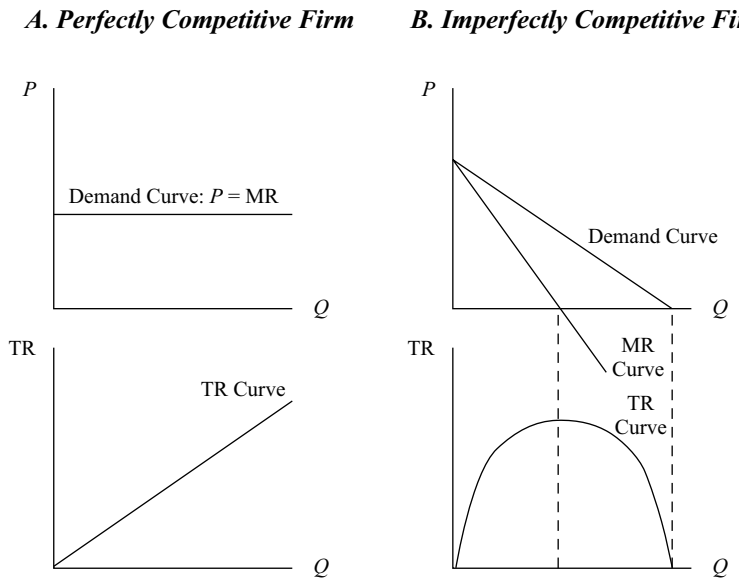
☐ determine and interpret breakeven and shutdown points of production, as well as how economies and diseconomies of scale affect costs under perfect and imperfect competition

Firms generally can be classified as operating in either a perfectly competitive or an imperfectly competitive environment. The difference between the two manifests in the slope of the demand curve facing the firm. If the environment of the firm is perfectly competitive, it must take the market price of its output as given, so it faces a perfectly elastic, horizontal demand curve. In this case, the firm's marginal revenue (MR) and the price of its product are identical. Additionally, the firm's **average revenue** (AR), or revenue per unit, is also equal to price per unit. A firm that faces a negatively sloped demand curve, however, must lower its price to sell an additional unit, so its MR is less than price (P).

These characteristics of MR are also applicable to the total revenue (TR) functions. Under conditions of perfect competition, TR (as always) is equal to price times quantity: TR = $(P)(Q)$. But under conditions of perfect competition, price is dictated by the market; the firm has no control over price. As the firm sells one more unit, its TR rises by the exact amount of price per unit.

Under conditions of imperfect competition, price is a variable under the firm's control, and therefore price is a function of quantity: $P = f(Q)$, and TR = $f(Q) \times Q$. For simplicity, suppose the firm is monopolistic and faces the market demand curve, which we will assume is linear and negatively sloped. Because the monopolist is the only seller, its TR is identical to the total expenditure of all buyers in the market. When price is reduced and quantity sold increases in this environment, a decrease in price initially increases total expenditure by buyers and TR to the firm because the decrease in price is outweighed by the increase in units sold. But as price continues to fall, the decrease in price overshadows the increase in quantity, and total expenditure (revenue) falls. We can now depict the demand and TR functions for firms under conditions of perfect and imperfect competition, as shown in Exhibit 1.

Exhibit 1: Demand and Total Revenue Functions for Firms under Conditions of Perfect and Imperfect Competition

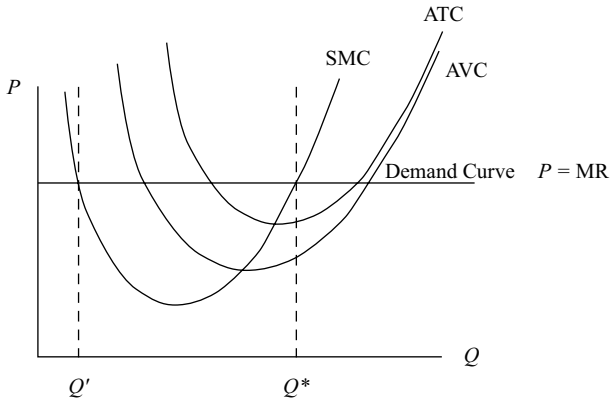


Panel A of Exhibit 1 depicts the demand curve (upper graph) and total revenue curve (lower graph) for the firm under conditions of perfect competition. Notice that the vertical axis in the upper graph is price per unit (e.g., GBP/bushel), whereas TR is measured on the vertical axis in the lower graph (e.g., GBP/week). The same is true for the respective axes in Panel B, which depicts the demand and total revenue curves for the monopolist. The TR curve for the firm under conditions of perfect competition is linear, with a slope equal to price per unit. The TR curve for the monopolist first rises (in the range where MR is positive and demand is elastic) and then falls (in the range where MR is negative and demand is inelastic) with output.

Profit-Maximization, Breakeven, and Shutdown Points of Production

We can now combine the firm's short-run TC curves with its TR curves to represent profit maximization in the cases of perfect competition and imperfect competition. Exhibit 2 shows both the AR and average cost curves in one graph for the firm under conditions of perfect competition.

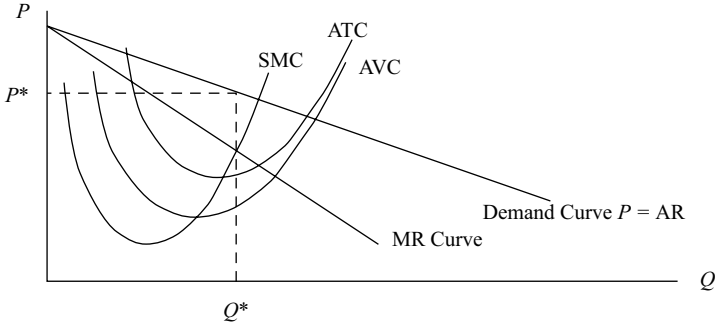
Exhibit 2: Demand and Average and Marginal Cost Curves for the Firm under Conditions of Perfect Competition



The firm is maximizing profit by producing Q^*, where price is equal to short-run marginal cost (SMC) and SMC is rising. Note at another output level, Q', where P = SMC, SMC is still falling, so this cannot be a profit-maximizing solution. If market price were to rise, the firm's demand and MR curve would simply shift upward, and the firm would reach a new profit-maximizing output level to the right of Q^*. If, however, market price were to fall, the firm's demand and MR curve would shift downward, resulting in a new and lower level of profit-maximizing output. As depicted, this firm is currently earning a positive economic profit because market price exceeds average total cost (ATC), at output level Q^*. This profit is possible in the short run, but in the long run, competitors would enter the market to capture some of those profits and would drive the market price down to a level equal to each firm's ATC.

Exhibit 3 depicts the cost and revenue curves for the monopolist that is facing a negatively sloped market demand curve. The MR and demand curves are not identical for this firm. But the profit-maximizing rule is still the same: Find the level of Q that equates SMC, to MR—in this case, Q^*. Once that level of output is determined, the optimal price to charge is given by the firm's demand curve at P^*. This monopolist is earning positive economic profit because its price exceeds its ATC. The barriers to entry that give this firm its monopolistic power mean that outside competitors would not be able to compete away this firm's profits.

Exhibit 3: Demand and Average and Marginal Cost Curves for the Monopolistic Firm



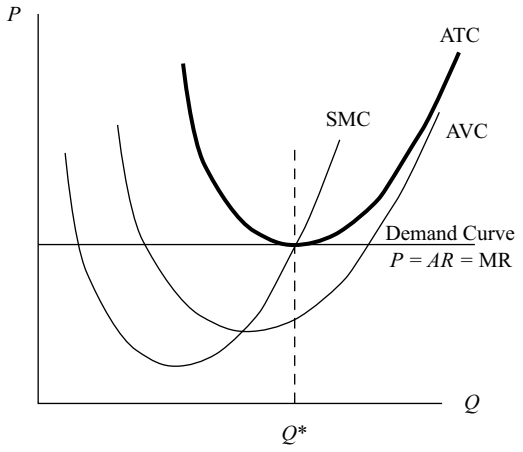
Breakeven Analysis and Shutdown Decision

A firm is said to break even if its TR is equal to its TC. It also can be said that a firm breaks even if its price (AR) is exactly equal to its ATC, which is true under conditions of perfect and imperfect competition. Of course, the goal of management is not just to breakeven but to maximize profit. However, perhaps the best the firm can do is cover all of its economic costs. Economic costs are the sum of total accounting costs and implicit opportunity costs. A firm whose revenue is equal to its economic costs is covering the opportunity cost of all of its factors of production, including capital. Economists would say that such a firm is earning normal profit, but not positive economic profit. It is earning a rate of return on capital just equal to the rate of return that an investor could expect to earn in an equivalently risky alternative investment (opportunity cost). Firms that are operating in a competitive environment with no barriers to entry from other competitors can expect, in the long run, to be unable to earn a positive economic profit; the excess rate of return would attract entrants who would produce more output and ultimately drive the market price down to the level at which each firm is, at best, just earning a normal profit. This situation, of course, does not imply that the firm is earning zero accounting profit.

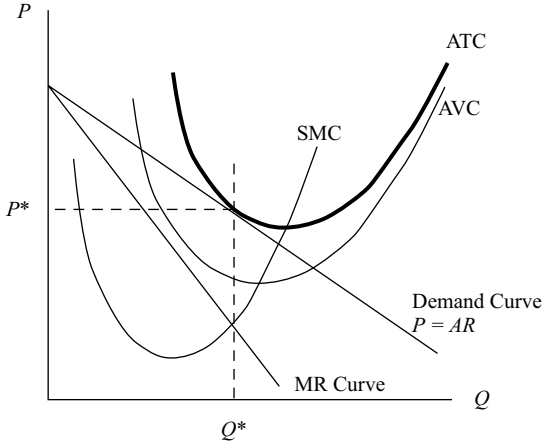
Exhibit 4 depicts the condition for both a firm under conditions of perfect competition (Panel A) and a monopolist (Panel B) in which the best each firm can do is to break even. Note that at the level of output at which SMC is equal to MR, price is equal to ATC. Hence, economic profit is zero, and the firms are breaking even.

Exhibit 4: Examples of Firms under Perfect Competition and Monopolistic Firms That Can, at Best, Break Even

A. Perfect Competition



B. Monopolist



The Shutdown Decision

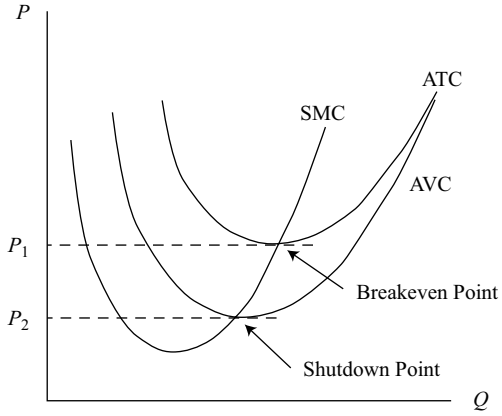
In the long run, if a firm cannot earn at least a zero economic profit, it will not operate because it is not covering the opportunity cost of all of its factors of production, labor, and capital. In the short run, however, a firm might find it advantageous to continue to operate even if it is not earning at least a zero economic profit. The discussion that follows addresses the decision to continue to operate and earn negative profit or shut down operations.

Recall that typically some or all of a firm's fixed costs are incurred regardless of whether the firm operates. The firm might have a lease on its building that it cannot avoid paying until the lease expires. In that case, the lease payment is a sunk cost: It cannot be avoided, no matter what the firm does. Sunk costs must be ignored in the decision to continue to operate in the short run. As long as the firm's revenues cover

at least its variable cost, the firm is better off continuing to operate. If price is greater than average variable cost (AVC), the firm is covering not only all of its variable cost but also a portion of fixed cost.

In the long run, unless market price increases, this firm would exit the industry. But in the short run, it will continue to operate at a loss. Exhibit 5 depicts a firm under conditions of perfect competition facing three alternative market price ranges for its output. At any price above P_1, the firm can earn a positive profit and clearly should continue to operate. At a price below P_2, the minimum AVC, the firm could not even cover its variable cost and should shut down. At prices between P_2 and P_1, the firm should continue to operate in the short run because it is able to cover all of its variable cost and contribute something toward its unavoidable fixed costs. Economists refer to the minimum AVC point as the **shutdown point** and the minimum ATC point as the **breakeven point**.

Exhibit 5: A Firm under Conditions of Perfect Competition Will Choose to Shut Down If Market Price Is Less Than Minimum AVC



EXAMPLE 1

Breakeven Analysis and Profit Maximization When the Firm Faces a Negatively Sloped Demand Curve under Imperfect Competition

Revenue and cost information for a future period including all opportunity costs is presented in Exhibit 6 for WR International, a newly formed corporation that engages in the manufacturing of low-cost, prefabricated dwelling units for urban housing markets in emerging economies. (Note that quantity increments are in blocks of 10 for a 250 change in price.) The firm has few competitors in a market setting of imperfect competition.

Exhibit 6: Revenue and Cost Information for WR International

Quantity (*Q*)	Price (*P*)	Total Revenue (*TR*)	Total Cost (*TC*)[a]	Profit
0	10,000	0	100,000	–100,000
10	9,750	97,500	170,000	–72,500

Quantity (*Q*)	Price (*P*)	Total Revenue (*TR*)	Total Cost (*TC*)[a]	Profit
20	9,500	190,000	240,000	–50,000
30	9,250	277,500	300,000	–22,500
40	9,000	360,000	360,000	0
50	8,750	437,500	420,000	17,500
60	8,500	510,000	480,000	30,000
70	8,250	577,500	550,000	27,500
80	8,000	640,000	640,000	0
90	7,750	697,500	710,000	–12,500
100	7,500	750,000	800,000	–50,000

[a] *Includes all opportunity costs*

1. How many units must WR International sell to initially break even?

   Solution:

   WR International will initially break even at 40 units of production, where TR and TC equal 360,000.

2. Where is the region of profitability?

   Solution:

   The region of profitability will range from greater than 40 units to less than 80 units. Any production quantity of less than 40 units and any quantity greater than 80 units will result in an economic loss.

3. At what point will the firm maximize profit? At what points are there economic losses?

   Solution:

   Maximum profit of 30,000 will occur at 60 units. Lower profit will occur at any output level that is higher or lower than 60 units. From 0 units to less than 40 units and for quantities greater than 80 units, economic losses occur.

Given the relationships between TR, total variable costs (TVC), and total fixed costs (TFC), Exhibit 7 summarizes the decisions to operate, shut down production, or exit the market in both the short run and the long run. The firm must cover its variable cost to remain in business in the short run; if TR cannot cover TVC, the firm shuts down production to minimize loss. The loss would be equal to the amount of fixed cost. If TVC exceeds TR in the long run, the firm will exit the market to avoid the loss associated with fixed cost at zero production. By exiting the market, the firm's investors do not suffer the erosion of their equity capital from economic losses. When TR is enough to cover TVC but not all of TFC, the firm can continue to produce in the short run but will not be able to maintain financial solvency in the long run.

Exhibit 7: Short-Run and Long-Run Decisions to Operate or Not

Revenue–Cost Relationship	Short-Run Decision	Long-Term Decision
TR = TC	Stay in market	Stay in market
TR = TVC but < TC	Stay in market	Exit market
TR < TVC	Shut down production	Exit market

EXAMPLE 2

Shutdown Analysis

For the most recent financial reporting period, a London-based business has revenue of GBP2 million and TC of GBP2.5 million, which are or can be broken down into TFC of GBP1 million and TVC of GBP1.5 million. The net loss on the firm's income statement is reported as GBP500,000 (ignoring tax implications). In prior periods, the firm had reported profits on its operations.

1. What decision should the firm make regarding operations over the short term?

   Solution:

   In the short run, the firm is able to cover all of its TVC but only half of its GBP1 million in TFC. If the business ceases to operate, its loss would be GBP1 million, the amount of TFC, whereas the net loss by operating would be minimized at GBP500,000. The firm should attempt to operate by negotiating special arrangements with creditors to buy time to return operations back to profitability.

2. What decision should the firm make regarding operations over the long term?

   Solution:

   If the revenue shortfall is expected to persist over time, the firm should cease operations, liquidate assets, and pay debts to the extent possible. Any residual for shareholders would decrease the longer the firm is allowed to operate unprofitably.

3. Assume the same business scenario except that revenue is now GBP1.3 million, which creates a net loss of GBP1.2 million. What decision should the firm make regarding operations in this case?

   Solution:

   The firm would minimize loss at GBP1 million of TFC by shutting down. If the firm decided to continue to do business, the loss would increase to GBP1.2 million. Shareholders would save GBP200,000 in equity value by pursuing this option. Unquestionably, the business would have a rather short life expectancy if this loss situation were to continue.

When evaluating profitability, particularly of start-up firms and businesses using turnaround strategies, analysts should consider highlighting breakeven and shutdown points in their financial research. Identifying the unit sales levels at which the firm

enters or leaves the production range for profitability and at which the firm can no longer function as a viable business entity provides invaluable insight when making investment decisions.

Economies and Diseconomies of Scale with Short-Run and Long-Run Cost Analysis

Rational behavior dictates that the firm select an operating size or scale that maximizes profit over any time frame. The time frame that defines the short run and long run for any firm is based on the ability of the firm to adjust the quantities of the fixed resources it uses. The short run is the time period during which at least one of the factors of production, such as technology, physical capital, and plant size, is fixed. The long run is defined as the time period during which all factors of production are variable. Additionally, in the long run, firms can enter or exit the market based on decisions regarding profitability. The long run is often referred to as the "planning horizon" in which the firm can choose the short-run position or optimal operating size that maximizes profit over time. The firm is always operating in the short run but planning in the long run.

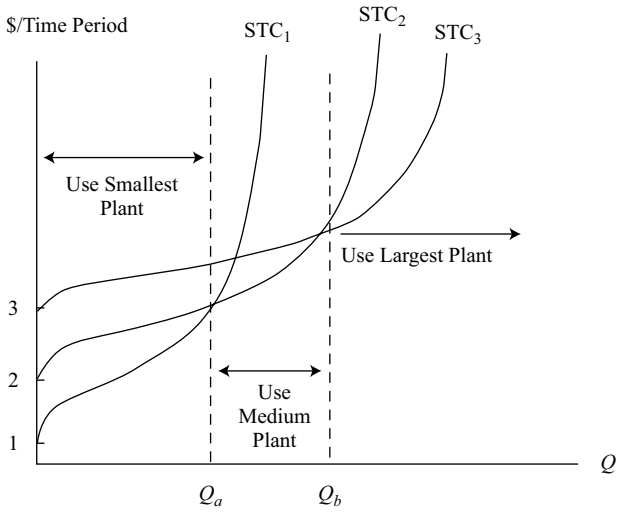
The time required for long-run adjustments varies by industry. For example, the long run for a small business using very little technology and physical capital may be less than a year, whereas for a capital-intensive firm, the long run may be more than a decade. Given enough time, however, all production factors are variable, which allows the firm to choose an operating size or plant capacity based on different technologies and physical capital. In this regard, costs and profits will differ between the short run and the long run.

Short- and Long-Run Cost Curves

Recall that when we addressed the short-run cost curves of the firm, we assumed that the capital input was held constant. That meant that the only way to vary output in the short run was to change the level of the variable input—in our case, labor. If the capital input—namely, plant and equipment—were to change, however, we would have an entirely new set of short-run cost curves, one for each level of capital input.

The short-run total cost includes all the inputs—labor and capital—the firm is using to produce output. For reasons discussed earlier, the typical short-run total cost (STC) curve might rise with output, first at a decreasing rate because of specialization economies and then at an increasing rate, reflecting the law of diminishing marginal returns to labor. TFC, the quantity of capital input multiplied by the rental rate on capital, determines the vertical intercept of the STC curve. At higher levels of fixed input, TFC is greater, but the production capacity of the firm is also greater. Exhibit 8 shows three different STC curves for the same technology but using three distinct levels of capital input—points 1, 2, and 3 on the vertical axis.

Exhibit 8: Short-Run Total Cost Curves for Various Plant Sizes



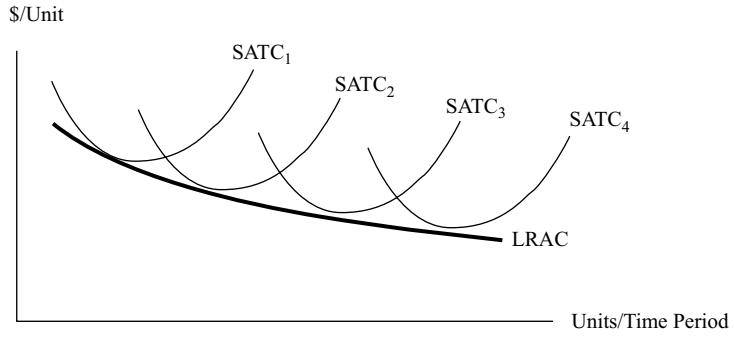
Plant Size 1 is the smallest and, of course, has the lowest fixed cost; hence, its STC_1 curve has the lowest vertical intercept. Note that STC_1 begins to rise more steeply with output, reflecting the lower plant capacity. Plant Size 3 is the largest of the three and reflects that size with both a higher fixed cost and a lower slope at any level of output. If a firm decided to produce an output between zero and Q_a, it would plan on building Plant Size 1 because for any output level in that range, its cost would be less than it would be for Plant Size 2 or 3. Accordingly, if the firm were planning to produce output greater than Q_b, it would choose Plant Size 3 because its cost for any of those levels of output would be lower than it would be for Plant Size 1 or 2. Of course, Plant Size 2 would be chosen for output levels between Q_a and Q_b. The long-run total cost curve is derived from the lowest level of STC for each level of output because in the long run, the firm is free to choose which plant size it will operate. This curve is called an "envelope curve." In essence, this curve envelopes—encompasses—all possible combinations of technology, plant size, and physical capital.

For each STC curve, there is also a corresponding **short-run average total cost** (SATC) curve and a corresponding **long-run average total cost** (LRAC) curve, the envelope curve of all possible short-run average total cost curves. The shape of the LRAC curve reflects an important concept called **economies of scale** and **diseconomies of scale**.

Defining Economies of Scale and Diseconomies of Scale

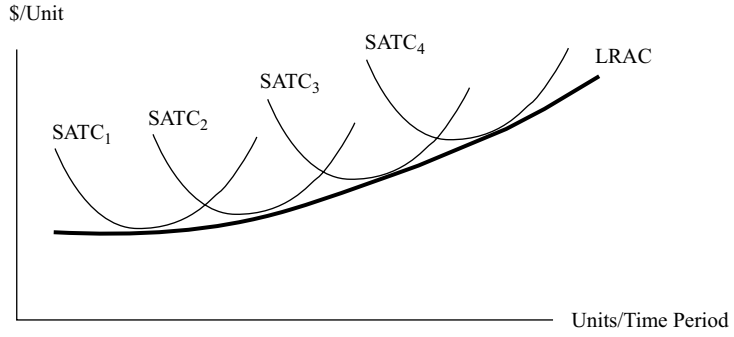
When a firm increases all of its inputs to increase its level of output (obviously, a long-run concept), it is said to *scale up* its production. *Scaling down* is the reverse—decreasing all of its inputs to produce less in the long run. Economies of scale occur if, as the firm increases its output, cost per unit of production falls. Graphically, this definition translates into an LRAC curve with a negative slope. Exhibit 9 depicts several SATC curves, one for each plant size, and the LRAC curve representing economies of scale.

Exhibit 9: Short-Run Average Total Cost Curves for Various Plant Sizes and Their Envelope Curve, LRAC: Economies of Scale



Diseconomies of scale occur if cost per unit rises as output increases. Graphically, diseconomies of scale translate into an LRAC curve with a positive slope. Exhibit 10 depicts several SATC curves, one for each plant size, and their envelope curve, the LRAC curve, representing diseconomies of scale.

Exhibit 10: Short-Run Average Total Cost Curves for Various Plant Sizes and Their Envelope Curve, LRAC: Diseconomies of Scale



As the firm grows in size, economies of scale and a lower ATC can result from the following factors:

- Achieving **increasing returns to scale** when a production process allows for increases in output that are proportionately larger than the increase in inputs.
- Having a division of labor and management in a large firm with numerous workers, which allows each worker to specialize in one task rather than perform many duties, as in the case of a small business (as such, workers in a large firm become more proficient at their jobs).
- Being able to afford more expensive, yet more efficient equipment and to adapt the latest in technology that increases productivity.
- Effectively reducing waste and lowering costs through marketable by-products, less energy consumption, and enhanced quality control.
- Making better use of market information and knowledge for more effective managerial decision making.

- Obtaining discounted prices on resources when buying in larger quantities.

A classic example of a business that realizes economies of scale through greater physical capital investment is an electric utility. By expanding output capacity to accommodate a larger customer base, the utility company's per-unit cost will decline. Economies of scale help explain why electric utilities have naturally evolved from localized entities to regional and multiregional enterprises. Walmart is an example of a business that has used its bulk purchasing power to obtain deep discounts from suppliers to keep costs and prices low. Walmart also uses the latest technology to monitor point-of-sale transactions to gather timely market information to respond to changes in customer buying behavior, which leads to economies of scale through lower distribution and inventory costs.

Factors that can lead to diseconomies of scale, inefficiencies, and rising costs when a firm increases in size include the following:

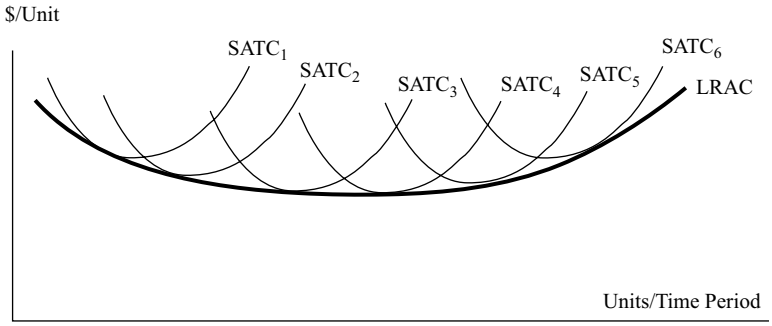
- Realizing **decreasing returns to scale** when a production process leads to increases in output that are proportionately smaller than the increase in inputs.
- Being so large that it cannot be properly managed.
- Overlapping and duplicating business functions and product lines.
- Experiencing higher resource prices because of supply constraints when buying inputs in large quantities.

Before its restructuring, General Motors (GM) was an example of a business that had realized diseconomies of scale by becoming too large. Scale diseconomies occurred through product overlap and duplication (i.e., similar or identical automobile models), and the fixed cost for these models was not spread over a large volume of output. In 2009, GM decided to discontinue three brands (Saturn, Pontiac, and Hummer) and also to drop various low-volume product models that overlapped with others. GM had numerous manufacturing plants around the world and sold vehicles in more than a hundred countries. Given this geographic dispersion in production and sales, the company had communication and management coordination problems, which resulted in higher costs. In 2017, GM sold its European arm, Opel, to Groupe PSA, the maker of Peugeot and Citroën. GM also had significantly higher labor costs than its competitors. As the largest producer in the market, it had been a target of labor unions for higher compensation and benefits packages relative to other firms.

Economies and diseconomies of scale can occur at the same time; the impact on LRAC depends on which dominates. If economies of scale dominate, LRAC decreases with increases in output. The reverse holds true when diseconomies of scale prevail. LRAC may fall (economies of scale) over a range of output and then LRAC might remain constant over another range, which could be followed by a range over which diseconomies of scale prevail, as depicted in Exhibit 11.

The minimum point on the LRAC curve is referred to as the **minimum efficient scale**. The minimum efficient scale is the optimal firm size under perfect competition over the long run. Theoretically, perfect competition forces the firm to operate at the minimum point on the LRAC curve because the market price will be established at this level over the long run. If the firm is not operating at this least-cost point, its long-term viability will be threatened.

Exhibit 11: LRAC Can Exhibit Economies and Diseconomies of Scale



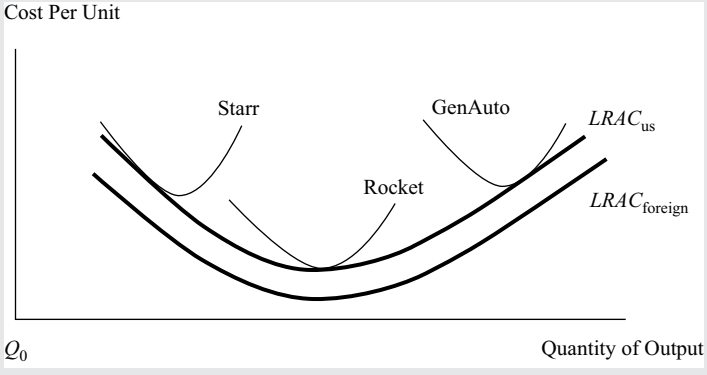
EXAMPLE 3

Long-Run Average Total Cost Curve

Exhibit 12 displays the long-run average total cost curve ($LRAC_{US}$) and the short-run average total cost curves for three hypothetical US-based automobile manufacturers—Starr Vehicles (Starr), Rocket Sports Cars (Rocket), and General Auto (GenAuto). The LRAC curve for foreign-owned automobile companies that compete in the US auto market ($LRAC_{foreign}$) is also indicated in the graph. (The market structure implicit in the exhibit is imperfect competition.)

1. To what extent are the cost relationships depicted in Exhibit 12 useful for an economic and financial analysis of the three US-based auto firms?

Exhibit 12: Long-Run Average Total Cost Curves for Three Auto Manufacturers



Solution:

First, it is observable that the foreign auto companies have a lower LRAC compared with that of the US automobile manufacturers. This competitive position places the US firms at a cost—and possibly, pricing—disadvantage in the market, with the potential to lose market share to the lower-cost foreign competitors. Second, only Rocket operates at the minimum point of the $LRAC_{US}$, whereas GenAuto is situated in the region of diseconomies of scale and Starr is positioned in the economies of scale portion of the curve. To become more efficient and competitive, GenAuto needs to downsize and restructure, which means moving down the $LRAC_{US}$ curve to a smaller

yet lower-cost production volume. In contrast, Starr has to grow in size to become more efficient and competitive by lowering per-unit costs. From a long-term investment prospective and given its cost advantage, Rocket has the potential to create more investment value relative to GenAuto and Starr. Over the long run, if GenAuto and Starr can lower their ATC, they will become more attractive to investors. But if any of the three US auto companies cannot match the cost competitiveness of the foreign firms, they may be driven from the market. In the long run, the lower-cost foreign automakers pose a severe competitive challenge to the survival of the US manufacturers and their ability to maintain and grow shareholders' wealth.

QUESTION SET

1. An agricultural firm operating in a perfectly competitive market supplies wheat to manufacturers of consumer food products and animal feeds. If the firm were able to expand its production and unit sales by 10%, the *most likely* result would be:

   A. a 10% increase in total revenue.

   B. a 10% increase in average revenue.

   C. a less than 10% increase in total revenue.

   Solution:

   A is correct. In a perfectly competitive market, an increase in supply by a single firm will not affect price. Therefore, an increase in units sold by the firm will be matched proportionately by an increase in revenue.

2. The marginal revenue per unit sold for a firm doing business under conditions of perfect competition will *most likely* be:

   A. equal to average revenue.

   B. less than average revenue.

   C. greater than average revenue.

   Solution:

   A is correct. Under perfect competition, a firm is a price taker at any quantity supplied to the market, and AR = MR = Price.

3. A profit maximum is *least likely* to occur when:

   A. average total cost is minimized.

   B. marginal revenue is equal to marginal cost.

   C. the difference between total revenue and total cost is maximized.

   Solution:

   A is correct. The quantity at which average total cost is minimized does not necessarily correspond to a profit maximum.

4. The short-term breakeven point of production for a firm operating under perfect competition will *most likely* occur when:

   A. price is equal to average total cost.

   B. marginal revenue is equal to marginal cost.

C. marginal revenue is equal to average variable costs.

Solution:

A is correct. Under perfect competition, price is equal to marginal revenue. A firm breaks even when marginal revenue equals average total cost.

3 INTRODUCTION TO MARKET STRUCTURES

☐ describe characteristics of perfect competition, monopolistic competition, oligopoly, and pure monopoly

Different market structures result in different sets of choices facing a firm's decision makers. Thus, an understanding of market structure is a powerful tool in analyzing issues, such as a firm's pricing of its products and, more broadly, its potential to increase profitability. In the long run, a firm's profitability will be determined by the forces associated with the market structure within which it operates. In a highly competitive market, long-run profits will be driven down by the forces of competition. In less competitive markets, large profits are possible even in the long run; in the short run, any outcome is possible. Therefore, understanding the forces behind the market structure will aid the financial analyst in determining firms' short- and long-term prospects.

Market structures address questions such as the following: What determines the degree of competition associated with each market structure? Given the degree of competition associated with each market structure, what decisions are left to the management team developing corporate strategy? How does a chosen pricing and output strategy evolve into specific decisions that affect the profitability of the firm? The answers to these questions are related to the forces of the market structure within which the firm operates.

Analysis of Market Structures

Traditionally, economists classify a market into one of four structures: perfect competition, monopolistic competition, oligopoly, and monopoly.

Economists define a market as a group of buyers and sellers that are aware of each other and can agree on a price for the exchange of goods and services. Although internet access has extended a number of markets worldwide, certain markets remain limited by geographic boundaries. For example, the internet search engine Google operates in a worldwide market. In contrast, the market for premixed cement is limited to the area within which a truck can deliver the mushy mix from the plant to a construction site before the compound becomes useless. Thomas L. Friedman's international best seller *The World Is Flat* challenges the concept of the geographic limitations of the market. If the service being provided by the seller can be digitized, its market expands worldwide. For example, a technician can scan your injury in a clinic in Switzerland. That radiographic image can be digitized and sent to a radiologist in India to be read. As a customer (i.e., patient), you may never know that part of the medical service provided to you was the result of a worldwide market.

Some markets are highly concentrated, with the majority of total sales coming from a small number of firms. For example, in the market for internet search, three firms controlled 98.9 percent of the US market (Google 63.5 percent, Microsoft 24 percent, and Oath (formerly Yahoo!) 11.4 percent) as of January 2018. Other markets

are fragmented, such as automobile repairs, in which small independent shops often dominate and large chains may or may not exist. New products can lead to market concentration. For example, Apple introduced its first digital audio player (iPod) in 2001 and despite the entry of competitors had a world market share of more than 70 percent among digital audio players in 2009.

THE IMPORTANCE OF MARKET STRUCTURE

Consider the evolution of television broadcasting. As the market environment for television broadcasting evolved, the market structure changed, resulting in a new set of challenges and choices. In the early days, viewers had only one choice: the "free" analog channels that were broadcast over the airwaves. Most countries had one channel, owned and run by the government. In the United States, some of the more populated markets were able to receive more channels because local channels were set up to cover a market with more potential viewers. By the 1970s, new technologies made it possible to broadcast by way of cable connectivity and the choices offered to consumers began to expand rapidly. Cable television challenged the "free" broadcast channels by offering more choice and a better-quality picture. The innovation was expensive for consumers and profitable for the cable companies. By the 1990s, a new alternative began to challenge the existing broadcast and cable systems: satellite television. Satellite providers offered a further expanded set of choices, albeit at a higher price, than the free broadcast and cable alternatives. In the early 2000s, satellite television providers lowered their pricing to compete directly with the cable providers.

Today, cable program providers, satellite television providers, and terrestrial digital broadcasters that offer premium and pay-per-view channels compete for customers who are increasingly finding content on the internet and on their mobile devices. Companies like Netflix, Apple, and Amazon offered alternative ways for consumers to access content. Over time, these companies had moved beyond the repackaging of existing shows to developing their own content, mirroring the evolution of cable channels, such as HBO and ESPN a decade earlier.

This is a simple illustration of the importance of market structure. As the market for television broadcasting became increasingly competitive, managers have had to make decisions regarding product packaging, pricing, advertising, and marketing to survive in the changing environment. In addition, mergers and acquisitions as a response to these competitive pressures have changed the essential structure of the industry.

Market structure can be broken down into four distinct categories: perfect competition, monopolistic competition, oligopoly, and monopoly.

We start with the most competitive environment, **perfect competition**. Unlike some economic concepts, perfect competition is not merely an ideal based on assumptions. Perfect competition is a reality—for example, in several commodities markets, in which sellers and buyers have a strictly homogeneous product and no single producer is large enough to influence market prices. Perfect competition's characteristics are well recognized and its long-run outcome is unavoidable. Profits under the conditions of perfect competition are driven to the required rate of return paid by the entrepreneur to borrow capital from investors (so-called normal profit or rental cost of capital). This does not mean that all perfectly competitive industries are doomed to extinction by a lack of profits. On the contrary, millions of businesses that do very well are living under the pressures of perfect competition.

Monopolistic competition is also highly competitive; however, it is considered a form of imperfect competition. Two economists, Edward H. Chamberlin (United States) and Joan Robinson (United Kingdom), identified this hybrid market and came

up with the term because this market structure not only has strong elements of competition but also some monopoly-like conditions. The competitive characteristic is a notably large number of firms, while the monopoly aspect is the result of product differentiation. That is, if the seller can convince consumers that its product is uniquely different from other, similar products, then the seller can exercise some degree of pricing power over the market. A good example is the brand loyalty associated with soft drinks such as Coca-Cola. Many of Coca-Cola's customers believe that their beverages are truly different from and better than all other soft drinks. The same is true for fashion creations and cosmetics.

The **oligopoly** market structure is based on a relatively small number of firms supplying the market. The small number of firms in the market means that each firm must consider what retaliatory strategies the other firms will pursue when prices and production levels change. Consider the pricing behavior of commercial airline companies. Pricing strategies and route scheduling are based on the expected reaction of the other carriers in similar markets. For any given route—say, from Paris, France, to Chennai, India—only a few carriers are in competition. If one of the carriers changes its pricing package, others likely will retaliate. Understanding the market structure of oligopoly markets can help identify a logical pattern of strategic price changes for the competing firms.

Finally, the least competitive market structure is the **monopoly**. In pure monopoly markets, no other good substitutes exist for the given product or service. A single seller, which, if allowed to operate without constraint, exercises considerable power over pricing and output decisions. In most market-based economies around the globe, pure monopolies are regulated by a governmental authority. The most common example of a regulated monopoly is the local electrical power provider. In most cases, the monopoly power provider is allowed to earn a normal return on its investment and prices are set by the regulatory authority to allow that return.

Factors That Determine Market Structure

The following five factors determine market structure:

1. The number and relative size of firms supplying the product;
2. The degree of product differentiation;
3. The power of the seller over pricing decisions;
4. The relative strength of the barriers to market entry and exit; and
5. The degree of non-price competition.

The number and relative size of firms in a market influence market structure. When many firms exist, the degree of competition increases. With fewer firms supplying a good or service, consumers are limited in their market choices. One extreme case is the monopoly market structure, with only one firm supplying a unique good or service. Another extreme is perfect competition, with many firms supplying a similar product. Finally, an example of relative size is the automobile industry, in which a small number of large international producers (e.g., Volkswagen and Toyota) are the leaders in the global market, and a number of small companies either have market power because they are niche players (e.g., Ferrari or McLaren) or have limited market power because of their narrow range of models or limited geographical presence (e.g., Mazda or Stellantis).

In the case of monopolistic competition, many firms are providing products to the market, as with perfect competition. However, one firm's product is differentiated in some way that makes it appear to be better than similar products from other firms. If a firm is successful in differentiating its product, this differentiation will provide pricing leverage. The more dissimilar the product appears, the more the market will