

Firms in a Competitive Market

Econ 304K: Introduction to Economics

Why do firms charge the price they do?

In this chapter and the next four, we look in more detail at how markets work, the profits firms earn, and how market forces determine the price a firm can charge for its product or service. We begin our examination of **market structure**, or how individual firms are interconnected, by looking at the conditions necessary to create a competitive market. Although few real markets achieve this ideal market structure described in this chapter, this model provides a good starting point for understanding other market structures.

Our analysis of competitive markets shows that when competition is widespread, firms have little to no control over the price they can charge, and they make little or no economic profit; thus, in competitive markets, firms are completely at the mercy of market forces that set the price...let's find out why.

Big Questions

- How do competitive markets work?
 - The firms in competitive markets sell similar products. Firms are also free to enter and exit the market whenever they wish.
 - A price taker has no control over the price it receives in the market.
 - In competitive markets, the price and quantity produced are determined by market forces instead of by the firm
- How do firms maximize profits?
 - A firm maximizes profits by expanding output until marginal revenue is equal to marginal cost ($MR = MC$, or the profit-maximizing rule). The profit-maximizing rule is a condition for stopping production at the point where profit opportunities no longer exist.
 - This firm should shut down in the short run if the price it receives does not cover its average variable costs; because variable costs are incurred only when operating, if

a firm can make enough to cover its variable costs in the short run, it will choose to continue to operate,

- In the long run, the firm should go out of business if it cannot cover its average total costs
- What does the supply curve look like in perfectly competitive markets?
 - Profits and losses act as signals for firms to enter or leave a market. As a result, perfectly competitive markets drive economic profit to zero in the long run.
 - The entry and exit of firms ensure that the market supply curve in a competitive market is much more elastic in the long run than in the short run.

How do competitive markets work?

Competitive markets exist when there are so many buyers and sellers that each one has only a small impact on the market price and output. When buyers are willing to purchase a product anywhere, sellers have no control over the price they charge. These two characteristics—similar goods and many participants—create a highly competitive market where the price and quantity sold are determined by the market conditions rather than by any one firm.

Table 9.1

| Characteristics of Competitive Markets |
|--|
| Many sellers |
| Similar products |
| Free entry and exit |
| Price taking |
| Every firm is small |

In competitive markets, buyers can expect to find consistently low prices and wide availability of the good they want. Firms that produce goods in competitive markets are known as price takers. A **price taker** has no control over the price set by the market. It “takes”—that is, accept—the price determined by the overall supply and demand conditions that regulate the market. One of the reasons why firms are price takers is that each seller is small compared to the overall market; this means that any individual seller’s decision (to either increase or decrease production) has no impact on the market price.

Competitive markets have another important feature: new competitors can easily enter the market. When barriers to entry into a marketplace are low, new firms are free to compete with existing businesses, which ensures the existence of competitive markets and low prices. **Table 9.1** summarizes the characteristics of competitive markets.

In the next section, we examine the profits competitive firms make. After all, profits motivate firms to produce a product, so knowing how a business can make the profit is central to understanding how competitive markets work.

How do firms maximize profits?

All firms, whether they are active in a competitive market or not, attempt to maximize profits; making a profit requires that a firm have thorough grasp of costs and revenues. In the previous chapter, we learned about the firm's cost structure. In this section, we examine its revenues; combining the firm's revenue with its costs enables us to determine how much profit the firm makes.

Profits are a key goal of almost every firm, but they don't always materialize; sometimes, firms experience losses instead of profits, so we explore whether a firm should shut down or continue to operate in order to minimize its losses. Once we fully understand the firm's decision-making process, we will better comprehend how the entire market functions.

The Profit-Maximizing Rule

The **marginal revenue** is the change (Δ) in total revenue when the firm produces one additional unit of output; in chapter 8, we saw that to understand cost structure, a firm focuses on marginal cost. The same is true on the revenue side; the **profit-maximizing rule** states that profit maximization occurs when a firm expands output as long as marginal revenue is greater than marginal cost, stopping close to **MR = MC** as practical. According to the $MR = MC$ rule, production should stop at the point at which profit opportunities no longer exist.

Deciding how much to produce in a competitive market

We have observed that a firm in a highly competitive market is a price taker; it has no control over the price set by the market. Because all snow removal companies provide the same service, they must charge the price determined by the overall supply and demand conditions that regulate that particular market.

To better understand these relationships, we look at them visually. In Figure 9.1, we use the MR and MC data from Table 9.3 to illustrate the profit calculation. For reference, we also include the average total cost curve; recall from Chapter 8 that marginal cost curve (MC, shown in orange) always crosses the average total cost curve (ATC) at the lowest point. Figure 9.1 illustrates the relationship between the marginal cost curve (MC) and the marginal revenue curve (MR).

Note that we can use the profit-maximizing rule, $MR = MC$, to identify the most profitable output in a two-step process:

1. Locate the point at which the firm will maximize its profits: $MR = MC$, this is the point labeled A in **Figure 9.1**
2. Look for the profit-maximizing output: move down the vertical dashed line to the x -axis at point Q . Any quantity greater than or less than Q would result in lower profits.

Once we know the profit-maximizing quantity, we can determine the average cost of producing Q units. From Q , we move up along the dashed line until it intersects with the ATC curve.

$$\text{profit} = (\text{price} - \text{ATC [along the dashed line at quantity } Q]) * Q$$

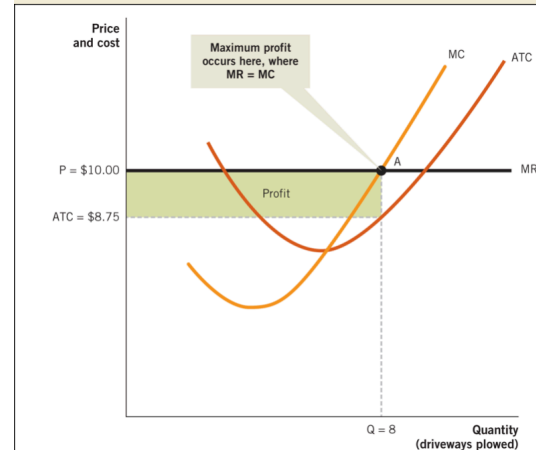
The Firm in the Short Run

Deciding how much to produce in order to maximize profits is the goal of every business in a competitive market. However, there are many times when it is not possible to make a profit; when revenue is sufficient to cover cost, the firm suffers a loss—at which point it must decide whether to operate or temporarily shut down. Successful businesses make this decision all the time.

FIGURE 9.1

Profit Maximization

Mr. Plow uses the profit-maximizing rule to locate the point at which marginal revenue equals marginal cost, or $MR = MC$. This point determines the ideal output level, Q . The firm takes the price from the market; price is shown as the horizontal MR curve at $P = \$10.00$. Because the price charged is higher than the average total cost curve along the dashed line at quantity Q , the firm makes the economic profit shown in the green rectangle.



Fortunately, a firm can use a simple, intuitive rule to decide whether to operate or shutdown in the short run: if the firm would lose less by shutting down than by staying open, it should shut down. Recall that costs are broken into two parts—fixed and variable. Fixed costs must be paid whether the business is open or not because variable costs are incurred only when the business is open, if it can

FIGURE 9.2

When to Operate and When to Shut Down

If the MR (marginal revenue) curve is above the minimum point on the ATC (average total cost) curve, the Ice Cream Float will make a profit (shown in green). If the MR curve is below the minimum point on the ATC curve (\$2.50) but above the minimum point on the AVC (average variable cost) curve (\$2.00), the float will operate at a loss (shown in yellow). If the MR curve is below the minimum point

Table 9.4

| Profit and Loss in the Short Run | | |
|----------------------------------|---|---|
| Condition | In words | Outcome |
| $P > ATC$ | The price is greater than the average total cost of production | The firm makes a profit |
| $ATC > P > AVC$ | The average total cost of production is greater than the price the firm charges, but the price is greater than the average variable cost of production. | The firm will operate to minimize loss. |
| $AVC > P$ | The price is less than the average variable cost of production. | The firm will temporarily shut down. |

make enough to cover its variable costs—it will choose to remain open. Once the variable costs are covered, any extra money goes toward paying the fixed costs.

A business should operate if it can cover variable costs, and it should shut down if it cannot. **Figure 9.2** illustrates the decision using cost curves, as long as the firm's marginal revenue (MR) is greater than the minimum point on the average variable cost curve (AVC)—the green and yellow areas—the firm will choose to operate. (Note that the MR curve is not shown in **Figure 9.2**; the shaded areas in the figure denote the range of potential MR curves that are profitable and those

that cause a loss.) Finally, if the MR curve falls below the the AVC curve—the red area—the firm should shut down; **Table 9.4** summarizes these decisions.

The Firm's Short-Run Supply Curve

Cost curves provide detailed picture of a firm's willingness to supply a good or service. We have seen that when the MR curve is below the minimum point on the AVC curve, the firm shuts down and production, or output, falls to zero. In other words, when revenues are too low, no supply is produced.

Sunk costs

Unrecoverable costs that have been incurred as a result of past decisions are known as **sunk costs**. They represent money that has already been spent, no matter what comes next, and that therefore should have no bearing on future decisions. This is known as the principle of sunk costs; it's the "What's done is done" rule, applied to economics.

The firm's long-run supply curve

In the long run, a competitive firm's output decision is directly tied to profits; because the firm is flexible in the long run, all costs are variable. As a result, the firm's long-run supply curve exists only when the firm expects to cover its total cost production (because otherwise the firm would go out of business—that is, exit the market).

FIGURE 9.3

The Firm's Short-Run Supply Curve

The short-run supply curve (S_{SR}) and marginal cost curve (MC) are equivalent when the price is above the minimum point on the average variable cost curve (AVC). Below that point, the firm shuts down and no supply exists.

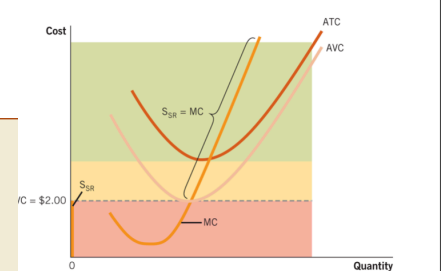


FIGURE 9.4

The Firm's Long-Run Supply Curve

The long-run supply curve (S_{LR}) and marginal cost curve (MC) are equivalent when the price is above the minimum point on the average total cost curve (ATC). Below that point, the firm shuts down and no supply exists.

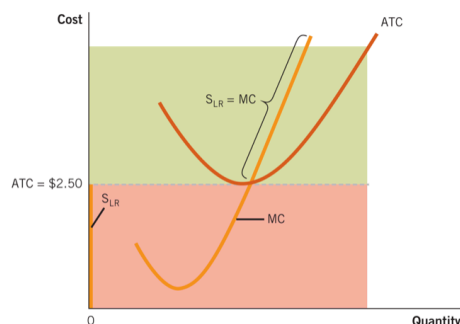


Table 9.5

| The Long-Run shutdown criteria | | |
|--------------------------------|--|---------------------------|
| Condition | In words | Outcome |
| $P > ATC$ | The price is greater than the average total cost of production | The firm makes a profit |
| $P < ATC$ | The price is less than the average total cost of production. | The firm should shut down |

So far, we have examined the firm's decision-making process in the short run in the context of revenue versus cost, which enabled us to determine the profit each firm makes. However, a single firm represents only a small part of the overall supply in a competitive market. In the next section, we develop the short-run and long-run market supply curves.

What does the Supply Curve look like in Perfectly Competitive Markets?

We have seen that a firm's willingness to supply a good or service depends on whether the firm is making a short-run or long-run decision. In the short run, a firm may choose to operate at a loss to recover a portion of its fixed costs. In the long run, there are no fixed costs, so a firm is willing to operate only if it expects the price it charges to cover total costs.

However, the supply curve for a single firm represents only a small part of the overall supply in a competitive market. We now turn to market supply and develop the short-run and long-run market supply curves.

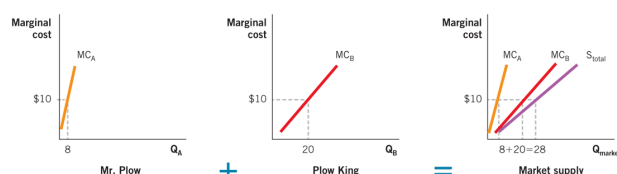
The Short-Run Market Supply Curve

Recall that a competitive market is one in which a large number of buyers seek a product many sellers offer. Competitive markets are also characterized by easy entry and exit. Existing firms and entrepreneurs decide whether to enter and exit a market based on incentives. When existing firms are enjoying profits, there is an incentive for them to produce more and also for entrepreneurs to enter the market; the result is an increase in the quantity of the goods supplied. Likewise, when existing firms are

FIGURE 9.5

Short-Run Market Supply

The market supply is determined by summing the individual supplies of all the firms in the market. Although we have only shown this process for two firms, Mr. Plow and Plow King, the process extends to any number of firms in a market.



experiencing losses, there is an incentive for them to exit the market; then the quantity supplied decreases.

Entry and exit have the combined effect of regulating the amount of profit a firm can hope to make in the long run. As long as profits exist, the quantity supplied will increase because existing firms expand production or other firms enter the market. When losses exist, the quantity supplied will decrease because existing firms reduce production or other firms exit the market; so both profits and losses signal a need for an adjustment in market supply, in other words, profits and losses act as signals for resources to enter or leave a market. **Signals** convey information about the profitability of various markets.

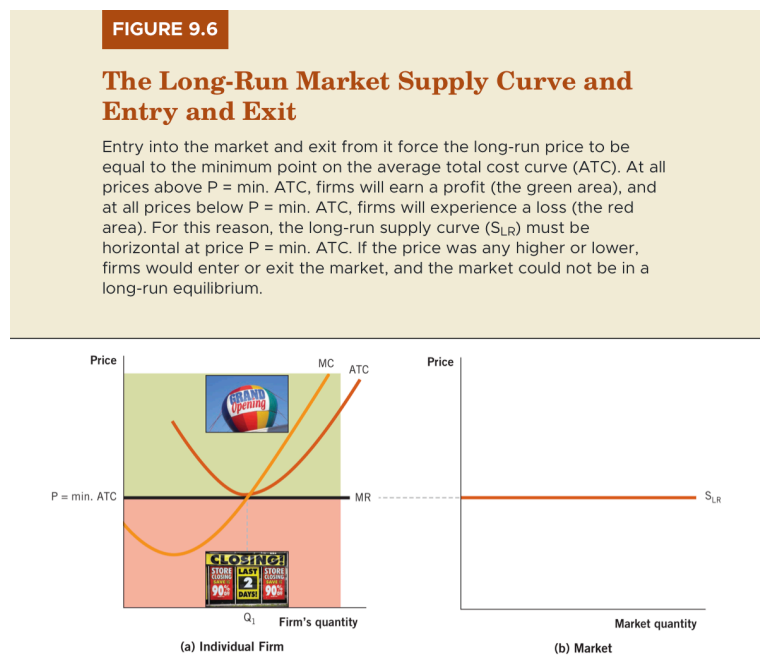
The only time an adjustment does not take place is when participants in the market make zero economic profit; in that case, the market is in long-run equilibrium. Existing firms and entrepreneurs are not inclined to enter or exit the market; the adjustment process that occurs through price changes ends.

The benefit of a competitive market is that profits guide existing firms and entrepreneurs to produce more goods and services that society values. Losses encourage firms to exit and move somewhere else; without profits and losses acting as signals for firms to enter or exit the market, resources will be misallocated and surpluses and shortages will occur.

Figure 9.6 captures how entry and exit determine the market supply; the profit-maximizing point of the individual firm in panel

(a), $MR = MC$, is located at the minimum point on the ATC curve. The price ($P = \min. ATC$) that existing firms receive is just enough to cover costs, so profits are zero.

As a result, new firms have no incentive to enter the market and existing firms have no reason to leave. At all prices above



$P = \min.ATC$, firms will earn a profit (the green area), and at all prices below $P = \min.ATC$, firms will experience a loss (the red area). This picture is consistent for all markets with free entry and exit; zero economic profit occurs only one price, and the price is the lowest point of the ATC curve.

At this price, the supply curve in panel (b) must be a higher horizontal line at $P = \min.ATC$. If the price were any higher, firms would enter, supply would increase, and price would be forced back down to $P = \min.ATC$; if the price were any lower, firms would exit, supply would decrease, and price would be forced up to $P = \min.ATC$, because we know that these adjustments will have time to take place in the long run, the long-run supply curve must also be equal to $P = \min.ATC$ to satisfy demand that exists at this price.

A reminder about economic profit

Now that you have learned how perfect competition affects business profits in the long run, you may not think that a competitive market is a desirable environment for business to seeking to earn profits. After all, if a firm cannot expect to make an economic profit in the long run, why bother? It's easy to forget the distinction between accounting profit and economic profit; firms enter a market when they expect to be reasonably compensated for their investment, and they leave a market when the investment does not yield satisfactory result. Economic profit is determined by deducting the explicit and implicit costs from the total revenue; therefore, firms are willing to stay in perfectly competitive markets in the long run when they're

FIGURE 9.7

A Competitive Market in Long-Run Equilibrium

When a market is in long-run equilibrium, the short-run supply curve (S_{SR}) and short-run demand curve (D_{SR}) intersect along the long-run supply curve (S_{LR}). At this point, the price the firm charges is equal to the minimum point along the average total cost curve (ATC). The existing firms in the market earn zero economic profit, and there is no incentive for firms to enter or exit the market.

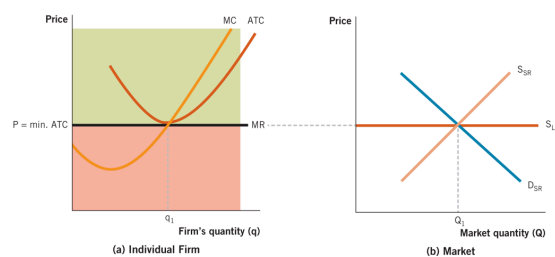
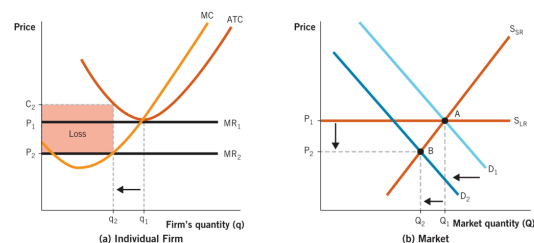


FIGURE 9.8

The Short-Run Adjustment to a Decrease in Demand

A decrease in demand causes the price to fall in the market, as shown by the movement from D_1 to D_2 in panel (b). Because the firm is a price taker, the price it can charge falls to P_2 . As we see in panel (a), the intersection of MR_2 and MC occurs at Q_2 . At this output level, the firm incurs the short-run loss shown by the red area in (a).

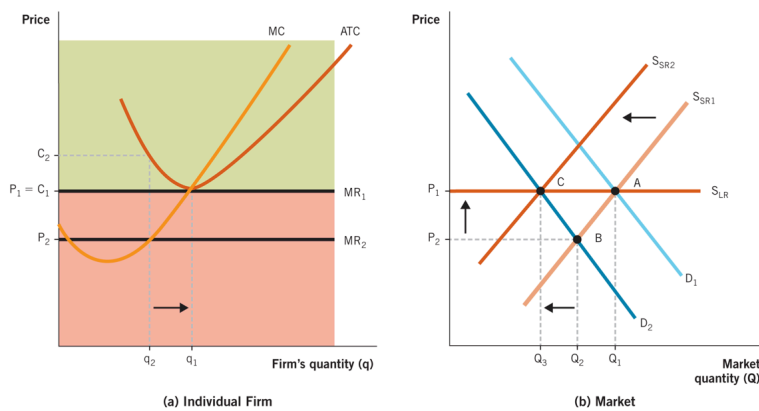


breaking even because they are being reasonably compensated for the explicit expenses they have incurred and also for the implicit expenses—like the opportunity costs of other business ventures—they would expect to incur elsewhere.

FIGURE 9.9

The Long-Run Adjustment to a Decrease in Demand

Short-run losses cause some firms to exit the market. Their exit shifts the market supply curve to the left in panel (b) until the price returns to long-run equilibrium at point C. Price is restored to P_1 and the MR_2 curve in panel (a) shifts up to MR_1 . At P_1 the firm is once again earning zero economic profit.



Conclusion

In competitive markets, where firms are at the mercy of market forces that set the price, individual firms have no control over the price because they sell the same products as their competitors. In addition, profits and losses help regulate economic activity in competitive markets and promote economic efficiency. Profits reward producers for producing a good that is valued more highly than the resources used to produce it. Profits encourage entry into a market. Likewise, losses penalize producers who operate inefficiently or produce goods consumers do not want. Losses encourage exit from the market; the process of entry and exit ensures that resources flow into markets that are undersupplied and away from markets where too many firms exist.

In this chapter, we studied competitive markets to establish a benchmark that will help us understand how other market structure compare with this ideal. In the next few chapters, we explore imperfect markets, which provide a significant contrast with the

results we have just seen. The closer a market is to meeting the criteria of perfect competition, the better the result for consumers and society in general.